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Job #: 2044225*00

2020 Urban Water Management Plan

Palmdale Water District

PALMDALE WATER DISTRICT

A CENTURY OF SERVICE

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Palmdale Water District 2020 Urban Water Management Plan

Final

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Prepared for

Palmdale Water District
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List of Acronyms

Act	Urban Water Management Planning Act
AF	Acre-feet
AF	Acre-feet-per-year
AIP	Agreement in Principle
AMI	Advanced Metering Infrastructure
AVEK	Antelope Valley East-Kern Water Agency
AVSWCA	Antelope Valley State Water Contractors Association
AWPF	Advanced Water Purification Facility
AWWA	American Water Works Association
BMPs	Best Management Practices
CalOES	California Office of Emergency Services
CCR	Consumer Confidence Report
CDFW	California Department of Fish & Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CIMIS	California Irrigation Management Information Systems
City	City of Palmdale, California
COA	Coordinated Operations Agreement
Corps	American Army Corps of Engineers
CWC	California Water Code
CUWCC	California Urban Water Conservation Council
CVP	Central Valley Project
DAC	Disadvantaged Communities
DCP	Delta Conveyance Project
DCR	Delivery Capability Report

DDW	Division of Drinking Water
Delta	San Joaquin-Sacramento Bay Delta
District	Palmdale Water District
DMMs	Demand Management Measures
DRA	Drought Risk Assessment
DSOD	California Division of Safety of Dams
DWR	Department of Water Resources
EIR	Environmental Impact Report
ESA	Federal Endangered Species Act
ETo	evapotranspiration
FWS	United States National Fish & Wildlife Service
GAMA	Groundwater Ambient Monitoring and Assessment Program
GIS	Geographic Information Systems
GPCD	gallons per capita per day
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
HET	High-efficiency Toilet
IRWM	Integrated Regional Water Management Plan
ITP	Incidental Take Permit
LACSD	Los Angeles County Sanitation District
LCID	Littlerock Creek Irrigation District
MCL	Maximum Contaminant Level
MGD	million gallons per day
NMFS	National Marines Fisheries Service
Plan	Urban Water Management Plan
PBP	Priority Basin Project
PRWA	Palmdale Recycled Water Authority
PWA	Palmdale Water Authority; Public Water Agencies
PWD	Palmdale Water District
Reclamation	United States Bureau of Reclamation
RWMG	Regional Water Management Group
SCAG	Southern California Association of Governments
SGMA	Sustainable Groundwater Management Act
SLDMWA	San Luis & Delta Mendota Water Authority
SNMP	Salt & Nutrient Management Plan
SWP	State Water Project
SWRCB	State Water Resources Control Board
SWRP	Strategic Water Resources Plan
TDS	Total Dissolved Solids
UIF	Unimpaired Flow
USBR	United States Bureau of Reclamation
USEPA	United States Environmental Protection Agency

UWMP	Urban Water Management Plan
WIIN	Water Infrastructure Improvements for the Nation Act
WMT	water management tools
WRP	Water Reclamation Plant
WSCP	Water Shortage Contingency Plan
WSMP	Water System Master Plan
WTP	Water Treatment Plant

Executive Summary

This document presents the 2020 Urban Water Management Plan (UWMP, Plan) for the Palmdale Water District (PWD) service area. This section describes the general purpose of the Plan, discusses Plan implementation and provides general information about the PWD and its service area characteristics.

The State of California mandates that all urban water suppliers within the state prepare an UWMP. Detailed information on what must be included in these plans as well as who must complete them can be found in California Water Code Sections 10610 through 10657.

An UWMP is a planning tool that generally guides the actions of urban water suppliers. It provides managers and the public with a broad perspective on a number of water supply issues. It is not a substitute for project-specific planning documents, nor was it intended to be when mandated by the State Legislature. For example, the Legislature mandated that a plan include a section which "…describes the opportunities for exchanges or water transfers on a short-term or long-term basis." (Wat. Code, § 10631, subd. [d]). The identification of such opportunities and the inclusion of those opportunities in a plan's general water service reliability analysis neither commits an urban water supplier to pursue a particular water exchange/transfer opportunity, nor precludes it from exploring exchange/transfer opportunities never identified in its plan. Before an urban water supplier is able to implement any potential future sources of water supply identified in a plan, detailed project plans are prepared and approved, financial and operational plans are developed, and all required environmental analysis is completed.

"A plan is intended to function as a planning tool to guide broad-perspective decision making by the management of water suppliers." (*Sonoma County Water Coalition v. Sonoma County Water Agency* (2010) 189 Cal. App. 4th 33, 39.) It should not be viewed as an exact blueprint for supply and demand management. Water management in California must address uncertainty. Planning projections may change in response to a number of factors that are associated with uncertainty such as climate change, population growth and water demand.

The California Supreme Court has recognized the uncertainties inherent in long-term land use and water planning and observed that the generalized information required in the early stages of the planning process are replaced by firm assurances of water supplies at later stages." (*Id.*at 41.) From this perspective, it is appropriate to look at the UWMP as a general planning framework, not a specific action plan. It is an effort to generally answer a series of planning questions such as:

- What are the potential sources of supply and what amounts are estimated to be available from them?
- What is the projected demand, given a reasonable set of assumptions about growth and implementation of good water management practices?
- How do the projected supply and demand figures compare and relate to each other?

Using these “framework” questions and resulting answers, the implementing agency or agencies will pursue feasible and cost-effective options and opportunities to develop supplies and meet demands.

As further detailed in this Plan, PWD will continue to explore enhancing and managing supplies from existing sources such as imported water as well as other options. These may include groundwater extraction, water exchanges and transfers, water conservation, water recycling, brackish water desalination, and water banking/conjunctive use. Additional specific planning efforts may be undertaken in regard to each option, involving detailed evaluations of how each option would fit into the overall supply/demand framework, potential environmental impacts, and how each option would affect customers.

The UWMP Act requires preparation of a plan that, among other things:

- Accomplishes water supply planning over a 20-year period in five-year increments (PWD is going beyond the requirements of the Act by developing a plan which spans twenty-five years to 2045).
- Identifies and quantifies existing and projected water supplies and water supply opportunities, including recycled water, for existing and future demands, in normal, single-dry and multiple-dry years.
- Implements conservation and efficient use of urban water supplies.

State legislation, Senate Bill 7 of Special Extended Session 7 (SBX7-7) was signed into law in November 2009, which calls for progress towards a 20 percent reduction in per capita water use statewide by 2020. The legislation requires that retailers develop and report the 2020 water use target, their baseline daily per capita use and 2020 compliance daily per capita use, along with the basis for determining those estimates. This UWMP reports on PWD’s progress in meeting the SBX7-7 targets.

Water Use

This UWMP describes historic and current water usage and the methodology used to project future demands within the PWD service area. Water usage is divided into sectors including residential, commercial, industrial, irrigation, and institutional. To undertake this evaluation, existing land use data and new housing construction information were compiled PWD. Based on average water consumption, ultimate potable water demands were projected to be approximately 24,250 AFY. Projected demands are provided in Table ES- 1.

Table ES- 1 Projected Potable Water Demands 2025 to 2045 AFY

Water Use	2025	2030	2035	2040	2045
Total Water Deliveries (see Section 2)	16,520	17,010	18,080	19,280	20,550
Sales to Other Water Agencies (see Section 2)	1,300	1,300	1,300	1,300	1,300
Distribution System Water Losses (see Section 2)	1,900	2,000	2,100	2,200	2,400
Total	**19,720**	**20,310**	**21,480**	**22,780**	**24,250**

Notes: Demands do not include non-potable water supplies.

Actions to Manage Demand

PWD has a uniquely low water use for a high desert area. However, PWD recognizes that conserving water is an integral component of a responsible water management strategy. PWD has a variety of programs to manage water demand including water waste prohibitions, public education, and outreach, metering, monitoring and repairing system leaks, and rebate programs. These programs are part of PWD's water conservation program. PWD plans to expand this program over the next five years and is dedicated to water conservation as a vital part of the water supply portfolio.

Compliance with Water Use Targets

From 1996 to 2004 average potable water use was approximately 231 gallons per capita per day (GPCD). The SBX7-7 reduction interim target for year 2015 was 208 GPCD and the Compliance Target for year 2020 was 185 GPCD. PWD had a GPCD of 165 in 2020, which means PWD has exceeded the reductions required by the 2015 Interim Target and 2020 Compliance Target. PWD plans to maintain an efficient GPCD by continuing implementation of demand management measures and water shortage contingency planning.

Water Service Reliability

Water Supply

PWD's water supplies include imported water, local and regional supplies, groundwater, and recycled water. As a State Water Contractor of the State Water Project (SWP), PWD purchases imported water from the Department of Water Resources (DWR). Each year, PWD receives an annual allotment, which is based on available SWP supplies, with a total maximum contract amount of 21,300 AFY. Since 2010, PWD has received between 13 and 78 percent of their annual allotment. PWD also has a long-term lease agreement with Butte County for up to 10,000 AFY of their SWP Table A Amount (2019 DCR). The amount available varies on the final annual allotment from DWR to its State Water Contractors.

PWD's local water sources include groundwater, surface water, and recycled water. Groundwater is pumped from the Antelope Valley Groundwater Basin and has accounted for an average of 35 percent of PWD's supplies since 2016. In late 2015, PWD and other parties agreed to a stipulated judgment for the adjudication of the Antelope Valley Groundwater Basin. Per the judgment, PWD will begin receiving a groundwater production right of 2,770 AFY starting in 2023. PWD is also temporarily entitled to a share of a federal groundwater right, of up to 1,450 AFY until 2025.

PWD jointly owns and operates the Littlerock Dam Reservoir, which constitutes PWD's local surface water supply source and is located in the hills southwest of the PWD service area. PWD projects being able to take approximately 4,000 AFY from Littlerock Dam Reservoir in normal, single-dry, and multiple-dry years.

PWD is actively working with the Sanitation Districts of Los Angeles County (LACSD) to develop recycled water supplies for its service area customers and future groundwater recharge projects. Recycled water will help PWD meet its future water demands. A summary of current and future supplies is provided in Table ES- 2, Table ES- 3, and Table ES- 4 below; these supplies are anticipated to be available in a normal year, a single-dry year, and during multiple-dry years.

Table ES- 2 Normal Year Water Supplies 2025 to 2045 (AFY)

	2025	2030	2035	2040	2045
Water Supply Source					
Groundwater	4,220	2,770	2,770	2,770	2,770
Groundwater Return Flow Credits	5,000	5,000	5,000	5,000	5,000
Groundwater or Surface Water Augmentation	5,325	5,325	5,325	5,325	5,325
Local Surface Water	4,000	4,000	4,000	4,000	4,000
Imported SWP Water	12,030	11,720	11,400	11,080	11,080
Butte Transfer Agreement(a)	5,650	5,500	5,350	5,200	5,200
Recycled Water	500	1,000	1,500	2,000	2,000
Total Supplies	**36,725**	**35,315**	**35,345**	**35,375**	**35,375**

Notes: Values are rounded.
(a) For details see Section 4.3.1.

Table ES- 3 Single-Dry Year Water Supplies 2025 to 2045 (AFY)

	2025	2030	2035	2040	2045
Water Supply Source					
Groundwater	4,220	2,770	2,770	2,770	2,770
Groundwater Return Flow Credits	5,000	5,000	5,000	5,000	5,000
Groundwater or Surface Water Augmentation	5,325	5,325	5,325	5,325	5,325
Local Surface Water	4,000	4,000	4,000	4,000	4,000
Imported SWP Water	1,490	1,705	1,915	2,130	2,130
Butte Transfer Agreement(a)	700	800	900	1,000	1,000
Recycled Water	500	1,000	1,500	2,000	2,000
Total Supplies	**21,235**	**20,600**	**21,410**	**22,225**	**22,225**

Note: Values are rounded.
(a) For details see Section 4.3.1.

Table ES- 4 Multiple-Dry Year Water Supplies 2025 to 2045 (AFY)

	2025	2030	2035	2040	2045
Water Supply Source					
Groundwater (from Table 4-3)	4,220	2,770	2,770	2,770	2,770
Groundwater Return Flow Credits (from Table 4-4)	5,000	5,000	5,000	5,000	5,000
Groundwater Augmentation	5,325	5,325	5,325	5,325	5,325
Local Surface Water (from Table 4-6)	4,000	4,000	4,000	4,000	4,000
Imported SWP Water (from Table 4-9)	6,180	5,645	5,110	4,470	4,470
Butte Transfer Agreement[(a)]	2,900	2,650	2,400	2,100	2,100
Recycled Water (from Table 5-4)	500	1,000	1,500	2,000	2,000
Total Supplies	**28,125**	**26,390**	**26,105**	**25,665**	**25,665**

Note: Values are rounded.
(a) For details see Section 4.3.1.

Water Quality

Based on current conditions and knowledge, water quality is not anticipated to affect water supply reliability. However, water quality issues are constantly evolving. It is understood that water quality treatment can have significant costs.PWD is committed to and will continue to work proactively to address water quality concerns in a timely manner to ensure safe drinking water is available to their customers.

Fundamental Findings of the UWMP

It is the stated goal of PWD to deliver a reliable and high-quality water supply to its customers, even during dry periods. Based on water supply and demand assumptions over the next twenty-five years, the UWMP successfully achieves this goal. PWD anticipates having adequate supplies to meet demands during normal years. However, PWD anticipates that during single-dry year conditions, demands will exceed supplies starting in 2030 and during multiple-dry year conditions, demands will exceed supplies starting in 2045. Additionally, in a consecutive five-year drought, PWD anticipates demands exceeding supplies in 2021 and 2023. Therefore, additional supplies are assumed to be needed to meet demands under those conditions. PWD has identified numerous short-and long-term transfer and exchange opportunities that would provide additional supplies to help overcome supply shortages. The Water Shortage Contingency Plan identifies numerous opportunities to reduce customer demand during water shortages. Therefore, it is anticipated that existing supplies in combination with identified future and potential water supply opportunities will enable PWD to meet all future water demands under all hydrologic conditions through the end of the planning period.

Section 1: Introduction/Lay Description

1.1 Overview

This document presents the 2020 Urban Water Management Plan (UWMP, Plan) for the Palmdale Water District (PWD) service area. This section describes the general purpose of the Plan, discusses Plan implementation and provides general information about PWD and its service area characteristics.

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1.2 Purpose

An UWMP is a planning tool that generally guides the actions of urban water suppliers. It provides managers and the public with a broad perspective on a number of water supply issues. It is not a substitute for project-specific planning documents, nor was it intended to be when mandated by the State Legislature. For example, the Legislature mandated that a plan include a section which "…describes the opportunities for exchanges or water transfers on a short-term or long-term basis." (Wat. Code, § 10631, subd.[d]). The identification of such opportunities and the inclusion of those opportunities in a plan's general water service reliability analysis neither commits an urban water supplier to pursue a particular water exchange/transfer opportunity, nor precludes it from exploring exchange/transfer opportunities never identified in its plan. Before an urban water supplier is able to implement any potential future sources of water supply identified in a plan, detailed project plans are prepared and approved, financial and operational plans are developed, and all required environmental analysis is completed.

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The District’s 2020 UWMP revises the 2015 UWMP and incorporates changes enacted by legislation since that time. The Act has been modified over the years in response to the state’s water shortages, droughts, and other factors. The main changes since 2015 to note include:

1. UWMP Submittal Date: 2020 UWMP updates must be adopted and submitted to DWR by July 1, 2021.

2. Reporting on Compliance with SBx7-7 Targets: The 2020 UWMP will be required to document compliance with the 20% reduction described in the *20 by 2020 Water Conservation Plan*, and a comparison of actual water use against the target.

3. Reporting compliance with Water Loss Standard: The State Water Resources Control Board (SWRCB) was to adopt a water loss standard no later than July 1, 2020. Currently it appears as if the formal rulemaking and standards will not be adopted until sometime in the future. Retail water suppliers such as the PWD will have to show progress on meeting a water loss standard in the 2020 UWMP. Water loss standards go into effect June 30, 2022.

4. 5-year Drought Risk Assessment: In past UWMPs suppliers were to conduct a drought risk assessment assuming a period of drought lasting 3 consecutive years. This requirement has changed, and suppliers must now conduct an assessment for a drought lasting 5 years.

5. Sustainable Groundwater Management Act (AB 1739, SB1168, and SB1319): Requires UWMPs to show consistency with Groundwater Sustainability Plan (GSP) supply protections, if applicable.

6. Seismic Risk Assessment (SB 664): Requires an urban water supplier to include within its plan 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. This bill allows an urban water supplier to comply with this requirement by submitting a copy of the most recent adopted local hazard mitigation plan or multi-hazard mitigation plan if that plan specifically addressed seismic risk to the water supplier's infrastructure.

7. Water Shortage Contingency Plan (WSCP) Updates: State requirements call for an update to the existing WSCP and that it be formally adopted as a stand-alone plan. The WSCP must be updated in parallel to the UWMP.

8. Annual Water Supply and Demand Assessments will be required, starting June 2022, and the process to do the assessment must be described in the 2020 WSCP.

Items optional in the past, but now required, include: calculating the energy intensity of water, incorporation of land use changes in demand forecasting, and calculating water savings from codes and standards.

A checklist to ensure compliance of this Plan with UWMP Act requirements is provided in Appendix A.

It is the stated goal of PWD to deliver a reliable and high-quality water supply to its customers, even during dry periods. Based on conservative water supply and demand assumptions over the next twenty-five years in combination with conservation of non-essential demands during normal and dry water years, the 2020 UWMP successfully achieves this goal.

1.3 Basis for Preparing a Plan

In accordance with the California Water Commission (CWC), urban water suppliers with 3,000 or more service connections, or supplying 3,000 or more acre-feet of water per year, are required to prepare a UWMP every five years. PWD qualifies as an urban water supplier and its 2020 UWMP shall be updated and submitted to DWR by July 1, 2021.

1.3.1 Relationship to Other Planning Efforts

Several other planning efforts related to the UWMP have been completed by PWD including:

- **Antelope Valley Integrated Regional Water Management Plan (2019):** Several leaders and agencies in the Antelope Valley Region, including Palmdale Water District, joined together to form a Regional Water Management Group (RWMG) to create the Integrated Regional Water Management (IRWM) Plan. In 2007, the RWMG and other stakeholders began to develop the IRWM plan consistent with the State sponsored Integrated Regional Water Management Program that makes grant funds available to support sound regional water management. The IRWM Plan defined a course of action to meet expected water demands within the Antelope Valley Region through 2035. The IRWM Plan was then updated in 2012 and revisited in 2017. Most recently, the IRWM Plan was updated in 2019 to extend the planning horizon through 2040.

- **Water System Master Plan (2016):** The Water System Master Plan (WSMP) was created to provide guidelines for the planning of PWD's potable water system through the year 2030 and under 2040 build-out conditions. The WSMP evaluated the potable water system under existing and future conditions.

- **Palmdale Recycled Water Authority (PRWA) Recycled Water Master Plan (2015):** The PRWA manages recycled water that is generated and used within the Palmdale area. The Recycled Water Master Plan updated and consolidated previous master planning documents as well as prepared a cost of service study to identify how development of a recycled water system can be economically financed. In addition, the Recycled Water Master Plan identified potential funding sources for planning and construction to help offset local costs.

- **Strategic Water Resources Plan: Final Report (2010):** The Strategic Water Resources Plan (SWRP) developed a water supply strategy through the year 2035 to meet the demands of current and future customers. The SWRP includes a recommended water resource strategy to meet supply needs through 2035, an implementation plan and schedule of the activities to take place, and a financing plan for how funding will be provided to make the necessary improvements.

1.3.2 Relationship to Water Shortage Contingency Plan

The CWC requires preparation of a separate Water Shortage Contingency Plan (WSCP) as outlined in *Making Water Conservation a California Way of Life* (DWR and SWRCB, 2018):

> "The legislation…Requires each urban water supplier to prepare, adopt, and periodically review a WSCP as part of its UWMP to describe the method, procedures, response actions, enforcement, and communications during six levels of water supply shortage conditions (CWC §10620(d)(2) and §10632)"

Concurrent with the 2020 UWMP update, PWD will also update its WSCP consistent with the CWC. The 2020 WSCP utilizes and expands on the WSCP contained within the 2015 UWMP per the new requirements set forth by the CWC. The WSCP will be adopted separately from the UWMP but will be submitted to DWR as an appendix to the UWMP (Appendix J).

1.4 Implementation of the Plan

This subsection provides the cooperative framework within which the Plan will be implemented including agency coordination, public outreach, and resources maximization.

1.4.1 Public Water Systems

Public water systems (PWS) provide drinking water for human consumption and are regulated by the State Water Resources Control Board Division of Drinking Water (SWRCB DDW). PWSs are required to electronically file Annual Reports to the Drinking Water Program with the SWRCB DDW, which include water usage and other information.

Table 1-1 provides the name and number of the PWS (drinking water only) that is covered by this UWMP.

Table 1-1 Retail Public Water System

Public Water System Number	Public Water System Name	Number of Municipal Connections 2020	Volume of Water Supplied 2020 (AF)
CA1910102	Palmdale Water District	27,479	20,511

Notes: Modified from DWR Table 1-1
Source: District Public Water System Statistics, Production data

1.4.2 Fiscal or Calendar Year

A water supplier may report on a fiscal year or calendar year basis but must clearly state in its UWMP the type of year that is used for reporting. The type of year should remain consistent throughout the Plan.

DWR prefers that agencies report on a calendar year basis in order to ensure UWMP data is consistent with data submitted in other reports to the State. This plan provides data consistent with a calendar year, in acre-feet per year (AFY).

1.5 Cooperative Preparation of the Plan

The UWMP Act requires that the water agency identify its coordination with appropriate nearby agencies. PWD’s 2020 UWMP is intended to address those aspects of the UWMP Act which are under the control of PWD, specifically water supply and water use. While preparing the 2020 UWMP, PWD coordinated its efforts with relevant agencies to ensure data and issues are presented accurately.

PWD has encouraged community participation in water planning. Interested groups were informed about the development of the Plan along with the schedule of public activities.

Notices of public meetings were published in the local press and on PWD's website. Copies of the draft UWMP were sent to the City of Palmdale, the City of Lancaster, and Los Angeles County for review and comment, in addition to other local water agencies as noted in Table 1-2. Water resource specialists with expertise in water resource management were retained to assist PWD in preparing the details of its Plan.

Table 1-3 presents a timeline for public participation during the development of the Plan.

Table 1-2 Agency Coordination Summary

	Participated in UWMP Development	Received Copy of Draft	Commented on Draft	Attended Public Meetings	Contacted for Assistance	Sent Notice of Intent Adopt
City of Palmdale	X	X				X
City of Lancaster	X	X				X
Los Angeles County Department of Regional Planning	X	X				X
Littlerock Creek Irrigation District	X	X				X
Los Angeles County Sanitation District	X	X				X
Antelope Valley-East Kern Water Agency	X	X				X
Quartz Hill Water District	X	X				X
Rosamond Community Services District	X	X				X
Los Angeles County Farm Bureau	X	X				X
Los Angeles World Airports	X	X				X
Los Angeles County Waterworks District No. 40	X	X				X

1.5.1 Plan Adoption

PWD began preparation of this UWMP in September 2020. The final version of the UWMP was adopted by the PWD Board on June 14, 2021, and submitted to DWR, the California State Library, the City of Palmdale, the City of Lancaster, and to Los Angeles County within thirty days of Board approval. This Plan includes all information necessary to meet the requirements of Water Conservation Act of 2009 (Wat. Code, §§ 10608.12-10608.64) and the Urban Water Management Planning Act (Wat. Code, §§ 10610-10656). Plan Adoption materials are provided in Appendix C.

1.5.2 Public Outreach

PWD has encouraged community participation in water planning. Interested groups as identified in Table 1-2 were informed about the development of the Plan along with the schedule of public activities. Notices of public meetings were published in the local press and at PWD's website. Copies of the draft UWMP were sent to the County of Los Angeles and Cities of Palmdale and Lancaster for review and comment as noted in Table 1-2. Table 1-3 presents a timeline for public participation during the development of the Plan. Copies of the public outreach materials are provided in Appendix D.

Table 1-3 Public Participation Timeline

Date	Event	Details
Sep. 3, 2020	Kick-off Meeting	Describe UWMP requirements and process
May 14, 2021	Public Draft UWMP	Public Draft released to solicit input
June 14, 2021	Public Hearing	Review contents of Public Draft UWMP and take comments
June 14, 2021	Board Approval	UWMP and WSCP approved by the Board

1.5.3 Resources Maximization

Several documents have been developed to enable PWD to maximize the use of available resources, including PWD's 2010 UWMP (RMC 2011), PWD's Recycled Water Facilities Plan (RMC 2010), the Palmdale Recycled Water Authority Recycled Water Facilities Master Plan (Carollo 2015), the Antelope Valley Integrated Regional Water Management Plan (2019), DWR's 2019 State Water Project Delivery Capability Report (DWR 2019), PWD's 2016 Water System Master Plan (MWH 2016), Consumer Confidence Reports, the Antelope Valley Salt and Nutrient Management Plan. Section 4 of this Plan describes in detail the water resources available to PWD for the twenty-five-year period covered by the Plan. A complete reference list is provided in Section 9 of this Plan.

1.6 Water Management within PWD’s Service Area

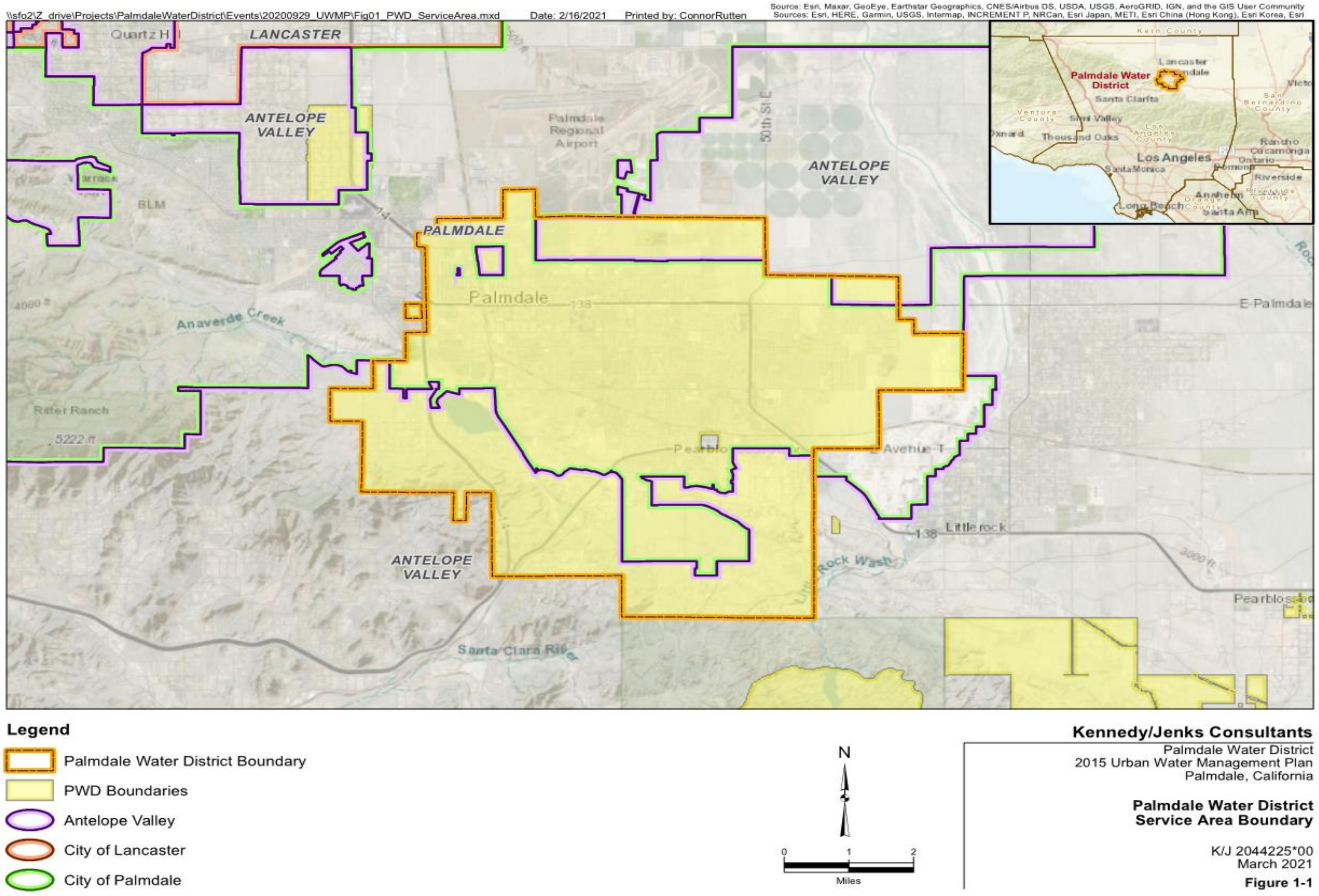
1.6.1 System Description

PWD is located within the Antelope Valley in Los Angeles County, approximately 60 miles north of the City of Los Angeles and includes the central and southern portions of the City of Palmdale and adjacent unincorporated areas of Los Angeles County, as shown in Figure 1-1. The City of Palmdale’s nearest neighbor, Lancaster, is approximately 10 miles to the north.

The Antelope Valley Freeway (State Highway 14) runs north-south and Pearblossom Highway (State Highway 138) meanders in an east-west direction through the Palmdale Water District. PWD was established in 1918 as the Palmdale Irrigation District. The primary function of the PWD is to provide retail water service within its service area. Under the provisions of the CWC relating to the establishment of irrigation districts, PWD has the power to carry out any act to provide sufficient water for present and future beneficial uses, including construction and operation of facilities to store, regulate, divert and distribute water for use within its boundaries.

Until the 1950s, the area within Palmdale Irrigation District’s boundaries was primarily agricultural. However, with the activation of Air Force Plant 42 and the increased use of Edwards Air Force Base, agricultural water use diminished. As populations grew within the Antelope Valley, the shift to domestic water began. In 1963, the Palmdale Irrigation District entered into an agreement to purchase water from the newly planned State Water Project (SWP). This agreement guarantees PWD will have sufficient imported source water to supply projected population growth well into its future.

Figure 1-1 PWD Service Area



To contain the anticipated increased water supply, bonds were sold to rebuild and expand Palmdale Lake (formerly known as Harold Reservoir) to an increased capacity of over 4,100 AF. This bond financing also allowed the construction of a new treatment facility adjacent to the Lake allowing Palmdale Irrigation District to serve a broader area of Palmdale. In 1973 the Palmdale Irrigation District name was changed to the more appropriate PWD. Founded as an irrigation district supplying water mainly to farms for agricultural use, PWD's boundaries had expanded with Palmdale's rapid population growth and PWD shifted to providing predominantly municipal and industrial water supply. PWD now acts as a retailer of water supplies for municipal, residential, irrigation, commercial, industrial, and institutional users.

PWD has continued to improve and add to its water distribution and storage facilities. PWD's primary service area now covers approximately 29,440 acres (46 square miles). The distribution system encompasses approximately 400 miles of pipeline, multiple well sites, booster pumping stations, and water storage tanks maintaining a total storage capacity of over 50 million gallons.

1.7 Population, Demographics, and Socioeconomics

1.7.1 Population

PWD currently serves 26,869 active connections of 27,479 total connections, the majority of which (96 percent) are residential. Commercial connections account for approximately 2.5 percent, industrial connections account for about 0.5 percent, and landscape irrigation connections account for about 1 percent. Table 1-4 shows the historical service connections in 2015. As stated above, the categories have changed in 2020 and are reflected in Table 1-5.

Table 1-4 Historical Service Connections (2015)

Customer Class	2015
Single Family Residential	24,910
Multi-Family Residential	541
Commercial/Institutional	612
Industrial	78
Landscape Irrigation	225
Other (Fire Protection/ Non-potable)	0
Total	**26,366**

Source: District Public Water System Statistics.

Table 1-5 Existing Service Connections (2020)

Customer Class	2020
Single Family Residential	25,240
Multi-Family Residential	543
Commercial/Industrial	670
Irrigation	244
Fire Service	151
Construction	21
Total	**26,869**

Source: Communication with PWD Staff, April 2021.

PWD has experienced steady population growth over the past 40 years, increasing by approximately 50 percent since 1995 (PWD 2005 UWMP). Table 1-6 shows PWD's population from 2015 – 2020.

Table 1-6 Historical Population Estimates (2015 - 2020)

Year	2015[(a)]	2016	2017	2018	2019	2020[(a)]
Population Served[(b)]	118,227	119,794	121,361	122,928	124,495	126,062

Note:

(a) DWR online population tool. See Appendix F for the population tool printout for 2020.

(b) Population for 2016 through 2019 were interpolated from the 2015 and 2020 values.

Table 1-7 shows the current and projected service area population in five-year increments to Year 2045. Population projections presented here are based on the PWD Water Master Plan Draft Report (MWH 2016). Projections were determined by using Southern California Association of Governments (SCAG) growth percentages for the City of Palmdale and applying them to the population recorded in the 2010 census within the PWD boundary. The current population (2020) shown below was calculated with the DWR population tool.

Table 1-7 Population - Current and Projected

Year	2020	2025	2030	2035	2040	2045
Population Served[(a)]	126,062[(b)]	128,998	132,003	138,554	145,962	153,766

Notes: Modified from DWR Table 3-1

(a) Source of 2025-2045 projections: PWD Draft Water Master Plan, September 2014, Table 2-5, "Adjusted SCAG Population Projections".

(b) 2020 population number is based on the DWR population tool (printout provided in Appendix F).

1.7.2 Demographics and Socioeconomics

Water service is provided to residential, commercial, industrial, and institutional customers, and for environmental and other uses, such as fire protection and landscaping. The total demand trend on water supplies is expected to continue to rise within the Antelope Valley area (along with most of California) because of population growth, planned development, economic activity, environmental and water quality needs, and regulatory requirements. Table 1-8 provides a breakdown of demographic and socioeconomic indicators for the City of Palmdale using the most recent US Census Bureau available.

Table 1-8 Demographics for the City of Palmdale, CA (a)

Demographic Category	Value
Age and Sex	
Persons under 5 years, percent	7.80%
Persons under 18 years, percent	30.00%
Persons 65 years and over, percent	9.30%
Female persons, percent	51.10%
Race and Hispanic Origin	
White alone, percent	46.10%
White alone, not Hispanic or Latino, percent	20.00%
Black or African American alone, percent	13.20%
American Indian and Alaska Native alone, percent	1.60%
Asian alone, percent	4.70%
Native Hawaiian and Other Pacific Islander alone, percent	0.40%
Two or More Races, percent	5.00%
Hispanic or Latino, percent	60.40%
Housing	
Owner-occupied housing unit rate, 2015-2019	65.30%
Median value of owner-occupied housing units, 2015-2019	$280,000
Median gross rent, 2015-2019	$1,319
Families & Living Arrangements	
Households, 2015-2019	43,404
Persons per household, 2015-2019	3.60
Economy	
In civilian labor force, total, percent of population age 16 years+, 2015-2019	59.60%
Persons in poverty, percent	15.60%

Note:
(a) Data taken from US Census Bureau (census.gov)

1.8 Land Uses in the Service Area

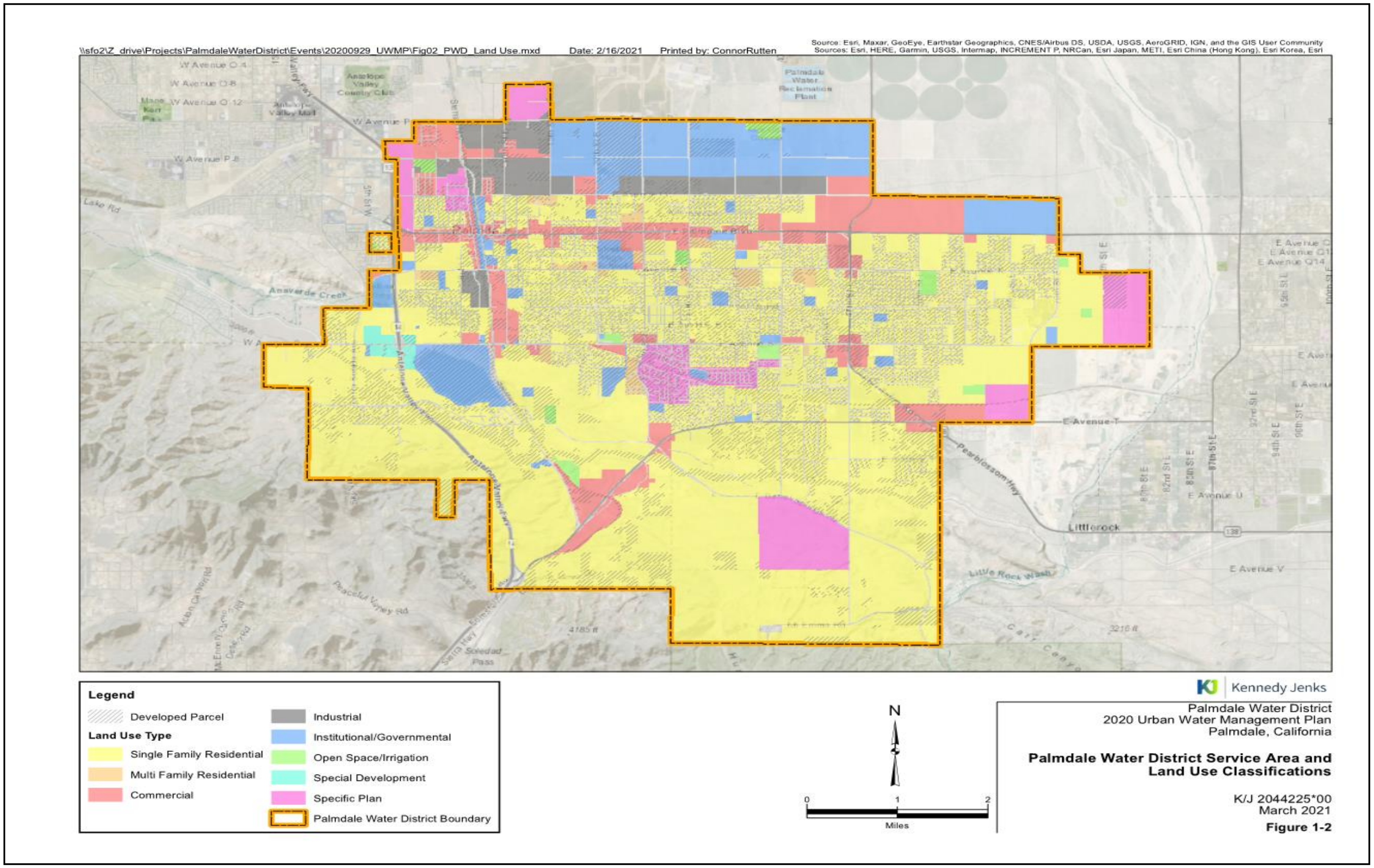
The breakdown of land uses in the service area were calculated using Los Angeles (LA) County parcel data as well as the most recent land use data taken from general and specific plans (provided by PWD). Existing land uses were determined from only developed parcels (not classified as "vacant" by LA County parcel data). Table 1-9 provides a breakdown of these land uses.

Figure 1-2 shows the identified land use categories in the PWD service area and also identifies which areas are developed/undeveloped.

Table 1-9 Existing Land Uses in Service Area

Land Use Type	Acreage
Single Family Residential	13,716
Recreational	71
Multi-Family Residential	285
Miscellaneous	741
Irrigated Farm	134
Institutional	154
Industrial	322
Government	1,177
Commercial	528
Total	**17,128**

Figure 1-2 Land Use Map



1.9 Climate

The climate in PWD's service area is characterized by wide temperature fluctuations, hot summers, cold winters, strong winds, low humidity and scant rainfall. Temperatures in the summer months vary between 54 degrees Fahrenheit (°F) and 95 °F. In the winter months, the average temperature extremes vary from 28 to 61 °F, respectively. Most of the precipitation occurs during the winter and spring months. Over the last five years monthly precipitation has averaged less than 1 inch. Table 1-10 shows the average, monthly evapotranspiration (ETo), rainfall, and temperature data for PWD.

Table 1-10 Climate Data
Monthly Average Climate Data Summary

		Average Total	Average Temperature (F)	
Month	**Monthly ETo**	**Rainfall (inches)**	**Max**	**Min**
January	1.69	1.10	60.70	29.70
February	2.44	0.90	63.69	31.83
March	4.70	0.95	67.62	35.94
April	5.99	0.20	74.16	41.27
May	7.98	0.15	79.54	47.24
June	9.33	0.006	90.64	54.88
July	9.66	0.08	95.23	60.97
August	8.93	0.02	95.73	60.20
September	6.18	0.11	91.65	53.50
October	4.62	0.19	80.39	42.67
November	2.95	0.42	67.84	33.01
December	2.08	1.06	58.56	28.64

Source: California Irrigation Management System (CIMIS) data provided from Station No. 197, Los Angeles Region, January 2010 – December 2020 http://www.cimis.water.ca.gov/cimis/welcome.jsp.

1.10 Potential Effects of Climate Change

A topic of growing interest and research for water planners and managers is climate change and the potential impacts it could have on California's future water supplies. DWR's California Water Plan considers how climate change may affect water availability, water use, water quality, and the ecosystem. The California Water Plan Update 2018 builds upon previous updates and provides recommended actions, funding scenarios, and an investment strategy to meet the challenges and goals laid out in the prior 2013 Plan.[1]

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[1] California Water Plan Update 2018

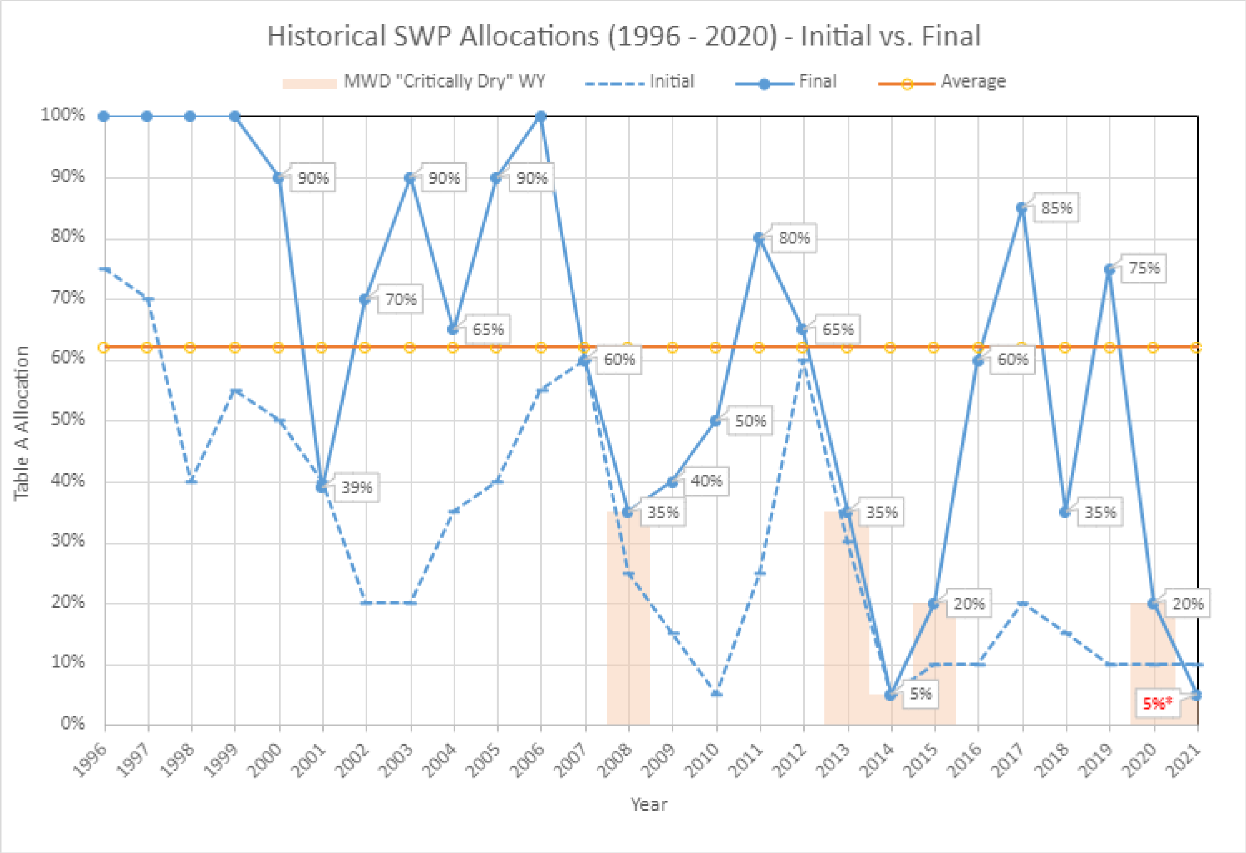
Chapter 3 of the California Water Plan, “Actions for Sustainability”, Volume 1, Chapter 5 of the California Water Plan, “Managing an Uncertain Future,” evaluated three different scenarios of future water demand based on alternative but plausible assumptions on population growth, land use changes, water conservation and future climate change. Future updates will test different response packages, or combinations of resource management strategies, for each future scenario. These response packages help decision-makers, water managers, and planners develop integrated water management (IRWM) plans that provide for resource sustainability and investments in actions with more sustainable outcomes. The 2018 Update provides recommended actions in order to support each of the identified goals of the plan. The goals are:

- Improve Integrated Watershed Management
- Strengthen Resiliency and Operational Flexibility of Existing and Future Infrastructure
- Restore Critical Ecosystem Functions
- Empower California’s Under-Represented or Vulnerable Communities
- Improve Inter-Agency Alignment and Address Persistent Regulatory Challenges
- Support Real-Time Decision-Making, Adaptive Management, and Long-Term Planning.

California faces the prospect of additional water management challenges due to a variety of issues including population growth, regulatory restrictions and climate change. Climate change is of particular interest because of the range of possibilities and their potential impacts on essential operations. The most likely scenarios involve increased temperatures, which will reduce the Sierra Nevada snowpack and shift more runoff to winter months and accelerated sea level rise. The other much-discussed climate change scenario is an increase in precipitation variability. Changes in precipitation patterns combined with the effects of sea level rise will especially compound water supply reliability impacts on State Water Project and Central Valley Project supplies that are conveyed through the fragile levee system of the Sacramento-San Joaquin Delta. The primary factor identified to impact Delta exports is the “flow seasonal pattern shifts.” Along with increasing temperatures, there will also be changes in the timing and type of precipitation and the timing and volumes of surface runoff. More precipitation will fall in the form of rain rather than snow, thereby resulting in a shift to more runoff during winter and early spring seasons. Earlier snowmelt and more rain versus snow will also result in an increasing inability to capture that runoff for later use, and most of the extra flows in the winter and early spring in the Delta watershed will be released as flood water and become Delta outflow. Overall, water supply from snowpack is projected to decline by two-thirds by 2050 in the State. Additionally, climate change poses the threat of more frequent water quality degradation, such as salinity impacts from sea level rise, which may also heavily impact delivery capability. Overall, by mid-century, Delta exports are projected to be reduced significantly, with possible reductions by up to 50% more than during historical droughts, and carryover storage may decline to one-fifth of levels found during historical droughts (Wang et al. 2018).

Already over past years, SWP supplies have become increasingly unreliable with substantial curtailments occurring during dry years. As a result of increasing hydrologic variability compounded with regulatory restrictions, the SWP is no longer capable of delivering full contractor entitlements on a routine basis. The last time 100 percent SWP allocations could be fulfilled was in 2006, after which time SWP allocations have shown a downward trend. During the height of the recent drought, SWP allocation was as low as 5 percent (in 2014). Since then, deliveries have fluctuated, with lows of 20 percent in 2015 and 2020 and a high of 85 percent in 2017 (Figure 1-3). The initial SWP allocation for 2021 is 10 percent of contractor requested Table A amounts. While some of the reductions since 2005 were also a result of more stringent Delta regulations and operational changes, long-term projections indicate continued curtailments in the future in large part due to climate change, for reasons described above.

Figure 1-3 Historical SWP Allocations



Source: https://californiawaterblog.com/2020/05/24/an-introduction-to-state-water-project-deliveries/

Projections for future deliveries are outlined in DWR's State Water Project Delivery Capability Report (DCR) 2019 (DWR 2020), which also considers impacts on SWP deliveries due to climate change, among other factors. In general, the DCR describes factors affecting the operation of the SWP, its long-term capability to provide water for beneficial use, and an estimate of its current delivery capability. In addition, the DCR Technical Addendum provides information on climate change hydrology and sea-level rise in its analysis of SWP delivery capability under future conditions, specifically under a 2040 high-emissions and 1.5-foot sea level rise scenario. Under current conditions, the long-term average of SWP Table A water deliveries is estimated to be 58 percent, with deliveries ranging between 7 percent for a single dry year and up to 97 percent for a single wet year. Under future conditions, the minimum, average, and maximum percent of maximum SWP Table A amounts are estimated to be 9 percent, 52 percent and 94 percent respectively. Average delivery estimates are down from previous DCR estimates.

In addition to imported water supplies, climate change will also have increasing impacts on groundwater resources which also serve as an important source of water supplies for the District. While groundwater is often considered a drought-resistant water resource, warmer temperatures, changing precipitation patters and more extreme drought conditions can indeed impact groundwater supplies. These conditions can lead to reduced groundwater recharge and increased dependence on groundwater supplies when other supplies, such as imported SWP supplies, are less available under drought conditions. However, local impacts are still uncertain given that average precipitation in the Antelope Valley may either increase or decrease in the future. This has implications on the sustainability of local groundwater operations.

Climate change impacts also have implications for water demands. Warmer temperatures and changes in precipitation patterns, as well as more frequent and extreme drought conditions, are anticipated to result in increasing water needs to support aquatic habitat and irrigation demands including for outdoor landscaping and irrigated agriculture, among other uses. Warmer temperatures increase plant evapotranspiration and reduces soil moisture, which contributes to increased water demands. Outdoor water use is a large component of water demands in the Antelope Valley, and generally a large component of urban water demands. On the other hand, drought conditions that impact water supply reliability may also lead to required demand reductions to avoid shortages, thereby counteracting demand increases. Climate change impacts on water demand have been considered in this UWMP primarily based on demand trends during historical dry weather conditions. Potential climate change effects on the Region include an increase in average temperature by 5 to 6 degrees by 2050, extreme heat days above threshold by 2050 with 34 additional extreme heat days by 2100, 524 to 413 more hectares burned by 2050 due to wildfires, a slight 1.6 inch increased in annual precipitation by 2050, and a reduction in local snowpack from 0.7 inches to zero. These climate change impacts are expected to impact future water demands. Additional details on demands are provided in Section 2 of this Plan.

With a broad range of uncertainty that the State and Antelope Valley face in its water supplies and demands, optimizing water resource management includes identifying combinations of resource management strategies, for future scenarios of local and imported water supply and demand conditions. This UWMP includes projections of water demands over the planning period as well as existing and future water supply options to continue to reliably serve the Antelope Valley.

1.11 Climate Change Vulnerability Analysis

Identification of watershed characteristics that could potentially be vulnerable to future climate change is the first step in assessing the climate change vulnerabilities in the Region. In the context of this analysis, vulnerability is defined as the degree to which a system is exposed to, susceptible to, and able to cope with and adapt to, the adverse effects of climate change, consistent with the definition in the recently issued Climate Change Handbook for Regional Water Planning (USEPA and DWR, 2011).

Water-related resources that are considered important in the Region and potentially sensitive to future climate change include water demands, water supplies, water quality, flooding, and ecosystem and habitat. A qualitative assessment of each of these resources with respect to anticipated climate change impacts has been prepared in the 2019 Integrated Regional Water Management Plan for the Antelope Valley Region. The assessment identified high priority vulnerability issues for the Region including:

- Limited ability to meet summer demand decrease in seasonal reliability
- Increases in flash flooding due to more frequent and intense storms
- Lack of groundwater storage to buffer drought
- Decrease in imported water supply
- Invasive species can reduce supply available
- Decreased water quality due to increased constituent concentrations

The assessment follows the climate change vulnerability checklist assessment as defined in the Climate Change Handbook for Regional Water Planning and highlights those water-related resources that are important to the Region and are sensitive to climate change.[2]

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[2] Antelope Valley Integrated Regional Water Management Plan, 2019 update, Appendix H

Section 2: Water Use

2.1 Overview

This section describes historical and current water usage and the methodology used to project future demands within PWD’s service area. Water usage was divided into categories such as residential, industrial, commercial, irrigation, and other. Starting in January 2020, PWD no longer has a customer class of ‘other’ and has added the sub-class ‘institutional.’ To undertake this evaluation, existing land use data and population projections were evaluated. This information was then compared to historical trends for new water service connections and customer water usage information. In addition, weather and water conservation effects on historical water usage were considered in the evaluation. Several factors can affect demand projections, including:

- Land use revisions
- New regulations
- Consumer choice
- Economic conditions
- Climate change
- Transportation needs
- Environmental factors
- Conservation programs
- Building and plumbing codes

The foregoing factors affect the amount of water needed, as well as the timing of when it is needed and available. During an economic recession, there is a major downturn in development and a subsequent slowing of the projected demand for water. The projections in this UWMP do not attempt to forecast recessions or droughts, but to develop measures to help mitigated against droughts. Likewise, no speculation is made about future building and plumbing codes or other regulatory changes. However, the projections do include water conservation consistent with new legislative requirements calling for a 20 percent reduction in per capita demand by 2020 (SBX7-7).

An analysis was performed that combined growth projections with water use data to forecast total water demand in future years. Water uses were broken out into specific categories and assumptions made about each to project future use more accurately. Three separate data sets were collected and included in the assessment; historical water use by land-use type, current population and projected population.

2.2 Historical Water Use

PWD only serves potable water supplies within its service area. A discussion on recycled water availability and use is found in Section 5.

2.2.1 Historical Water Deliveries

Predicting future water use requires accurate historical water use patterns and water usage records. PWD has meters on all residential, commercial and landscape service connections in the service area and requires meters on all new connections. PWD provides potable water service to customers within its service area and serves supplemental water to several customers outside its primary service area in accordance with agreements made with the Antelope Valley-East Kern Water Agency (AVEK).

PWD's water use categories are characterized as follows:

- Single-Family Residential – A single family dwelling unit, generally a single lot containing a single home.

- Multi-Family Residential – Multiple dwelling units contained within one building or a complex of several buildings.

- Commercial/Industrial– This category captures water customers conducting business (i.e., providing a product or service), such as construction, as well as water users dedicated to public service such as fire service. Most of PWD's water use in this category reflects water use for retail businesses. Water users under the Industrial category are typically manufacturers or processors of materials. PWD serves one industrial customer.

- Institutional – Water users under this category are typically Governmental customers.

- Irrigation– Water connections supplying water solely for landscape irrigation, including landscapes in a residential, commercial, or institutional setting.

Approximately 80 percent of PWD's demand comes from the residential demand category based on average demand data from 2017 – 2020. Historical (2015) and current (2020) water deliveries by demand category are shown in Table 2-2.

2.2.2 System Losses

In 2020, PWD removed the "Other" demand category from their rate structure. In addition to the traditional demand sources, there is another component that impacts PWD's water resources known as system water losses. This component is typically defined as the difference between water production and water sales. These water losses can come from authorized, but unmetered sources, such as main flushing, or unauthorized sources such as leakage, illegal connections, and inaccurate flow meters.

New legislation requires the analysis for the 2020 UWMP to report on distribution system water losses for each of the five years preceding the plan update. The method suppliers use to estimate water loss is based on American Water Works Association's (AWWA) M36 Manual. Water loss estimates are available for calendar years 2015 – 2019. Water loss volumes are summarized in Table 2-1. On average over the last five years, system water losses have accounted for approximately 10 percent of total production. PWD anticipates losses to decline as we continue to replace old mainlines.

Table 2-1 Water Loss Audit Report Summary

Reporting Year[(a)]	Volume of Non-Revenue Water[(b)] (AF)	Water Loss as % of Water Supplied[(c)]
2015	1,297	7.7%
2016	1,559	9.0%
2017	1,808	10.0%
2018	1,723	9.0%
2019	1,351	7.7%

Notes: Modified from DWR Table 4-4

(a) Calendar Year

(b) Sum of real and apparent losses based on AWWA water audit software output (Line 58).

(c) Calculated from PWD water use records based on total water purchased and total authorized consumption.

In 2020, PWD removed the “Other” demand category from their rate structure. Demand data provided by PWD for 2020 included both “fire service” as well as “construction” demand categories. With guidance from PWD, demands under “fire service” were included in the “industrial” demand category, and demands under “construction” were included in the “other” demand category for the purposes of comparing 2015 to 2020 demands.

Table 2-2 Historical Water Deliveries (2015 and 2020)

Demand Category	2015	2020[(a)]
Single family	10,251	11,757
Multi-family	1,276	1,555
Commercial[(b)]	863	1,190
Industrial	1,548	1,637
Landscape Irrigation	744	1,040
Other[(c)]	41	34
Sales to Other Agencies	432	1,301
Groundwater Recharge/Storage/Banking	0	0
Long Term System Storage	0	0
Saline Water Intrusion Barrier	0	0
Agricultural Irrigation	0	0
Non-Revenue Water [(d)]	1,841	1,997
Total	**16,996**	**20,511**

Note: Modified from DWR Table 4-1

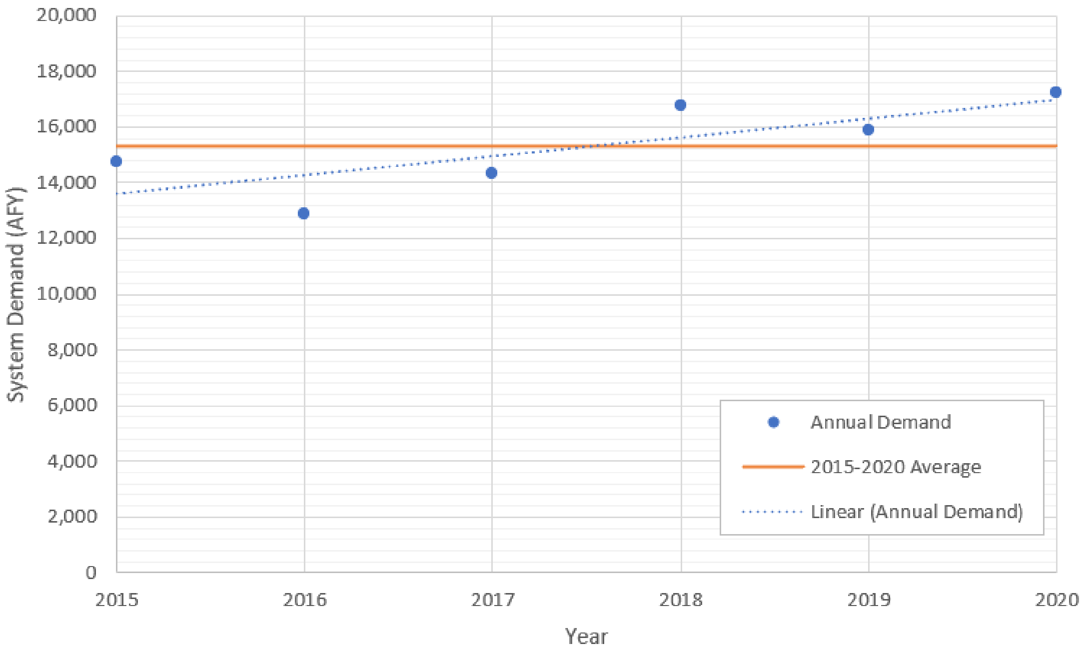
(a) Data provided by PWD Staff Public Water System Statistics. 2020 total production was 20,511 AF as shown in Table 1-1.

(b) Includes Institutional and Governmental demands.

(c) Other uses include water for street sweeping, construction and other various limited use meters at PWD and school facilities.

(d) Based on average non-revenue water from past 5 years of water audit reports (see Table 2-1).

Figure 2-1 Historic Demands 2015 - 2020



As Figure 2-1 shows, 2020 had the highest system demand that the PWD system has experienced in the past six years. The demand projections discussed in Section 2.3 use the 2017-2020 average demand values rather than the 2020 historical demand values in order to avoid over-estimating projected demand. 2015 and 2016 demands were not included based on correspondence with PWD since demand during these years was uncharacteristically low due to severe drought conditions. Water loss and sales are not included in Figure 2-1.

2.2.3 Historical Sales and Deliveries to Other Water Agencies

PWD currently has arrangements with AVEK and Littlerock Creek Irrigation District (LCID) to provide treatment and delivery of raw water received from those agencies. Specifically, AVEK and LCID provide raw water to PWD, which is then treated and passed on to AVEK and LCID customers. These deliveries are described in Table 2-3.

As no additional PWD supplies are provided to AVEK or LCID with these treatment and delivery arrangements, those deliveries have no effect on PWD demands or supplies. Therefore, these deliveries are not accounted for in total PWD demands or supplies. No other arrangements for delivery or sales to other agencies currently exist with PWD.

Table 2-3 Historical Water Deliveries to Other Systems (AF)

Agency	2015	2016	2017	2018	2019	2020
LCID	1	2	2	3	10	1
AVEK	431	639	1,159	1,314	1,164	1,300
Total	**432**	**641**	**1,161**	**1,317**	**1,174**	**1,301**

Notes:
Data provided by PWD staff. As described above, these deliveries do not constitute sales to other agencies and due to the pass-through nature of these supplies are not being accounted for in total district demands. Values are rounded to the nearest whole number.

2.3 Projected Water Use

2.3.1 Water Delivery Projections Based on Land Use

PWD's projected water deliveries were estimated considering various factors, including historical and current demands, SCAG population projection data, and land use data. Figure 1-2 shows the land use classifications of both the developed and undeveloped areas within the PWD service area.

A relationship was first developed between the projected population and the projected land uses of the undeveloped areas within the PWD service area, using the estimated 2020 population within the PWD service area and the total developed residential acreage within the PWD service area. The estimated 2020 population within the PWD service area is 126,062 based on the DWR online population tool (see Table 1-6). Based on existing land use data, there are approximately 14,001 acres of developed residential acreage within the PWD service area, which equates to approximately 9 persons per acre of residential land. Therefore, for every 9 persons that SCAG estimates will be added to the PWD service area, 1 acre of residential land will develop. Approximately 98% of the existing developed residential acreage is single-family residential and 2% is multi-family residential.

Using the average historical water deliveries by usage category from 2017 to 2020 (see Table 2-2) combined with the existing developed land use data (see Table 1-8) unit demand factors with units of AFY per acre (AFY/Ac) for each usage category were developed. Table 2-4 shows the unit demand factors developed for the demand projections analysis.

Table 2-4 Unit Demand Factors

Usage Type	AFY/Ac
Single Family Residential	0.82
Multi-Family Residential	4.97
Commercial (b)	0.60
Industrial	4.06
Irrigation	7.24

Notes:
Based on 2017-2020 consumption and land use Classifications.
(a) Includes Institutional/Governmental Usage

Lastly, the land use data of the remaining undeveloped parcels within the PWD service area was analyzed to develop a ratio of undeveloped residential acreage to undeveloped commercial, industrial, and landscape acreages. Data from Specific Plans (Foothill Ranch, Palmdale Trade and Commerce, Palmdale Transit Village) was also analyzed to determine what portion of the area of these specific plans would fall into each defined land use category. Based on the Avenue S Corridor Area Plan, which included areas designated as “special development” at the intersection of Highway 14 and East Avenue S, these areas have not yet been slated for a specific type of development, and therefore were excluded from the acreage totals shown below in Table 2-5. The remaining undeveloped parcel acreages by land use are shown in Table 2-5, as well as the area ratios.

Table 2-5 Acreage of Remaining Undeveloped Within PWD Service Area By Land Use

Usage Type	Acreage	Ratio to Residential Acreage
Single Family	10,608	-
Multi Family	72	-
Commercial (a)	3,610	0.34
Industrial	336	0.03
Landscape Irrigation	346	0.03

Note:
a. Includes Institutional/Governmental Usage

Based on the land use classifications of the remaining undeveloped parcels within the PWD service area, for every 1 acre of residential area developed, approximately 0.34 acres of commercial, 0.03 acres of industrial, and 0.03 acres of landscape irrigation area will develop. Since no specific timelines are available for when the various commercial, industrial, or landscape irrigation projects will be completed, this method assumes that acreages associated with each land use type will increase in parallel with one another from the year 2020 up to “Buildout” (when all of the area inside of the PWD service area is assumed to be developed) at the ratios/rates identified above.

Given the projected population from Table 1-6, the calculated # persons per residential acre, the unit demands from Table 2-4, and the area ratios for the remaining undeveloped parcels within the PWD service area from Table 2-5, water delivery projections were developed through the year 2045, and are presented in Table 2-6. A linear growth rate for development was assumed between 2025 and 2045.

Table 2-6 Projected Potable Water Deliveries (AF)

Demand Category	2025	2030	2035	2040	2045
Single family	11,460	11,730	12,310	12,970	13,660
Multi-family	1,450	1,480	1,560	1,640	1,730
Commercial (a)	1,170	1,240	1,390	1,550	1,730
Industrial	1,350	1,390	1,480	1,590	1,700
Landscape	1,050	1,130	1,300	1,490	1,690
Other (c)	40	40	40	40	40
Sales to Other Agencies	1,300	1,300	1,300	1,300	1,300
Groundwater Recharge/Storage/Banking	0	0	0	0	0
Long Term System Storage	0	0	0	0	0
Saline Water Intrusion Barrier	0	0	0	0	0
Agricultural Irrigation	0	0	0	0	0
Non-Revenue Water (b)	1,900	2,000	2,100	2,200	2,400
Total	**19,720**	**20,310**	**21,480**	**22,780**	**24,250**

Notes: Modified from DWR Table 4-2

a. Includes Institutional/Governmental demands
b. Based on average non-revenue water from past 5 years of water audit reports (see Table 2-1).
c. Other uses include water for street sweeping, construction and other various limited use meters at PWD and school facilities.
d. Values are rounded.

2.3.2 Effects of Codes, Standards, and Other Ordinances

Recent legislation provides that "if available and applicable" to PWD, demand projections must display and account for the water savings estimated to result from adopted codes, standards, ordinances, or transportation and land use plans identified by the urban water supplier, as applicable to the service area. If such information is reported, the assessment will provide citations of the various codes, standards, ordinances, or transportation and land use plans utilized in making the projections.

Water savings resulting from implementation of codes, standards and other ordinances were not specifically estimated for water use projections in this UWMP. However, their potential impact was considered, and overall, it is expected that the water savings potential from codes and standards would be limited based on the following two main factors. 1) The majority of the City of Palmdale's housing stock is generally older, with approximately 52 percent of housing units built prior to 1990[3]. Figure 2-2 below shows how the number of housing units has grown from 1990 – 2020, showing a relatively steep increase from 1990 – 2008 before plateauing, as a result of the recession and slowed growth.

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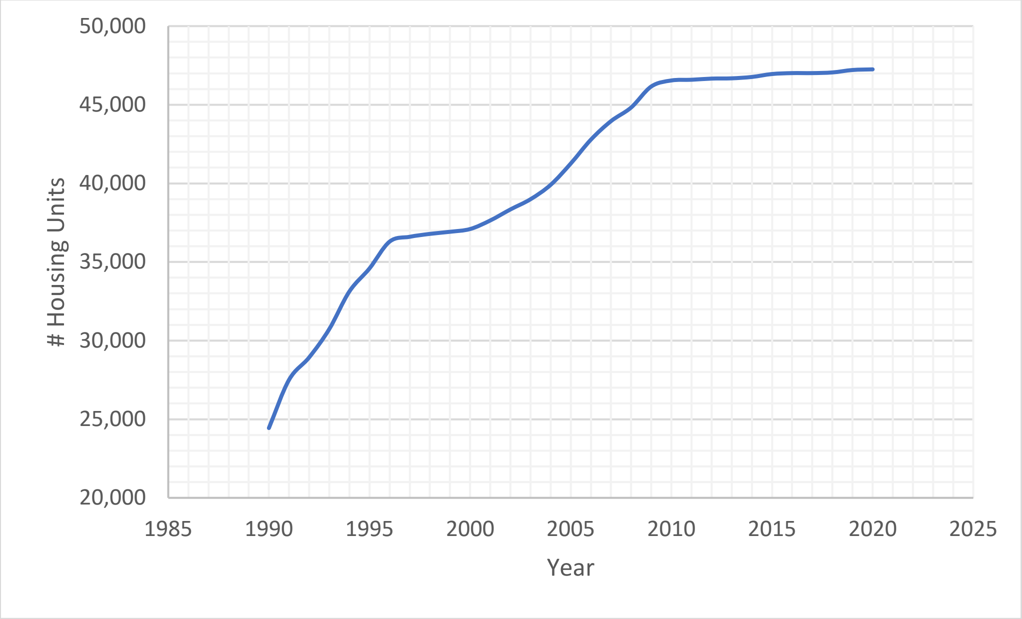
[3] State of California, Department of Finance, E-5 Population and Housing Estimates for Cities, Counties and the State — January 1, 2011-2020. Sacramento, California, May 2020. Available at: https://www.dof.ca.gov/Forecasting/Demographics/Estimates/

Figure 2-2 City of Palmdale # of Housing Units From 1990 - 2020



While water fixtures and appliances have become significantly more efficient since then due to standards and codes, these older housing units are also more likely to have already become more water efficient as a result of PWD rebate programs, natural replacement of old or malfunctioning fixtures or appliances, retrofit upon resale, or remodels. 2) There is minimal projected growth. New development would have to meet the newest water efficiency standards, thereby presenting a potential for water savings compared to the existing housing stock. However, the impact of the potential water savings from the new housing stock in PWD's service area would overall be limited due to the minor growth anticipated in the service area.

2.3.3 Effects of Climate Change on Water Use

Climate change projections have shown that California's water resources will likely be impacted by changes to temperature and precipitation. For the Antelope Valley Region, climate change is expected to increase average temperature by at least 5 degrees (Antelope Valley IRWMP, 2019) and precipitation is expected to remain relatively unchanged, with more precipitation coming in the form of intense storms. Temperature increases with more precipitation falling as rain rather than snow can lead to reduced snowpack storage and reduced imported water deliveries, resulting in more frequent drought periods.

In response to past drought conditions, PWD has implemented intensive conservation efforts and statewide conservation mandates in 2015 and has since maintained fairly steady demands with continued conservation efforts. The City plans to continue implementing effective demand management measures which are anticipated to impede major increases or rebounds in future per capita demands. Water conservation is the new normal for PWD customers, who continue to express interest in water conservation efforts and District programs. Projected water demands based on the current population and existing land uses are therefore estimated to stay within the recent 5-year range.

Projections are based on historic demands, thereby accounting for past dry periods, ongoing conservation efforts in addition to water savings resulting from the City's long-standing water conservation regulations, such as the City's Water Conservation Ordinance (Ord. 1516-NS) which lays out permanent mandatory water conservation measures.

As such, the baseline water use calculated from the recent 5-year period is considered to reasonably reflect regular water conservation practices and water savings related to codes and standards implemented to date.

2.4 Characteristic Five-Year Water Use

A new requirement for the 2020 UWMP cycle is the preparation of a five-year Drought Risk Assessment (DRA), in which water suppliers compare available water supplies with projected water use for a 5-year drought period. The first step in preparing the DRA is estimating expected gross water use for the next five years (2021 to 2025) without drought conditions, i.e., without accounting for short-term demand reduction actions or other drought effects.

Table 2-7 presents estimated normal and dry year water use over the next five years, based on factors anticipated to impact water use over the planning period, as described above. As noted above, baseline water demands take into account ongoing water conservation programs and permanent water conservation measures in accordance with PWD ordinances. Increases in demands above 2020 levels and through 2025 are a result of anticipated growth in PWD's service area. No additional water use demands are anticipated during dry periods. System losses are assumed to be equal to 11 percent of total production based on historical water loss audit data.

Table 2-7 Projected Five-Year Water Use (2021 - 2025)

Use Type	2021	2022	2023	2024	2025
Single family	11,250	11,300	11,360	11,410	11,460
Multi-family	1,420	1,430	1,440	1,440	1,450
Commercial	1,120	1,130	1,1140	1,160	1,170
Industrial	1,310	1,320	1,330	1,340	1,350
Landscape	990	1,000	1,020	1,030	1,050
Other	40	40	40	40	40
System Losses (Non-Revenue Water)	1,880	1,885	1,890	1,895	1,900
Sales to Other PWS	1,300	1,300	1,300	1,300	1,300
Total	**19,310**	**19,405**	**19,520**	**19,615**	**19,720**

2.5 Lower Income Projected Water Demands

The UWMP Act requires that water use projections of a UWMP include the projected water use for single-family and multi-family residential housing for lower income households as identified in the housing element of any city, county, or city and county general plan in the service area of the supplier.

Based on a GIS analysis using census data, households with an income less than 80 of the state's median household income, made up approximately 50 percent of the PWD service area population in 2010. For purposes of estimating water use projections for PWD's lower income households, the proportion of lower income households within PWD's service area is assumed to be 50 percent through 2045. Related demands are presented in Table 2-8 and are accounted for in total water demands described in Section 2.4.

Table 2-8 Projections of Future Low-Income Household Water Use (AF)

Water Use	2025	2030	2035	2040	2045
Estimated Lower Income Water Use(a)	6,500	6,600	6,900	7,300	7,700

Notes: Values are rounded.
(a) Calculated as 50 percent of the single-family and multi-family residential demands presented in Table 2-6.

In addition, PWD will not deny or condition approval of water services, or reduce the amount of services applied for by a proposed development that includes housing units affordable to lower income households unless one of the following occurs:

- PWD specifically finds that it does not have sufficient water supply;
- PWD is subject to a compliance order issued by the SWRCB DDW that prohibits new water connections; or
- The applicant has failed to agree to reasonable terms and conditions relating to the provision of services.

Section 3: SBx7-7 Baseline and Targets

3.1 Existing and Targeted Per Capita Water Use

The Water Conservation Act of 2009 (SBX7-7) is one of four policy bills enacted as part of the November 2009 Comprehensive Water Package (Special Session Policy Bills and Bond Summary). The Water Conservation Act of 2009 provides the regulatory framework to support the goal of achieving a statewide reduction in urban per capita water use described in the 20x2020 Water Conservation Plan (DWR, 2010). Consistent with SBX7-7, each water supplier must determine and report its existing baseline water consumption and establish water use targets in gallons per capita per day (GPCD), and compare actual water use against the target. This section identifies the water use targets in 2015 and 2020 to demonstrate a 20% reduction in per capita water use by 2020. PWD calculated its baseline and target per capita water demands, in accordance with Method No. 1 described in "*Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use*" (DWR Methodologies, 2011) The primary calculations required by SBX7-7 are summarized in Table 3-1.

Table 3-1 SBX7-7 Calculations

	2010 UWMP	**2015 UWMP**	**2020 UWMP**
Base Daily Water Use calculation (average GPCD used in past years)	First calculated and reported in 2010 plan	May be revised in 2015 Plan, must be revised if 2010 Census data not used in original calculation	Must use calculation from the 2015 plan
Interim Water Use Target (target GPCD in 2015)	First calculated and reported in 2010 plan	May be revised in 2015 Plan, must be revised if 2010 Census data not used in original calculation	May be revised in 2020 Plan under special circumstances
Compliance Water Use Target (target GPCD in 2020)	First calculated and reported in 2010 plan	May be revised in 2015 Plan, must be revised if 2010 Census data not used in original calculation	May be revised in 2020 Plan under special circumstances
Actual 2015 Water Use (in GPCD)	NA	In 2015 Plan must compare actual 2015 GPCD against 2015 target	Reported in the 2015 UWMP
Actual 2020 Water Use (in GPCD)	NA	NA	In 2020 Plan must compare actual 2020 GPCD against 2020 target

In the 2020 UWMP water agencies must demonstrate that the agency has met the 2020 Compliance Target by December 31, 2020. Compliance is done through review of the SBX7-7 Verification Tables and SBX7-7 Compliance Tables submitted with the 2020 Plan (included as Appendix F).

DWR requires that if an Agency prepared a 2015 UWMP it must use the baseline and target identified in its 2015 UWMP to determine compliance for 2020. Therefore, the methodology provided below is consistent with what was reported in PWD's 2015 UWMP.

The Base Daily Water Use calculation is based on gross water use by an agency in each year and can be based on a ten-year average ending no earlier than 2004 and no later than 2010 or a 15-year average if ten percent of 2008 demand was met by recycled water. Base Daily Water Use must account for all water sent to retail customers, excluding:

- Recycled water
- Water sent to another water agency
- Water that went into storage

It is at an agency's discretion whether or not to exclude agricultural water use from the Base Daily Water Use calculation. If agricultural water use is excluded from the Base Daily Water Use calculation it must also be excluded from the calculation of actual water use in later urban water management plans. PWD did not supply water to agriculture during the period 1995 to 2010 and so agricultural water does not factor into the baseline SBX7-7 calculations.

An urban retail water supplier must set a 2020 water use target (herein called the Compliance Water Use Target) and a 2015 interim target (herein called the Interim Water Use Target).

There are four methods for calculating the Compliance Water Use Target:

1. Eighty percent of the urban water supplier's baseline per capita daily water use
2. Per capita daily water use estimated using the sum of the following:
    a. For indoor residential water use, 55 gallons per capita daily water use as a provisional standard. Upon completion of DWR's 2016 report to the Legislature reviewing progress toward achieving the statewide 20 percent reduction target, this standard may be adjusted by the Legislature by statute.
    b. For landscape irrigated through dedicated or residential meters or connections, water use efficiency equivalent to the standards of the Model Water Efficient Landscape Ordinance set forth in section 490 et seq. of Title 23 of the California Code of Regulations, as in effect the later of the year of the landscape's installation or 1992.
    c. For CII uses, a ten percent reduction in water use from the baseline CII water use by 2020.
3. Ninety-five percent of the applicable state hydrologic region target as stated in the 2010 DWR "20x2020 Water Conservation Plan" (February 2010) (20x2020 Plan). PWD falls within the South Lahontan Hydrologic Region (95 percent target for this region is 162).

4. Reduce the 10 or 15-year Base Daily Per Capita Water Use a specific amount for different water sectors:
    a. Indoor residential water use to be reduced by 15 GPCD or an amount determined by use of DWR's "BMP Calculator".
    b. A 20 percent savings on all unmetered uses.
    c. A 10 percent savings on baseline CII use.
    d. A 21.6 percent savings on current landscape and water loss uses.

The Interim Water Use Target is set as a halfway point between the Base Daily Water Use GPCD and the 2020 Compliance Water Use Target GPCD.

Finally, the selected Compliance Water Use Target must be compared against what DWR calls the "Maximum Allowable GPCD". The Maximum Allowable GPCD is based on 95 percent of a 5-year average base gross water use ending no earlier than 2007 and no later than 2010. The Maximum Allowable GPCD is used to determine whether a supplier's 2015 and 2020 per capita water use targets meet the minimum water use reduction requirements of SBX7-7. If an agency's Compliance Water Use Target is higher than the Maximum Allowable GPCD, the agency must instead use the Maximum Allowable GPCD as its target. As shown below, the Maximum Allowable GPCD does not apply to the PWD. PWD chose to use Methodology No. 1 and calculated a 2020 GPCD target of 185.

3.1.1 Base Daily Per Capita Water Use

Figure 1-1 illustrates PWD's service area used to estimate the Base Daily Per Capita Water Use. Tables Table 3-2 and Table 3-3 summarize the Base Daily Water Use calculation for PWD. As is shown in these tables, the PWD is not eligible to use a 15-year base period. Years 1995 to 2004 have been selected for calculation of the 10-year base period while years 2003 to 2007 have been selected for calculation of the 5-year base period.

Table 3-2 Baseline Period Ranges

Baseline	Parameter	Value	Units
10 to 15 year baseline period	2008 total water deliveries	25,339	AFY
	2008 total volume of delivered recycled water	0	AFY
	2008 recycled water as a percent of total deliveries	0	Percent
	Number of years in baseline period[(a)]	10	Years
	Year beginning baseline period range	1995	-
	Year ending baseline period range[(b)]	2004	-
5 year baseline period	Number of years in baseline period	5	Years
	Year beginning baseline period range	2003	-
	Year ending baseline period range[(c)]	2007	-

Notes:

(a) If the 2008 recycled water percent is less than 10 percent, then the first baseline period is a contiguous 10-year period. If the amount of recycled water delivered in 2007 is 10 percent or greater, the first baseline period is a contiguous 10 to 15 year period.

(b) The ending year must be between December 31, 2004 and December 31, 2010.

(c) The ending year must be between December 31, 2007 and December 31, 2010.

In order to calculate Base Daily Per Capita Water Use for past years, it was necessary to develop population estimates for past years. The population for the PWD service area was calculated for 1990, 2000, 2010, 2015, and 2020 using the DWR online population tool (printout provided in Appendix F).

This was accomplished using a Geographic Information System (GIS) interface to derive population. By adding shape files for the entity service area boundaries or public water system boundary in 1990, 2000, 2010, 2015 and 2020 population is derived using U.S. Census Bureau census tract data from census years. Then, along with PWD production and service connections, the DWR population tool derives a person's-per-connection number, which is used to determine population in the intervening years between 1990 and 2010 and estimates population in 2020.

As shown in the top portion of Table 3-3 PWD's 10-year Baseline GPCD was calculated as 231. As shown in the second tier of Table 3-3 PWD's 5-year Baseline GPCD is 229.

Table 3-3 Baseline Daily Per Capita Use

Year		Service Area Population	Gross Water Use (AFY)	Daily Per Capita Water Use (GPCD)
10 to 15 Year Baseline GPCD				
1	1995	79,578	22,233	249
2	1996	88,785	23,514	236
3	1997	89,675	23,152	230
4	1998	90,540	20,626	203
5	1999	91,375	23,398	229
6	2000	92,172	25,901	251
7	2001	98,516	25,220	229
8	2002	99,649	25,670	230
9	2003	100,788	24,909	221
10	2004	104,237	26,684	229
10 to 15 Year Average Baseline GPCD				**231**
5 Year Baseline GPCD				
1	2003	100,788	24,909	221
2	2004	104,237	26,684	229
3	2005	104,120	26,128	224
4	2006	105,754	27,934	236
5	2007	107,396	28,152	234
5 Year Average Baseline GPCD				**229**
2015 Compliance Year				
	2015	118,227	17,015	**128**
2020 Compliance Year				
	2020	126,062	23,245	**165**

3.1.2 Compliance Water Use Targets

In addition to calculating base gross water use, the “20 by 2020” legislation requires that a retail water supplier identify its demand reduction targets. The methodologies for calculating demand reduction targets were described above. PWD chose to use Method 1, as shown in Appendix F.

As shown in Table 3-3 PWD had a 2020 GPCD of 165, which means PWD has met its 2020 Compliance Target of 185 as identified in Table 3-4.

Table 3-4 Components of Target Daily Per Capita Use

Period	Value	Unit
10-year period selected for baseline GPCD	*First Year 1995*	*Last Year 2004*
5-year period selected for maximum allowable GPCD	*First Year 2003*	*Last Year 2007*
Highest 10-year Average	231	GPCD
Highest 5-year Average	229	GPCD
Compliance Water Use Target (20% Reduction on 10yr)	185	GPCD
Max Allowable Water Use Target (5% Reduction 5yr)	218	GPCD
2015 Interim Target	**208**	GPCD
2020 Target	**185**	GPCD
Methodology Used	Option #1	

PWD plans to maintain progress on meeting the 20x2020 water use targets through the continuation of existing methods of conservation that have been proven successful to date, and other methods discussed in Section 8 Demand Management Measures.

Section 4: Water Supply

4.1 Overview

This section describes the water resources available to PWD for the 25-year period covered by this UWMP. PWD currently receives water from three sources: groundwater, surface water from Littlerock Dam Reservoir, and imported water from the SWP. Groundwater is obtained from the Antelope Valley Groundwater Basin. This water is treated with chlorine disinfection and pumped directly into the District's potable distribution system. PWD's imported water is provided by the SWP and is conveyed through the East Branch of the California Aqueduct to Lake Palmdale, which acts as a forebay for the PWD's 35 million gallon per day (MGD) water treatment plant. Lake Palmdale can store approximately 4,129 AF of SWP and Littlerock Dam Reservoir water.

PWD has developed recycled water supplies to offset potable water demand and to diversify its water supply. Additionally, PWD is developing new sources of supply via groundwater banking and anticipated new supplies from transfer and exchange opportunities. PWD does not currently, nor does it have plans to use stormwater.

PWD supplies are summarized in Table 4-1 and discussed in more detail below. Both currently available and planned supplies are discussed.

This section also assesses supplies available to PWD in an average year, a single dry year, and during multiple dry years.

- An average year (also called a normal year) is the average supply over a range of years and represents the median water supply available.
- The single-dry year is the year that represents the lowest water supply available.
- The multiple-dry year period is the lowest average water supply available for five consecutive dry years.

The term "dry" is used throughout this section and in subsequent sections concerning water resources and reliability as a measure of supply availability. As used in this Plan, dry years are those years when supplies are the lowest and demands are the highest, which occurs primarily when precipitation is lower than the long-term average precipitation. The impact of low precipitation in a given year on a particular source of supply may differ based on how low the precipitation is, or whether the year follows a high-precipitation year or another low-precipitation year. For the SWP, a low-precipitation year may or may not affect supplies, depending on how much water is in SWP storage at the beginning of the year. Also, dry conditions can differ geographically. For example, a dry year can be local to the Antelope Valley area (thereby affecting local groundwater replenishment and production, and yield from Littlerock Dam Reservoir), local to northern California (thereby affecting SWP water deliveries), or statewide (thereby affecting both local groundwater and the SWP). When the term "dry" is used in this Plan, statewide drought conditions are assumed, affecting both local groundwater and SWP supplies at the same time.

Table 4-1 Summary of Current and Projected Supplies

		2020		2025	2030	2035	2040	2045
	Detail	Actual Volume (AF)	Level of Treatment	Reasonably Available Volume (AF)	Reasonably Available Volume (AF)	Reasonably Available Volume (AF)	Reasonably Available Volume (AF)	Reasonably Available Volume (AF)
Existing Supplies								
Groundwater[(a)]	Antelope Valley Groundwater Basin	7,600	Drinking Water	4,220	2,770	2,770	2,770	2,770
Groundwater[(a)]	Return Flow Credit	4,090	Drinking Water	5,000	5,000	5,000	5,000	5,000
Groundwater	Groundwater or Surface Water Augmentation	0	Drinking Water	5,325	5,325	5,325	5,325	5,325
Surface Water[(b)]	Littlerock Reservoir	4,540	Raw Water	4,000	4,000	4,000	4,000	4,000
Imported Water[(c)]	SWP Table A	5,695	Raw Water	12,030	11,720	11,400	11,080	11,080
Imported Water	Butte Transfer Agreement[(d)]	1,320	Raw Water	5,650	5,500	5,350	5,200	5,200
Recycled Water[(f)]	LACSD[(e)]	70	Recycled Water	500	1,000	1,500	2,000	2,000
	Total Supplies	**23,315**	**-**	**36,725**	**35,315**	**35,345**	**35,375**	**35,375**

Notes: Modified from DWR Table 6-9

Values are rounded.

(a) See Section 4.2.1.3 for details.
(b) Projections based on estimated 50 percent of average historical yield (50 percent of 8,000 AFY). See Section 4.2.2.2.
(c) Supplies are linearly adjusted between “existing” and “future conditions” found in 2019 DCR technical addendum.
(d) For details see Section 4.2.3.
(e) Direct Reuse.
(f) See Section 5 for details.

4.2 Local Water Supplies

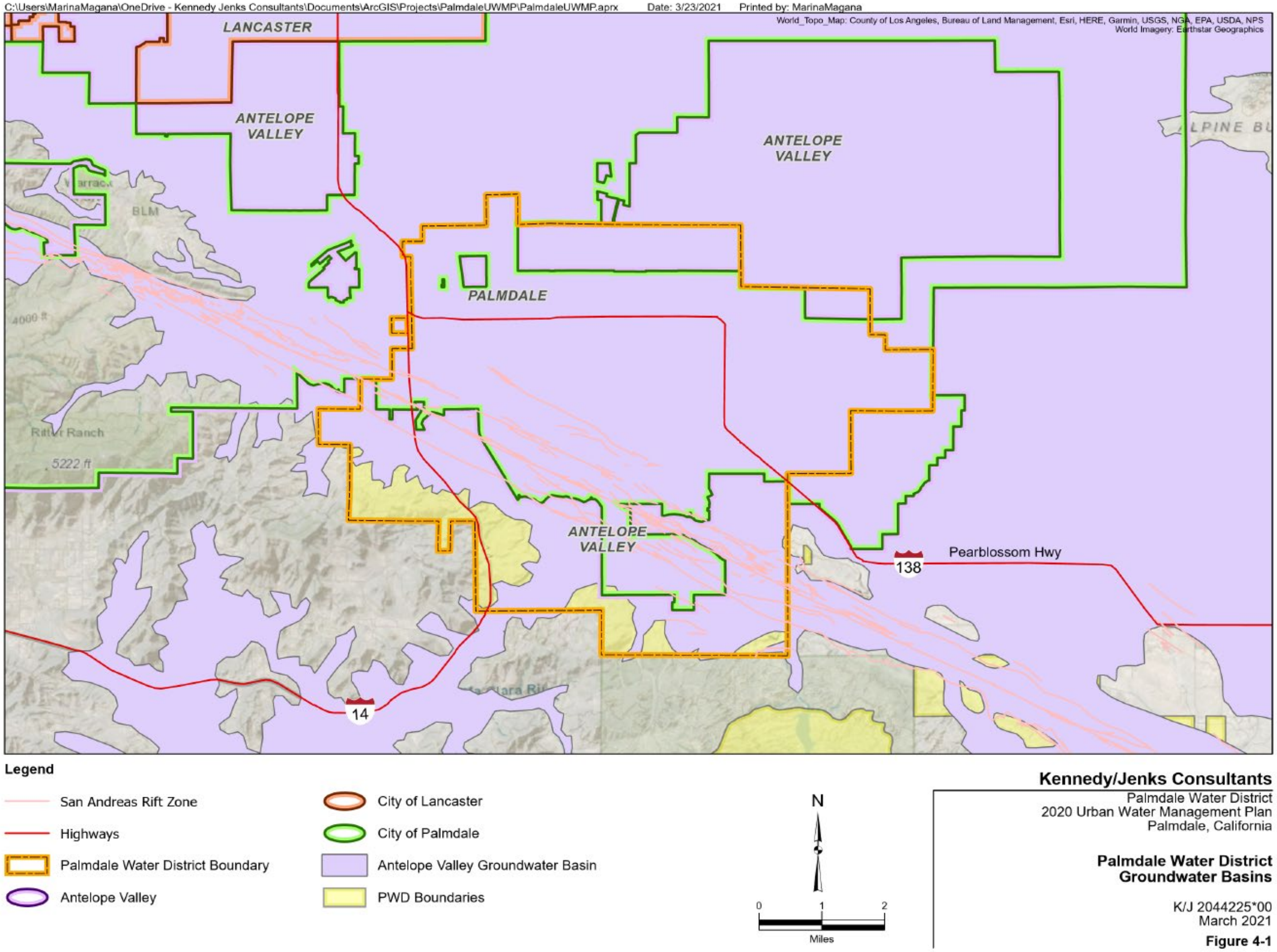
4.2.1 Groundwater

Groundwater pumping currently makes up a significant proportion of PWD’s water supply portfolio, accounting for about 35 percent of supplies over the last five years. PWD’s groundwater supply is the Antelope Valley Groundwater Basin (DWR Basin No. 6-44, Bulletin 118), (Figure 4-1) where there are 22 active wells currently drawing from the aquifer. This water is treated with chlorine disinfection and pumped directly into PWD’s potable distribution system.

Since 2015, PWD has produced on average 6,380 AF of groundwater per year. The availability of groundwater supply for PWD does not vary throughout the course of a year.

Figure 4-1 Groundwater Basins

C:\Users\MarinaMagana\OneDrive - Kennedy Jenks Consultants\Documents\ArcGIS\Projects\PalmdaleUWMP\PalmdaleUWMP.aprx Date: 3/23/2021 Printed by: MarinaMagana

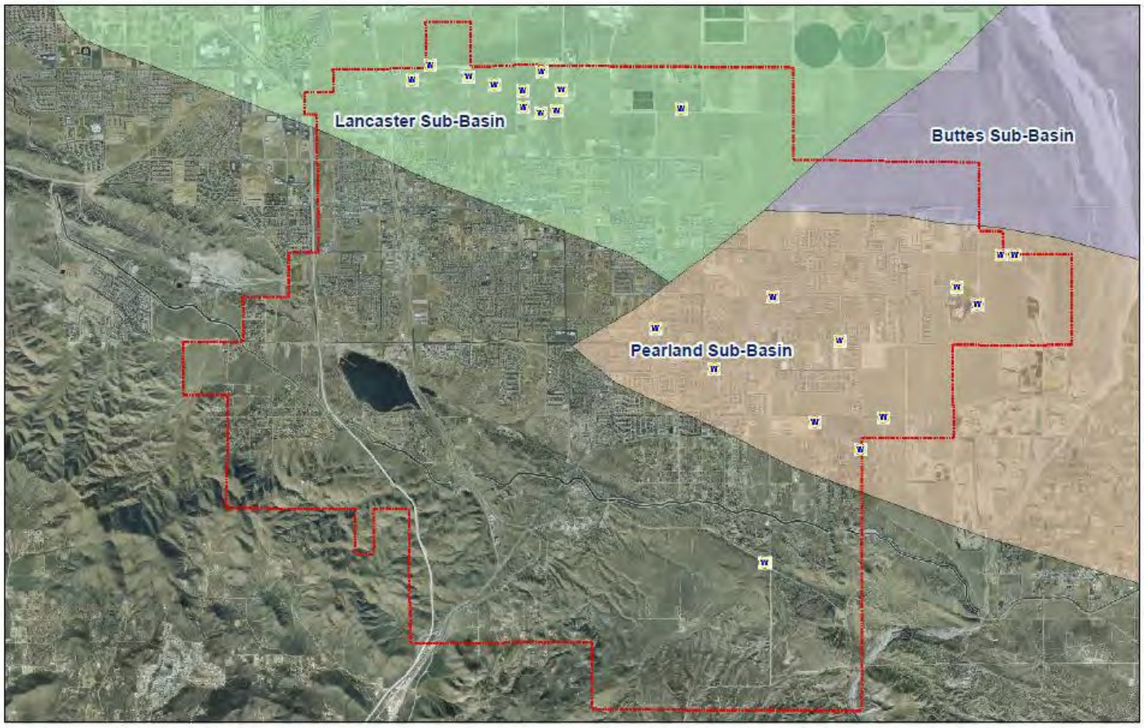


World_Topo_Map: County of Los Angeles, Bureau of Land Management, Esri, HERE, Garmin, USGS, NGA, EPA, USDA, NPS
World Imagery: Earthstar Geographics

4.2.1.1 Groundwater Subbasins

The U.S. Geological Survey has identified a series of subbasins in the Antelope Valley Groundwater Basin. PWD service area overlies the Lancaster, Buttes, and Pearland groundwater subbasins as shown in Figure 4-2. The boundaries between the three subbasins are determined by discontinuity or by steepening of the groundwater surface as measured in wells, rather than by surface evidence of faults. Movement of groundwater from the Pearland and Buttes subbasins to the Lancaster subbasin is slowed across these boundaries. The total amount of water transferred between these three subbasins is unknown (RMC 2011).

Figure 4-2 Groundwater Subbasins



Note: The red outline on this map is the PWD service area. This map does not include the San Andreas Rift Zone.

4.2.1.1.1 Lancaster Subbasin

The Lancaster subbasin is located in the center of the Antelope Valley Groundwater Basin with its southernmost portions lying within the PWD service area. It is bounded by bedrock to the south and by the Buttes and Pearland subbasins to the east. Alluvium in this subbasin reaches a thickness of about 1,100 feet in the northern portion of the service area. Two aquifer zones occur in this subbasin. The principal (upper) aquifer is confined and is several hundred feet thick within the PWD service area. PWD has 12 wells in the Lancaster subbasin. Currently, PWD operates 10 wells in the Lancaster subbasin, with a pumping capability of approximately 12,500 gallons per minute (gpm).

4.2.1.1.2 Buttes Subbasin

The Buttes subbasin is located southeast of the Lancaster subbasin. A small portion underlies the PWD service area. PWD does not currently have any wells or pump water from this subbasin. The aquifer zone consists of approximately 150 feet of saturated alluvial deposits.

4.2.1.1.3 Pearland Subbasin

The Pearland subbasin is also located southeast of the Lancaster Subbasin. This subbasin is bounded on the south by bedrock, on the north by a fault separating it from Buttes subbasin and on the West by the basin boundary. The northern most portion of the subbasin lies within the PWD service area. A single aquifer zone occurs within the Pearland subbasin and consists of approximately 250 feet of saturated alluvial deposits. PWD has 11 wells in the Pearland subbasin. Currently, PWD operates 10 wells in the Pearland subbasin, with a pumping capability of 3,500 gpm.

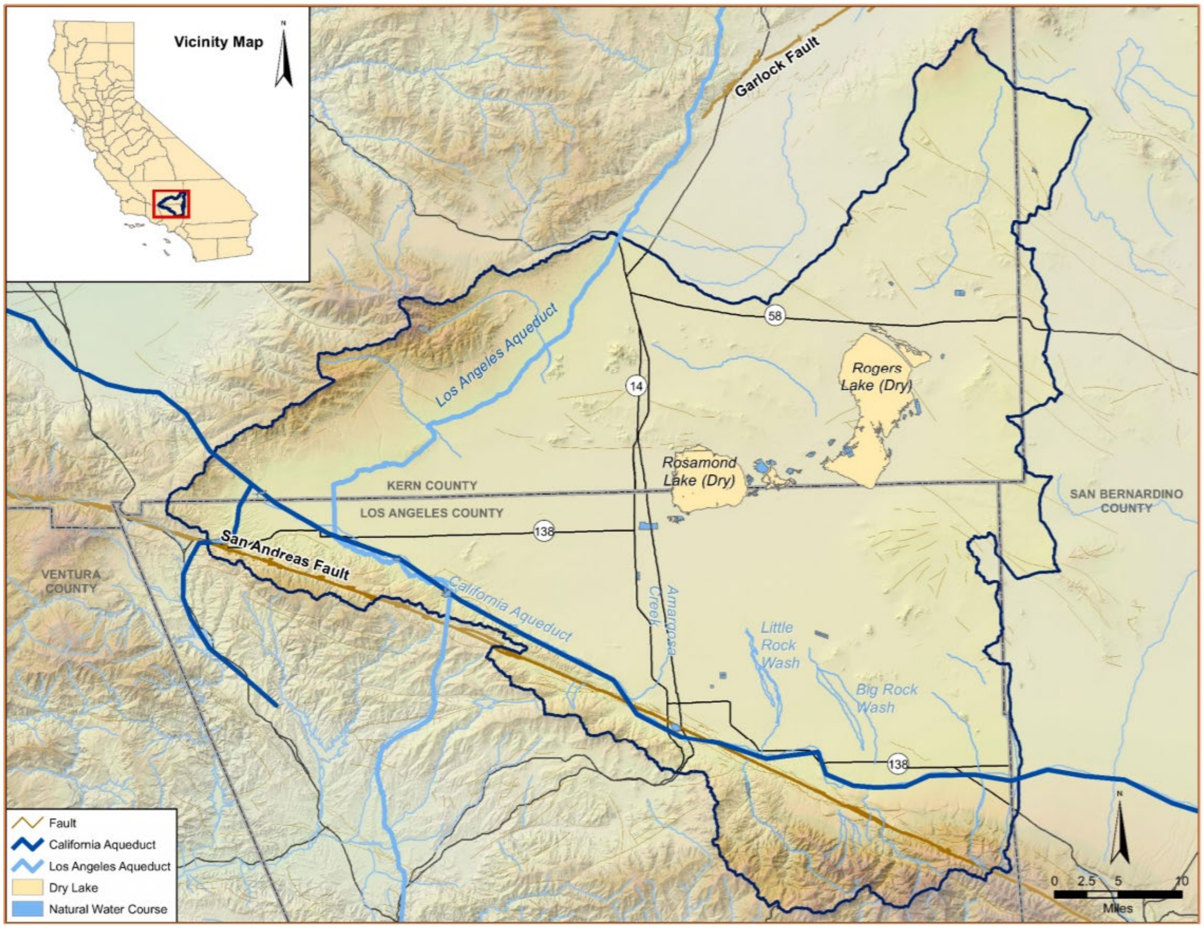
4.2.1.1.4 San Andreas Rift Zone

The San Andreas rift zone, widely known as the San Andreas Fault, has two general groundwater-bearing areas. These areas generally lie east and west of the intersection of Pearblossom Highway and Barrel Springs Road. The area to the east is a narrow valley, with poor groundwater production potential. The area to the west is a broader valley with more extensive groundwater-bearing deposits. PWD has 4 wells in the San Andreas rift zone, 2 in the western area and 2 in the eastern area.

Currently, PWD operates 3 of these wells, pumping approximately 150 AF each year.

The depth to water along the San Andreas rift zone is generally about 25 feet below the ground surface, with a seasonal groundwater level fluctuation of 15 feet. Over the long term, groundwater levels in sediments within the fault zone have remained relatively stable, suggesting that the groundwater-bearing sediments have not been overdrawn. The rift zone is shown on Figure 4-3 as the “San Andreas Fault”.

Figure 4-3 Antelope Valley Hydrologic Features



Source: 2019 Antelope Valley Integrated Regional Water Management Plan

4.2.1.2 Historical Groundwater Pumping

Total groundwater pumped from the Antelope Valley Groundwater Basin 2016-2020 by PWD is shown in Figure 4-2. PWD’s groundwater supplies accounted for 13 to 39 percent of PWD’s potable water supplies between 2016 and 2020. The projected groundwater pumping volumes are discussed in Section 4.2.1.3. As described in that section, pumping in the Antelope Valley Groundwater Basin will decrease in the future due to the adjudication process.

Table 4-2 Historical Pumping By PWD From the Antelope Valley Groundwater Basin (AF)

Basin Name	2016	2017	2018	2019	2020	Average
Antelope Valley	8,470	5,350	6,060	4,430	7,600	6,380

Note: Modified from DWR Table 6-1.
Values are rounded.
Source: PWD Groundwater pumping spreadsheet; 2016-2020.

4.2.1.3 Adjudication and Projected Groundwater Pumping

PWD is one of the entities involved in the adjudication of groundwater rights for the Antelope Valley Groundwater Basin that began in 2004. As part of an adjudication process, the court determines all the water rights in the basin, and orders either the reduction of groundwater extractions to levels that will stabilize or reverse groundwater level declines, or the purchase of imported water to replace over extraction of groundwater, or both. The adjudication allows groundwater banking between entities and allows PWD to take any additional groundwater banked.

In late 2015, PWD as well as the majority of parties involved agreed to a stipulated judgment for the adjudication of the Antelope Valley Groundwater Basin[1]. Per the judgment, PWD is receiving a groundwater production right of 2,770 AFY. The judgment is being appealed, but the PWD believes that it is unlikely that its groundwater production right will change significantly as a result of the appeal. Prior to the judgment, PWD had an unquantified right to pump water for beneficial use and assumed projected pumping volumes of up to 12,000 AF based on pumping capacity.

The judgment allows pumpers seven years, until 2023, to ramp down pumping and come into compliance with the judgement. PWD opted out of the seven year ramp down period and has been in full compliance with the judgement, pumping within its final adjudicated right since 2016.

In addition to its groundwater production right, PWD is entitled to a share of the unused federal reserved right. The judgment gives the federal government a right to pump 7,600 AFY, but it does not currently pump that much. The amount that the federal government does not pump is allocated among certain public water suppliers. Currently, the average amount of PWD’s share of unused Federal Reserved Water Right Production is 1,450 AFY. Although the federal government has the right to increase its pumping at any time, PWD believes that it will be able to pump this amount at least until 2025. Groundwater pumping projects are shown in Table 4-3.

PWD is also entitled to a pumping allocation for return flow credit of imported water used. The return flow credit is equal to 39.1 percent of all of the SWP water utilized by PWD either for direct use via the Leslie O. Carter Water Treatment Plant (WTP) or pumped following for recharge at existing or future banking projects. Return flows credits are available to PWD following delivery to the Littlerock Reservoir or after banked imported water has been pumped. Based on the analyses conducted in planning reports return flow credits are projected to range between approximately 4,900 AFY and 6,000 AFY through 2040. For purposes of supply projections in this UWMP, 5,000 AFY in return flow credits are assumed to be available through 2045, for all water year types. These projections are shown in Table 4-4.

Finally, under the judgment (provided in Appendix G), PWD is able to purchase or lease groundwater rights from other parties. It is expected that additional rights will be available to the PWD throughout the period covered by this plan, if needed.

Table 4-3 Projected Pumping of Adjudicated Right From the Antelope Valley Groundwater Basin (AF)

Basin Name	2025 [(a)(b)]	2030	2035	2040	2045
Antelope Valley					
Normal Year	4,220	2,770	2,770	2,770	2,770
Single Dry Year	4,220	2,770	2,770	2,770	2,770
Multiple Dry Year	4,220	2,770	2,770	2,770	2,770

Source: Adjudication Court Order Judgment, 2015
Notes: Modified from DWR Tables 6-9, 7-2, 7-3, 7-4.
Values are rounded.
(a) PWD has been in compliance with the lowered groundwater right by 2025 as stipulated by the adjudication judgment.
(b) Values include both the PWD's production right and its share of the unused federal reserved right. Federal reserve right only projected out to 2025.

Table 4-4 Projected Groundwater Return Flow Credits (AF)

Water Source	2025	2030	2035	2040	2045
Return Flow Credit(a)	5,000	5,000	5,000	5,000	5,000

Note: Modified from DWR Table 6-9
(a) Assumes same availability for all water year types.

4.2.1.4 Groundwater Management Plan

PWD has not adopted a groundwater management plan, and no regional groundwater management plan currently exists for the basin. The adjudication, however, includes a court-ordered physical solution, which is a plan for managing groundwater. This court order is included as Appendix G.

In 2014 the Sustainable Groundwater Management Act (SGMA) was passed. SGMA requires the formation of local groundwater sustainability agencies (GSAs) that must assess conditions in their local groundwater basins and adopt locally based management plans. For those basins DWR has identified as medium to high priority (the Antelope Valley Groundwater Basin is a low-priority basin), SGMA requires GSAs to implement plans and achieve long-term groundwater sustainability. However, because the superior court issued a final judgment in the adjudication, the Antelope Valley Basin is exempt from the requirements of SGMA.

4.2.1.5 Groundwater Reliability

The most recent version of DWR's Bulletin 118, California's Groundwater (2019), does not characterize the groundwater basin as overdrafted, however it was deemed a 'low-priority' basin by DWR. It is noted that the prior versions of Bulletin 118 (1980 and 2003) identified the Antelope Valley groundwater basin as overdrafted and 'high-priority', respectively. The court in the ongoing adjudication referred to above made a finding that the basin is overdrafted, and PWD agrees with that finding. The adjudication judgment and physical solution will eliminate, over time, the long-term overdraft, either by reduction of pumping or the purchase of replacement water. Additional detail is provided in Section 4.2.1.3.

4.2.2 Local Surface Water

Littlerock Dam Reservoir was built in 1922. This reservoir constitutes PWD's local surface water supply source and is located in the hills southwest of the PWD service area. Recent renovations to Littlerock Dam Reservoir have increased its designed storage capacity to 3,500 AF.

The principal tributary streams that supply water to the PWD service area are Littlerock and Big Rock Creeks, which flow north from the San Gabriel Mountains along PWD's southern boundary. Numerous intermittent streams also flow into the service area, however run-off is meager. The Littlerock Dam Reservoir intercepts flows from Littlerock and Santiago Canyons. Runoff from the 65 square mile watershed in the Angeles National Forest to the reservoir is seasonal and varies widely from year to year. Although Littlerock Creek flows mainly during winter and spring months, this is buffered somewhat by Littlerock Dam Reservoir, allowing this water to be available throughout the year. The water is transferred from Littlerock Dam Reservoir through an eight and a half mile long open ditch to Lake Palmdale.

4.2.2.1 Local Surface Water Entitlements

PWD and Littlerock Creek Irrigation District (LCID) jointly hold long-standing water rights to divert 5,500 AFY from Littlerock Creek flows. Per an agreement between the two districts, the first 13 cubic feet per second (cfs) of creek flows is available to LCID (with modifications as described below). Any flow above 13 cfs is shared between the two districts with 75 percent going to the PWD and 25 percent to LCID. Each district is entitled to 50 percent of the reservoir's storage capacity. PWD anticipates taking approximately 4,000 AF per year from Littlerock Dam Reservoir.

In 1992, during renegotiations of the PWDs' Littlerock Creek Dam and Reservoir Rehabilitation, Operation and Maintenance agreement, a plan to rehabilitate the existing dam was implemented. The plan involved reinforcing the original multiple-arch construction with roller-compacted concrete buttress, raising the dam by 12 feet to increase capacity, providing recreational facilities around the reservoir, and replacing the historic wooden trestle between the creek and the reservoir with an underground siphon. The entire project was completed by the end of 1995. This revised agreement gave PWD the authority to manage the reservoir.

LCID granted ownership of its water rights to PWD for the fifty-year term of the agreement in-lieu of contributing financial resources for the rehabilitation work. Most recently, PWD completed a sediment removal project to remove more than 1.16 million cubic yards of sediments that had built up behind the dam since 1992, and which were reducing storage capacity by 500 AF. LCID is currently entitled to purchase from PWD, in any one calendar year, 1,000 AF of water or 25 percent of the yield from Littlerock Dam Reservoir, whichever is less.

4.2.2.2 Historical and Projected Local Surface Water Production

PWD's historical and current production from Littlerock Dam Reservoir is shown in Table 4-5. Historically PWD's local surface water production accounts for approximately 1 to 10 percent of its water supplies. The projected local surface water production from Littlerock Dam Reservoir is shown in Table 4-6. For surface water from Littlerock Reservoir, PWD used the driest year on record of 1951. Thus, PWD expects to use 4,000 AF of its diversion rights under normal, single-dry, and multiple-dry year conditions. This amount is calculated as 50 percent of the average available yield from Littlerock Reservoir (50 percent of 8,000 AF) and is considered to be available for supply in all years.

Table 4-5 Historical Surface Water Supplies (AF)

Water Source	2016	2017	2018	2019	2020	Average
Littlerock Reservoir	-	970	3,140	3,130	4,540	2,950

Source: PWD Public Water System Statistics. Note: Values are rounded.

Table 4-6 Projected Surface Water Supplies (AF)

Water Source	2025	2030	2035	2040	2045
Littlerock Reservoir					
Normal Year	4,000	4,000	4,000	4,000	4,000
Single Dry Year	4,000	4,000	4,000	4,000	4,000
Multiple Dry Year	4,000	4,000	4,000	4,000	4,000

Source: Personal Communication, PWD, April 2021.
Note: Modified from DWR Table 6-9, 7-2, 7-3, 7-4

4.2.3 Imported Water

PWD is one of 29 water agencies (commonly referred to as "contractors") that have a SWP Water Supply Contract with DWR. Each SWP contractor's Water Supply Contract contains a "Table A," which lists the maximum amount of contract water supply, or "Table A water," an agency may request each year throughout the life of the contract. The Table A Amounts in each contractor's SWP Water Supply Contract ramped up over time, based on projections at the time the contracts were signed, of future increases in population and water demand, until they reached a maximum Table A Amount.

The total planned annual delivery capability of the SWP and the sum of all Contractors' maximum Table A amounts was originally 4.23 million AF. The initial SWP storage facilities were designed to meet Contractors' water demands in the early years of the SWP, with the construction of additional storage facilities planned as demands increased. However, essentially no additional SWP storage facilities have been constructed since the early 1970s. SWP conveyance facilities were generally designed and have been constructed to deliver maximum Table A Amounts to all contractors. After the permanent retirement of some Table A Amount by two agricultural contractors in 1996, the maximum Table A amounts of all SWP contractors now totals about 4.13

million AF. Currently, PWD's annual Table A Amount is 21,300 AF. Over the last decade, PWD has received between 13 percent and 78 percent of its 21,300 AF contractual amount.

4.2.3.1 Historical Imported Water Deliveries

PWD's recent SWP deliveries are shown in Table 4-7. Since 2011, imported water has accounted for approximately 13 to 66 percent of the PWD's water supply.

Table 4-7 Historical Imported Water Supplies (AF)

Water Source	2016	2017	2018	2019	2020	Average
Imported SWP	10,516	13,858	10,210	12,066	7,016	10,733

Source: DWR Annual Finalization Report – Water File.

4.2.3.2 Projected Imported Water Supplies

Projected imported water supplies for the planning period are provided in Table 4-8 and Table 4-9. The development of these projections is complex and details of the considerations in developing imported water supply projections are provided in Sections 4.2.3.3 through 4.2.3.13.

Table 4-8 PWD Imported Water Supply Reliability Average, Single-Dry Year, and Multiple-Dry Year Conditions

Imported SWP Supplies	2025	2030	2035	2040	2045
PWD Table A Allocation	21,300	21,300	21,300	21,300	21,300
Average Water Year[a]					
% of Table A Amount Available [e]	56.5%	55%	53.55%	52%	52%
Anticipated Deliverables (AF)[b]	12,030	11,720	11,400	11,080	11,080
Single-Dry Year [b]					
% of Table A Amount Available	7%	8%	9%	10%	10%
Anticipated Deliveries (AF)[d]	1,490	1,705	1,915	2,130	2,130
Multiple-Dry Year [c]					
% of Table A Amount Available	29%	26.5%	24%	21%	21%
Anticipated Deliveries (AF)[d]	6,180	5,645	5,110	4,470	4,470

Notes:

(a) Supplies to the PWD are based on DWR analyses presented in its "2019 State Water Project Delivery Capability Report, Technical Memorandum" (2019 DCR), assuming existing SWP facilities and current regulatory and operational constraints.
(b) Based on a repeat of the worst case historic single dry year of 1977 (from 2019 DCR).
(c) Supplies shown are annual averages over four consecutive dry years, based on a repeat of the historic four- year dry period of 1931-1934.
(d) Values are rounded.
(e) Supplies are linearly adjusted between "existing" and "future conditions" found in 2019 DCR technical addendum.

The projected imported water deliveries to PWD are shown in Table 4-9.

Table 4-9 Projected Imported Water Supplies (AF)

Water Source	2025	2030	2035	2040	2045
Imported SWP Supplies					
Normal Year	12,030	11,720	11,400	11,080	11,080
Single-Dry Year	1,490	1,705	1,915	2,130	2,130
Multiple-Dry Year	6,180	5,645	5,110	4,470	4,470

Source: See Table 4-8
Note: Modified from DWR Tables 6-9, 7-2, 7-3, and 7-4

4.2.3.3 Imported Water Reliability

SWP supplies originate in northern California, primarily from the Feather River watershed. The availability of these supplies is dependent on the amount of precipitation in the watershed, the amount of that precipitation that runs off into the Feather River, water use by others in the watershed and the amount of water in storage in the SWP's Lake Oroville at the beginning of the year. Variability in the location, timing, amount, and form (rain or snow) of precipitation, as well as how wet or dry the previous year was, produces variability from year to year in the amount of water that flows into Lake Oroville. However, Lake Oroville acts to regulate some of that variability, storing high inflows in wetter years that can be used to supplement supplies in dry years with lower inflows.

As discussed in Section 1.9 and in DWR's 2019 Delivery Capability Report (DCR), climate change adds another layer of uncertainty in estimating the future availability of SWP source water. Current literature suggests that global warming may change precipitation patterns in California from the patterns that occurred historically. While different climate change models show differing effects, potential changes could include higher temperatures and more precipitation falling in the form of rain rather than snow and earlier snowmelt, which would result in more runoff occurring in the winter rather than spread out over the winter and spring.

DWR prepares a biennial report to assist SWP contractors (including PWD) and local planners in assessing the near and long-term availability of supplies from the SWP. DWR issued its most recent update, the 2019 DCR, in August 2020. In the 2019 DCR, DWR provides SWP supply estimates for SWP contractors to use in their planning efforts, including for use in their 2020 UWMPs. The 2019 DCR includes DWR's estimates of SWP water supply availability under both current and future conditions.

DWR's estimates of SWP deliveries are based on a computer model that simulates monthly operations of the SWP and Central Valley Project systems. Key inputs to the model include the facilities included in the system, hydrologic inflows to the system, regulatory and operational constraints on system operations, and contractor demands for SWP water. In conducting its model studies, DWR must make assumptions regarding each of these key inputs.

In the 2019 DCR for its model study under existing conditions, DWR assumed: existing facilities, hydrologic inflows to the model based on 82 years of historical inflows (1922 through 2003), current regulatory and operational constraints including 2018 Coordinated Operations Agreement Amendment (see section 4.2.3.6), 2019 biological opinions and 2020 Incidental Take Permit (see section 4.2.3.12), and contractor demands at maximum Table A Amounts. The long-term average allocation reported in the 2019 DCR for the existing conditions study provide appropriate estimate of the SWP water supply availability under current conditions.

To evaluate SWP supply availability under future conditions, the 2019 DCR included a model study representing hydrologic and sea level rise conditions in 2040. The future condition study used all of the same model assumptions as the study under existing conditions, but reflected changes expected to occur from climate change, specifically, projected temperature and precipitation changes centered around 2035 (2020 to 2049) and a 45 cm sea level rise. For the long-term planning purposes of this UWMP, the long-term average allocations reported for the future conditions study from 2019 DCR is the most appropriate estimate of future SWP water supply availability.

SWP Public Water Agencies (PWAs) can rely on the main contractor tables or alternate tables in DCR. In the 2019 DCR, DWR estimates that for all contractors combined, the SWP can deliver on a long-term average basis a total Table A supply of 58 percent of total maximum Table A Amounts under current conditions to 52 percent under future conditions. In the single critically dry year, DWR estimates the SWP can deliver a total Table A supply of 7 under current conditions to 10 percent under future conditions. For this 2020 UWMP, for PWD the 5-year multiple dry year scenario, assuming a repeat of years 1931 to 1934, an average was assumed. Given a repeat of hydrologic conditions 1931 to 1934 the SWP is expected to deliver 29 percent of the PWD's Table A allocation during existing conditions to 21 percent for future conditions.

4.2.3.3.1 Lowest SWP Water Supply Allocation

DWR's 2019 Delivery Capability Report indicates that the modeled single dry year SWP water supply allocation is 7 percent under the existing conditions. However, historically the lowest SWP allocations were at 5 percent in 2014. Due to extraordinarily dry conditions in 2013 and 2014, the initial 2014 SWP allocation was a historically low 5 percent of Table A Amounts, was later reduced to 0 percent in January 2014, and was later raised back to 5 percent, the lowest ever final total SWP water supply allocation. The circumstances that led to the low 2014 SWP water supply allocation were unusual, and although possible, likely have a low probability of occurrence.

Each year by October 1, SWP contractors submit their requests for SWP supplies for the following calendar year. By December 1, DWR estimates the available water supply for the following year and sets an initial supply allocation based on the total of all contractors' requests, current reservoir storage, forecasted hydrology through the next year, and target reservoir storage for the end of the next year. The most uncertain of these factors is the forecasted hydrology. In setting water supply allocations, DWR uses a conservative 90 percent hydrologic forecast, where nine out of ten years will be wetter and one out of ten years drier than assumed. DWR re-evaluates its estimate of available supplies throughout the runoff season of winter and early spring, using updated reservoir storage and hydrologic forecasts, and revises SWP supply allocations as warranted. Since most of California's annual precipitation falls in the winter and early spring, by the end of spring the supply available for the year is much more certain, and in most years DWR issues its final SWP allocation by this time. While most of the water supply is certain by this time, runoff in the late fall remains somewhat variable as the next year's runoff season begins. A drier than forecasted fall can result in not meeting end-of-year reservoir storage targets, which means less water available in storage for the following year.

Water year 2013 was a year with two hydrologic extremes.1 October through December 2012 was one of the wettest fall periods on record but was followed by the driest consecutive 12 months on record. The supply allocation for 2013 was a low 35 percent allocation. However, the 2013 hydrology ended up being even drier than DWR's conservative hydrologic forecast, so the SWP began 2014 with reservoir storage lower than targeted levels and less stored water available for 2014 supplies. Compounding this low storage situation, 2014 also was a critically dry year, with runoff for water year 2014 the fourth driest on record.

The exceedingly dry sequence from the beginning of January 2013 through the end of 2014 was one of the driest two-year periods in the historical record. As noted above, the circumstances that led to the low 2014 SWP water supply allocation were unusual, and likely have a low probability of occurrence in the future. Thus, the assumption for SWP contractors such as PWD is that a 5 percent allocation represents the "worst-case" scenario.

4.2.3.3.2 SWP Contract Amendments for 2020 UMWP

DWR provides water supply from SWP to 29 SWP Contractors (Contractors) in exchange for Contractor payment of all costs associated with providing that supply. DWR and each of the Contractors entered into substantially uniform long-term water supply contracts (Contracts) in the 1960s with 75-year terms. The first Contract terminates in 2035, and most of the remaining Contracts terminate within three years after that.

The majority of the capital costs associated with the development and maintenance of the SWP is financed using revenue bonds. These bonds have historically been sold with 30-year terms. It has become more challenging in recent years to affordably finance capital expenditures for the SWP because bonds used to finance these expenditures are limited to terms that only extend to the year 2035, less than 30 years from now. To ensure continued affordability of debt service to Contractors, it was necessary to extend the termination date of the Contracts to allow DWR to continue to sell bonds with 30-year terms.

Public negotiations to extend the Contracts took place between DWR and the Contractors during 2013 and 2014. An Agreement in Principle (AIP) was reached and was the subject of analysis under the requirements of the California Environmental Quality Act (CEQA) (Notice of Preparation dated September 12, 2014). On December 11, 2018 DWR Director approved the Water Supply Contract Extension Project. In accordance with CEQA, DWR also filed its Notice of Determination for the project with the Governor's Office of Planning and Research. In addition, DWR filed an action in Sacramento County Superior Court to validate the Contract Extension Amendments (https://water.ca.gov/Programs/State-Water-Project/Management/Water-Supply-Contract-Extension). After CEQA was completed and contract language was finalized, DWR and 18 contractors have executed the Extension Amendment. The Extension Amendment extends the contracts through 2085 and improve the project's overall financial integrity and management. The Extension Amendment is the subject to a validation action and two CEQA lawsuits.

4.2.3.3.3 Water Management Tools

In a December 2017 Notice to Contractors, DWR indicated its desire to supplement and clarify the water management tools through this public process. Seeking greater flexibility to manage the system in order to address changes in hydrology and further constraints placed on DWR's operation of the SWP, PWAs and DWR conducted public negotiations in 2017 to improve water management tools (WMT Amendment). The goal of the negotiations was to develop concepts to supplement and clarify the existing SWP Contract's water transfer and exchange provisions to provide improved water management amongst the PWAs. Importantly, the transfers and exchanges provided for in the contract amendment are limited to those transfers and exchanges amongst the PWAs with SWP Contracts.

In June 2018, PWAs and DWR completed an AIP which included specific principles to accomplish this goal. These principles included adding contract language to include a process for transparency for transfers and exchanges. The principles also include amending existing contract provisions to provide new flexibility for single and multi-year non-permanent water transfers, allowing PWAs to set terms of compensation for transfers and exchanges, and providing for the limited transfer of carryover and Article 21 water.

In October 2018, a Draft Environmental Impact Report (DEIR) was circulated for the contract amendments. The AIP at that time included cost allocation for the California WaterFix project (WaterFix). In early 2019, the Governor decided not to move forward with WaterFix and DWR rescinded its approvals for WaterFix. After this shift, the PWAs and DWR held a public negotiation session and agreed to remove the WaterFix cost allocation sections from AIP, but to keep all the water management provisions in the AIP. The AIP for water management provisions was finalized on May 20, 2019. In February 2020, DWR amended and recirculated the Partially Recirculated DEIR for the State Water Project Supply Contract Amendments for Water Management and in August 2020, DWR certified the Final EIR. The EIR is being challenged in court. The WMT Amendment is effective when 24 SWP PWAs approve the amendment. The transfer and exchange tools will be available during litigation unless there is a final court order prohibiting their implementation.

4.2.3.3.4 Delta Conveyance Project

The third set of amendments would allocate Delta Conveyance Project costs and benefits among the SWP PWAs. Public negotiations between DWR and PWA’s for the Delta Conveyance Project began in 2019 and were completed in April 2020. These negotiations led to an AIP for an Amendment to the State Water Contract regarding the Delta Conveyance Project. The Parties’ goal was to equitably allocate costs and benefits of a Delta Conveyance Facility and to preserve SWP operational flexibility. A decision by each participating PWA for approving a contract amendment with DWR would not occur until after the environmental review for the Delta Conveyance Project is completed. That decision would likely occur in 2023, at the earliest.

4.2.3.3.5 Coordinated Operations Agreement (COA)

The Coordinated Operation Agreement (COA) was originally signed in 1986 and defines how the state and federal water projects share the available water supply and the obligations including senior water right demands, water quality and environmental flow requirements imposed by regulatory agencies. The agreement calls for periodic review to determine whether updates are needed considering changed conditions. After completing a joint review process, DWR and Reclamation agreed to an addendum to the COA in December 2018, to reflect water quality regulations, biological opinions and hydrology updated since the agreement was signed.

The COA Addendum includes changes to the percentages for sharing responsibilities for in basin uses, sharing available export capacity, and the review process. The 1986 Agreement required the Central Valley Project (CVP) to meet 75 percent of the in basin uses and the SWP to meet 25 percent. The COA Addendum now distinguishes responsibility based on water year type and CVP responsibilities range from 80 percent in wet years to 60 percent in critical years. SWP responsibility ranges from 20 percent in wet years to 40 percent in critical years. Additionally, the

COA Addendum changed sharing export capacity. Previously, export capacity was shared 50 percent to CVP and 50 percent to SWP. The COA addendum changed this formula to be 65 percent CVP and 35 percent SWP during balanced conditions and 60 percent CVP and 40 percent SWP during excess conditions. Overall, based on modeling, these change results in an approximately 115,000 AFY on average reduction in SWP supplies.

Finally, the 2018 COA Addendum updated the review process to require review of the COA Agreement and Addendum every 5 years. Litigation regarding the COA addendum environmental review is ongoing. The litigation is unlikely to change the negotiated COA addendum and implementation has already begun.

4.2.3.3.6 Delta Conveyance Project

Consistent with Executive Order N-10-19, in early 2019, the state announced a new single tunnel project, which proposed a set of new diversion intakes along Sacramento River in the north Delta for SWP. In 2019 DWR initiated planning and environmental review for a single tunnel Delta Conveyance Project (DCP) to protect the reliability of supplies from the effects of climate change and seismic events, among other risks. DWR's current schedule for the DCP environmental planning and permitting extends through the end of 2024. DCP will potentially be operational in 2040 following extensive planning, permitting and construction.

DWR estimates of SWP supply reliability in its 2019 Delivery Capability Report are based on existing facilities, and so do not include the proposed conveyance facilities that are part of the DCP. Since this UWMP uses DWR's 2019 Delivery Capability Report to estimate SWP supplies at 2040, any changes in SWP supply reliability that would result from the proposed DCP are not included in this UWMP.

4.2.3.3.7 Emergency Freshwater Pathway Description (Sacramento-San Joaquin Delta)

It has been estimated by DWR that in the event of a major earthquake in or near the Delta, water supplies could be interrupted for up to three years, posing a significant and unacceptable risk to the California business economy. A post-event strategy would provide necessary water supply protections to avert this catastrophe. Such a plan has been coordinated through DWR, Corps of Engineers (Corps), Bureau of Reclamation (Reclamation), California Office of Emergency Services (Cal OES), the Metropolitan Water District of Southern California, and the State Water Contractors.

4.2.3.3.8 DWR Delta Flood Emergency Management Plan

The Delta Flood Emergency Management Plan (DWR, 2018) provides strategies for response to Delta levee failures, up to and including earthquake-induced multiple island failures during dry conditions when the volume of flooded islands and saltwater intrusion are large, resulting in curtailment of export operations. Under these severe conditions, the plan includes a strategy to establish an emergency freshwater pathway from the central Delta along Middle River and Victoria Canal to the export pumps in the south Delta. The plan includes the prepositioning of emergency construction materials at existing and new stockpile and warehouse sites in the Delta, and development of tactical modeling tools (DWR Emergency Response Tool) to predict levee repair logistics, timelines of levee repair and suitable water quality to restore exports. The Delta Flood Emergency Management Plan has been extensively coordinated with state, federal and local emergency response agencies. DWR, in conjunction with local agencies, the Corps and Cal OES, conduct tabletop and field exercises to test and revise the plan under real time conditions.

DWR and the Corps provide vital Delta region response to flood and earthquake emergencies, complementary to Cal OES operations. These agencies perform under a unified command structure and response and recovery framework. The Northern California Catastrophic Flood Response Plan (Cal OES, 2018) incorporates the DWR Delta Flood Emergency Management Plan. The Delta Emergency Operations Integration Plan (DWR and USACE, 2019) integrates personnel and resources during emergency operations.

4.2.3.3.9 Pathway Implementation Timeline

The Delta Flood Emergency Management Plan has found that using pre-positioned stockpiles of rock, sheet pile and other materials, multiple earthquake-generated levee breaches and levee slumping along the freshwater pathway can be repaired in less than six months. A supplemental report (Levee Repair, Channel Barrier and Transfer Facility Concept Analyses to Support Emergency Preparedness Planning, M&N, August 2007) evaluated among other options, the placement of sheet pile to close levee breaches, as a redundant method if availability of rock is limited by possible competing uses. The stockpiling of sheet pile is vital should more extreme emergencies warrant parallel and multiple repair techniques for deep levee breaches. Stockpiles of sheet pile and rock to repair deep breaches and an array of levee slumping restoration materials are stored at DWR and Corps stockpile sites and warehouses in the Delta.

4.2.3.3.10 Emergency Stockpile Sites and Materials

DWR has acquired lands at Rio Vista and Stockton as major emergency stockpile sites, which are located and designed for rapid response to levee emergencies. The sites provide large loading facilities, open storage areas and new and existing warehousing for emergency flood fight materials, which augment existing warehousing facilities throughout the Delta. The Corps maintains large warehousing facilities in the Delta to store materials for levee freeboard restoration, which can be augmented upon request of other stockpiles in the United States. Pre-positioned rock and sheet pile are used for closure of deep levee breaches. Warehoused materials for rapid restoration of slumped levees include muscle (k-rail) walls, super sacks, caged rock containers, sandbags, stakes, and plastic tarp. Stockpiles will be augmented as materials are used.

4.2.3.3.11 Emergency Response Drills

Earthquake-initiated multiple island failures will mobilize DWR and Corps resources to perform Delta region flood fight activities within an overall Cal OES framework. In these events, DWR and the Corps integrate personnel and resources to execute flood fight plans through the Delta Emergency Operations Integration Plan (DWR and USACE, 2019). DWR, the Corps and local agencies perform emergency exercises focusing on communication readiness and the testing of mobile apps for information collection and dissemination. The exercises train personnel and test the readiness of emergency preparedness and response capabilities under unified command and provide information to help to revise and improve plans.

4.2.3.3.12 Levee Improvements and Prioritization

The DWR Delta Levees Subventions and Special Projects Programs have prioritized, funded, and implemented levee improvements along the emergency freshwater pathway and other water supply corridors in the central and south Delta. These efforts are complementary to the Delta Flood Emergency Management Plan, which along with pre-positioned emergency flood fight materials, ensures reasonable seismic performance of levees and timely pathway restoration after a severe earthquake. These programs have been successful in implementing a coordinated strategy of emergency preparedness to the benefit of SWP and CVP export systems.

Significant improvements to the central and south Delta levees systems along Old and Middle Rivers began in 2010 and are continuing to the present time. This complements substantially improved levees at Mandeville and McDonald Islands and portions of Victoria and Union Islands. Levee improvements along the Middle River emergency freshwater pathway and Old River consist of crest raising, crest widening, landside slope fill and toe berms, which improve seismic stability, reduce levee slumping, and create a more robust flood-fighting platform. Urban agencies, including Metropolitan, Contra Costa Water District, East Bay Municipal Utility District, and others have participated in levee improvement projects along or near the Old and Middle River corridors.

4.2.3.3.13 B. F. Sisk Dam Raise and San Luis Reservoir Expansion

U. S. Bureau of Reclamation (Reclamation) and San Luis & Delta Mendota Water Authority (SLDMWA) are proposing to raise Sisk Dam and increase storage capacity in San Luis Reservoir. The proposed 10-foot dam raise is in addition to the ongoing 12-foot raise of Sisk Dam to improve dam safety and would expand San Luis Reservoir storage by 130 TAF. The final supplemental EIS/EIR released on December 18, 2020, estimated that the SWP exports could potentially be reduced by about 23 TAF per year on average under the preferred alternative. This project is currently undergoing design, environmental planning and permitting. Construction is estimated to complete by 2030 following environmental planning and permitting.

DWR estimates of SWP supply reliability in its 2019 Delivery Capability Report are based on existing facilities, and do not include this project.

4.2.3.3.14 Sites Reservoir

Sites Reservoir is a proposed new 1,500,000 acre-feet off-stream storage reservoir in northern California near Maxwell. Sacramento River flows will be diverted during excess flow periods and stored in the off-stream reservoir and released for use in the drier periods. Sites Reservoir is expected to provide water supply, environmental, flood and recreational benefits. The proponents of Sites Reservoir include 31 entities including several individual SWP Public Water Agencies (PWAs). Sites Reservoir is expected to provide approximately 240 TAF (Sites Reservoir Value Planning Report, Table 8-1) of additional deliveries on average to participating agencies under existing conditions. Sites Reservoir is currently undergoing environmental planning and permitting. Full operations of the Sites Reservoir are estimated to start by 2029 following environmental planning, permitting and construction. Sites was conditionally awarded $816 million from the California Water Commission for ecosystem, recreation, and flood control benefits under Proposition 1. Reclamation may also invest in Sites under the Water Infrastructure Improvements for the Nation (WIIN) Act and recently transmitted a final Federal Feasibility Report to Congress for the project.

DWR estimates of SWP supply reliability in its 2019 Delivery Capability Report are based on existing facilities, and do not include the proposed Sites Reservoir.

4.2.3.3.15 SWP Seismic Improvements

DWR's recent SWP seismic resiliency efforts have focused heavily on SWP Dam Safety. The most prominent is the joint USBR/DWR corrective action study of Sisk Dam which will result in a massive seismic stability alteration project, which is expected to begin construction in 2021. Similarly, Perris Dam had a major foundation modification and stability berm added to the downstream face which has resulted in the removal of the DSOD imposed storage restriction. Several analyses have been conducted on SWP dam outlet towers/access bridges which has resulted in seismic upgrades (some completed/some on-going). Updated dam seismic safety evaluations are being performed on the Oroville Dam embankment and the radial gate control structure on the flood control spillway.

In addition to the dam safety elements, DWR has procured and stockpiled spare pipe sections for the South Bay Aqueduct to increase recovery times following seismic induced damage (as part of the 2015 South Bay Aqueduct Reliability Improvement Project). Seismic retrofits have also been completed on 23 SWP bridges located in four Field Divisions with additional retrofits in various development stages. DWR has also updated the earthquake notification procedures and has replaced and expanded instrumentation for the SWP's seismic network.

4.2.3.3.16 2019 Biological Opinion / 2020 Incidental Take Permit Litigation

In late 2019, the U.S. Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS) issued new Biological Opinions for the Long-Term Operation of the CVP and SWP. Reinitiation of consultation on the Biological Opinions began in 2016 to update the prior 2008 and 2009 Biological Opinions and provide Federal Endangered Species Act (ESA) compliance for the CVP and SWP. Additionally, in early 2020, the California Department of Fish and Wildlife (DFW) issued DWR an Incidental Take Permit for the Long-Term Operation of the SWP pursuant to the California Endangered Species Act (CESA with regards to state-protected longfin smelt and state- and federally protected delta smelt, winter-run Chinook and spring-run Chinook). Previously, DFW had issued the SWP an Incidental Take Permit for the state-listed longfin smelt and Consistency Determinations with the 2008 and 2009 Biological Opinions for the state and federally listed species, not a separate permit. Some of the operational restrictions in the 2019 Biological Opinions differ from those in the 2020 Incidental Take Permit. Specifically, even though the projects' operations are coordinated, the SWP is subject to additional operational constraints that reduce SWP supplies and create operational conflicts. Both the 2019 Biological Opinions and the 2020 Incidental Take Permit are subject to multiple court challenges.

4.2.3.3.16.1 ESA Biological Opinion Litigation

Two cases were filed challenging the Biological Opinions under the ESA, Administrative Procedure Act, and National Environmental Policy Act. The first case filed, *Pacific Coast Federation of Fisherman's Association, et al. v. Ross (Case No. 1:20-CV-00431-DAD-SAB ("PCFFA v. Ross")*, was brought by six environmental organizations. The second case, *California Natural Resources Agency, et al. v. Ross* (Case No. 1:20) ("*CNRA v. Ross*"), was brought by the California Natural Resources Agency, the California Environmental Protection Agency, and the California Attorney General. The State's case includes a cause of action under CESA alleging that the federal CVP must comply with CESA. The cases were coordinated and transferred to the Eastern District. State and federal water contractors have intervened as defendants in both cases.

In Spring of 2020, plaintiffs in both cases brought motions for preliminary injunction. The environmental organizations sought broad relief, asking the court to require the federal defendants to abide by the 2008 and 2009 Biological Opinions pending a determination on the merits. The State sought a narrow injunction requiring the federal defendants to operate pursuant to the inflow to export ratio in the 2009 NMFS Biological Opinion for the final 20 days of May based on alleged irreparable harm to delta smelt, longfin smelt and San Joaquin River steelhead. The court issued an order on May 11, 2020 granting the State's narrow injunction on limited grounds for the protection of steelhead. The court denied the other elements of the *PCFFA v. Ross* plaintiffs' motion for preliminary injunction finding the evidence presented was insufficient to show irreparable harm to the species or that the requested injunction was likely to materially improve conditions for the species during the specified period.

In *CNRA v. Ross*, the Federal Defendants and several intervenors filed motions to dismiss the State's CESA cause of action for lack of subject matter jurisdiction or, alternatively, failure to state a claim. As of this date, the court has not scheduled a hearing or ruled on the motion.

4.2.3.3.16.2 CESA Incidental Take Permit Litigation

Eight cases, listed below, have been filed in state court by public agencies, environmental organizations, and a Native American tribe challenging DWR's approval of the Long-Term Operations of the SWP and associated environmental review. Most of the cases also challenge CDFW's issuance of an Incidental Take Permit for the SWP.

- *North Coast Rivers Alliance, et al. v. Department of Water Resources, et al.*, County of San Francisco Superior Court Case No. CPF-20-517078, filed April 28, 2020;
- *State Water Contractors, et al. v. California Department of Water Resources, et al.*, County of Fresno Superior Court Case No. 20CECG01302, electronically filed April 28, 2020;
- *Tehama-Colusa Canal Authority, et al. v. California Department of Water Resources, et al.*, County of Fresno Superior Court Case No. 20CECG01303, electronically filed April 28, 2020;
- *The Metropolitan Water District of Southern California, et al. v. California Department of Water Resources, et al.*, County of Fresno Superior Court Case No. 20CECG01347, electronically filed April 28, 2020;

- *Sierra Club, et al. v. California Department of Water Resources*, County of San Francisco Superior Court Case No. CPF-20-517120, filed April 29, 2020;

- *Central Delta Water Agency, et al. v. California Department of Fish and Wildlife, et al.*, County of Sacramento Superior Court Case No. 34-2020-80003368, filed May 6, 2020;

- *San Bernardino Valley Municipal Water District v. California Department of Water Resources, et al.*, County of Fresno Superior Court Case No. 20CECG01556, filed May 28, 2020;

- *San Francisco Baykeeper, et al. v. California Department of Water Resources, et al.*, County of Alameda Superior Court Case No. RG20063682, filed June 5, 2020.

The challenges are raised on several legal grounds, including CESA, California Environmental Quality Act, the Delta Reform Act, Public Trust Doctrine, area of origin statutes, breach of contract, and breach of covenant of good faith and fair dealing. All eight cases have been coordinated in Sacramento County Superior Court.

Litigation over the 2019 Biological Opinions and 2020 Incidental Take Permit will likely take several years. The projects began operating to the new requirements in 2020. Throughout implementation any party may seek preliminary injunctive relief during the litigation, such as that sought by the plaintiffs in the 2019 Biological Opinion cases. It is likely that the 2019 Biological Opinions and 2020 Incidental Take Permit will govern operations until final judicial determinations on the merits are made. Thus, it is unlikely that SWP water supply would increase beyond that resulting from the limitations in the 2019 BiOps and 2020 ITP during this timeframe.

4.2.3.3.17 Water Quality Control Plan/Voluntary Agreement

The State Water Board is responsible for adopting and updating the Water Quality Control Plan for the San Francisco Bay/Sacramento–San Joaquin Delta Estuary (Bay-Delta Plan), which establishes water quality control objectives and flow requirements needed to provide reasonable protection of beneficial uses in the watershed. The State Water Board has been engaged for many years in updating the Bay Delta Plan.

The Bay-Delta Plan is being updated through phases. Phase 1 is updating the Bay-Delta Plan objectives for the San Joaquin River and its major tributaries and the southern Delta salinity objectives. Phase 2 is updating the objectives for the Sacramento River and Delta and their major tributaries. (Plan amendments). On December 12, 2018, through State Water Board Resolution No. 2018-0059, the State Water Board adopted the Phase 1 Plan amendments and Final SED establishing the Lower San Joaquin River flow objectives and revised southern Delta salinity objectives. On February 25, 2019, the Office of Administrative Law approved the Plan amendments. This plan requires an adaptive range of 30-50 percent of the unimpaired flow to be maintained from February through June in the Stanislaus, Tuolumne, and Merced Rivers, with a starting point of 40 percent of the unimpaired flow. During this same time period, the flows at Vernalis on the San Joaquin River, as provided by the unimpaired flow objective, are required to be no lower than a base flow of 1,000 cfs, with an adaptive range between 800 and 1,200 cfs, inclusive.

The State Water Board is also considering Phase 2 Plan amendments focused on the Sacramento River and its tributaries, Delta eastside tributaries (including the Calaveras, Cosumnes, and Mokelumne rivers), Delta outflows, and interior Delta flows. Staff is recommending an adaptive range of 45-65 percent Unimpaired Flow (UIF) objective with a starting point of 55 percent. Once the State Water Board adopts Phase 2 Plan amendments, the Board will need to conduct hearings to determine, consistent with water rights, water users' responsibilities for meeting the objectives in both Phase 1 and 2. At this time, the potential impacts to the SWP are unknown but this objective would have a large impact on water users in the Phase 2 planning area.

The State and several water users began working on an alternative to the Bay-Delta Plan update in 2018, known as the Voluntary Agreement process. The Voluntary Agreement process offers an alternative to the State Water Board staff's flow only approach. A Voluntary Agreement, if agreed to by the State Water Board, would be a substitute for the UIF approach and would become the Program of Implementation for the Plan amendments Implementing the Voluntary Agreement would not require a water rights hearing because the parties are agreeing to take the actions. The Voluntary Agreement approach provides flow, and funding for flows, habitat actions, and a robust science program. The Voluntary Agreement approach provides an opportunity to combine flow and habitat actions to protect public trust resources, while providing certainty for water users. It offers a chance to avoid years of hearings and litigation and to instead begin early implementation of Voluntary Agreement actions.

4.2.3.4 Delta Reliance

A portion of the water received by the PWD comes from the Sacramento-San Joaquin Delta (Delta). The 2020 UWMP Guidebook describes how urban water suppliers that anticipate participating in or receiving water from a "covered action" related to the Delta should provide information in their 2020 UWMPs to demonstrate consistency with *Delta Plan Policy WR P1, Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance* (Reduced Reliance Policy). DWR has suggested that any entity receiving imported water from the SWP should anticipate being part of a "covered action".

PWD gathered information to determine the volume of SWP received in past years. In Appendix H PWD:

- Establishes a base period for evaluation of Delta water use in the District
- Provides data on past service area demands and population
- Provides data on SWP water received in the past
- Provides a projection on service area demands and through 2045
- Provides information on supplier contribution to regional self-reliance (local supplies brought online 2010-2045 in 5-year increments)
- Projects SWP water that will be received by PWD through 2045

4.2.4 Potential Supply Inconsistency

PWD's supply reliability (discussed in detail in Section 7), can be impacted by many factors, including changes in the availability of supplies due to climatic or infrastructure changes, prolonged drought, as well as the efficient use of those supplies in both average and dry periods. These factors can result in acute impacts (facility failures), short-term impacts (SWP limitations), or long-term (drought) impacts to the reliability of its supplies. The factors resulting in the inconsistency of water supply, by source are identified in Table 4-10.

Table 4-10 Factors Resulting In Inconsistency of Water Supply

Water Source	Description	Limitation	Legal	Environmental	Water Quality	Climatic
Groundwater	Antelope Valley Groundwater Basin	Limited by well production capacity and adjudication	X		X	
Surface Water	Littlerock Reservoir	Limited by hydrology and diversion right	X			X
Imported Water	SWP (California Aqueduct)	Limited by Table A allocation and hydrologic conditions and/or regulatory constraints	X	X		X

4.3 Other Supplies

4.3.1 Transfers, Exchanges, and Groundwater Banking Programs

In addition to SWP water supplies, local surface water, and groundwater, PWD is currently exploring opportunities to utilize recycled water, groundwater banking, and other anticipated new sources.

4.3.1.1 Existing Transfer Agreement

PWD currently has a long-term lease agreement with Butte County for up to 10,000 AFY of their SWP Table A Amount. The amount available through this lease varies primarily on the final annual allotment from DWR to the State Water Contractors and can be roughly calculated by multiplying the final allotment percentage by 10,000 AF. This lease has been amended and extended through 2031. Butte and PWD anticipate renegotiating the agreement to extend past 2031.

The District assumes this supply for the purposes of this plan will continue through the planning period, to 2045. Supplies from this agreement are accounted for in PWD planned supplies and are anticipated to be available in future years based on SWP Table A Amounts projected for the PWD under normal, single-dry, and multiple-dry year scenarios as described in Section 4.2.3.2. Accordingly, 56.5 percent or 5,650 AFY is anticipated to be available in 2025 to 52 percent or 5,200 AFY past 2040, as shown in Table 4-1; 7 percent or 700 AFY is anticipated in a single-dry year in 2025 to 10 percent or 1,000 AF in a single-dry year after 2040; and 29 percent or 2,900 AF in a multi-dry year in 2025 to 21 percent or 2,100 AF in a multi-dry year after 2040.

4.3.1.2 Transfer and Exchange Opportunities

PWD has evaluated various transfer and exchange opportunities that could aid in meeting projected water demands and has participated in a number of water transfers over the last several years. PWD's anticipated new sources consist of additional water supply transfer and exchange opportunities. PWD will utilize a combination of various transfer and exchange opportunities, as necessary, to meet its projected water demands.

PWD recently completed and adopted its Strategic Water Plan (PWD 2018) wherein it identified additional needed surface water acquisitions and transfers as a component of its overall water supply strategy. Table 4-11 describes these potential water transfer and acquisition opportunities.

Table 4-11 Transfer and Exchange Opportunities

Transfer Agency	Transfer or Exchange	Short Term or Long Term	Proposed Volume (AF)
DWR	Excess Wet Year Water (Article 21)	Short Term	1,000-5,000
SWP	Wet-Year (1 Year)	Short Term	26,000
SWC/DWR	Dry year	Short Term	4,000-10,000
		Subtotal	***31,000-41,000***
SWP	Long-Term Lease	Long Term	12,000
SWP/Central Valley Project (CVP)	Permanent Transfer	Long Term	10,000
		Subtotal	***22,000***
SWP	Table A SWP Water	Short Term/ Permanent	10,000
CVP	CVP Water	Short Term/ Permanent	10,000
PRE-14	Non-SWP Water	Short Term/ Permanent	5,000-10,000
		Subtotal	***25,000-30,000***

For transfer and exchange strategic purposes, PWD will:

- Establish the ability to bank available imported water and develop supply reliability within the Antelope Valley Groundwater Basin as soon as possible.
- Pursue partners to participate in developing PWD's storage facilities including other Antelope Valley State Water Contractors Association (AVSWCA) members.

- Consider water banking in locations outside the PWD if they are cost effective and the project produces a value-added benefit (such as additional aqueduct delivery capacity).

At the current time these options are being explored and are not considered in the future supplies shown in Section 4.5.

4.3.2 Groundwater Programs

4.3.2.1 Palmdale Regional Water Augmentation Project

PWD does not operate a banking program but is actively pursuing this future water supply reliability option. PWD completed a preliminary feasibility study for a project that would utilize recycled water for surface water augmentation and/or groundwater injection. The Palmdale Regional Water Augmentation Project (PRWAP) would help to meet future water demands and improve PWD's water supply reliability.

As described in Section 5, PWD has an existing agreement with LACSD and is entitled to a maximum 5,325 AFY of tertiary water from the Palmdale WRP. PRWAP would utilize recycled water from the Palmdale WRP for surface water augmentation and/or groundwater injection. PWD would utilize full advanced treatment, including Reverse Osmosis (RO) and Advanced Oxidation Process (AOP) to treat the tertiary water to Title 22 standards. This includes construction of an 11.2 MGD Advanced Water Purification Facility (AWPF) with the treatment process, chemical storage, parking, and access roads and pipelines to convey the water from the Palmdale WRP to the new AWPF.

For surface water augmentation, the advanced treated water would be conveyed via new pipelines to Lake Palmdale, where it would be diluted and mixed with SWP water and water from Littlerock Dam Reservoir. It would then be treated at the Leslie O. Carter WTP for indirect potable reuse. For groundwater augmentation, the advanced treated water would be pumped from the AWPF to one or more new groundwater injection wells to be injected directly into the aquifer.

PRWAP is a solution that is drought resilient, provides local control of water resources, and helps PWD meet future water demands. The project is anticipated to provide at least 5,325 AFY of water for groundwater or surface water augmentation starting in 2025. More information can be found in the Final Technical Memorandum Recycled Water Alternatives Evaluation – Surface Water and Groundwater Augmentation Feasibility Study (Stantec, 2021).

4.3.2.2 Groundwater Banking Opportunities

There are water banks operating in a variety of locations throughout the state and in various forms. PWD is currently exploring banking opportunities within and outside the Antelope Valley. The list below includes PWD's potential groundwater water banking options.

- **Storage North of Delta**: This would consist of an exchange or transfer with agricultural entities north of the Delta in site specific areas for an interim or short-term basis. PWD could store 5,000 to 10,000 AF and recover 2,500 to 5,000 AF.

- **San Joaquin Valley Storage**: This would consist of purchasing shares in the Semitropic Water Bank, which is currently in operation. PWD could store over 60,000 AF and recover 10,000 to 20,000 AFY. Other banking programs may also be available.

- **Storage within the Antelope Valley**: This would consist of banking above-average SWP allocations in planned water banking projects in locations within the Antelope Valley. PWD could store over 60,000 AF and recover 10,000 to 15,000 AFY.

- **Storage South of the PWD**: This would consist of banking above-average SWP allocations by providing these supplies to SWP contractor agencies for groundwater recharge or in-lieu recharge within their service areas and in turn, during dry years, the PWD would receive SWP water from these agencies. This groundwater banking opportunity could store 10,000 to 30,000 AF and recover 5,000 to 15,000 AFY.

4.3.3 Development of Desalination

4.3.3.1 Brackish Water and/or Groundwater Desalination

The groundwater that underlies the PWD service area is not brackish in nature and does not require desalination. However, PWD could provide financial assistance to other SWP contractors to construct brackish desalination facilities in exchange for SWP supplies delivered via the East Branch of the Aqueduct. Communities near a brackish desalination plant would receive the desalinated water and an equivalent volume of SWP supplies would be exchanged and allocated to the PWD. Should the need arise PWD may consider this option in the future.

4.3.3.2 Seawater Desalination

Since PWD is not located in a coastal area, it is not practical nor economically feasible to implement a seawater desalination program. However, PWD could provide financial assistance to other SWP Contractors to construct seawater desalination facilities in a coastal location in exchange for SWP supplies delivered via the East Branch of the Aqueduct.

At this point in time, PWD has determined that desalination is not a cost-effective solution for water supply needs due to the local project and water resource opportunities that are currently available at a lower cost.

4.3.4 Recycled Water

Currently PWD is actively working with the Sanitation Districts of Los Angeles County (LACSD) to develop recycled water supplies for its service area customers. Further details on the PWD’s recycled water plans can be found in Section 5.

4.4 Planned Supplies

PWD regularly undertakes evaluation of its supplies. The 2018 PWD Strategic Plan, 2016 Water System Master Plan, and PRWA Recycled Water Master Plan were prepared to assist the District in developing a long-term water supply strategy that can meet demands now until buildout. These planned sources are meant to maximize local resources and minimize the need to import water. As described above, PWD has performed the appropriate planning, and has arranged financing for the water supply projects summarized in Table 4-12.

Table 4-12 Water Supplies (AFY)

Name of Future Project/Program	*Joint Project with other suppliers?* Y/N	If Yes, Agency Name	Description	Planned Implementation Year	Planned for Use in Year Type	Expected Increase in Water Supply to Supplier
Palmdale Regional Water Augmentation Project (PRWAP)	No		The goal of the PRWAP is the beneficial use of 5,325 AFY of recycled water for either surface or groundwater augmentation to benefit the region. PRWAP is a solution that is drought resilient, provides local control of water resources, and helps meet future demands of PWD.	2025	All Year Types	5,325 AFY

Note: Modified from DWR Table 6-7

4.5 Anticipated Water Supply Sources in a Normal, Single Dry, and Multiple Dry Years

Tables Table 4-13, Table 4-14, and Table 4-15 provide details on supplies anticipated to be available to PWD in normal, single-dry, and multiple-dry years.

Table 4-13 Water Supply Estimates - Normal Year (AFY)

	2025	2030	2035	2040	2045
Existing Supplies					
Groundwater	4,220	2,770	2,770	2,770	2,770
Groundwater Return Flow Credits	5,000	5,000	5,000	5,000	5,000
Groundwater or Surface Water Augmentation	5,325	5,325	5,325	5,325	5,325
Local Surface Water	4,000	4,000	4,000	4,000	4,000
Imported SWP Water	12,030	11,720	11,400	11,080	11,080
Butte Transfer Agreement(a)	5,650	5,500	5,350	5,200	5,200
Recycled Water	500	1,000	1,500	2,000	2,000
Total Supplies	**36,725**	**35,315**	**35,345**	**35,375**	**35,375**

Notes: Modified from DWR Table 7-2
Values are rounded.
(a) For details see Section 4.3.1.

Table 4-14 Water Supply Estimates - Single-Dry Year (AFY)

	2025	2030	2035	2040	2045
Existing Supplies					
Groundwater	4,220	2,770	2,770	2,770	2,770
Groundwater Return Flow Credits	5,000	5,000	5,000	5,000	5,000
Groundwater or Surface Water Augmentation	5,325	5,325	5,325	5,325	5,325
Local Surface Water	4,000	4,000	4,000	4,000	4,000
Imported SWP Water	1,490	1,705	1,915	2,130	2,130
Butte Transfer Agreement(a)	700	800	900	1,000	1,000
Recycled Water	500	1,000	1,500	2,000	2,000
Total Supplies	**21,235**	**20,600**	**21,410**	**22,225**	**22,225**

Note: Modified from DWR Table 7-3
Values are rounded.
(a) For details see Section 4.3.1.

Table 4-15 Water Supply Estimates - Multiple-Dry Years (AFY)

	2025	2030	2035	2040	2045
Existing Supplies					
Groundwater	4,220	2,770	2,770	2,770	2,770
Groundwater Return Flow Credits	5,000	5,000	5,000	5,000	5,000
Groundwater or Surface Water Augmentation	5,325	5,325	5,325	5,325	5,325
Local Surface Water	4,000	4,000	4,000	4,000	4,000
Imported SWP Water	6,180	5,645	5,110	4,470	4,470
Butte Transfer Agreement(a)	2,900	2,650	2,400	2,100	2,100
Recycled Water	500	1,000	1,500	2,000	2,000
Total Supplies	**28,125**	**26,390**	**26,105**	**25,665**	**25,665**

Note: Modified from DWR Table 7-4
Values are rounded.
(a) For details see Section 4.3.1.

4.6 Embedded Energy Current Supply Portfolio

Water energy intensity is the amount of energy, calculated on a whole-system basis, required for use of water in a specific location, such as the PWD service area. DWR provides guidance for calculating the operational energy intensity of water, defined as the total amount of energy expended by the urban water supplier on a per AF basis to take water from the location where the urban water supplier acquires the water to its point of delivery. DWR requires that urban water suppliers only report the energy intensity associated with water management processes occurring within their operational control and not include energy embedded in water supplies purchased from a wholesale water agency. Table 4-16 below provides an estimate, using the multiple water delivery approach, of the water energy intensity of PWD's potable water system. DWR's Energy Intensity spreadsheet is provided in Appendix I.

Table 4-16 Energy Intensity of the Water System

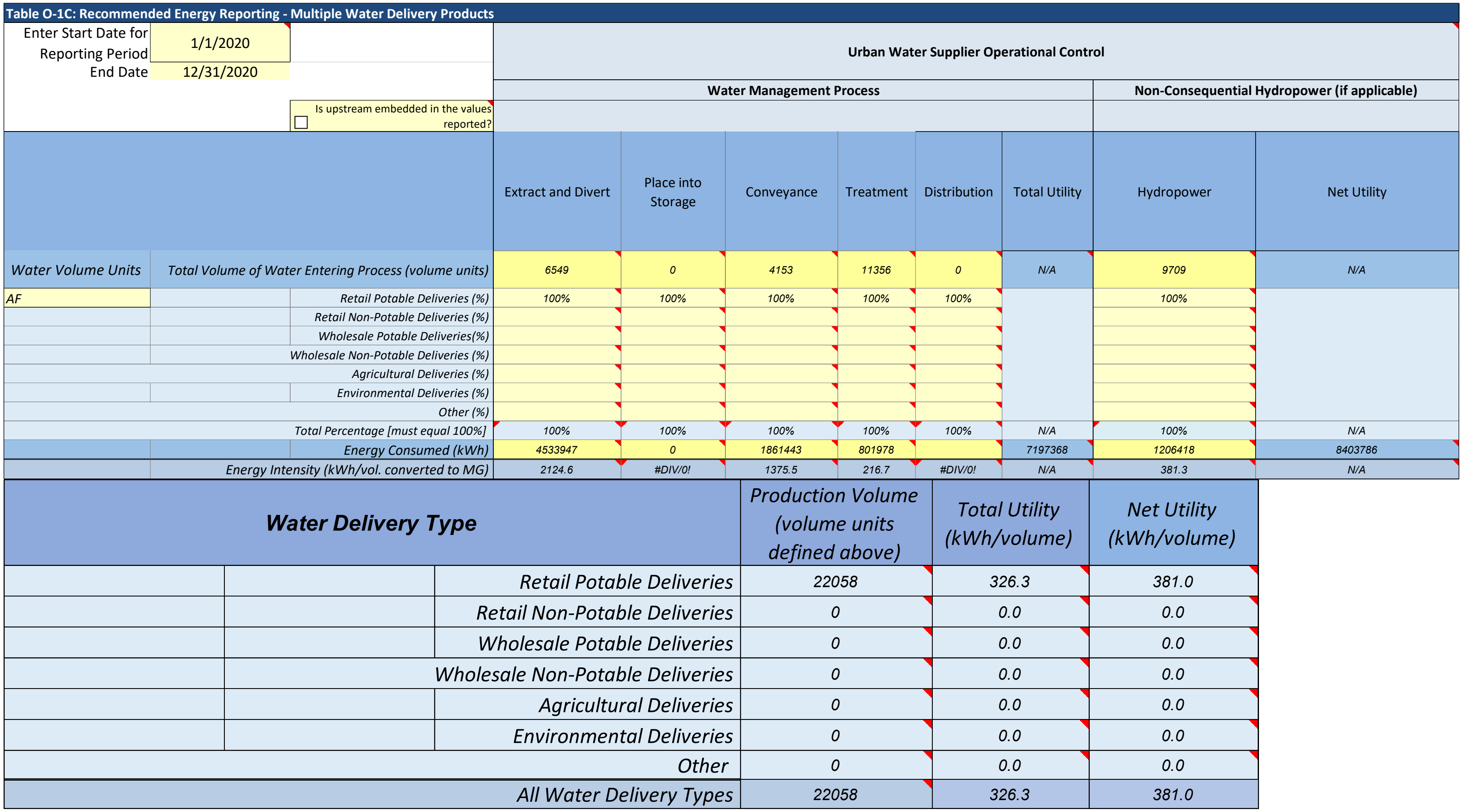


Table O-1C: Recommended Energy Reporting - Multiple Water Delivery Products

Enter Start Date for Reporting Period: 1/1/2020

End Date: 12/31/2020

☐ Is upstream embedded in the values reported?

Urban Water Supplier Operational Control

		Water Management Process						**Non-Consequential Hydropower (if applicable)**	
		Extract and Divert	Place into Storage	Conveyance	Treatment	Distribution	Total Utility	Hydropower	Net Utility
Water Volume Units	*Total Volume of Water Entering Process (volume units)*	*6549*	*0*	*4153*	*11356*	*0*	*N/A*	*9709*	*N/A*
AF	*Retail Potable Deliveries (%)*	*100%*	*100%*	*100%*	*100%*	*100%*		*100%*	
	Retail Non-Potable Deliveries (%)								
	Wholesale Potable Deliveries(%)								
	Wholesale Non-Potable Deliveries (%)								
	Agricultural Deliveries (%)								
	Environmental Deliveries (%)								
	Other (%)								
	Total Percentage [must equal 100%]	*100%*	*100%*	*100%*	*100%*	*100%*	*N/A*	*100%*	*N/A*
	Energy Consumed (kWh)	*4533947*	*0*	*1861443*	*801978*		*7197368*	*1206418*	*8403786*
	Energy Intensity (kWh/vol. converted to MG)	*2124.6*	*#DIV/0!*	*1375.5*	*216.7*	*#DIV/0!*	*N/A*	*381.3*	*N/A*

Water Delivery Type	*Production Volume (volume units defined above)*	*Total Utility (kWh/volume)*	*Net Utility (kWh/volume)*
Retail Potable Deliveries	*22058*	*326.3*	*381.0*
Retail Non-Potable Deliveries	*0*	*0.0*	*0.0*
Wholesale Potable Deliveries	*0*	*0.0*	*0.0*
Wholesale Non-Potable Deliveries	*0*	*0.0*	*0.0*
Agricultural Deliveries	*0*	*0.0*	*0.0*
Environmental Deliveries	*0*	*0.0*	*0.0*
Other	*0*	*0.0*	*0.0*
All Water Delivery Types	*22058*	*326.3*	*381.0*

Note: Modified from Table O-1C: Recommended Energy Reporting - Multiple Water Delivery

Section 5: Recycled Water

5.1 Overview

This section of the Plan describes the existing and future recycled water opportunities available to the PWD service area. The description includes estimates of potential recycled water supply and demand for 2020 to 2045 in five-year increments, as well as PWD's proposed incentives and implementation plan for recycled water.

5.2 Recycled Water Planning

Due to current and anticipated growth, as well as increasing uncertainty of PWD's ability to meet local water demands with imported water and groundwater, PWD is taking proactive steps towards expanding the use of non-potable water to meet a variety of non- potable and indirect potable uses. PWD has been actively working with the Los Angeles County Waterworks Districts, City of Palmdale, City of Lancaster, and LACSD to develop a regional recycled water system.

PWD developed a Recycled Water Facilities Plan in 2010 (RMC 2010) as part of the first non-potable reuse phase for the 2007 Antelope Valley Recycled Water Project Facilities Planning Report (Kennedy/Jenks 2006). This plan is meant to optimize the use of recycled water in the PWD service area.

In 2012, the Palmdale Recycled Water Authority (PRWA) was established to manage recycled water generated and used within the PWD service area, which coincides with the PRWA boundaries. PRWA is a joint entity comprised of the PWD and City of Palmdale which manages all aspects of recycled water use, including agreements to obtain recycled water from sanitation districts, planning for, designing, and constructing supporting facilities, and financing these efforts. Among the initial efforts of the PRWA, existing master planning documents were updated and consolidated within the 2015 PRWA Recycled Water Facilities Master Plan (Carollo 2015).

Implementation of the Recycled Water Facilities Master Plan, which is still in the planning phase, would include expansion of the existing non-potable distribution system. Projected recycled water supplies would be provided to PWD customers, primarily for landscape irrigation at parks, schools, and golf courses, as well as for recharge in the Lancaster subbasin, as described in more detail below.

5.3 Existing Wastewater Treatment Facilities

Wastewater collection and treatment for the cities of Palmdale and Lancaster are provided by LACSD, which provides service to the Antelope Valley through its Districts No. 14 and 20. The two districts serve a combined wastewater service area of approximately 76 square miles and approximately 310,000 people. Collection is provided through a network of 104 miles of trunk sewers, which are all designed to provide wastewater conveyance through gravity flow.

The Palmdale Water Reclamation Plant (WRP) is located in the City of Palmdale and currently provides tertiary treatment for approximately 12,000 AFY of wastewater generated in and around the City of Palmdale. In 2012, the Palmdale WRP was expanded to reach its current treatment capacity of 12 MGD. The Palmdale WRP is operated by the LACSD District No. 20. Currently, the tertiary-treated effluent is disposed of via agricultural irrigation of fodder crops on land leased by the LACSD from the City of Los Angeles World Airports. Table 5-1 presents influent and effluent flows at the Palmdale WRP in 2020.

Table 5-1 2020 Wastewater Flows at Palmdale WRP (AF)

Palmdale WRP Flows	2020
Influent	12,140
Effluent	10,770

Source: Palmdale WRP Annual Monitoring Report 2020.

All wastewater treated at the Palmdale WRP is treated to tertiary level and is used, discharged, or stored within the PWD service boundaries.

The Antelope Valley is a closed basin without an outlet to the ocean, and so treated wastewater either evaporates, is reused, or infiltrates into the Antelope Valley Groundwater Basin. LACSD anticipates reducing the amount of recycled water that it provides for agriculture as other beneficial uses are developed. However, until these alternative uses become effective, the recycled water must still be disposed of via agricultural irrigation (Carollo 2015, ESA 2014).

5.4 Recycled Water Supply

Recycled water available for use within the PWD service area is supplied from the LACSD Palmdale WRP. The contract with LACSD allows PWD up to 5,325 AF. The City of Palmdale had an agreement with the LACSD for 2,000 AFY of recycled water to provide to customers throughout the City's service area (Carollo 2015, ESA 2014), which has since been transferred to PRWA. The remaining recycled water from the Palmdale WRP and Lancaster WRP is expected to be allocated to the City of Palmdale in the ongoing reallocation negotiations. However, as noted above, uses for this recycled water are still being developed.

Currently the Palmdale WRP produces about 10,700 AFY of Title 22 recycled water on average. For future recycled water supply projections, it was assumed that recycled water production would grow linearly at the same rate as potable demands, which were estimated at approximately 1.0 percent per year on average for the period 2020 to 2045. As a result, the total recycled water supply is estimated to grow up to about 13,500 AFY by 2045, as shown in Table 5-2.

Table 5-2 Effluent Flow Projections For Palmdale WRP (AF)

	2020[a]	2025	2030	2035	2040	2045
PWRP Effluent Flows	10,770	11,300	11,800	12,300	12,900	13,500
Total Recycled Water Available to PWD	10,770	11,300	11,800	12,300	12,900	13,500

Notes:

(a) 2020 Effluent flows as reported in Palmdale WRP 2020 Annual Report.

5.5 Recycled Water Demand – Current and Projected

Primary existing recycled water customers served by the Palmdale WRP include growers and the City of Palmdale. The primary City demand is for landscape irrigation at McAdam Park, which makes up a small portion of total recycled water produced at the Palmdale WRP. The remaining major portion of Palmdale WRP recycled water is agricultural irrigation at agronomic rates on an agricultural site leased by the LACSD from Los Angeles World Airports. Seasonal storage ponds are used when more effluent water is produced than demanded. The stored recycled water is typically used in spring and summer months when agronomic crop needs exceed recycled water production from the Palmdale WRP. Actual recycled water use in 2020 is summarized in Table 5-3.

Table 5-3 Actual Recycled Water Use In 2020 (AF)

Water Use	Actual 2020 Recycled Water Use
PRWA/City of Palmdale Direct Reuse[a]	70
Total Recycled Water Use[b]	**70**

Notes:

(a) Based on correspondence from PWD and LACSD.

(b) Total recycled water demand within PWD service area. Values are rounded.

Market assessments by the PRWA have identified numerous potential recycled water customers including schools, parks, landscape maintenance districts, and others. Total annual demands of these customers were estimated at 2,392 AFY (Carollo 2015, ESA 2014). It is anticipated that the recycled water use for landscape irrigation will not exceed 2,000 AFY at buildout (Kennedy/Jenks 2015).

Additional major future recycled water uses include surface water augmentation or groundwater injection as follows.

Palmdale Regional Water Augmentation Project

Among the potential options to augment water supplies with local recycled water, there is potential to use recycled water for surface water augmentation at Lake Palmdale or groundwater injection within the Antelope Valley Groundwater Basin. The project entails construction of pipelines to convey tertiary treated water from the Palmdale WRP to an advanced water purification facility. New pipelines would convey the advanced treated water to Lake Palmdale for surface water augmentation, or to new injection wells that would inject advanced treated recycled water into the aquifer.

Projected Recycled Water Uses are shown in Table 5-4.

Table 5-4 Projected Recycled Water Demands (AF)

Water Use	2025	2030	2035	2040	2045
Palmdale Regional Water Augmentation Project (PRWAP)[(a)]	5,325	5,325	5,325	5,325	5,325
Direct Reuse[(b)]	500	1,000	1,500	2,000	2,000
Total Recycled Water Demands	**5,825**	**6,325**	**6,825**	**7,325**	**7,325**

Source: Data from Littlerock Creek Groundwater Recharge and Recovery Project (2015) and Title 22 Engineering Report (2016).

(a) Volume available for groundwater or surface water augmentation.

(b) Includes City direct demands and other potential landscape irrigation demands.

5.5.1 Recycled Water Use Comparisons

The 2015 UWMP anticipated 2020 recycled water use at 1,000 AF and assumed it would be used only for landscape and agricultural irrigation. Actual recycled water use within the PWD service area totaled 70 AFY in 2020, as shown in Table 5-5.

Table 5-5 Recycled Water Use Compared to Projected Use

User Type	2015 Projected for 2020[(a)]	2020 Actual
Municipal and Industrial, and Agricultural Irrigation	1,000	70
Groundwater Recharge	0	0
Total	**1,000**	**70**

Note:
(a) From 2015 PWD UWMP.

5.5.2 Encouraging Recycled Water Use

Future recycled water projects have the potential to use all available recycled water supplies through 2040, as described above. As necessary, PWD intends to use financial incentives to assist and encourage future users to connect to and utilize recycled water. These financial incentives will consist of recycled water rates that are lower than potable rates (typically 70 to 90 percent). A lower rate provides an incentive for existing or future customers to use recycled water in place of potable water.

Section 6: Water Quality

6.1 Overview

Water quality is an important factor in determining overall supply reliability; if adequate drinking water quality cannot be maintained, then the supply will no longer be available for use. Water quality is dynamic in nature and can vary over the course of a year. This is true for both the State Water Project (SWP) and the local groundwater of the Basin. During periods of intense rainfall or snowmelt, routes of surface water movement are changed, and new constituents are mobilized and enter the water while other constituents are diluted or eliminated. The quality of water changes over the course of a year. These same basic principles apply to groundwater. Depending on water depth, groundwater will pass through different layers of rock and sediment and potentially leach different materials from those strata. Water depth is a function of recharge from local rainfall and snowmelt and withdrawal from groundwater pumping. During periods of drought, the mineral content of groundwater increases. Water quality is not a static feature of water, and these dynamic variables must be recognized.

PWD understands the quality of supply sources can change over time and is therefore constantly working to anticipate and mitigate those changes. Water quality regulations also change. This is the result of the discovery of new contaminants, changing understanding of the health effects of previously known as well as new contaminants, development of new analytical technology, and the introduction of new treatment technology. All retail water purveyors are subject to drinking water standards set by the U.S. Environmental Protection Agency (EPA) and the State Division of Drinking Water (DDW).

PWD’s regular monitoring of its water supply quality and understanding of current and potential regulations allows it to respond readily to any quality induced reliability issues. This section provides a general description of the quality of each of PWD’s three water sources; groundwater from the Antelope Valley Groundwater Basin, imported water from the SWP, and seasonal supply from Littlerock Reservoir. SWP water is conveyed directly from the District turnout into Lake Palmdale, which feeds the Leslie O. Carter Water Treatment Plant (WTP).

Flows from Littlerock Reservoir are also conveyed into Lake Palmdale via an eight-and-a-half-mile earthen canal with sections of concrete lining and enclosed in a pipe for approximately one-mile, referred to as the Palmdale Ditch. The intake for the WTP is located along Lake Palmdale’s north shore. All three sources are constantly tested and treated in compliance with all applicable regulations to ensure high water quality and dependability of the water system.

This section provides a general description of the water quality of both imported water, groundwater supplies, and surface water supplies. A discussion of potential water quality impacts on the reliability of these supplies is also provided.

6.2 Groundwater Protection and Quality

PWD obtains groundwater from the Antelope Valley Groundwater Basin though twenty-two wells. This water is treated with chlorine at the wellhead and pumped directly into the distribution system. Groundwater has proved to be of suitable quality for municipal, irrigation and most industrial uses.

The general goal of groundwater protection activities is to maintain the groundwater and the aquifer to ensure a reliable high-quality supply. Activities to meet this goal include continued and increased monitoring, data sharing, education and coordination with other agencies that have local or regional authority or programs. As part of its protection activities, PWD has been taking the following actions:

- Water quality monitoring
- Wellhead protection
- Participation in the regional salt and nutrient management plan

6.2.1 Water Quality Monitoring

PWD monitors drinking water constituents consistent with federal and state laws. PWD annually provides a Consumer Confidence Report (CCR) detailing the water quality of its sources to all of its customers. This Report includes details about the source water, quality of the water, and how it compares to Drinking Water standards. Stringent water quality testing is performed before the water is delivered to consumers. In 2019 (2019a), PWD tested more than 3,500 samples and about 18,000 tests are done to ensure that PWD water meets or exceeds all Federal and State guidelines. Of the primary standard contaminants detected in 2019, all were at levels below the Maximum Contaminant Level (MCL) allowed by the State.

In the Antelope Valley region, the groundwater basin is primarily used for private and public water supply and irrigation. The predominant sources of groundwater are from the recharge of runoff from surrounding mountains, and water from direct infiltration by irrigation, sewer, and septic systems. The main discharge sources include pumping wells and evapotranspiration areas near dry lakebeds. Groundwater quality is assessed through the Groundwater Ambient Monitoring and Assessment (GAMA) Priority Basin Project (PBP), which consists of analyzing raw groundwater that provides drinking public water supply in the region. PBP sampled a large distribution of wells in the area and analyzed organic constituents as well as chromium, lead, molybdenum, sulfate, and chloride; all were detected at moderate concentrations, and volatile organic compounds were detected at low concentrations.

Two primary constituents that present concerns for groundwater quality in the Antelope Valley Groundwater Basin are Total Dissolved Solids (TDS) and nitrate. Past groundwater sampling data has shown TDS concentrations that range from 75 to 363 milligrams per liter (mg/L) (2019 AV IRWMP). Nitrate levels have ranged from non-detect to 14.4 mg/L. Arsenic has also emerged as a potential concern but is still well under the MCL of 0.01 mg/L. Water quality data is regularly reported on in the annual CCR; the most recent is the 2019 CCR.

PWD's drinking water sources are considered most vulnerable to the following activities associated with contaminants detected in the water supply: illegal activities, such as unauthorized dumping; recreation; highways; railroads; and sewer collection systems. A comprehensive source water protection program can prevent contaminants from entering the public water supply, reduce treatment costs and increase public confidence in the reliability and safety of drinking water.

6.2.2 Wellhead Protection

PWD has developed a Sanitary Survey of its water sources, including a Source Water Assessment of surface waters, which was updated in 2017 in compliance with State of California regulations. The assessment of surface water sources included Littlerock Reservoir and Palmdale Lake. A Groundwater Assessment and Protection Program was completed in January of 1999, and a Wellhead Protection Plan was completed in November 2000. The goal of local source water protection is to identify, develop and implement local measures that provide protection to the drinking water supply. Wellhead protection provides one more barrier to contamination in a multi-barrier protection treatment train.

6.2.3 Participation in the Antelope Valley Salt and Nutrient Management Plan

In February 2009, the SWRCB adopted the Recycled Water Policy to encourage and provide guidance for the use of recycled water in California. The Recycled Water Policy requires local water and wastewater entities, together with local stakeholders, to develop a Salt and Nutrient Management Plan (SNMP) in a cooperative and collaborative manner for each groundwater basin in California. The SNMPs are intended to help streamline the permitting of new recycled water and stormwater projects while ensuring compliance with water quality objectives, and beneficial uses of the groundwater basin are protected. Los Angeles County Department of Public Works (District 40), LACSD (Districts No. 14 and 20), and the Antelope Valley SNMP planning stakeholders' group (which includes PWD) prepared the Antelope Valley SNMP in 2014. As a stakeholder in the SNMP, PWD assisted with provision of water quality data for the plan, reviewed the modeling and other analyses of salt and nutrient assimilative capacity of local groundwater, and helped develop a plan to track the long-term impacts to groundwater quality resulting from past, current, and future land uses.

6.3 Imported Water Quality

PWD receives nearly 50 percent of its raw water supplies from SWP via the California Aqueduct. This water source begins in Northern California, flows into the Sacramento-San Joaquin Delta, and is pumped south through the California Aqueduct to Palmdale Lake. The District has a maximum contractual Table A Amount of 21,300 AFY. The annual allocations based on this contractual amount can vary based on the amount of stored water in northern California, demands by other SWP Contractors and various hydrologic factors. Imported water is generally of acceptable quality and receives treatment from the WTP. The District does not currently experience and does not foresee issues with its imported water quality given controls on the incoming water and treatment process.

One important property of SWP water is the mineral content. SWP water is generally low in dissolved minerals, such as calcium, magnesium, sodium, potassium, iron, manganese, and sulfate. Most of these minerals do not have health-based concerns. Nitrate is the main exception, as it has significant health effects for infants; however, the nitrate content of SWP water is very low.

Also of significance is the salinity content measured as TDS. Only at very high concentrations is TDS a health hazard, but TDS can be an aesthetic issue, can limit crop productivity, and can shorten the useful life of pipes and water-based appliances in homes and businesses. Although the quality of SWP water varies seasonally, the PWD does not foresee issues with imported water quality as it receives adequate treatment from the WTP.

6.4 Local Surface Water Quality

PWD’s surface water is stored at Littlerock Creek Dam Reservoir and Lake Palmdale. PWD’s Sanitary Survey assessed surface water sources from Littlerock Reservoir and Lake Palmdale and was updated in 2017 in compliance with state of California regulations. Littlerock Dam Reservoir has a current capacity of approximately 3,000 AF and is filled by natural runoff from the local San Gabriel Mountains. When the Littlerock Sediment Removal Project is completed, the Reservoir will have a capacity of 3,500 AFY. Water from Littlerock Reservoir is transferred to Palmdale Lake via the Palmdale Ditch, which is mostly an open channel connecting the two reservoirs. This local surface water supply accounts for 10 percent of PWD’s raw water supply. PWD has noticed higher levels of TDS in the Littlerock Reservoir along with impacts of wildfires in the Littlerock Creek Watershed. This water receives treatment at the PWD’s Leslie O. Carter WTP.

6.5 Water Quality Impacts on Reliability

The quality of water dictates numerous management strategies a retail water purveyor will implement, including, but not limited to, the selection of raw water sources, treatment alternatives, blending options, and modifications to existing treatment facilities. Maintaining and utilizing high quality sources of water simplifies management strategies by increasing water supply alternatives, water supply reliability, and decreasing the cost of treatment. The source water supplies are of generally good quality for PWD. Maintaining high quality source water allows for efficient management of water resources by minimizing costs.

Maintaining the quality of water supplies increases the reliability of each source by ensuring that deliveries are not interrupted due to water quality concerns. A direct result from the degradation of a water supply source is increased treatment cost before consumption. The poorer the quality of the source water, the greater the treatment cost. Water may degrade in quality to the point that it is not economically feasible for treatment. In this scenario the degraded source water is taken off-line. This in turn can decrease water supply reliability by potentially decreasing the total supply and increasing demands on alternative water supplies.

Overall, the management of water supplies by PWD will allow it to meet near term and long term demands within its service area. Therefore, no anticipated change in reliability or supply due to water quality issues is anticipated based on the present data, as shown in Table 6-1.

Table 6-1 Projected Water Supply Changes Due To Water Quality (Percentage Change)

Water source	2025	2030	2035	2040	2045
Groundwater	0%	0%	0%	0%	0%
Imported Water	0%	0%	0%	0%	0%
Local Surface Water	0%	0%	0%	0%	0%

Section 7: Water Service Reliability

7.1 Overview

The UWMP Act requires urban water suppliers to assess water service reliability that compares total projected water use with the expected water supply over the next twenty years in five-year increments. The Act also requires an assessment for a single-dry year and multiple-dry years. This section presents the reliability assessment for PWD's service area.

PWD's water service reliability can be impacted by many factors, including changes in the availability of supplies due to climatic or infrastructure changes, as well as the efficient use of those supplies in both average and dry periods. These factors can result in immediate (such as facility failures), short-term (SWP allocation limitations), or long-term (climate change) impacts to reliability and must therefore be considered in future planning.

The impacts of these factors on supply reliability increase under single-dry and multiple-dry year hydrologic conditions. Although not all shortages can be prevented, PWD's overall goal to further diversify its supply portfolio is the most important factor in improving the immediate, near- and long- term reliability of supplies. If shortages do occur, PWD has implemented a water shortage contingency plan to manage these situations.

The reliability within the PWD service area is a composite of the reliability of each source of supply as briefly discussed below.

7.1.1 Groundwater Reliability

Groundwater is traditionally considered a highly reliable supply since it is not immediately susceptible to changes in climate and surface flows. However, the two main factors that impact the reliability of groundwater supplies are legal and water quality. See Section 4 for more discussion of the region's groundwater resources.

Legal Factors

On December 23, 2015, PWD as well as the majority of parties involved agreed to a stipulated judgment for the adjudication of the Antelope Valley Groundwater Basin[5]. This resulted in PWD receiving a groundwater production right of 2,770 AFY. Prior to the judgment, PWD had an unquantified right to pump water for beneficial use and assumed projected pumping volumes at 12,000 AF based on pumping capacity. The judgment is on appeal, but PWD believes that it is unlikely that its groundwater production right will change significantly as a result of the appeal. In addition to the pumping allocation, return flow credits will be available to PWD, as described in Section 4.2.1.3.

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[5] Judgment, *Antelope Valley Groundwater Cases*, Los Angeles County Superior Court, Judicial Council Coordination Proceeding No. 4408 (filed Dec. 28, 2015) (provided in Appendix G).

Water Quality Factors

The water quality of groundwater supplies is a factor in PWD's reliability as it needs to meet drinking water standards. PWD relies on groundwater to provide a large portion of its water supply and therefore has taken measures to ensure protection of groundwater quality. These measures are discussed in detail in Section 6.

Climatic Factors

Regional climatic factors were considered in the 2016 adjudication process for the Antelope Valley Groundwater Basin.

7.1.2 Imported Water Reliability

PWD receives imported water from the SWP. The factors affecting the reliability of imported water supplies from the SWP include legal, environmental, water quality, and climatic factors.

Legal Factors

Legal factors include policies and contract stipulations from DWR. Any legal actions can impact supplies from SWP water supplies in various ways, such as the various court decisions limiting SWP pumping due to perceived impacts on endangered fish in the Sacramento-San Joaquin Delta (Delta) estuary.

Environmental Factors

Environmental factors such as impacts to endangered species, their habitat, and other related concerns can impact SWP water supplies, as above.

Water Quality Factors

The quality of SWP water sources can impact the treatment processes needed to ensure compliance with drinking water standards, however no impact to water supply availability is projected to occur.

Climatic Factors

Imported water supplies rely heavily on runoff from rainfall and snowpack. If annual snowpack and rainfall amounts change significantly without corresponding investment in infrastructure and/or management practices, the quantity of water available from the SWP in any given year is subject to potential reductions. At this time, the impacts of climate change to imported water supplies are uncertain, however, climate models suggest a future reduction in water supplies due to decreased snowpack from higher temperatures and increased precipitation falling as rain rather than snow. These preliminary assumptions from climate models validated by the Department of Water Resources are included in the supply reliability section below.

7.1.3 Local Surface Water Reliability

PWD expects a certain amount of Littlerock Dam Reservoir water to be available for supply in all years. This amount is estimated at 50 percent of the average available historical yield (8,000 AF) such that 4,000 AF is available in all years.

Climatic Factors

PWD diverts surface water from Littlerock Dam Reservoir, which receives flows from Littlerock Creek. Littlerock Creek flows can be variable given changes in local precipitation and ETo. Most Littlerock Creek flows occur seasonally during the winter months and decrease significantly during the dry months. PWD recognizes that annual climatic changes can potentially impact the reliability of Littlerock Dam Reservoir.

7.2 Projected Water Service Reliability

There are two aspects of service and supply reliability. The first relates to immediate service needs and is primarily a function of the availability and adequacy of supply facilities. The second aspect is climate-related and involves the availability of water during varying dry periods. This section considers PWD’s water supply reliability during three water scenarios: normal water year, single-dry water year, and multiple-dry water years. These scenarios are defined as follows:

- **Normal Year**: The normal year is a year in the historical sequence that most closely represents median runoff levels and patterns. The supply quantities for this condition are derived from historical average yields.

- **Single-Dry Year**: This is defined as the year with the minimum useable supply. The supply quantities for this condition are derived from the minimum historical annual yield.

- **Multiple-Dry Years**: This is defined as the five consecutive years with the minimum cumulative useable supply. Water systems are more vulnerable to these droughts of longer duration because they deplete water storage reserves in local and state reservoirs and in groundwater basins. The supply quantities for this condition are derived from historical three-year running minimum average yields.

For groundwater, it is assumed PWD will receive a groundwater allocation of approximately 2,770 AFY (see Section 3.2.1.3). It is expected that these supplies will be consistently available under normal, single-dry year, and multiple-dry years. For Littlerock Dam Reservoir, PWD used the driest year on record of 1951 to estimate reliable availability. Accordingly, PWD expects to have up to 4,000 AF of its diversion rights under normal, single-dry year, and multiple-dry years. This amount is calculated as 50 percent of the average available yield from the Littlerock Dam Reservoir (50 percent of 8,000 AF) and is considered to be available for supply in all years.

For SWP water, PWD used the 2019 SWP DCR to identify its single-dry and multiple-dry water years. A single year drought, such as the one that occurred in 1977, would result in a yield of approximately 7 - 10 percent of the District’s Table A Amount. In an extended drought, such as the one that occurred in 1931-1934, PWD expects to receive an average of 29 to 21 percent of its Table A Amount. Groundwater pumping and Littlerock Dam Reservoir diversions are expected to remain the same during a normal water year, single-dry year, and multiple-dry years. SWP water is the only water supply source PWD expects to have variability during single-dry and multiple-dry years.

7.3 Normal Water Year

This section summarizes PWD's water supplies available to meet demands over the 25-year planning period during an average/normal year and compares them to demands for the same period. Assumptions about supplies and demands are provided in Sections 2 and 3. Table 7-1 demonstrates that PWD anticipates adequate supplies for years 2020 to 2045 under normal hydrologic conditions.

Table 7-1 Comparison of Supplies and Demands - Normal Year (AF)

	2025	2030	2035	2040	2045
Existing Supplies					
Groundwater	4,220	2,770	2,770	2,770	2,770
Groundwater Return Flow Credits	5,000	5,000	5,000	5,000	5,000
Groundwater or Surface Water Augmentation	5,325	5,325	5,325	5,325	5,325
Local Surface Water	4,000	4,000	4,000	4,000	4,000
Imported SWP Water	12,030	11,720	11,400	11,080	11,080
Butte Transfer Agreement(a)	5,650	5,500	5,350	5,200	5,200
Recycled Water(	500	1,000	1,500	2,000	2,000
Total Supplies	**36,725**	**35,315**	**35,345**	**35,375**	**35,375**
Potable Water Demands	19,720	20,310	21,480	22,780	24,250
Recycled Water Demands	500	1,000	1,500	2,000	2,000
Total Demand(b)	**20,220**	**21,310**	**22,980**	**24,780**	**26,250**
Difference (Supply-Demand)	***16,505***	***14,005***	***12,365***	***10,595***	***9,125***

Notes: Values are rounded.
(a) For details see Section 4.3.1.
(b) Demands are not expected to change during drought conditions; the region typically receives little rain, and with implementation of DMM's water demands for irrigation do not increase in the PWD under single-dry and multiple-dry year conditions.

7.4 Single-Dry Year

The water supplies and demands for the PWD service area over the 25-year planning period were analyzed in the event that a single-dry year occurs, similar to the drought that occurred in California in 1977. Table 7-2 summarizes the existing and planned supplies available to meet demands during a single-dry year (assuming 7-10% of SWP supply from the 2019 DCR).

Table 7-2 shows that PWD anticipates demands to exceed existing supplies starting in 2030 under single-dry year hydrologic conditions. A discussion on how PWD anticipates making up for supply deficits is discussed below in Section 7.7.

Table 7-2 Comparison of Supplies and Demands - Single-Dry Year (AF)

	2025	2030	2035	2040	2045
Existing Supplies					
Groundwater	4,220	2,770	2,770	2,770	2,770
Groundwater Return Flow Credits	5,000	5,000	5,000	5,000	5,000
Groundwater or Surface Water Augmentation	5,325	5,325	5,325	5,325	5,325
Local Surface Water	4,000	4,000	4,000	4,000	4,000
Imported SWP Water	1,490	1,705	1,915	2,130	2,130
Butte Transfer Agreement^(a)	700	800	900	1,000	1,000
Recycled Water	500	1,000	1,500	2,000	2,000
Total Supplies	**21,235**	**20,600**	**21,410**	**22,225**	**22,225**
Potable Water Demands	19,720	20,310	21,480	22,780	24,250
Recycled Water Demands	500	1,000	1,500	2,000	2,000
Total Demand(b)	**20,220**	**21,310**	**22,980**	**24,780**	**26,250**
Difference (Supply-Demand)	***1,015***	***-710***	***-1,570***	***-2,555***	***-4,025***

Note: Values are rounded.

(a) For details see Section 4.3.1.

(b) Demands are not expected to change during drought conditions; the region typically receives little rain, and with implementation of DMMs water demands for irrigation do not increase in the PWD under single-dry and multiple-dry year conditions.

7.5 Multiple-Dry Year (5-years)

The water supplies and demands for PWD service area over the 25-year planning period were analyzed in the event that a five-year multiple-dry year event occurs, similar to the drought that occurred during the years 1931 to 1934. Table 7-3 summarizes the existing and planned supplies available to meet demands during multiple-dry years (assuming 29% SWP supply from the 2019 DCR). Table 7-3 shows that PWD anticipates demands to exceed existing supplies starting in 2045 under multiple-dry year hydrologic conditions. A discussion on how PWD anticipates making up for supply deficits is discussed below in Section 7.7.

Table 7-3 Comparison of Supplies and Demands - Multiple-Dry Year (AF)

	2025	2030	2035	2040	2045
Existing Supplies					
Groundwater	4,220	2,770	2,770	2,770	2,770
Groundwater Return Flow Credits	5,000	5,000	5,000	5,000	5,000
Groundwater or Surface Water Augmentation	5,325	5,325	5,325	5,325	5,325
Local Surface Water (from Table 4-6)	4,000	4,000	4,000	4,000	4,000
Imported SWP Water (from Table 4-9)	6,180	5,645	5,110	4,470	4,470
Butte Transfer Agreement(a)	2,900	2,650	2,400	2,100	2,100
Recycled Water (from Table 5-4)	500	1,000	1,500	2,000	2,000
Total Supplies	**28,125**	**26,390**	**26,105**	**25,665**	**25,665**
Potable Water Demands	19,720	20,310	21,480	22,780	24,250
Recycled Water Demands	500	1,000	1,500	2,000	2,000
Total Demand(b)	**20,220**	**21,310**	**22,980**	**24,780**	**26,250**
Difference (Supply-Demand)	***7,905***	***5,080***	***3,125***	***885***	***-585***

Note: Values are rounded.

(a) For details see Section 4.3.1.

(b) Demands are not expected to change during drought conditions; the region typically receives little rain, and with implementation of DMMs water demands for irrigation do not increase in the PWD under single-dry and multiple-dry year conditions.

7.6 Drought Risk Assessment

The Water Code requires that every urban water supplier include in its UWMP, a drought risk assessment for its water service to its customers. This is to benefit and inform the demand management measures and water supply projections and programs to be included in the UWMP.

7.6.1 Data and Methodologies Used

7.6.1.1 Water Demands

The water demands for this UWMP utilize water demand forecast developed in February 2021 based on extensive data on existing land use and water demands and projected land uses. The water demand estimates changes in demand due to water conservation and codes and standards that have occurred over time. Using the anticipated land uses and associated water demand factors, PWD has estimated water demands from 2021 through 2025, as shown in Table 7-4, below and in Section 2.4.

7.6.1.2 Water Supplies

This Drought Risk Assessment looks at all the water supplies anticipated to be available in a 5-year consecutive drought, from 2021 to 2025, including any limitations due to infrastructure and regulations.

Imported Water

PWD is a direct contractor of the State Water Project (SWP). PWD's contractual maximum allocation that can be received in a year, is 21,300 AF. The DWR 2019 DCR estimates that supplies may vary from 41% to 10% in a consecutive dry year scenario based on a repeat of the historic five-year dry period of 1988-1992. The maximum allowed amount received from the Butte Transfer Agreement is 10,000 AF. Table 7-4 assumes the Butte Transfer Agreement available SWP supplies will also vary from 10% to 41% in a consecutive five-year drought.

Groundwater

PWD receives its groundwater from the Antelope Valley Groundwater Basin. In 2015, the basin was adjudicated and PWD received a new pumping right of 2,770 AFY. The adjudication allowed for PWD to ramp down production and comply with the new pumping right within seven years, or 2023. Additionally, PWD is entitled to a portion of the unused federal share, approximately 1,370 AFY, until the year 2025. PWD also has the ability to receive return flows in the amount of 5,000 AFY. These values are reflected in Table 7-4.

Surface Water

PWD anticipates being able to supply up to 4,000 AF of surface water from Littlerock Reservoir from 2021 through 2025.

Recycled Water

PWD anticipates being able to deliver up to 100 AF or recycled water in 2021 even in a drought year. With the planned recycled water projects, this will increase to 500 AF by 2025, assuming drought years. These volumes assumed reduced inflows to the wastewater treatment plant, due to drought, decrease normal recycled water production.

Table 7-4 Summary of Anticipated Supplies and Demand Consecutive Dry Years (2021 - 2025)

Supply	**2021**	**2022**	**2023**	**2024**	**2025**
Groundwater	4,220	4,220	4,220	4,220	4,220
Groundwater Return Flow Credits	5,000	5,000	5,000	5,000	5,000
Groundwater or Surface Water Augmentation	0	0	0	0	5,325
Local Surface Water	4,000	4,000	4,000	4,000	4,000
Imported SWP Water	2,130	8,730	2,555	4,260	3,835
Butte Transfer Agreement	1,000	4,100	1,200	2,000	1,800
Recycled Water	100	100	500	500	500
Total Supplies	**16,450**	**26,155**	**17,475**	**19,980**	**24,680**
Potable Demands (Table 2-7)	**19,310**	**19,405**	**19,520**	**19,615**	**19,720**
Non-Potable Demands	100	100	100	100	500
Total Demands	**19,410**	**19,505**	**19,620**	**19,715**	**20,220**
Difference	***-2,960***	***6,650***	***-2,145***	***265***	***4,460***

Note: Modified from DWR Table 7-5

7.7 Summary of Comparisons

As shown in the analyses above, PWD projects adequate supplies to meet demands during normal years throughout the planning period. However, PWD anticipates that during single-dry year conditions, demands will exceed existing supplies starting in 2030 and that during multiple-dry year conditions, demands will exceed existing supplies starting in 2045. During a consecutive five-year drought, PWD anticipates demand exceeding supplies in 2021 and 2023. Therefore, additional supplies or a reduction in demand are assumed to be needed to meet demands under those conditions.

As described in Section 4, PWD is currently in the process of developing the Palmdale Regional Water Augmentation Project (PRWAP), which is anticipated to provide 5,325 AFY for surface water augmentation or groundwater injection. In addition, PWD has identified numerous short- and long-term transfer and exchange opportunities, as described in Section 4.3.3.2, which would provide additional supplies to help overcome supply shortages. The Water Shortage Contingency Plan, provided in Appendix J, identifies potential demand reduction actions to reduce shortage gaps.

Therefore, it is anticipated that existing supplies in combination with identified future and potential water supply opportunities and demand reduction responses will enable PWD to meet all future water demands under all hydrologic conditions through the end of the planning period.

Section 8: Water Demand Management Measures

8.1 Demand Management 2016-2020

This section describes the Demand Management Measures (DMMs) that PWD is currently implementing and plans to implement in order to meet its urban water use reduction targets (see Section 3).

In addition, Governor Edmund J. Brown's April 2014 emergency declaration requires that all state agencies that distribute funding for projects that impact water resources, including groundwater resources, will require recipients of future financial assistance to have appropriate conservation and efficiency programs in place.

Recent legislation significantly revised the UWMP Act to simplify and clarify the DMM reporting requirements for the 2020 UWMP cycle. Since PWD is a member of the California Urban Water Conservation Council (CUWCC) it may continue to submit its annual reports as required by Section 6.2 of the Memorandum of Understanding Regarding Urban Water Conservation in California in order to comply with this section of the Act.

PWD recognizes that conserving water is an integral component of a responsible water management strategy. PWD has a uniquely low water use for a high desert area, located in the South Lahontan Hydrologic Region. Based on data reported in the 2010 UWMPs, the South Lahontan Hydrologic Region had a population-weighted baseline 5-year average water use of 258 GPCD with an average population-weighted 2020 target of 207 GPCD (DWR 2014). With a 2015 GPCD of 128 gallons, the PWD's water use is significantly lower than the rest of the South Lahontan Hydrologic Region. The District has achieved its goals largely by focusing on system performance, rate increases and a community culture of conservation and small landscapes. It will maintain this level of demand, and possibly reduce demand even further, by continuing to implement the CUWCC BMPs.

For the purposes of this UWMP the DMMs are categorized as "Foundational" and "Other." Foundational DMMs, listed below, are those DMMs that the UWMP Act and Water Code specifically mention for retail water suppliers such as PWD:

1. Water waste prevention ordinances
2. Metering
3. Conservation Pricing
4. Public Education and Outreach
5. Programs to assess and manage distribution system real loss
6. Water conservation program coordination and staff support

Activities outside of the Foundational DMMs that encourage less water use in PWD's service area fall in the "Other" category.

8.1.1 Foundational DMMs

8.1.1.1 Water Waste Prevention Ordinances and Prohibition

In 2001 the Board of Directors adopted the Waste of Water Policy, which outlines actions to be taken by PWD to prevent and address waste and unreasonable use of water, including penalties for violations. In December 2009, the Board of Directors adopted and approved Resolution No. 09-19 declaring water conservation regulations, with the intent to meet the water use reduction goals of 20 percent by 2020 and ensure adequate water supply for human consumption, sanitation, and fire protection.

8.1.1.2 Metering

PWD is fully metered with all customers have metered accounts. PWD is in the process of replacing all meters within its service area with a new AMI metering system to ensure more accurate reading and data capture. This is considered a water conservation initiative, in addition to a financial best management practice.

8.1.1.3 Conservation Pricing

PWD uses a budget based tiered rate approach for water pricing. The most recent September 17th 2014 Proposition 218 process redistributed the old Tier 1 pricing into a new two- tier approach. Tier 1 now is a customer's Indoor allocation for use of all residential activities inside the home. Tier 2 is a customer's Outdoor water allocation. Pricing varies between the two Tiers. Tier 1 is the least expensive while Tier 2 water increases in price due to increased water usage for irrigation. Four (4) additional tiers remain, with the cost per unit increasing progressively at each tier.

8.1.1.4 Public Education and Outreach

PWD has school education programs in place that provide educational materials and instructional assistance. This program is intended to reach the youngest water users and emphasize the need to engage them in water conservation.

To provide PWD customers with the tools to maintain water conservation goals, public education efforts have included, radio spots, bill inserts, newsletters, press releases, rebate programs including Water Wise Landscape Conversion Program and some indoor high efficiency appliances, booths at local events, public speaking engagements, web-based presentations, and school interaction. PWD is committed to providing its customers with the education and tools to maintain their low use, all of which can be found on PWD's website at: http://www.palmdalewater.org/conservation/ .

8.1.1.5 Programs to assess and mange distribution system real loss

PWD regularly checks and evaluates the mainline piping system to detect leaks. Distribution system loss is discussed in Section 2.2.2 and reported in Appendix E.

8.1.1.6 Consistency with State Water Loss Standards

At the current time, a water loss standard has not been adopted by the State of California. Future UWMPs prepared by PWD will report on compliance with any State water loss standards.

8.1.1.7 Water conservation program coordination and staffing support

Water conservation activities include significant public outreach efforts as described earlier. In addition, there are two full-time Water Use Efficiency Specialists with a moderate budget. Contact information: Robert Rosati, Water Use Efficiency Specialist, 661-456-5943; Maria Avelar, Water Use Efficiency Specialist, 661-456-1001.

8.1.2 Other DMMs

8.1.2.1 Rebate Programs

PWD started several rebate programs for customers in the later part of 2009. Customers were given rebates as credits on their water bills if they filled out an application after buying the rebated product and returning the original receipt and a copy of the water bill to PWD. In addition, PWD implements a number of rebate programs to encourage water conservation:

1. High Efficiency Toilet (HET) Rebate Program: A HET rebate program was instituted in 2009 for residential and commercial customers. The rebate amount for this program is a credit on their water bill of $100.00 per toilet installed.

2. High-Efficiency Urinal Rebate Program: A urinal rebate program is available for residential and commercial customers that install a urinal with a use of 0.125 gpf or less.

3. High Efficiency Washing Machines Rebate Program: A washing machine rebate program is available for customers who wish to purchase a water efficient washing machine with a water factor of 3.7 or less. The rebate amount for this program is a credit on the customer’s account of $150.00 per washer bought.

4. Water-Wise Landscape Conversion Program. This program encourages the replacement of grass with “water-smart” landscaping to conserve water.

5. Weather Based Irrigation Controller Rebate Program: This rebate offers up to $150 credit on the customers water bill for water sense labeled controllers.

8.1.3 Planned Implementation of DMMs to Achieve Water Use Targets

PWD currently has a water conservation program and will continue to expand this program over the next five years and is dedicated to water conservation as a vital part of its water supply portfolio. Several water conservation programs have been implemented over the last few decades, including classroom education programs, public outreach, and various rebate programs. PWD will continue to provide these programs as part of its conservation efforts on a yearly basis.

PWD will continue to implement its conservation program and the DMMs described in this UWMP. These programs, taken together, will help to maintain progress on meeting 20x2020 water use reduction targets as described in Section 3 of this UWMP.

Section 9: Water Shortage Contingency Planning

PWD has prepared a separate stand-alone Water Shortage Contingency Plan (WSCP), contained in Appendix J. The WSCP was adopted on June 14, 2021 at the regular Board of Directors meeting. This section includes a brief description summary of the WSCP required by the UWMP Guidelines.

9.1 Purpose of the WSCP

PWD has developed a WSCP to provide guidance if triggering events occur - whether from reduced supply, increased demand, or an emergency declaration — and to identify corresponding actions to be taken during the various stages of a water shortage. The plan includes voluntary and mandatory stages which are intended to be fair to all water customers and users while having the least impact on business, employment, and quality of life for residents.

9.2 Annual Assessment

New provisions in Water Code Section 10632.1. require that an urban water supplier such as PWD, conduct an annual water supply and demand assessment ("Annual Assessment"), on or before July 1 of each year, to be submitted to DWR. As part of the WSCP PWD has identified the timeline, staff and outside agency coordination, and other actions necessary to conduct the Annual Assessment.

9.3 Shortage Stages

The WSCP describes water shortage stages corresponding to progressive ranges of up to 10, 20, 30, 40, and 50 percent shortages and greater than 50 percent shortage.

9.4 Water Shortage Response Actions

The WSCP identifies water shortage response actions, including:

- Water supply augmentation
- Operational Changes
- Demand Reduction Actions

Section 10: References

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June 25, 2021

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APPENDICES
2020 Urban Water Management Plan
Palmdale Water District

PALMDALE WATER DISTRICT
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Appendix A: UWMP Checklist

Appendix A:
UWMP Checklist

Checklist Arranged by Water Code.

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
10608.20(e)	Retail suppliers shall provide baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.	Baselines and Targets	Chapter 5	Section 3.1
10608.22	Retail suppliers' per capita daily water use reduction shall be no less than 5 percent of base daily per capita water use of the 5 year baseline. This does not apply if the suppliers base GPCD is at or below 100.	Baselines and Targets	Section 5.7.2	Section 3.1.1
10608.24(a)	Retail suppliers shall meet their water use target by December 31, 2020.	Baselines and Targets	Section 5.7	Section 3.1.2
10608.24(d)(2)	If the retail supplier adjusts its compliance GPCD using weather normalization, economic adjustment, or extraordinary events, it shall provide the basis for, and data supporting the adjustment.	Baselines and Targets	Sections 5.2 and 5.5.7	Section 3.1.2; Appendix F Table 4-D, Appendix B, Table 7-5

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
10608.26(a)	Retail suppliers shall conduct a public hearing to discuss adoption, implementation, and economic impact of water use targets.	Plan Adoption, Submittal, and Implementation	Chapter 10	Appendix C
10608.4	Retail suppliers shall report on their progress in meeting their water use targets. The data shall be reported using a standardized form.	Baselines and Targets	Section 5.8 and App E	Section 3.12
10620(b)	Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.	Plan Preparation	Section 2.1	Section 1.1
10620(d)(2)	Coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.	Plan Preparation	Section 2.5.2	Section 1.5
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	Section 7.4	Section 4.2.3.5
10621(b)	Notify, at least 60 days prior to the public hearing, any city or county within which the supplier provides water that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan.	Plan Adoption, Submittal, and Implementation	Section 10.2.1	Appendix C

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
10621(f)	Each urban water supplier shall update and submit its 2020 plan to the department by July 1, 2021.	Plan Adoption, Submittal, and Implementation	Sections 10.3.1 and 10.4	Appendix C
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.	Summary	Chapter 1	Executive Summary
10631(a)	Describe the water supplier service area.	System Description	Section 3.1	Section 1.6.1
10631(a)	Describe the climate of the service area of the supplier.	System Description	Section 3.3	Section 1.9
10631(a)	Indicate the current population of the service area.	System Description and Baselines and Targets	Sections 3.4 and 5.4	Section 1.7.1
10631(a)	Provide population projections for 2025, 2030, 2035, 2040 and optionally 2045.	System Description	Section 3.4	Section 1.7.1
10631(a)	Describe other social, economic, and demographic factors affecting the supplier's water management planning.	System Description	Section 3.4	Section 1.7.2

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
10631(a)	Describe the land uses within the service area.	System Description	Section 3.5	Section 1.8
10631(b)	Identify and quantify the existing and planned sources of water available for 2020, 2025, 2030, 2035, 2040 and optionally 2045.	System Supplies	Section 6.2.8	Section 4.1
10631(b)	Indicate whether groundwater is an existing or planned source of water available to the supplier.	System Supplies	Section 6.2	Section 4.2.1
10631(b)(1)	Provide a discussion of anticipated supply availability under a normal, single dry year, and a drought lasting five years, as well as more frequent and severe periods of drought.	System Supplies	Section 6.2	Section 4.6
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	Section 6.1	Section 4.2.3.4
10631(b)(3)	Describe measures taken to acquire and develop planned sources of water.	System Supplies	Section 6.1	Section 4.3.2
10631(b)(4)(A)	Indicate whether a groundwater sustainability plan or groundwater management plan has been adopted by the water supplier or if there is any other specific authorization for groundwater management. Include a copy of the plan or authorization.	System Supplies	Section 6.2.2	Section 4.2.1.3

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
10631(b)(4)(B)	Describe the groundwater basin.	System Supplies	Section 6.2.2	Section 4.2.1.1
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	Section 6.2.2	Section 4.2.1.3, Appendix G
10631(b)(4)(B)	For unadjudicated basins, indicate whether or not the department has identified the basin as a high or medium priority. Describe efforts by the supplier to coordinate with sustainability or groundwater agencies to achieve sustainable groundwater conditions.	System Supplies	Section 6.2.3	N/A
10631(b)(4)(C)	Provide a detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years	System Supplies	Section 6.2.4	Section 4.2.1.2
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	Section 6.2	Section 4.2.1.3
10631(c)	Describe the opportunities for exchanges or transfers of water on a short-term or long- term basis.	System Supplies	Section 6.7	Section 4.3.1
10631(d)(1)	Quantify past, current, and projected water use, identifying the uses among water use sectors.	System Water Use	Section 4.2	Section 4.1, 4.2.1.2, 4.2.2.2, 4.2.3.1

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
10631(d)(3)(A)	Report the distribution system water loss for each of the 5 years preceding the plan update.	System Water Use	Section 4.3	Section 2.2.2
10631(d)(3)(C)	Retail suppliers shall provide data to show the distribution loss standards were met.	System Water Use	Section 4.2	Section 2.2.2
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	Sections 9.2 and 9.3	Section 8.2
10631(f)	Describe the expected future water supply projects and programs that may be undertaken by the water supplier to address water supply reliability in average, single-dry, and for a period of drought lasting 5 consecutive water years.	System Supplies	Section 6.8	Section 7.6
10631(g)	Describe desalinated water project opportunities for long-term supply.	System Supplies	Section 6.6	Section 4.3.3
10631(h)	Retail suppliers will include documentation that they have provided their wholesale supplier(s) - if any - with water use projections from that source.	System Supplies	Section 2.5.1	Appendix D
10631.1(a)	Include projected water use needed for lower income housing projected in the service area of the supplier.	System Water Use	Section 4.5	Section 2.5

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
10631.2(a)	The UWMP must include energy intensity information as stated in the code.		Section 6.4 and Appendix O	Section 4.6
10632(a)	Provide a water shortage contingency plan (WSCP) with specified elements below.	Water Shortage Contingency Planning	Chapter 8	Appendix I
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	Section 8.2	Appendix I
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	Section 8.2	Appendix I
10632(a)(3)(A)	Define six standard water shortage levels of 10, 20, 30, 40, 50 percent shortage and greater than 50 percent shortage. These levels shall be based on supply conditions, including percent reductions in supply, changes in groundwater levels, changes in surface elevation, or other conditions. The shortage levels shall also apply to a catastrophic interruption of supply.	Water Shortage Contingency Planning	Section 8.3	Appendix I
10632(a)(3)(B)	Suppliers with an existing water shortage contingency plan that uses different water shortage levels must cross reference their categories with the six standard categories.	Water Shortage Contingency Planning	Section 8.3	Appendix I
10632(a)(4)(A)	Suppliers with water shortage contingency plans that align with the defined shortage levels must specify locally appropriate supply augmentation actions.	Water Shortage Contingency Planning	Section 8.4	Appendix I

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
10632(a)(4)(B)	Specify locally appropriate demand reduction actions to adequately respond to shortages.	Water Shortage Contingency Planning	Section 8.4	Appendix I
10632(a)(4)(C)	Specify locally appropriate operational changes.	Water Shortage Contingency Planning	Section 8.4	Appendix I
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	Section 8.4	Appendix I
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	Section 8.4	Appendix I
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	Section 8.5	Appendix I
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	Section 8.5, 8.6	Appendix I
10632(a)(7)(A)	Describe the legal authority that empowers the supplier to enforce shortage response actions.	Water Shortage Contingency Planning	Section 8.7	Appendix I
10632(a)(7)(B)	Provide a statement that the supplier will declare a water shortage emergency Water Code Chapter 3.	Water Shortage Contingency Planning	Section 8.7	Appendix I

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
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	Section 8.7	Appendix I
10632(a)(8)(A)	Describe the potential revenue reductions and expense increases associated with activated shortage response actions.	Water Shortage Contingency Planning	Section 8.8	Appendix I
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	Section 8.8	Appendix I
10632(a)(8)(C)	Describe the cost of compliance with Water Code Chapter 3.3: Excessive Residential Water Use During Drought.	Water Shortage Contingency Planning	Section 8.8	Appendix I
10632(a)(9)	Retail suppliers must describe the monitoring and reporting requirements and procedures that ensure appropriate data is collected, tracked, and analyzed for purposes of monitoring customer compliance.	Water Shortage Contingency Planning	Section 8.9	Appendix I
10632(a)(10)	Describe reevaluation and improvement procedures for monitoring and evaluation the water shortage contingency plan to ensure risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented.	Water Shortage Contingency Planning	Section 8.10	Appendix I
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	Section 8.11	Appendix I

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
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)	Section 6.2	Section 5.3
10633(c)	Describe the recycled water currently being used in the supplier's service area.	System Supplies (Recycled Water)	Section 6.2	Section 5.4
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)	Section 6.2	Section 5.5.2
10633(e)	Describe the projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected.	System Supplies (Recycled Water)	Section 6.2	Section 5.5, Table 6-4
10633(f)	Describe the actions which may be taken to encourage the use of recycled water and the projected results of these actions in terms of acre-feet of recycled water used per year.	System Supplies (Recycled Water)	Section 6.2	Section 5.5.53
10633(g)	Provide a plan for optimizing the use of recycled water in the supplier's service area.	System Supplies (Recycled Water)	Section 6.2	Section 5.5.2
10634	Provide information on the quality of existing sources of water available to the supplier and the manner in which water quality affects water management strategies and supply reliability	Water Supply Reliability Assessment	Chapter 7	Section 6.2, 6.3

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
10635(a)	Assess the water supply reliability during normal, dry, and multiple dry water years by comparing the total water supply sources available to the water supplier with the total projected water use over the next 20 years.	Water Supply Reliability Assessment	Section 7.3	Section 7.3, 7.4, 7.5
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	Section 7.3	Section 7.6
10635(b)(1)	Include a description of the data, methodology, and basis for one or more supply shortage conditions that are necessary to conduct a drought risk assessment for a drought period that lasts 5 consecutive years.	Water Supply Reliability Assessment	Section 7.3	Section 7.6.1
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	Section 7.3	Section 7.1.1, 7.1.2, 7.1.3
10635(b)(3)	Include a comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period.	Water Supply Reliability Assessment	Section 7.3	Section 6.2.4
10635(b)(4)	Include considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change condition, anticipated regulatory changes, and other locally applicable criteria.	Water Supply Reliability Assessment	Section 7.3	Section 7

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
10635(c)	Provide supporting documentation that Water Shortage Contingency Plan has been, or will be, provided to any city or county within which it provides water, no later than 60 days after the submission of the plan to DWR.	Plan Adoption, Submittal, and Implementation	Sections 8.12, 10.4	Section 1.2.2
10642	Provide supporting documentation that the water supplier has encouraged active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan and contingency plan.	Plan Preparation	Section 2.6	Section 1.7.2
10642	Provide supporting documentation that the urban water supplier made the plan and contingency plan available for public inspection, published notice of the public hearing, and held a public hearing.	Plan Adoption, Submittal, and Implementation	Sections 10.2.2, 10.3, and 10.5	Section 1.4.2
10642	The water supplier is to provide the time and place of the hearing to any city or county within which the supplier provides water.	Plan Adoption, Submittal, and Implementation	Section 10.2	Section 1.4.2
10642	Provide supporting documentation that the plan and contingency plan has been adopted as prepared or modified.	Plan Adoption, Submittal, and Implementation	Section 10.3.1	Section 1.4.3
10644(a)	Provide supporting documentation that the urban water supplier has submitted this UWMP to the California State Library.	Plan Adoption, Submittal, and Implementation	Section 10.5	Section 1.4.4
10644(a)(1)	Provide supporting documentation that the urban water supplier has submitted this UWMP to any city or county within which the supplier provides water no later than 30 days after adoption.	Plan Adoption, Submittal, and Implementation	Section 10.5	Section 1.4.4

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
10644(a)(2)	The plan, or amendments to the plan, submitted to the department shall be submitted electronically.	Plan Adoption, Submittal, and Implementation	Sections 10.4.1 and 10.4.2	Section 1.4.4
10645(a)	Provide supporting documentation that, not later than 30 days after filing a copy of its plan with the department, the supplier has or will make the plan available for public review during normal business hours.	Plan Adoption, Submittal, and Implementation	Section 10.5	Section 1.4.4
10645(b)	Provide supporting documentation that, not later than 30 days after filing a copy of its water shortage contingency plan with the department, the supplier has or will make the plan available for public review during normal business hours.	Plan Adoption, Submittal, and Implementation	Section 10.5	Appendix C

Appendix B: Submittal Tables

Submittal Table 2-1 Retail Only: Public Water Systems

Public Water System Number	Public Water System Name	Number of Municipal Connections 2020	Volume of Water Supplied 2020 *
Add additional rows as needed			
CA1910102	Palmdale Water District	27,479	20,511
	TOTAL	27,479	20,511

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

NOTES:

Submittal Table 2-2: Plan Identification

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

Submittal Table 2-3: Supplier Identification

Type of Supplier (select one or both)	
☐	Supplier is a wholesaler
☑	Supplier is a retailer
Fiscal or Calendar Year (select one)	
☑	UWMP Tables are in calendar years
☐	UWMP Tables are in fiscal years
If using fiscal years provide month and date that the fiscal year begins (mm/dd)	
Units of measure used in UWMP * (select from drop down)	
Unit	AF

Submittal Table 2-4 Retail: Water Supplier Information Exchange

The retail Supplier has informed the following wholesale supplier(s) of projected water use in accordance with Water Code Section 10631.

Wholesale Water Supplier Name
Add additional rows as needed

NOTES: Not applicable. PWD does not receive water from a wholesale supplier. PWD is a direct contractor of the State Water Project.

Submittal Table 3-1 Retail: Population - Current and Projected

Population Served	2020	2025	2030	2035	2040	2045*(opt)*
	126,002	128,998	132,003	138,554	145,962	153,766

Submittal Table 4-1 Retail: Demands for Potable and Non-Potable[1] Water - Actual

Use Type	2020 Actual		
Drop down list May select each use multiple times These are the only Use Types that will be recognized by the WUEdata online submittal tool	Additional Description (as needed)	Level of Treatment When Delivered Drop down list	Volume[2]
Add additional rows as needed			
Single Family			11,757
Multi-Family			1,555
Commercial			1,190
Industrial			1,637
Institutional/Governmental			
Landscape			1,040
Sales/Transfers/Exchanges to other Suppliers			1,301
Losses			1,997
Other			34
		TOTAL	20,511

[1] *Recycled water demands are NOT reported in this table. Recycled water demands are reported in Table 6-4.*

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

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

Use Type	Additional Description (as needed)	Projected Water Use[2] *Report To the Extent that Records are Available*				
Drop down list May select each use multiple times These are the only Use Types that will be recognized by the WUEdata online submittal tool		2025	2030	2035	2040	2045 (opt)
Add additional rows as needed						
Single Family		11,460	11,730	12,310	12,970	13,660
Multi-Family		1,450	1,480	1,560	1,640	1,730
Commercial	(a)	1,170	1,240	1,390	1,550	1,730
Industrial		1,350	1,390	1,480	1,590	1,700
Institutional/Governmental						
Landscape		1,050	1,130	1,300	1,490	1,690
Sales/Transfers/Exchanges to other Suppliers		1,300	1,300	1,300	1,300	1,300
Losses	(b)	1,900	2,000	2,100	2,200	2,400
Other	(c)	40	40	40	40	40
	TOTAL	19,720	20,310	21,480	22,780	24,250

Submittal Table 4-3 Retail: Total Water Use (Potable and Non-Potable)

	2020	2025	2030	2035	2040	2045 (opt)
Potable Water, Raw, Other Non-potable *From Tables 4-1R and 4-2 R*	20,511	19,720	20,310	21,480	22,780	24,250
Recycled Water Demand[1] *From Table 6-4*	70	500	1,000	1,500	2,000	2,000
Optional Deduction of Recycled Water Put Into Long-Term Storage[2]						
TOTAL WATER USE	20,581	20,220	21,310	22,980	24,780	26,250

Submittal Table 4-4 Retail: Last Five Years of Water Loss Audit Reporting

Reporting Period Start Date (mm/yyyy)	Volume of Water Loss [1,2]
01/2015	1297
01/2016	1559
01/2017	1808
01/2018	1723
01/2019	1351

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

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

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

Are Future Water Savings Included in Projections? (Refer to Appendix K of UWMP Guidebook) *Drop down list (y/n)*	No
If "Yes" to above, state the section or page number, in the cell to the right, where citations of the codes, ordinances, or otherwise are utilized in demand projections are found.	
Are Lower Income Residential Demands Included In Projections? *Drop down list (y/n)*	Yes

Submittal Table 5-1 Baselines and Targets Summary
From SB X7-7 Verification Form

Retail Supplier or Regional Alliance Only

Baseline Period	Start Year *	End Year *	Average Baseline GPCD*	Confirmed 2020 Target*
10-15 year	*SB X7-7 Table 1*	*SB X7-7 Table 1*	*SB X7-7 Table 5*	*SB X7-7 Table 7-F*
5 Year	*SB X7-7 Table 1*	*SB X7-7 Table 1*	*SB X7-7 Table 5*	

**All cells in this table should be populated manually from the supplier's SBX7-7 Verification Form and reported in Gallons per Capita per Day (GPCD)*

Submittal Table 5-2: 2020 Compliance From SB X7-7 2020 Compliance Form *Retail Supplier or Regional Alliance Only*				
2020 GPCD			2020 Confirmed Target GPCD*	Did Supplier Achieve Targeted Reduction for 2020? Y/N
Actual 2020 GPCD*	2020 TOTAL Adjustments*	Adjusted 2020 GPCD* *(Adjusted if applicable)*		
SB X7-7 Table 9	*SB X7-7 Table 9*	*SB X7-7 Table 9*	*SB X7-7 Table 9*	*SB X7-7 Table 9*
**All cells in this table should be populated manually from the supplier's SBX7-7 2020 Compliance Form and reported in Gallons per Capita per Day (GPCD)*				

Submittal Table 6-1 Retail: Groundwater Volume Pumped						
☐	Supplier does not pump groundwater. The supplier will not complete the table below.					
☐	All or part of the groundwater described below is desalinated.					
Groundwater Type **_Drop Down List_** _May use each category multiple times_	Location or Basin Name	2016*	2017*	2018*	2019*	2020*
Add additional rows as needed						
Alluvial Basin	Antelope Valley Basin	8473	4355	6058	4425	7599
	TOTAL	8,473	4,355	6,058	4,425	7,599

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

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

Wastewater Collection			**Recipient of Collected Wastewater**			
Name of Wastewater Collection Agency	Wastewater Volume Metered or Estimated? *Drop Down List*	Volume of Wastewater Collected from UWMP Service Area 2020 *	Name of Wastewater Treatment Agency Receiving Collected Wastewater	Treatment Plant Name	Is WWTP Located Within UWMP Area? *Drop Down List*	Is WWTP Operation Contracted to a Third Party? *(optional)* *Drop Down List*
Los Angeles County Sanitation Districts (LACSD)	Metered	12,140	LACSD District No. 20	Palmdale Water Reclamation Plant (WRP)	Yes	No
Total Wastewater Collected from Service Area in 2020:		12,140				

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

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

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

Wastewater Treatment Plant Name	Discharge Location Name or Identifier	Discharge Location Description	Wastewater Discharge ID Number *(optional)* [2]	Method of Disposal ***Drop down list***	Does This Plant Treat Wastewater Generated Outside the Service Area? ***Drop down list***	Treatment Level ***Drop down list***	**2020 volumes** [1]				
							Wastewater Treated	Discharged Treated Wastewater	Recycled Within Service Area	Recycled Outside of Service Area	Instream Flow Permit Requirement
Palmdale Water Reclamation Plant (WRP)		Agricultural irrigation of fodder cops on land leased by LACSD from the City of LA World Airports		Other	Yes	Tertiary	12,140	10,770	110		
						Total	12,140	10,770	110	0	0

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

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

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

☐	Recycled water is not used and is not planned for use within the service area of the supplier. The supplier will not complete the table below.
Name of Supplier Producing (Treating) the Recycled Water:	Los Angeles County Sanitation Districts (LACSD)
Name of Supplier Operating the Recycled Water Distribution System:	
Supplemental Water Added in 2020 (volume) *Include units*	
Source of 2020 Supplemental Water	

Beneficial Use Type *Insert additional rows if needed.*	**Potential** Beneficial Uses of Recycled Water (Describe)	Amount of **Potential** Uses of Recycled Water (Quantity) *Include volume units* [1]	General Description of 2020 Uses	Level of Treatment *Drop down list*	2020 [1]	2025 [1]	2030[1]	2035[1]	2040[1]	2045[1] (opt)
Agricultural irrigation										
Landscape irrigation (exc golf courses)					70					
Golf course irrigation										
Commercial use										
Industrial use										
Geothermal and other energy production										
Seawater intrusion barrier										
Recreational impoundment										
Wetlands or wildlife habitat										
Groundwater recharge (IPR)						500	1,000	1,500	2,000	2,000
Reservoir water augmentation (IPR)										
Direct potable reuse										
Other (Description Required)										
				Total:	70	500	1,000	1,500	2,000	2,000
				2020 Internal Reuse						

Submittal Table 6-5 Retail: 2015 UWMP Recycled Water Use Projection Compared to 2020 Actual

☐	Recycled water was not used in 2015 nor projected for use in 2020. The supplier will not complete the table below. If recycled water was not used in 2020, and was not predicted to be in 2015, then check the box and do not complete the table.

Beneficial Use Type	2015 Projection for 2020 [1]	2020 Actual Use[1]
Insert additional rows as needed.		
Agricultural irrigation		
Landscape irrigation (exc golf courses)	1,000	70
Golf course irrigation		
Commercial use		
Industrial use		
Geothermal and other energy production		
Seawater intrusion barrier		
Recreational impoundment		
Wetlands or wildlife habitat		
Groundwater recharge (IPR)		
Reservoir water augmentation (IPR)		
Direct potable reuse		
Other (Description Required)		
Total	1,000	70

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

☐	Supplier does not plan to expand recycled water use in the future. Supplier will not complete the table below but will provide narrative explanation.		
	Provide page location of narrative in UWMP		
Name of Action	Description	Planned Implementation Year	Expected Increase in Recycled Water Use *
Add additional rows as needed			
Palmdale Regional Water Augmentation Project	The goal of the PRWAP is the beneficial use of 5,325 AFY of recycled water for either surface or groundwater augmentation to benefit the region. PRWAP is a solution that is drought resilient, provides local control of water resources, and helps meet future demands of PWD	2025	5,325
		Total	5,325

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

Submittal Table 6-7 Retail: Expected Future Water Supply Projects or Programs						
☐	No expected future water supply projects or programs that provide a quantifiable increase to the agency's water supply. Supplier will not complete the table below.					
☑	Some or all of the supplier's future water supply projects or programs are not compatible with this table and are described in a narrative format.					
Page 4-14	Provide page location of narrative in the UWMP					
Name of Future Projects or Programs	Joint Project with other suppliers?		Description (if needed)	Planned Implementation Year	Planned for Use in Year Type *Drop Down List*	Expected Increase in Water Supply to Supplier* *This may be a range*
	Drop Down List (y/n)	*If Yes, Supplier Name*				
Add additional rows as needed						

Submittal Table 6-8 Retail: Water Supplies — Actual

Water Supply	Additional Detail on Water Supply	2020		
Drop down list May use each category multiple times.These are the only water supply categories that will be recognized by the WUEdata online submittal tool		Actual Volume*	Water Quality Drop Down List	Total Right or Safe Yield* (optional)
Add additional rows as needed				
Groundwater (not desalinated)	Antelope Valley Basin	7,600	Drinking Water	
Groundwater (not desalinated)	Return Flow Credit	4,090	Drinking Water	
Groundwater (not desalinated)	Groundwater Banking	0	Drinking Water	
Surface water (not desalinated)	Littlerock Reservoir	4,540	Drinking Water	
Purchased or Imported Water	SWP Table A	5,695	Drinking Water	
Purchased or Imported Water	Butte Transfer Agreement	1,320	Drinking Water	
Recycled Water		70	Other Non-Potable Water	
	Total	23,315		0

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

NOTES:

Submittal Table 6-9 Retail: Water Supplies — Projected

Water Supply	Additional Detail on Water Supply	**Projected Water Supply *** Report To the Extent Practicable									
Drop down list May use each category multiple times. These are the only water supply categories that will be recognized by the WUEdata online submittal tool		**2025**		**2030**		**2035**		**2040**		**2045** (opt)	
		Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)
Add additional rows as needed											
Groundwater (not desalinated)	Antelope Valley Basin	4,220		2,770		2,770		2,770		2,770	
Groundwater (not desalinated)	Return Flow Credit	5,000		5,000		5,000		5,000		5,000	
Groundwater (not desalinated)	Groundwater or Surface Water Augmentation	5,325		5,325		5,325		5,325		5,325	
Surface water (not	Littlerock Reservoir	4,000		4,000		4,000		4,000		4,000	
Purchased or Imported Water	SWP table A	12,030		11,720		11,400		11,080		11,080	
Purchased or Imported Water	Butte Transfer Agreement	5,650		5,500		5,350		5,200		5,200	
Recycled Water	LACSD	500		1,000		1,500		2,000		2,000	
	Total	36,725	0	35,315	0	35,345	0	35,375	0	35,375	0

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

Submittal Table 7-1 Retail: Basis of Water Year Data (Reliability Assessment)

Year Type	**Base Year** If not using a calendar year, type in the last year of the fiscal, water year, or range of years, for example, water year 2019-2020, use 2020	Available Supplies if Year Type Repeats	
		☐ Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP. Location ____________________________	
		☑ Quantification of available supplies is provided in this table as either volume only, percent only, or both.	
		Volume Available *	**% of Average Supply**
Average Year	1922-2003	21300	100%
Single-Dry Year	1977	2130	10%
Consecutive Dry Years 1st Year	1988	2130	10%
Consecutive Dry Years 2nd Year	1989	8733	41%
Consecutive Dry Years 3rd Year	1990	2556	12%
Consecutive Dry Years 4th Year	1991	4260	20%
Consecutive Dry Years 5th Year	1992	3834	18%

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

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

Submittal Table 7-2 Retail: Normal Year Supply and Demand Comparison

	2025	2030	2035	2040	2045 *(Opt)*
Supply totals *(autofill from Table 6-9)*	36,725	35,315	35,345	35,375	35,375
Demand totals *(autofill from Table 4-3)*	20,220	21,310	22,980	24,780	26,250
Difference	16,505	14,005	12,365	10,595	9,125

Submittal Table 7-3 Retail: Single Dry Year Supply and Demand Comparison

	2025	2030	2035	2040	2045 (Opt)
Supply totals*	21,235	20,600	21,410	22,225	22,225
Demand totals*	20,220	21,310	22,980	24,780	26,250
Difference	1,015	(710)	(1,570)	(2,555)	(4,025)

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

Submittal Table 7-4 Retail: Multiple Dry Years Supply and Demand Comparison

		2025*	2030*	2035*	2040*	2045* (Opt)
First year	Supply totals	28,125	26,390	26,105	25,665	25,665
	Demand totals	20,220	21,310	22,980	24,780	26,250
	Difference	7,905	5,080	3,125	885	(585)
Second year	Supply totals	28,125	26,390	26,105	25,665	25,665
	Demand totals	20,220	21,310	22,980	24,780	26,250
	Difference	7,905	5,080	3,125	885	(585)
Third year	Supply totals	28,125	26,390	26,105	25,665	25,665
	Demand totals	20,220	21,310	22,980	24,780	26,250
	Difference	7,905	5,080	3,125	885	(585)
Fourth year	Supply totals	28,125	26,390	26,105	25,665	25,665
	Demand totals	20,220	21,310	22,980	24,780	26,250
	Difference	7,905	5,080	3,125	885	(585)
Fifth year	Supply totals	28,125	26,390	26,105	25,665	25,665
	Demand totals	20,220	21,310	22,980	24,780	26,250
	Difference	7,905	5,080	3,125	885	(585)

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

2021	Total
Total Water Use	19,410
Total Supplies	16,450
Surplus/Shortfall w/o WSCP Action	(2,960)
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	4,270
Revised Surplus/(shortfall)	1,310
Resulting % Use Reduction from WSCP action	22%

2022	Total
Total Water Use	19,505
Total Supplies	26,155
Surplus/Shortfall w/o WSCP Action	6,650
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	6,650
Resulting % Use Reduction from WSCP action	0%

2023	Total
Total Water Use	19,620
Total Supplies	17,475
Surplus/Shortfall w/o WSCP Action	(2,145)
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	4,316
Revised Surplus/(shortfall)	2,171
Resulting % Use Reduction from WSCP action	22%

2024	Total
Total Water Use	19,715
Total Supplies	19,980
Surplus/Shortfall w/o WSCP Action	265
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	265
Resulting % Use Reduction from WSCP action	0%

2025	Total
Total Water Use	20,220
Total Supplies	24,680
Surplus/Shortfall w/o WSCP Action	4,460
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	4,460
Resulting % Use Reduction from WSCP action	0%

Submittal Table 8-1
Water Shortage Contingency Plan Levels

Shortage Level	Percent Shortage Range	Shortage Response Actions *(Narrative description)*
1	Up to 10%	**Minor Shortage**. A threatened shortage exists and a voluntary consumer demand reduction, up to ten (10%) percent, is requested to make more efficient use of water and to appropriately respond to existing water conditions.
2	Up to 20%	**Moderate Shortage.** A shortage exists and a mandatory demand reduction, up to twenty (20%) percent, is requested to make more efficient use of water and to appropriately respond to existing water conditions.
3	Up to 30%	**Severe Shortage.** A severe shortage exists and a mandatory demand reduction, up to thirty (30%) percent, is requested to make more efficient use of water and to appropriately respond to existing water conditions.
4	Up to 40%	**Critical Shortage**. A critical shortage exists and a mandatory demand reduction, up to forty (40%) percent, is requested to make more efficient use of water and to appropriately respond to existing water conditions.
5	Up to 50%	**Emergency Shortage**. An emergency shortage exists and a mandatory reduction, up to fifty (50%) percent, is requested to make more efficient use of water and to appropriately respond to existing water conditions.
6	>50%	**Catastrophic Failure**. A water shortage emergency exists and a mandatory reduction in consumer demand of fifty or more (50%) is necessary to maintain sufficient water supplies for public health and safety.

Submittal Table 8-2: Demand Reduction Actions

Shortage Level	Demand Reduction Actions **_Drop down list_** *These are the only categories that will be accepted by the WUEdata online submittal tool. Select those that apply.*	How much is this going to reduce the shortage gap? *Include units used (volume type or percentage)*	Additional Explanation or Reference *(optional)*	Penalty, Charge, or Other Enforcement? ***For Retail Suppliers Only*** *Drop Down List*
Add additional rows as needed				
1	Expand Public Information Campaign	Up to 10%		No
1	Provide Rebates for Landscape Irrigation Efficiency	Up to 10%		No
2	Provide Rebates for Landscape Irrigation Efficiency	Up to 20%		No
2	Expand Public Information Campaign	Up to 20%		No
2	Implement or Modify Drought Rate Structure or Surcharge	Up to 20%		Yes
3	Expand Public Information Campaign	Up to 30%		No
3	Increase Frequency of Meter Reading	Up to 30%		Yes
3	Provide Rebates on Plumbing Fixtures and Devices	Up to 30%		No
3	Provide Rebates for Landscape Irrigation Efficiency	Up to 30%		No
3	Reduce System Water Loss	Up to 30%		No
3	Increase Water Waste Patrols	Up to 30%		Yes
3	Landscape - Restrict or prohibit runoff from landscape irrigation	Up to 30%		Yes
3	Implement or Modify Drought Rate Structure or Surcharge	Up to 30%		Yes
4	Expand Public Information Campaign	Up to 40%		No
4	Increase Frequency of Meter Reading	Up to 40%		Yes
4	Provide Rebates on Plumbing Fixtures and Devices	Up to 40%		No
4	Provide Rebates for Landscape Irrigation Efficiency	Up to 40%		No
4	Reduce System Water Loss	Up to 40%		No
4	Increase Water Waste Patrols	Up to 40%		Yes
4	Implement or Modify Drought Rate Structure or Surcharge	Up to 40%		Yes
5	Landscape - Restrict or prohibit runoff from landscape irrigation	Up to 50%		Yes
5	Expand Public Information Campaign	Up to 50%		No
5	Increase Frequency of Meter Reading	Up to 50%		Yes

5	Provide Rebates on Plumbing Fixtures and Devices	Up to 50%		No
5	Provide Rebates for Landscape Irrigation Efficiency	Up to 50%		No
5	Reduce System Water Loss	Up to 50%		No
5	Increase Water Waste Patrols	Up to 50%		Yes
5	Implement or Modify Drought Rate Structure or Surcharge	Up to 50%		Yes
6	Landscape - Restrict or prohibit runoff from landscape irrigation	Over 50%		Yes
6	Expand Public Information Campaign	Over 50%		No
6	Increase Frequency of Meter Reading	Over 50%		Yes
6	Provide Rebates on Plumbing Fixtures and Devices	Over 50%		No
6	Provide Rebates for Landscape Irrigation Efficiency	Over 50%		No
6	Reduce System Water Loss	Over 50%		No
6	Increase Water Waste Patrols	Over 50%		Yes
6	Implement or Modify Drought Rate Structure or Surcharge	Over 50%		Yes
6	Moratorium or Net Zero Demand Increase on New Connections	Over 50%		Yes

Submittal Table 8-3: Supply Augmentation and Other Actions

Shortage Level	Supply Augmentation Methods and Other Actions by Water Supplier **_Drop down list_** _These are the only categories that will be accepted by the WUEdata online submittal tool_	How much is this going to reduce the shortage gap? _Include units used (volume type or percentage)_	Additional Explanation or Reference _(optional)_
Add additional rows as needed			
4	Decrease Line Flushing	5	Decrease water distribution line flushing
5	New recycled water	4500	Expand recycled water Use
5	Transfers	9700	Activate local transfer agreements
4	Stored emergency supply	3000	Increase Lake Palmdale storage

Submittal Table 10-1 Retail: Notification to Cities and Counties

City Name	60 Day Notice	Notice of Public Hearing
Add additional rows as needed		
Palmdale	Yes	Yes
Lancaster	Yes	Yes
County Name *Drop Down List*	60 Day Notice	Notice of Public Hearing
Add additional rows as needed		
Los Angeles County	Yes	Yes

Appendix C: Adoption of UWMP

PALMDALE WATER DISTRICT
RESOLUTION NO. 21-11

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE PALMDALE WATER DISTRICT ADOPTING, DIRECTING FILING OF, AND IMPLEMENTING THE PALMDALE WATER DISTRICT 2020 URBAN WATER MANAGEMENT PLAN, THE 2015 URBAN WATER MANAGEMENT PLAN AMENDMENT, AND THE 2020 WATER SHORTAGE CONTINGENCY PLAN

WHEREAS, the California Legislature enacted Assembly Bill 797 during the 1983-1984 Regular Session of the California Legislature (Water Code Section 10610 et.seq.) known as the Urban Water Management Plan Act (the Act).

WHEREAS, the California Water Code Section 10632 requires that every urban water supplier shall prepare and adopt a Water Shortage Contingency Plan (WSCP) as part of its Urban Water Management Plan (UWMP); and

WHEREAS, the WSCP is consistent with the California Water Code Sections 350 through 359 and Section 10632 and guidance provided by the California Department of Water Resources Urban Drought Guidebook; and

WHEREAS, the Act mandates that every urban water supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually prepare, and every five (5) years thereafter update, its UWMP, the primary objective of which is to plan for the conservation and efficient use of water.

WHEREAS, the 2020 UWMP, 2015 UWMP amendment, and the 2020 WSCP (together known as the Plans) must be adopted by July 1, 2021 and filed with the California Department of Water Resources, the California State Library, and the City of Palmdale within thirty days of adoption; and

WHEREAS, the Palmdale Water District prepared and filed a UWMP with the California Department of Water Resources in December 1985, December 1990, December 1995, December 2000, December 2005, December 2010, and December 2015; and

WHEREAS, the Act further requires that the adopted UWMP's and WSCP be available for public review during normal business hours for thirty (30) days following its submission to the Department of Water Resources; and

WHEREAS, as an urban water supplier providing water service to over 117,000 customers, Palmdale Water District is subject to the Act and has, therefore, prepared and circulated for public view a draft 2020 UWMP, a draft 2015 UWMP Addendum, and a draft 2020 WSCP in compliance with the requirements of the Act, and a properly noticed public hearing regarding the proposed Plan was duly held by the Palmdale Water District on June 14, 2021.

NOW, THEREFORE, BE IT RESOLVED by the Board of the Directors of the Palmdale Water District as follows:

1. The 2020 Urban Water Management Plan, the 2015 Urban Water Management Plan Amendment, and the 2020 Water Shortage Contingency Plan are hereby approved and adopted.

2. The General Manager is hereby authorized and directed to file the Plans with the California Department of Water Resources, the California State Library, and the City of Palmdale within thirty days of adoption in accordance with the Act.

3. When required by conditions contained in the Plans, the General Manager is authorized to declare a Water Shortage Emergency and to implement water conservation programs as detailed in the Plans, including recommendations to the Board of Directors regarding necessary procedures, rules, and regulations to carry out effective and equitable water conservation programs.

4. The General Manager and staff are hereby further authorized and directed to take such other and further actions as may be reasonably necessary to carry out the purposes and intent of the Plan.

PASSED AND ADOPTED at the Regular Meeting of the Palmdale Water District Board of Directors held on June 14, 2021.

Gloria A. Dizmang

GLORIA DIZMANG, President,
Palmdale Water District Board of Directors

ATTEST:

Kathy MacLaren-Gomez

KATHY MAC LAREN-GOMEZ, Secretary,
Palmdale Water District Board of Directors

APPROVED AS TO FORM:

Aleshire & Wynder, LLP, General Counsel

Appendix D: Public Outreach Materials

PWD EST. 1918

PALMDALE WATER DISTRICT

A CENTURY OF SERVICE

October 1, 2020

City of Palmdale – Planning Division
38300 Sierra Hwy # A
Palmdale, CA 93550

Subject: 2020 Urban Water Management Plan for the Palmdale Water District

To Whom It May Concern:

The Palmdale Water District (PWD) is undertaking the review, update, and revision of its Urban Water Management Plan. PWD is located in Los Angeles County and serves the residents of the City of Palmdale. The Urban Water Management Planning Act requires every "urban water supplier" of a certain size to prepare and adopt an Urban Water Management Plan (UWMP) at least once every five years. The UWMP is a planning document in which water suppliers evaluate and compare their water supply and reliability to their existing and projected demands. A complete UWMP is necessary for PWD to remain eligible for state drought water bank assistance and is a requirement of state grant and loan funding programs.

The 2020 UWMP will include an update of anticipated water demands in the PWD service area. Concurrent with the UWMP update which will be adding a Seismic Risk Assessment section, PWD will also revise its Water Shortage Contingency Plan (WSCP) and create a new document for the WSCP. PWD is encouraging participation by land use agencies, water use agencies, and other interested parties in the UWMP and WSCP and would like to extend to your agency an opportunity to meet with us and review the various elements of the two documents including assumptions about future population, future water demand, future water supplies, and upcoming water conservation programs.

We anticipate that a draft UWMP and WSCP will be available for public review starting in March 2021. PWD will hold a public hearing in June 2021, prior to adoption of the UWMP and WSCP. Hence, we would like to solicit your input in the near future.

If your agency would like to learn more about the Urban Water Management Plan and Water Shortage Contingency Plan, please contact me at 661-456-1092 or cbolanos@palmdalewater.org no later than November 16, 2021.

Very truly yours,

Claudia Bolanos

Claudia Bolanos
Resource and Analytics Supervisor

PALMDALE WATER DISTRICT
A CENTURY OF SERVICE

October 1, 2020

City of Lancaster – Planning Department
44933 Fern Avenue
Lancaster, CA 93534

Subject: 2020 Urban Water Management Plan for the Palmdale Water District

To Whom It May Concern:

The Palmdale Water District (PWD) is undertaking the review, update, and revision of its Urban Water Management Plan. PWD is located in Los Angeles County and serves the residents of the City of Palmdale. The Urban Water Management Planning Act requires every "urban water supplier" of a certain size to prepare and adopt an Urban Water Management Plan (UWMP) at least once every five years. The UWMP is a planning document in which water suppliers evaluate and compare their water supply and reliability to their existing and projected demands. A complete UWMP is necessary for PWD to remain eligible for state drought water bank assistance and is a requirement of state grant and loan funding programs.

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Very truly yours,

Claudia Bolanos

Claudia Bolanos
Resource and Analytics Supervisor

PWD EST. 1918

PALMDALE WATER DISTRICT

A CENTURY OF SERVICE

October 1, 2020

Los Angeles County Department of Regional Planning
320 W Temple Street
Los Angeles, CA 90012

Subject: 2020 Urban Water Management Plan for the Palmdale Water District

To Whom It May Concern:

The Palmdale Water District (PWD) is undertaking the review, update, and revision of its Urban Water Management Plan. PWD is located in Los Angeles County and serves the residents of the City of Palmdale. The Urban Water Management Planning Act requires every "urban water supplier" of a certain size to prepare and adopt an Urban Water Management Plan (UWMP) at least once every five years. The UWMP is a planning document in which water suppliers evaluate and compare their water supply and reliability to their existing and projected demands. A complete UWMP is necessary for PWD to remain eligible for state drought water bank assistance and is a requirement of state grant and loan funding programs.

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Very truly yours,

Claudia Bolanos

Claudia Bolanos
Resource and Analytics Supervisor

PWD EST. 1918
PALMDALE WATER DISTRICT
A CENTURY OF SERVICE

October 1, 2020

Littlerock Creek Irrigation District
Attn. James Chaisson
35141 87th St E
Littlerock, CA 93543

Subject: 2020 Urban Water Management Plan for the Palmdale Water District

To Whom It May Concern:

The Palmdale Water District (PWD) is undertaking the review, update, and revision of its Urban Water Management Plan. PWD is located in Los Angeles County and serves the residents of the City of Palmdale. The Urban Water Management Planning Act requires every "urban water supplier" of a certain size to prepare and adopt an Urban Water Management Plan (UWMP) at least once every five years. The UWMP is a planning document in which water suppliers evaluate and compare their water supply and reliability to their existing and projected demands. A complete UWMP is necessary for PWD to remain eligible for state drought water bank assistance and is a requirement of state grant and loan funding programs.

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Very truly yours,

Claudia Bolanos

Claudia Bolanos
Resource and Analytics Supervisor

PWD
EST. 1918

PALMDALE WATER DISTRICT

A CENTURY OF SERVICE

October 1, 2020

Los Angeles County Sanitation District No. 20
1955 Workman Mill Road
Whittier, CA 90601

Subject: 2020 Urban Water Management Plan for the Palmdale Water District

To Whom It May Concern:

The Palmdale Water District (PWD) is undertaking the review, update, and revision of its Urban Water Management Plan. PWD is located in Los Angeles County and serves the residents of the City of Palmdale. The Urban Water Management Planning Act requires every "urban water supplier" of a certain size to prepare and adopt an Urban Water Management Plan (UWMP) at least once every five years. The UWMP is a planning document in which water suppliers evaluate and compare their water supply and reliability to their existing and projected demands. A complete UWMP is necessary for PWD to remain eligible for state drought water bank assistance and is a requirement of state grant and loan funding programs.

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Very truly yours,

Claudia Bolanos

Claudia Bolanos
Resource and Analytics Supervisor

PWD EST. 1918

PALMDALE WATER DISTRICT

A CENTURY OF SERVICE

October 1, 2020

Antelope Valley-East Kern Water Agency
Attn. Dwayne Chisam
6500 W Avenue N
Palmdale, CA 93551

Subject: 2020 Urban Water Management Plan for the Palmdale Water District

To Whom It May Concern:

The Palmdale Water District (PWD) is undertaking the review, update, and revision of its Urban Water Management Plan. PWD is located in Los Angeles County and serves the residents of the City of Palmdale. The Urban Water Management Planning Act requires every "urban water supplier" of a certain size to prepare and adopt an Urban Water Management Plan (UWMP) at least once every five years. The UWMP is a planning document in which water suppliers evaluate and compare their water supply and reliability to their existing and projected demands. A complete UWMP is necessary for PWD to remain eligible for state drought water bank assistance and is a requirement of state grant and loan funding programs.

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Very truly yours,

Claudia Bolanos

Claudia Bolanos
Resource and Analytics Supervisor

PWD EST. 1918

PALMDALE WATER DISTRICT

A CENTURY OF SERVICE

October 1, 2020

Quartz Hill Water District
Attn. Chad Reed
5034 W. Avenue L
Quartz Hill, CA 93536

Subject: 2020 Urban Water Management Plan for the Palmdale Water District

To Whom It May Concern:

The Palmdale Water District (PWD) is undertaking the review, update, and revision of its Urban Water Management Plan. PWD is located in Los Angeles County and serves the residents of the City of Palmdale. The Urban Water Management Planning Act requires every "urban water supplier" of a certain size to prepare and adopt an Urban Water Management Plan (UWMP) at least once every five years. The UWMP is a planning document in which water suppliers evaluate and compare their water supply and reliability to their existing and projected demands. A complete UWMP is necessary for PWD to remain eligible for state drought water bank assistance and is a requirement of state grant and loan funding programs.

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Very truly yours,

Claudia Bolanos

Claudia Bolanos
Resource and Analytics Supervisor

PALMDALE WATER DISTRICT
A CENTURY OF SERVICE

BOARD OF DIRECTORS

ROBERT E. ALVARADO
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Division 3

KATHY MAC LAREN
Division 4

VINCENT DINO
Division 5

DENNIS D. LaMOREAUX
General Manager

ALESHIRE & WYNDER LLP
Attorneys

October 1, 2020

Rosamond Community Services District
Attn. Steve Perez
3179 35th Street West
Rosamond, CA 93560

Subject: 2020 Urban Water Management Plan for the Palmdale Water District

To Whom It May Concern:

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Very truly yours,

Claudia Bolanos

Claudia Bolanos
Resource and Analytics Supervisor

PALMDALE WATER DISTRICT
A CENTURY OF SERVICE

October 1, 2020

Los Angeles County Farm Bureau
Attn. Richard Miner
41228 12th Street West, Suite A
Palmdale, CA 93551

Subject: 2020 Urban Water Management Plan for the Palmdale Water District

To Whom It May Concern:

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Very truly yours,

Claudia Bolanos

Claudia Bolanos
Resource and Analytics Supervisor

PALMDALE WATER DISTRICT
A CENTURY OF SERVICE

October 1, 2020

Los Angeles World Airports
Airport Environmental Manager
7301 World Way West, 3rd Floor
Los Angeles, CA 90045

Subject: 2020 Urban Water Management Plan for the Palmdale Water District

To Whom It May Concern:

The Palmdale Water District (PWD) is undertaking the review, update, and revision of its Urban Water Management Plan. PWD is located in Los Angeles County and serves the residents of the City of Palmdale. The Urban Water Management Planning Act requires every "urban water supplier" of a certain size to prepare and adopt an Urban Water Management Plan (UWMP) at least once every five years. The UWMP is a planning document in which water suppliers evaluate and compare their water supply and reliability to their existing and projected demands. A complete UWMP is necessary for PWD to remain eligible for state drought water bank assistance and is a requirement of state grant and loan funding programs.

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Claudia Bolanos
Resource and Analytics Supervisor

PALMDALE WATER DISTRICT
A CENTURY OF SERVICE

October 1, 2020

Los Angeles County Waterworks District 40
900 S. Fremont St.
Alhambra, CA 91803

Subject: 2020 Urban Water Management Plan for the Palmdale Water District

To Whom It May Concern:

The Palmdale Water District (PWD) is undertaking the review, update, and revision of its Urban Water Management Plan. PWD is located in Los Angeles County and serves the residents of the City of Palmdale. The Urban Water Management Planning Act requires every "urban water supplier" of a certain size to prepare and adopt an Urban Water Management Plan (UWMP) at least once every five years. The UWMP is a planning document in which water suppliers evaluate and compare their water supply and reliability to their existing and projected demands. A complete UWMP is necessary for PWD to remain eligible for state drought water bank assistance and is a requirement of state grant and loan funding programs.

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Very truly yours,

Claudia Bolanos

Claudia Bolanos
Resource and Analytics Supervisor

PALMDALE WATER DISTRICT
A CENTURY OF SERVICE

May 14, 2021

City of Lancaster – Planning Department
44933 Fern Avenue
Lancaster, CA 93534

Notice of Public Hearing
2020 Urban Water Management Plan and 2020 Water Shortage Contingency Plan for Palmdale Water District

Palmdale Water District (PWD) is undertaking review, update, and revision of its Draft 2020 Urban Water Management Plan and Draft 2020 Water Shortage Contingency Plan. PWD serves water to areas throughout the Antelope Valley within the City of Palmdale's planning area.

The Urban Water Management Planning Act requires every "urban water supplier" of a certain size to prepare and adopt an Urban Water Management Plan (UWMP) at least once every five years. The UWMP is a planning document in which water suppliers evaluate and compare their water supply and reliability to their existing and projected demands. All urban water suppliers are also required to prepare a Water Shortage Contingency Plan (WSCP) as part of the 2020 UWMP.

On June 14, 2021 at 6:00 P.M., PWD's Board of Directors will conduct a public hearing pursuant to California Water Code sections 10642 and 10608.2 to consider and receive comments and input on the 2020 Urban Water Management Plan and 2020 Water Shortage Contingency Plan for, to allow community input regarding PWD's implementation plan for complying with Part 2.55 of the Water Code and to consider the potential impacts of the implementation plan, and to provide information on their baseline water use, water use targets, and implementation plan required by the Water Conservation Act of 2009 (Water Code section 1068.20(b)). The hearing will take place at the Palmdale Water District office at 2029 East Avenue Q, Palmdale, California 93550. The public can participate via teleconference and links will be posted in the meeting agenda on PWD's website at: https://www.palmdalewater.org/2021-meeting-agendas-minutes/.

PALMDALE WATER DISTRICT
A CENTURY OF SERVICE

A copy of the Draft 2020 Urban Water Management Plan and Draft 2020 Water Shortage Contingency Plan (Appendix J of the UWMP) is available for public review starting on May 14, 2021 and can be viewed online at https://www.palmdalewater.org/-about/reportsstudies/planning-reports/.

The 2020 Urban Water Management Plan for PWD has been developed for implementation in accordance with the requirements of the California Urban Water Management Planning Act, Water Code section 10610 through 10657, and the Water Conservation Act of 2009, Water Code section 10608 through 10608.64. PWD has also updated the Water Shortage Contingency Plan consistent with California Water Code Section 10632 and Section 10635. Public input from diverse social, cultural, and economic elements of the population is encouraged and will be considered as part of the urban water management planning process. Any written comments regarding the Draft 2020 Urban Water Management Plan and Draft 2020 Water Shortage Contingency Plan should be submitted by the close of business on June 14, 2021 to Claudia Bolanos, Resource and Analytics Supervisor at cbolanos@palmdalewater.org.

Comments can also be made at the public hearing at the time and place first set forth above. Upon conclusion of the public hearing, PWD's Board of Directors may revise, change, modify, and/or adopt the plan.

Questions regarding the public hearing of the 2020 Urban Water Management Plan and 2020 Water Shortage Contingency Plan should also be directed to Claudia Bolanos, Resource and Analytics Supervisor at (661) 456-1092 or cbolanos@palmdalewater.org.

Sincerely,

Claudia Bolanos

Claudia Bolanos
Resource and Analytics Supervisor

PALMDALE WATER DISTRICT
A CENTURY OF SERVICE

EST. 1918

BOARD OF DIRECTORS

AMBERROSE MERINO
Division 1

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KATHY MAC LAREN-GOMEZ
Division 4

VINCENT DINO
Division 5

DENNIS D. LaMOREAUX
General Manager

ALESHIRE & WYNDER LLP
Attorneys

ACWA
PROUD MEMBER

May 14, 2021

City of Palmdale – Planning Division
38300 Sierra Hwy # A
Palmdale, CA 93550

Notice of Public Hearing
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PWD
EST. 1918

PALMDALE WATER DISTRICT

A CENTURY OF SERVICE

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Sincerely,

Claudia Bolanos

Claudia Bolanos
Resource and Analytics Supervisor

PWD EST. 1918

PALMDALE WATER DISTRICT

A CENTURY OF SERVICE

May 14, 2021

Los Angeles County Department of Regional Planning
320 W Temple Street
Los Angeles, CA 90012

Notice of Public Hearing
2020 Urban Water Management Plan and 2020 Water Shortage Contingency Plan for Palmdale Water District

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PALMDALE WATER DISTRICT
A CENTURY OF SERVICE

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Claudia Bolanos

Claudia Bolanos
Resource and Analytics Supervisor

PWD EST. 1918

PALMDALE WATER DISTRICT

A CENTURY OF SERVICE

May 14, 2021

Littlerock Creek Irrigation District
35141 87th St E
Littlerock, CA 93543

Notice of Public Hearing
2020 Urban Water Management Plan and 2020 Water Shortage Contingency Plan for Palmdale Water District

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PALMDALE WATER DISTRICT
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Claudia Bolanos

Claudia Bolanos
Resource and Analytics Supervisor

PALMDALE WATER DISTRICT
A CENTURY OF SERVICE

May 14, 2021

Los Angeles County Sanitation District No. 20
1955 Workman Mill Road
Whittier, CA 90601

Notice of Public Hearing
2020 Urban Water Management Plan and 2020 Water Shortage Contingency Plan for Palmdale Water District

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PALMDALE WATER DISTRICT

A CENTURY OF SERVICE

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Resource and Analytics Supervisor

PALMDALE WATER DISTRICT
A CENTURY OF SERVICE

EST. 1918

May 14, 2021

Antelope Valley-East Kern Water Agency
6500 W Avenue N
Palmdale, CA 93551

Notice of Public Hearing
2020 Urban Water Management Plan and 2020 Water Shortage Contingency Plan for Palmdale Water District

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Resource and Analytics Supervisor

PALMDALE WATER DISTRICT
A CENTURY OF SERVICE

May 14, 2021

Rosamond Community Services District
3179 35th Street West
Rosamond, CA 93560

Notice of Public Hearing
2020 Urban Water Management Plan and 2020 Water Shortage Contingency Plan for Palmdale Water District

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PWD EST. 1918

PALMDALE WATER DISTRICT

A CENTURY OF SERVICE

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Resource and Analytics Supervisor

PALMDALE WATER DISTRICT
A CENTURY OF SERVICE

May 14, 2021

Los Angeles World Airports
7301 World Way West, 3rd Floor
Los Angeles, CA 90045

Notice of Public Hearing
2020 Urban Water Management Plan and 2020 Water Shortage Contingency Plan for Palmdale Water District

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EST. 1918
PALMDALE WATER DISTRICT
A CENTURY OF SERVICE

May 14, 2021

Los Angeles County Waterworks District 40
900 S. Fremont St.
Alhambra, CA 91803

Notice of Public Hearing
2020 Urban Water Management Plan and 2020 Water Shortage Contingency Plan for Palmdale Water District

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PALMDALE WATER DISTRICT
A CENTURY OF SERVICE

May 14, 2021

Quartz Hill Water District
5034 W. Avenue L
Quartz Hill, CA 93536

Notice of Public Hearing
2020 Urban Water Management Plan and 2020 Water Shortage Contingency Plan for Palmdale Water District

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PALMDALE WATER DISTRICT
A CENTURY OF SERVICE

May 14, 2021

Los Angeles County Farm Bureau
41228 12th Street West, Suite A
Palmdale, CA 93551

Notice of Public Hearing
2020 Urban Water Management Plan and 2020 Water Shortage Contingency Plan for Palmdale Water District

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A CENTURY OF SERVICE

A copy of the Draft 2020 Urban Water Management Plan and Draft 2020 Water Shortage Contingency Plan (Appendix J of the UWMP) is available for public review starting on May 14, 2021 and can be viewed online at https://www.palmdalewater.org/-about/reportsstudies/planning-reports/.

The 2020 Urban Water Management Plan for PWD has been developed for implementation in accordance with the requirements of the California Urban Water Management Planning Act, Water Code section 10610 through 10657, and the Water Conservation Act of 2009, Water Code section 10608 through 10608.64. PWD has also updated the Water Shortage Contingency Plan consistent with California Water Code Section 10632 and Section 10635. Public input from diverse social, cultural, and economic elements of the population is encouraged and will be considered as part of the urban water management planning process. Any written comments regarding the Draft 2020 Urban Water Management Plan and Draft 2020 Water Shortage Contingency Plan should be submitted by the close of business on June 14, 2021 to Claudia Bolanos, Resource and Analytics Supervisor at cbolanos@palmdalewater.org.

Comments can also be made at the public hearing at the time and place first set forth above. Upon conclusion of the public hearing, PWD's Board of Directors may revise, change, modify, and/or adopt the plan.

Questions regarding the public hearing of the 2020 Urban Water Management Plan and 2020 Water Shortage Contingency Plan should also be directed to Claudia Bolanos, Resource and Analytics Supervisor at (661) 456-1092 or cbolanos@palmdalewater.org.

Sincerely,

Claudia Bolanos

Claudia Bolanos
Resource and Analytics Supervisor

AFFIDAVIT OF PUBLICATION

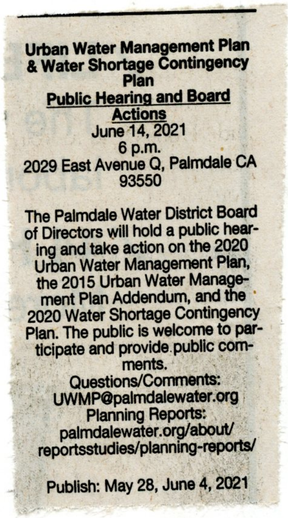
(2015.5 C.C.P.)

STATE OF CALIFORNIA }
County of Los Angeles } ss

The space above for file stamp only

URBAN WATER MANAGEMENT PLAN & WATER SHORTAGE CONTINGENCY PLAN

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the principal clerk of the printer of the **Antelope Valley Press**, a newspaper of general circulation, printed and published **daily** in the city of **Palmdale**, County of Los Angeles, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Los Angeles, State of California, under date of October 24, 1931, Case Number 328601; Modified Case Number 657770 April 11, 1956; also operating as the Ledger-Gazette, adjudicated a legal newspaper June 15, 1927, by Superior Court decree No. 224545; also operating as the Desert Mailer News, formerly known as the South Antelope Valley Foothill News, adjudicated a newspaper of general circulation by the Superior Court of the County of Los Angeles, State of California on May 29, 1967, Case Number NOC564 and adjudicated a newspaper of general circulation for the **City of Lancaster,** State of California on January 26, 1990, Case Number NOC10714, Modified October 22, 1990; that the notice, of which the annexed is a printed copy (set in type not smaller than nonpareil), has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to-wit:



Urban Water Management Plan & Water Shortage Contingency Plan

Public Hearing and Board Actions

June 14, 2021
6 p.m.
2029 East Avenue Q, Palmdale CA 93550

The Palmdale Water District Board of Directors will hold a public hearing and take action on the 2020 Urban Water Management Plan, the 2015 Urban Water Management Plan Addendum, and the 2020 Water Shortage Contingency Plan. The public is welcome to participate and provide public comments.

Questions/Comments:
UWMP@palmdalewater.org
Planning Reports:
palmdalewater.org/about/reportsstudies/planning-reports/

Publish: May 28, June 4, 2021

May 28, June 4, 2021

I certify (or declare) under penalty of perjury that the fore-going is true and correct.

Signature

Dated June 4, 2021
Executed at Palmdale, California

Antelope Valley Press

37404 SIERRA HWY., PALMDALE CA 93550
Telephone (661)267-4112/Fax (661)947-4870

Appendix E: Water Systems Audit Output

AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0

? Click to access definition
\+ Click to add a comment

Water Audit Report for: Palmdale Water District
Reporting Year: 2015 | 1/2015 - 12/2015

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

Master Meter and Supply Error Adjustments

WATER SUPPLIED

<----------- Enter grading in column 'E' and 'J' ---------->

						Pcnt:		Value:	
Volume from own sources:	+ ?	9	17,014.560	acre-ft/yr	+ ?	10	-1.00%	● ○		acre-ft/yr
Water imported:	+ ?	n/a	0.000	acre-ft/yr	+ ?			● ○		acre-ft/yr
Water exported:	+ ?	8	433.490	acre-ft/yr	+ ?	10	-1.00%	● ○		acre-ft/yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: **16,748.556** acre-ft/yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

					Pcnt:		Value:	
Billed metered:	+ ?	9	15,078.000	acre-ft/yr				
Billed unmetered:	+ ?	n/a	0.000	acre-ft/yr				
Unbilled metered:	+ ?	10	19.830	acre-ft/yr				
Unbilled unmetered:	+ ?	4	353.290	acre-ft/yr		○ ●	353.290	acre-ft/yr

Unbilled Unmetered volume entered is greater than the recommended default value

Use buttons to select percentage of water supplied **OR** value

AUTHORIZED CONSUMPTION: ? **15,451.120** acre-ft/yr

WATER LOSSES (Water Supplied - Authorized Consumption) **1,297.436** acre-ft/yr

Apparent Losses

					Pcnt:		Value:	
Unauthorized consumption:	+ ?		41.871	acre-ft/yr	0.25%	● ○		acre-ft/yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	+ ?	7	308.119	acre-ft/yr	2.00%	● ○		acre-ft/yr
Systematic data handling errors:	+ ?		37.695	acre-ft/yr	0.25%	● ○		acre-ft/yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: ? **387.685** acre-ft/yr

Real Losses (Current Annual Real Losses or CARL)
Real Losses = Water Losses - Apparent Losses: ? **909.750** acre-ft/yr

WATER LOSSES: **1,297.436** acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: ? **1,670.556** acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	+ ?	9	433.0	miles
Number of active AND inactive service connections:	+ ?	10	27,481	
Service connection density:	?		63	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: + ? (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure: + ? 9 80.0 psi

COST DATA

Total annual cost of operating water system:	+ ?	10	$32,560,448	$/Year
Customer retail unit cost (applied to Apparent Losses):	+ ?	5	$3.26	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	+ ?	5	$108.26	$/acre-ft

☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 79 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Customer retail unit cost (applied to Apparent Losses)
2: Variable production cost (applied to Real Losses)
3: Volume from own sources

AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0

?	Click to access definition
+	Click to add a comment

Water Audit Report for: Palmdale Water District
Reporting Year: 2016 | 1/2016 - 12/2016

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<----------- Enter grading in column 'E' and 'J' ---------->

Master Meter and Supply Error Adjustments

WATER SUPPLIED

									Pcnt:		Value:	
Volume from own sources:	+	?	5	17,367.3	acre-ft/yr	+	?	8		○ ●	-430.269	acre-ft/yr
Water imported:	+	?	n/a	0.000	acre-ft/yr	+	?			● ○		acre-ft/yr
Water exported:	+	?	3	641.060	acre-ft/yr	+	?	4		● ○		acre-ft/yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: **17,156.510** acre-ft/yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

						Pcnt:		Value:	
Billed metered:	+	?	7	15,204.000	acre-ft/yr				
Billed unmetered:	+	?	n/a	0.000	acre-ft/yr				
Unbilled metered:	+	?	9	27.390	acre-ft/yr				
Unbilled unmetered:	+	?	10	366.120	acre-ft/yr		○ ●	366.120	acre-ft/yr

Unbilled Unmetered volume entered is greater than the recommended default value

Use buttons to select percentage of water supplied **OR** value

AUTHORIZED CONSUMPTION: ? **15,597.510** acre-ft/yr

WATER LOSSES (Water Supplied - Authorized Consumption)

1,559.000 acre-ft/yr

Apparent Losses

						Pcnt:		Value:	
Unauthorized consumption:	+	?		42.891	acre-ft/yr	0.25%	● ○		acre-ft/yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	+	?	5	333.080	acre-ft/yr	2.14%	● ○		acre-ft/yr
Systematic data handling errors:	+	?		38.010	acre-ft/yr	0.25%	● ○		acre-ft/yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: ? **413.981** acre-ft/yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: ? **1,145.019** acre-ft/yr

WATER LOSSES: **1,559.000** acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: ? **1,952.510** acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	+	?	9	433.0	miles
Number of active AND inactive service connections:	+	?	7	27,420	
Service connection density:		?		63	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: + ? (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure:	+	?	9	71.2	psi

COST DATA

Total annual cost of operating water system:	+	?	10	$34,383,009	$/Year
Customer retail unit cost (applied to Apparent Losses):	+	?	9	$1.22	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	+	?	5	$267.56	$/acre-ft

☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 65 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources

2: Customer metering inaccuracies

3: Variable production cost (applied to Real Losses)

AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0

? Click to access definition
\+ Click to add a comment

Water Audit Report for: Palmdale Water District
Reporting Year: 2017 1/2017 - 12/2017

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<----------- Enter grading in column 'E' and 'J' ---------->

Master Meter and Supply Error Adjustments

WATER SUPPLIED

									Pcnt:		Value:	
Volume from own sources:	+	?	7	18,665.0	acre-ft/yr	+	?	8		○ ●	-567.329	acre-ft/yr
Water imported:	+	?	n/a	0.000	acre-ft/yr	+	?			● ○		acre-ft/yr
Water exported:	+	?	3	1,160.920	acre-ft/yr	+	?	4		● ○		acre-ft/yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: **18,071.409** acre-ft/yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

						Pcnt:		Value:	
Billed metered:	+	?	7	16,175.900	acre-ft/yr				
Billed unmetered:	+	?	n/a	0.000	acre-ft/yr				
Unbilled metered:	+	?	10	47.120	acre-ft/yr				
Unbilled unmetered:	+	?	7	40.130	acre-ft/yr		○ ●	40.130	acre-ft/yr

Use buttons to select percentage of water supplied
OR
value

AUTHORIZED CONSUMPTION: ? **16,263.150** acre-ft/yr

WATER LOSSES (Water Supplied - Authorized Consumption)

1,808.259 acre-ft/yr

Apparent Losses

						Pcnt:		Value:	
Unauthorized consumption:	+	?		45.179	acre-ft/yr	0.25%	● ○		acre-ft/yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	+	?	8	407.446	acre-ft/yr	2.45%	● ○		acre-ft/yr
Systematic data handling errors:	+	?		40.440	acre-ft/yr	0.25%	● ○		acre-ft/yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: ? **493.065** acre-ft/yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: ? **1,315.194** acre-ft/yr

WATER LOSSES: **1,808.259** acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: ? **1,895.509** acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	+	?	9	433.0	miles
Number of active AND inactive service connections:	+	?	7	27,439	
Service connection density:		?		63	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: + ? (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure: + ? 9 82.1 psi

COST DATA

Total annual cost of operating water system:	+	?	10	$35,713,325	$/Year
Customer retail unit cost (applied to Apparent Losses):	+	?	9	$1.33	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	+	?	5	$290.77	$/acre-ft

☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 74 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Variable production cost (applied to Real Losses)
3: Billed metered

AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0

? Click to access definition
\+ Click to add a comment

Water Audit Report for: Palmdale Water District
Reporting Year: 2018 1/2018 - 12/2018

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<----------- Enter grading in column 'E' and 'J' ---------->

Master Meter and Supply Error Adjustments

WATER SUPPLIED

									Pcnt:		Value:	
Volume from own sources:	+	?	7	19,886.5	acre-ft/yr	+	?	8		○ ●	-389.628	acre-ft/yr
Water imported:	+	?	n/a	0.000	acre-ft/yr	+	?			● ○		acre-ft/yr
Water exported:	+	?	3	1,317.140	acre-ft/yr	+	?	4		● ○		acre-ft/yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED:	**18,959.018**	acre-ft/yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

						Pcnt:		Value:	
Billed metered:	+	?	8	16,671.000	acre-ft/yr				
Billed unmetered:	+	?	n/a	0.000	acre-ft/yr				
Unbilled metered:	+	?	10	527.190	acre-ft/yr				
Unbilled unmetered:	+	?	7	38.310	acre-ft/yr		○ ●	38.310	acre-ft/yr

Use buttons to select percentage of water supplied **OR** value

AUTHORIZED CONSUMPTION:	?	**17,236.500**	acre-ft/yr

WATER LOSSES (Water Supplied - Authorized Consumption)	**1,722.518**	acre-ft/yr

Apparent Losses

						Pcnt:		Value:	
Unauthorized consumption:	+	?		47.398	acre-ft/yr	0.25%	● ○		acre-ft/yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	+	?	8	-27.473	acre-ft/yr	-0.16%	● ○		acre-ft/yr
Systematic data handling errors:	+	?		41.678	acre-ft/yr	0.25%	● ○		acre-ft/yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses:	?	**61.602**	acre-ft/yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses:	?	**1,660.916**	acre-ft/yr
WATER LOSSES:		**1,722.518**	acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER:	?	**2,288.018**	acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	+	?	9	433.0	miles
Number of active AND inactive service connections:	+	?	7	27,458	
Service connection density:		?		63	conn./mile main

Are customer meters typically located at the curbstop or property line?				Yes	
Average length of customer service line:	+	?			(length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure:	+	?	9	78.2	psi

COST DATA

Total annual cost of operating water system:	+	?	10	$36,916,891	$/Year
Customer retail unit cost (applied to Apparent Losses):	+	?	9	$1.37	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	+	?	5	$277.61	$/acre-ft

☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 74 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Variable production cost (applied to Real Losses)
3: Unauthorized consumption

WAS v5.0
American Water Works Association.

AWWA Free Water Audit Software:
Reporting Worksheet

? Click to access
+ Click to add a

Water Audit Report for: Palmdale Water District (1910102)
Reporting Year: 2019 | 1/2019 - 12/2019

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<------------ Enter grading in column 'E' and 'J' ---------->

WATER SUPPLIED

		Grade	Volume	Unit	Grade	Pcnt:		Value:	Unit
Volume from own sources:	+ ?	7	18,534.091	acre-ft/yr	8		○ ●	-221.434	acre-ft/yr
Water imported:	+ ?	n/a	0.000	acre-ft/yr			● ○		acre-ft/yr
Water exported:	+ ?	3	1,174.620	acre-ft/yr	4		● ○		acre-ft/yr
WATER SUPPLIED:			**17,580.905**	acre-ft/yr					

Master Meter and Supply Error Adjustments

Enter negative % or value for under-registration
Enter positive % or value for over-registration

AUTHORIZED CONSUMPTION

Click here: ? for help using option

		Grade	Volume	Unit	Pcnt:		Value:	Unit
Billed metered:	+ ?	8	15,853.000	acre-ft/yr				
Billed unmetered:	+ ?	n/a	0.000	acre-ft/yr				
Unbilled metered:	+ ?	10	337.980	acre-ft/yr				
Unbilled unmetered:	+ ?	7	38.660	acre-ft/yr		○ ●	38.660	acre-ft/yr
AUTHORIZED CONSUMPTION:	?		**16,229.640**	acre-ft/yr				

Use buttons to select percentage of water supplied
OR
value

WATER LOSSES (Water Supplied - Authorized Consumption)

1,351.265 acre-ft/yr

Apparent Losses

		Grade	Volume	Unit	Pcnt:		Value:	Unit
Unauthorized consumption:	+ ?		43.952	acre-ft/yr	0.25%	● ○		acre-ft/yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

		Grade	Volume	Unit	Pcnt:		Value:	Unit
Customer metering inaccuracies:	+ ?	8	-27.478	acre-ft/yr	-0.17%	● ○		acre-ft/yr
Systematic data handling errors:	+ ?	7	39.633	acre-ft/yr	0.25%	● ○		acre-ft/yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: ? **56.107** acre-ft/yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: ? **1,295.158** acre-ft/yr

WATER LOSSES: **1,351.265** acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: ? **1,727.905** acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

		Grade	Value	Unit
Length of mains:	+ ?	9	433.0	miles
Number of active AND inactive service connections:	+ ?	7	27,454	
Service connection density:	?		63	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: + ? (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

		Grade	Value	Unit
Average operating pressure:	+ ?	9	74.8	psi

COST DATA

		Grade	Value	Unit
Total annual cost of operating water system:	+ ?	10	$36,692,915	$/Year
Customer retail unit cost (applied to Apparent Losses):	+ ?	9	$1.37	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	+ ?	5	$277.03	$/acre-ft

☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 74 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources

2: Variable production cost (applied to Real Losses)

3: Unauthorized consumption

Appendix F: SBX7-7 & DWR Population Tool

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

SB X7-7 Table-1: Baseline Period Ranges

Baseline	Parameter	Value	Units
10- to 15-year baseline period	2008 total water deliveries	25,339	Acre Feet
	2008 total volume of delivered recycled water		Acre Feet
	2008 recycled water as a percent of total deliveries	0%	**See Note 1**
	Number of years in baseline period[1, 2]	10	Years
	Year beginning baseline period range	1995	▨
	Year ending baseline period range[3]	2004	▨
5-year baseline period	Number of years in baseline period	5	Years
	Year beginning baseline period range	2003	▨
	Year ending baseline period range[4]	2007	▨

[1] *If the 2008 recycled water delivery is less than 10 percent of total water deliveries, then the 10-15year baseline period is a continuous 10-year period. If the amount of recycled water delivered in 2008 is 10 percent or greater of total deliveries, the 10-15 year baseline period is a continuous 10- to 15-year period.*

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

SB X7-7 Table 3: Service Area Population

Year		Population
10 to 15 Year Baseline Population		
Year 1	1995	79,578
Year 2	1996	88,785
Year 3	1997	89,675
Year 4	1998	90,540
Year 5	1999	91,375
Year 6	2000	92,172
Year 7	2001	98,516
Year 8	2002	99,649
Year 9	2003	100,788
Year 10	2004	104,237
Year 11		
Year 12		
Year 13		
Year 14		
Year 15		
5 Year Baseline Population		
Year 1	2003	100,788
Year 2	2004	104,237
Year 3	2005	104,120
Year 4	2006	105,754
Year 5	2007	107,396

NOTES:

SB X7-7 Table 4: Annual Gross Water Use *

Baseline Year *Fm SB X7-7 Table 3*		**Volume Into Distribution System** *This column will remain blank until SB X7-7 Table 4-A is completed.*	**Deductions**					**Acre Feet**
			Exported Water	**Change in Dist. System Storage** (+/-)	**Indirect Recycled Water** *This column will remain blank until SB X7-7 Table 4-B is completed.*	**Water Delivered for Agricultural Use**	**Process Water** *This column will remain blank until SB X7-7 Table 4-D is completed.*	**Annual Gross Water Use**
10 to 15 Year Baseline - Gross Water Use								
Year 1	1995	22,233			-		-	22,233
Year 2	1996	23,514			-		-	23,514
Year 3	1997	23,152			-		-	23,152
Year 4	1998	20,626			-		-	20,626
Year 5	1999	23,398			-		-	23,398
Year 6	2000	25,901			-		-	25,901
Year 7	2001	25,220			-		-	25,220
Year 8	2002	25,670			-		-	25,670
Year 9	2003	24,909			-		-	24,909
Year 10	2004	26,684			-		-	26,684
Year 11	0	-			-		-	-
Year 12	0	-			-		-	-
Year 13	0	-			-		-	-
Year 14	0	-			-		-	-
Year 15	0	-			-		-	-
10 - 15 year baseline average gross water use								**24,131**
5 Year Baseline - Gross Water Use								
Year 1	2003	24,909			-		-	24,909
Year 2	2004	26,684			-		-	26,684
Year 3	2005	26,128			-		-	26,128
Year 4	2006	27,934			-		-	27,934
Year 5	2007	28,152			-		-	28,152
5 year baseline average gross water use								**26,761**

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

Complete one table for each source.

Name of Source		Enter Name of Source 1		
This water source is:				
☐	The supplier's own water source			
☐	A purchased or imported source			
Baseline Year *Fm SB X7-7 Table 3*		Volume Entering Distribution System[1]	Meter Error Adjustment [2] *Optional* *(+/-)*	Corrected Volume Entering Distribution System
10 to 15 Year Baseline - Water into Distribution System				
Year 1	1995	22,233		22,233
Year 2	1996	23,514		23,514
Year 3	1997	23,152		23,152
Year 4	1998	20,626		20,626
Year 5	1999	23,398		23,398
Year 6	2000	25,901		25,901
Year 7	2001	25,220		25,220
Year 8	2002	25,670		25,670
Year 9	2003	24,909		24,909
Year 10	2004	26,684		26,684
Year 11	0			-
Year 12	0			-
Year 13	0			-
Year 14	0			-
Year 15	0			-
5 Year Baseline - Water into Distribution System				
Year 1	2003	24,909		24,909
Year 2	2004	26,684		26,684
Year 3	2005	26,128		26,128
Year 4	2006	27,934		27,934
Year 5	2007	28,152		28,152

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

[2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

SB X7-7 Table 4-C.1: Process Water Deduction Eligibility

Criteria 1
Industrial water use is equal to or greater than 12% of gross water use

Baseline Year *Fm SB X7-7 Table 3*		Gross Water Use Without Process Water Deduction	Industrial Water Use *	Percent Industrial Water	**Eligible for Exclusion Y/N**
10 to 15 Year Baseline - Process Water Deduction Eligibility					
Year 1	1995	22,233		0%	NO
Year 2	1996	23,514		0%	NO
Year 3	1997	23,152		0%	NO
Year 4	1998	20,626		0%	NO
Year 5	1999	23,398		0%	NO
Year 6	2000	25,901		0%	NO
Year 7	2001	25,220		0%	NO
Year 8	2002	25,670		0%	NO
Year 9	2003	24,909		0%	NO
Year 10	2004	26,684		0%	NO
Year 11	0	-			NO
Year 12	0	-			NO
Year 13	0	-			NO
Year 14	0	-			NO
Year 15	0	-			NO
5 Year Baseline - Process Water Deduction Eligibility					
Year 1	2003	24,909		0%	NO
Year 2	2004	26,684		0%	NO
Year 3	2005	26,128		0%	NO
Year 4	2006	27,934		0%	NO
Year 5	2007	28,152		0%	NO

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

SB X7-7 Table 4-C.2: Process Water Deduction Eligibility

Criteria 2

Industrial water use is equal to or greater than 15 GPCD

Baseline Year *Fm SB X7-7 Table 3*		Industrial Water Use *	Population	Industrial GPCD	**Eligible for Exclusion Y/N**
10 to 15 Year Baseline - Process Water Deduction Eligibility					
Year 1	1995		79,578	-	NO
Year 2	1996		88,785	-	NO
Year 3	1997		89,675	-	NO
Year 4	1998		90,540	-	NO
Year 5	1999		91,375	-	NO
Year 6	2000		92,172	-	NO
Year 7	2001		98,516	-	NO
Year 8	2002		99,649	-	NO
Year 9	2003		100,788	-	NO
Year 10	2004		104,237	-	NO
Year 11	0		-		NO
Year 12	0		-		NO
Year 13	0		-		NO
Year 14	0		-		NO
Year 15	0		-		NO
5 Year Baseline - Process Water Deduction Eligibility					
Year 1	2003		100,788	-	NO
Year 2	2004		104,237	-	NO
Year 3	2005		104,120	-	NO
Year 4	2006		105,754	-	NO
Year 5	2007		107,396	-	NO

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

SB X7-7 Table 4-C.3: Process Water Deduction Eligibility

Criteria 3

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

Baseline Year *Fm SB X7-7 Table 3*		Gross Water Use Without Process Water Deduction *Fm SB X7-7 Table 4*	Industrial Water Use *	Non-industrial Water Use	Population *Fm SB X7-7 Table 3*	Non-Industrial GPCD	**Eligible for Exclusion Y/N**
10 to 15 Year Baseline - Process Water Deduction Eligibility							
Year 1	1995	22,233		22,233	79,578	249	NO
Year 2	1996	23,514		23,514	88,785	236	NO
Year 3	1997	23,152		23,152	89,675	230	NO
Year 4	1998	20,626		20,626	90,540	203	NO
Year 5	1999	23,398		23,398	91,375	229	NO
Year 6	2000	25,901		25,901	92,172	251	NO
Year 7	2001	25,220		25,220	98,516	229	NO
Year 8	2002	25,670		25,670	99,649	230	NO
Year 9	2003	24,909		24,909	100,788	221	NO
Year 10	2004	26,684		26,684	104,237	229	NO
Year 11	0	-		-	-		NO
Year 12	0	-		-	-		NO
Year 13	0	-		-	-		NO
Year 14	0	-		-	-		NO
Year 15	0	-		-	-		NO
5 Year Baseline - Process Water Deduction Eligibility							
Year 1	2003	24,909		24,909	100,788	221	NO
Year 2	2004	26,684		26,684	104,237	229	NO
Year 3	2005	26,128		26,128	104,120	224	NO
Year 4	2006	27,934		27,934	105,754	236	NO
Year 5	2007	28,152		28,152	107,396	234	NO

SB X7-7 Table 5: Baseline Gallons Per Capita Per Day (GPCD)

Baseline Year *Fm SB X7-7 Table 3*		Service Area Population *Fm SB X7-7 Table 3*	Annual Gross Water Use *Fm SB X7-7 Table 4*	Daily Per Capita Water Use (GPCD)
10 to 15 Year Baseline GPCD				
Year 1	1995	79,578	22,233	249
Year 2	1996	88,785	23,514	236
Year 3	1997	89,675	23,152	230
Year 4	1998	90,540	20,626	203
Year 5	1999	91,375	23,398	229
Year 6	2000	92,172	25,901	251
Year 7	2001	98,516	25,220	229
Year 8	2002	99,649	25,670	230
Year 9	2003	100,788	24,909	221
Year 10	2004	104,237	26,684	229
Year 11	0	-	-	
Year 12	0	-	-	
Year 13	0	-	-	
Year 14	0	-	-	
Year 15	0	-	-	
10-15 Year Average Baseline GPCD				**231**

5 Year Baseline GPCD

Baseline Year *Fm SB X7-7 Table 3*		Service Area Population *Fm SB X7-7 Table 3*	Gross Water Use *Fm SB X7-7 Table 4*	Daily Per Capita Water Use
Year 1	2003	100,788	24,909	221
Year 2	2004	104,237	26,684	229
Year 3	2005	104,120	26,128	224
Year 4	2006	105,754	27,934	236
Year 5	2007	107,396	28,152	234
5 Year Average Baseline GPCD				**229**

SB X7-7 Table 6: Baseline GPCD *From Table SB X7-7 Table 5*	*Summary*
10-15 Year Baseline GPCD	231
5 Year Baseline GPCD	229
NOTES:	

SB X7-7 Table 7: 2020 Target Method

Select Only One

Target Method		**Supporting Tables**
☑	Method 1	SB X7-7 Table 7A
☐	Method 2	SB X7-7 Tables 7B, 7C, and 7D
☐	Method 3	SB X7-7 Table 7-E
☐	Method 4	Method 4 Calculator *Located in the WUE Data Portal at wuedata.water.ca.gov* Resources *button*

SB X7-7 Table 7-A: Target Method 1
20% Reduction

10-15 Year Baseline GPCD	**2020 Target GPCD**
231	**185**

NOTES:

SB X7-7 Table 7-C: Target Method 2

Target CII Water Use

Baseline Year *Fm SB X7-7 Table 3*		**CII Water Use** [1,2]	**Process Water Exclusion** (Optional) *Fm SB X7-7 Table 4*	**CII Water Use Minus Process Water**	**Population** *Fm SB X7-7 Table 3*	**CII GPCD**
Unit of Measure						**Acre Feet**
Year 1	1995		0	0	79,578	0
Year 2	1996		0	0	88,785	0
Year 3	1997		0	0	89,675	0
Year 4	1998		0	0	90,540	0
Year 5	1999		0	0	91,375	0
Year 6	2000		0	0	92,172	0
Year 7	2001		0	0	98,516	0
Year 8	2002		0	0	99,649	0
Year 9	2003		0	0	100,788	0
Year 10	2004		0	0	104,237	0
Year 11	0		0	0	-	
Year 12	0		0	0	-	
Year 13	0		0	0	-	
Year 14	0		0	0	-	
Year 15	0		0	0	-	
Average Annual 10 to 15 Year Baseline CII Water Use (GPCD)						0
10% Reduction						0.0
2020 Target CII Water Use						**0**

[1] *CII water use for each year of the baseline period must be provided by the user.*

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

SB X7-7 Table 7-F: Confirm Minimum Reduction for 2020 Target

5 Year Baseline GPCD *From SB X7-7 Table 5*	Maximum 2020 Target[1]	**Calculated 2020 Target [2]**			**Confirmed 2020 Target[4]**
		As calculated by supplier in this SB X7-7 Verification Form	**Special Situations[3]**		
			Prorated 2020 Target	Population Weighted Average 2020 Target	
229	217				**217**

[1] ***Maximum 2020 Target*** *is 95% of the 5 Year Baseline GPCD except for suppliers at or below 100 GPCD.*

[2] ***Calculated 2020 Target*** *is the target calculated by the Supplier based on the selected Target Method, see SB X7-7 Table 7 and corresponding tables for agency's calculated target. Supplier may only enter one calculated target.*

[3] ***Prorated targets and population weighted target*** *are allowed for special situations only. These situations are described in Appendix P, Section P.3*

[4] ***Confirmed Target*** *is the lesser of the Calculated 2020 Target (C5, D5, or E5) or the Maximum 2020 Target (Cell B5)*

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

SB X7-7 Table 2: Method for 2020 Population Estimate

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

NOTES:

SB X7-7 Table 3: 2020 Service Area Population

2020 Compliance Year Population	
2020	126,002

NOTES:

SB X7-7 Table 4: 2020 Gross Water Use

Compliance Year 2020	2020 Volume Into Distribution System *This column will remain blank until SB X7-7 Table 4-A is completed.*	2020 Deductions					2020 Gross Water Use
		Exported Water *	Change in Dist. System Storage* (+/-)	Indirect Recycled Water *This column will remain blank until SB X7-7 Table 4-B is completed.*	Water Delivered for Agricultural Use*	Process Water *This column will remain blank until SB X7-7 Table 4-D is completed.*	
	23,245			-		-	**23,245**

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

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

Complete one table for each source.

Name of Source	SWP Water - Table A Amounts

This water source is *(check one)* **:**

☐ The supplier's own water source

☑ A purchased or imported source

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional* *(+/-)*	Corrected Volume Entering Distribution System
	5,695	-	5,695

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

[2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES

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

Complete one table for each source.

Name of Source	SWP Water - Butte Transfer Agreement

This water source is *(check one)* **:**

☐ The supplier's own water source

☑ A purchased or imported source

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional* *(+/-)*	Corrected Volume Entering Distribution System
	1,320		1,320

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

[2] ***Meter Error Adjustment -*** *See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

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

Complete one table for each source.

Name of Source	Littlerock Dam Reservoir - Surface Water

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

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional* *(+/-)*	Corrected Volume Entering Distribution System
	4,540		4,540

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

NOTES:

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

Complete one table for each source.

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

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional* *(+/-)*	Corrected Volume Entering Distribution System
	4,090		4,090

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

NOTES:

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

Complete one table for each source.

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

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional* *(+/-)*	Corrected Volume Entering Distribution System
	7,600		7,600

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

[2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 4-C.1: 2020 Process Water Deduction Eligibility *(For use only by agencies that are deducting process water using Criteria 1)*

Criteria 1

Industrial water use is equal to or greater than 12% of gross water use

2020 Compliance Year	2020 Gross Water Use Without Process Water Deduction	2020 Industrial Water Use	Percent Industrial Water	**Eligible for Exclusion Y/N**
	23,245		0%	NO

NOTES:

SB X7-7 Table 4-C.2: 2020 Process Water Deduction Eligibility

(For use only by agencies that are deducting process water using Criteria 2)

Criteria 2

Industrial water use is equal to or greater than 15 GPCD

2020 Compliance Year	2020 Industrial Water Use	2020 Population	2020 Industrial GPCD	**Eligible for Exclusion Y/N**
		126,002	-	NO

NOTES:

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

Criteria 3

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

2020 Compliance Year	2020 Gross Water Use Without Process Water Deduction *Fm SB X7-7 Table 4*	2020 Industrial Water Use	2020 Non-industrial Water Use	2020 Population *Fm SB X7-7 Table 3*	Non-Industrial GPCD	**Eligible for Exclusion Y/N**
	23,245		23,245	126,002	165	NO

SB X7-7 Table 9: 2020 Compliance

Actual 2020 GPCD[1]	Optional Adjustments to 2020 GPCD					2020 Confirmed Target GPCD [1, 2]	Did Supplier Achieve Targeted Reduction for 2020?
	Enter "0" if Adjustment Not Used			TOTAL Adjustments[1]	Adjusted 2020 GPCD [1] *(Adjusted if applicable)*		
	Extraordinary Events[1]	Weather Normalization[1]	Economic Adjustment[1]				
165	-	-	-	-	165		**NO**

[1] *All values are reported in GPCD*

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

NOTES:

Please print this page to a PDF and include as part of your UWMP submittal.

Confirmation Information

Generated By	Water Supplier Name	Confirmation #	Generated On
Lauren Everett	Palmdale Water District	6940412223	1/29/2021 1:14:15 PM

Boundary Information

Census Year	Boundary Filename	Internal Boundary ID
1990	PWD_Boundary_1990.kml	462
2000	PWD_Boundary_2000.kml	463
2010	PWD_Boundary_2010.kml	464
1990	PWD_Boundary_1990.kml	462
2000	PWD_Boundary_2000.kml	463
2010	PWD_Boundary_2010.kml	464
1990	PWD_Boundary_1990.kml	462
2000	PWD_Boundary_2000.kml	463
2010	PWD_Boundary_2010.kml	464
1990	PWD_Boundary_1990.kml	462
2000	PWD_Boundary_2000.kml	463
2010	PWD_Boundary_2010.kml	464
1990	PWD_Boundary_1990.kml	462
2000	PWD_Boundary_2000.kml	463
2010	PWD_Boundary_2010.kml	464
1990	PWD_Boundary_1990.kml	462
2000	PWD_Boundary_2000.kml	463
2010	PWD_Boundary_2010.kml	464
1990	PWD_Boundary_1990.kml	462
2000	PWD_Boundary_2000.kml	463
2010	PWD_Boundary_2010.kml	464

Baseline Period Ranges

10 to 15-year baseline period

Number of years in baseline period:	10
Year beginning baseline period range:	1995
Year ending baseline period range[1]:	2004

5-year baseline period

Year beginning baseline period range:	2003
Year ending baseline period range[2]:	2007

[1] The ending year must be between December 31, 2004 and December 31, 2010.

[2] The ending year must be between December 31, 2007 and December 31, 2010.

Persons per Connection

Year	Census Block Level Total Population	Number of Connections *	Persons per Connection
1990	66,477	19619	3.39
1991	-	-	3.46
1992	-	-	3.53
1993	-	-	3.60
1994	-	-	3.67
1995	-	-	3.74
1996	-	-	3.80
1997	-	-	3.87
1998	-	-	3.94
1999	-	-	4.01
2000	92,172	22595	4.08
2001	-	-	4.11
2002	-	-	4.13
2003	-	-	4.16
2004	-	-	4.18
2005	-	-	4.21

2006	-	-	4.23
2007	-	-	4.25
2008	-	-	4.28
2009	-	-	4.30
2010	112,468	25959	**4.33**
2011	-	-	4.36
2012	-	-	4.38
2013	-	-	4.41
2014	-	-	4.43
2015	-	-	4.46
2020	-	-	4.59 **

Population Using Persons-Per-Connection

Year		Number of Connections *	Persons per Connection	Total Population
10 to 15 Year Baseline Population Calculations				
Year 1	1995	21306	3.74	79,578
Year 2	1996	23340	3.80	88,785
Year 3	1997	23154	3.87	89,675
Year 4	1998	22968	3.94	90,540
Year 5	1999	22781	4.01	91,375
Year 6	2000	22595	4.08	92,172
Year 7	2001	23999	4.11	98,516
Year 8	2002	24128	4.13	99,649
Year 9	2003	24257	4.16	100,788
Year 10	2004	24937	4.18	104,237
5 Year Baseline Population Calculations				
Year 1	2003	24257	4.16	100,788
Year 2	2004	24937	4.18	104,237
Year 3	2005	24761	4.21	104,120
Year 4	2006	25001	4.23	105,754
Year 5	2007	25240	4.25	107,396
2020 Compliance Year Population Calculations				
2020		27479	4.59 **	126,062

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Appendix G: Groundwater Adjudication Court Order

SUPERIOR COURT OF THE STATE OF CALIFORNIA

COUNTY OF LOS ANGELES – CENTRAL DISTRICT

ANTELOPE VALLEY GROUNDWATER CASES

Included Actions:
Los Angeles County Waterworks District No. 40 v. Diamond Farming Co., Superior Court of California, County of Los Angeles, Case No. BC 325201;

Los Angeles County Waterworks District No. 40 v. Diamond Farming Co., Superior Court of California, County of Kern, Case No. S-1500-CV-254-348;

Wm. Bolthouse Farms, Inc. v. City of Lancaster, Diamond Farming Co. v. City of Lancaster, Diamond Farming Co. v. Palmdale Water Dist., Superior Court of California, County of Riverside, Case Nos. RIC 353 840, RIC 344 436, RIC 344 668

RICHARD WOOD, on behalf of himself and all other similarly situated v. A.V. Materials, Inc., et al., Superior Court of California, County of Los Angeles, Case No. BC509546

Judicial Council Coordination Proceeding No. 4408

CLASS ACTION

Santa Clara Case No. 1-05-CV-049053
Assigned to the Honorable Jack Komar

(~~PROPOSED~~) JUDGMENT

The matter came on for trial in multiple phases. A large number of parties representing the majority of groundwater production in the Antelope Valley Area of Adjudication ("Basin") entered into a written stipulation to resolve their claims and requested that the Court enter their [Proposed] Judgment and Physical Solution as part of the final judgment. As to all remaining parties, including those who failed to answer or otherwise appear, the Court heard the testimony of witnesses, considered the evidence, and heard the arguments of counsel. Good cause appearing, the Court finds and orders judgment as follows:

1. The Second Amended Stipulation For Entry of Judgment and Physical Solution among the stated stipulating parties is accepted and approved by the Court.
2. Consistent with the December 23 2015 Statement of Decision ("Decision"), the Court adopts the Proposed Judgment and Physical Solution attached hereto as Exhibit A and incorporated herein by reference, as the Court's own physical solution ("Physical Solution"). The Physical Solution is binding upon all parties.
3. In addition to the terms and provisions of the Physical Solution the Court finds as follows:
    a. Each of the Stipulating Parties to the Physical Solution has the right to pump groundwater from the Antelope Valley Adjudication Area as stated in the Decision and Physical Solution.
    b. The following entities are awarded prescriptive rights from the native safe yield against the Tapia Parties, defaulted parties identified in Exhibit 1 to the Physical Solution, and parties who did not appear at trial identified in Exhibit B attached hereto, in the following amounts:

Los Angeles County Waterworks District No. 40	17,659.07 AFY
Palmdale Water District	8,297.91 AFY
Littlerock Creek Irrigation District	1,760 AFY
Quartz Hill Water District	1,413 AFY
Rosamond Community Services District	1,461.7 AFY
Palm Ranch Irrigation District	960 AFY

Desert Lake Community Services District	318 AFY
California Water Service Company	655 AFY
North Edwards Water District	111.67 AFY

No other parties are subject to these prescriptive rights.

c. Each of the parties referred to in the Decision as Supporting Landowner Parties has the right to pump groundwater from the Antelope Valley Adjudication Area as stated in the Decision and in Paragraph 5.1.10 of the Physical Solution in the following amounts:

i.	Desert Breeze MHP, LLC	18.1 AFY
ii.	Milana VII, LLC dba Rosamond Mobile Home Park	21.7 AFY
iii.	Reesdale Mutual Water Company	23 AFY
iv.	Juanita Eyherabide, Eyherabide Land Co., LLC and Eyherabide Sheep Company, collectively	12 AFY
v.	Clan Keith Real Estate Investments, LLC., dba Leisure Lake Mobile Estates	64 AFY
vi.	White Fence Farms Mutual Water Co. No. 3	4 AFY
vii.	LV Ritter Ranch LLC	0 AFY
viii.	Robar Enterprises, Inc., Hi-Grade Materials Co., and CJR, a General Partnership	200 AFY

d. Each member of the Small Pumper Class can exercise an overlying right pursuant to the Physical Solution. The Judgment Approving Small Pumper Class Action Settlements is attached as Exhibit C ("Small Pumper Class Judgment") and is incorporated herein by reference.

e. Cross-defendant Charles Tapia, as an individual and as Trustee of Nellie Tapia Family Trust (collectively, "The Tapia Parties") has no right to pump groundwater from the Antelope Valley Adjudication Area except under the terms of the Physical Solution.

f. Phelan Piñon Hills Community Services District ("Phelan") has no right to pump groundwater from the Antelope Valley Adjudication Area except under the terms of the Physical Solution.

g. The Willis Class members have an overlying right that is to be exercised in accordance with the Physical Solution.

h. All defendants or cross-defendants who failed to appear in any of these coordinated and consolidated cases are bound by the Physical Solution and their overlying rights, if any, are subject to the prescriptive rights of the Public Water Suppliers. A list of the parties who failed to appear is attached hereto as Exhibit D.

i. ~~Robar Enterprises, Inc., Hi-Grade Materials Co., and CJR, a general partnership (collectively, "Robar") are ____ ____ ____ ____.~~

4. Each party shall designate the name, address and email address, to be used for all subsequent notices and service of process by a designation to be filed within thirty days after entry of this Judgment. The list attached as Exhibit A to the Small Pumper Class Judgment shall be used for notice purposes initially, until updated by the Class members and/or Watermaster. The designation may be changed from time to time by filing a written notice with the Court. Any party desiring to be relieved of receiving notice may file a waiver of notice to be approved by the Court. The Court will maintain a list of parties and their respective addresses to whom notice or service of process is to be sent. If no designation is made as required herein, a party's designee shall be deemed to be the attorney of record or, in the absence of an attorney of record, the party at its specified address.

5. All real property owned by the parties within the Basin is subject to this Judgment. It is binding upon all parties, their officers, agents, employees, successors and assigns. Any party, or executor of a deceased party, who transfers real property that is subject to this Judgment shall notify any transferee thereof of this Judgment.

This Judgment shall not bind the parties that cease to own real property within the Basin, and cease to use groundwater, except to the extent required by the terms of an instrument, contract, or other agreement.

The Clerk shall enter this Judgment.

Dated: Dec 23, 2015

JUDGE OF THE SUPERIOR COURT

Appendix H: Data to Document Consistency with Delta Plan Policy WR P1

As stated in the 2020 UWMP Guidebook Appendix C (Draft version dated March 2021):

> "An urban water supplier (Supplier) that anticipates participating in or receiving water supply benefits from a proposed project (covered action[4]) such as a multi-year water transfer, conveyance facility, or new diversion that involves transferring water through, exporting water from, or using water in the Sacramento-San Joaquin Delta (Delta) should provide information in their 2015 and 2020 Urban Water Management Plans (UWMP's) that can then be used in the covered action process to demonstrate consistency with Delta Plan Policy WR P1, *Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance* (California Code Reg., tit. 23, § 5003)."

WR P1 subsection (c)(1) further defines what adequately contributing to reduced reliance on the Delta means in terms of (a)(1) above.

> "(c)(1) Water suppliers that have done all the following are contributing to reduced reliance on the Delta and improved regional self-reliance and are therefore consistent with this policy:
>
>> (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

---

[4] Cal. Code Regs., tit. 23, § 5001, subd. (j): A "Covered action" is defined as "an activity which may cause either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment, or a reasonably foreseeable indirect physical change in the environment … "directly undertaken by any public agency""(Pub. Resources Code, § 21065) that (i) will occur, in whole or in part, within the boundaries of the Delta or Suisun Marsh, (ii) will be carried out, approved, or funded by the state or a local public agency, (iii) is covered by one or more provisions of the Delta Plan, and (iv) will have a significant impact on achievement of one or both of the coequal goals or the implementation of government-sponsored flood control programs to reduce risks to people, property, and state interest in the Delta."

> 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)."

Preparation of UWMPs and Implementation of Projects from the UWMP

PWD completed and submitted to DWR, 2005, 2010, and 2015 Urban Water Management Plans, in addition to this 2020 UWMP. PWD has identified, evaluated and implemented projects that are locally cost effective and technically feasible which improve local reliability and reduce reliance on the Delta.

Expected Outcomes for Measurable Reduction in Delta Reliance

The expected outcomes for PWD's Delta reliance and regional self-reliance were developed based on the approach and guidance described in Appendix C of DWR's Urban Water Management Plan Guidebook 2020 (Draft version dated March 2021) and are summarized in Tables H-1 to H-3 below. This involves setting a baseline and evaluating normal year water demands (potable and non-potable), estimating service area population and water use in gallons per capita per day, evaluating and projecting water supply sources to meet estimated normal year demands including supplies from the Delta, local groundwater, conjunctive use projects, surface water, transfers and exchanges, and non-potable supplies. Inputs to Table H-1, H-2, and H-3 include:

- **Baseline**. In order to calculate the expected outcomes for measurable reduction in Delta reliance and improved regional self-reliance, a baseline is needed to compare against. For consistency with conversations had with DWR, PWD is using year 2010 as the baseline year. This analysis uses a normal water year representation of 2010 as the baseline. Data for the 2010 baseline were taken from PWD's 2005 UWMP as the UWMPs generally do not provide normal water year data for the year that they are adopted (i.e., 2005 UWMP forecasts normal year 2010, 2010 UWMP forecasts normal year 2015, and so on).

- **Service Area Demands**. Service area demands, including demands for non-potable water, for 2010, 2015, and 2020 were taken from projections from the previous (2005, 2010, and 2015) UWMPs. Service area demands 2025 to 2045 were taken from projections developed as part of the 2020 UWMP.

- **Service Area Population**. Consistent with the methodology for service area demands (using normal year projections from the previous UWMP), service area population for 2010 were taken from the previous (2005) UWMP. Consideration was given to using 2010 UWMP service area population projections for 2015 but because the 2015 UWMP had the benefit of complete Census data, year 2015 population data was taken from the 2015 UWMP. 2020 service area population projections were taken from the 2015 UWMP. Year 2025-2045 service area demands were taken from the 2020 UWMP.

The outcome of Table H-1 is a calculation of water use efficiency since the baseline year (2010). The calculation uses the change in gallons per capita per day and service area population to estimate water use efficiency in years 2015 through 2045 compared to the baseline year of 2010.

- **Supplies Contributing to Regional Self-Reliance**. In Table H-2, the estimate of water use efficiency is taken from Table H-1. Other water supplies, such as recycled water and advanced water technologies were taken from previous UWMPs (2005 projections were supplied for 2010 etc.). For years 2025-2045 local supplies were taken from projections prepared for the 2020 UWMP.

The outcome of Table H-2 is an estimate of the supplies contributing to regional self-reliance.

- **CVP/SWP Contract Supplies**. CVP/SWP contract supplies were estimated based on the percentage of Delta supplies provided as a percent of overall imported supplies from the State Water Project. Given that all of PWD’s imported supplies come directly from DWR, data provided in the 2019 Delivery and Capability Report was utilized to estimate the percentages of supplies from the Delta watershed.

The outcome of Table H-3 is a calculation of the percent change in supplies from the Delta watershed relative to the 2010 Baseline.

Table H-3 illustrates that from 2010 to 2015, PWD reduced reliance on the Delta and is projected to have a net reduction in reliance on the Delta from the baseline, through year 2045.

Table H-1: Calculation of Water Use Efficiency -To be completed if Water Supplier does not specifically estimate Water Use Efficiency as a supply

Service Area Water Use Efficiency Demands (Acre-Feet)	**Baseline (2010)**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**
Service Area Water Demands with Water Use Efficiency Accounted For	31,034	35,000	22,720	19,720	20,310	21,480	22,780	24,250
Non-Potable Water Demands	2,500	1,000	2,500	500	1,000	1,500	2,000	2,000
Potable Service Area Demands with Water Use Efficiency Accounted For	28,534	34,000	20,220	19,220	19,310	19,980	20,780	22,250

Total Service Area Population	**Baseline (2010)**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**
Service Area Population	132,801	164,312	131,200	126,002	128,998	138,554	145,962	153,766

Water Use Efficiency Since Baseline (Acre-Feet)	**Baseline (2010)**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**
Per Capita Water Use (GPCD)	192	185	138	136	134	129	127	129
Change in Per Capita Water Use from Baseline (GPCD)		(7)	(54)	(56)	(58)	(63)	(65)	(63)
Estimated Water Use Efficiency Since Baseline		1,305	7,970	7,853	8,407	9,790	10,582	10,789

Total Service Area Water Demands (Acre-Feet)	**Baseline (2010)**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**
Service Area Water Demands with Water Use Efficiency	31,034	35,000	22,720	19,720	20,310	21,480	22,780	24,250
Reported Water Use Efficiency or Estimated Water Use Efficiency		1,305	7,970	7,853	8,407	9,790	10,582	10,789
Service Area Water Demands without Water Use Efficiency	31,034	36,305	30,690	27,573	28,717	31,270	33,362	35,039

Table H-2: 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
Water Use Efficiency	0	1,305	7,970	7,853	8,407	9,790	10,582	10,789
Water Recycling	2,500	1,000	2,500	500	1,000	1,500	2,000	2,000
Stormwater Capture and Use								
Advanced Water Technologies								
Conjunctive Use Projects (Groundwater or Surface Water Augmentation)		2,600	5,000	5,325	5,325	5,325	5,325	5,325
Local and Regional Water Supply and Storage Projects (Groundwater)	10,310	12,000	6,280	4,140	2,770	2,770	2,770	2,770
Local and Regional Water Supply and Storage Project (Groundwater Return Flow Credits)				5,000	5,000	5,000	5,000	5,000
Other Programs and Projects the Contribute to Regional Self-Reliance (Surface Water)	3,405	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Water Supplies Contributing to Regional Self-Reliance	16,215	20,905	25,750	26,898	26,502	28,385	29,677	29,884

Service Area Water Demands without Water Use Efficiency (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Service Area Water Demands without Water Use Efficiency Accounted For	31,034	36,305	30,690	27,573	28,717	31,270	33,362	35,039

Change in Regional Self Reliance (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Water Supplies Contributing to Regional Self-Reliance	16,215	20,905	25,750	26,898	26,502	28,385	29,677	29,884
Change in Water Supplies Contributing to Regional Self-Reliance		4,690	9,535	10,683	10,287	12,170	13,462	13,669

Percent Change in Regional Self Reliance (As Percent of Demand w/out WUE)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Percent of Water Supplies Contributing to Regional Self-Reliance	52.2%	57.6%	83.9%	97.6%	92.3%	90.8%	89.0%	85.3%
Change in Percent of Water Supplies Contributing to Regional Self-Reliance		5.3%	31.7%	45.3%	40.0%	38.5%	36.7%	33.0%

Table H-3: Calculation of Reliance on Water Supplies from the Delta Watershed

Water Supplies from the Delta Watershed (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
CVP/SWP Contract Supplies	15,123	12,800	13,200	12,030	11,720	11,400	11,080	11,080
Delta/Delta Tributary Diversions								
Transfers and Exchanges of Supplies from the Delta Watershed (Butte Transfer Agreement)	2,104	2,600	6,200	5,700	5,200	5,200	5,200	5,200
Other Water Supplies from the Delta Watershed	-	-	-	-	-	-	-	-
Total Water Supplies from the Delta Watershed	17,227	15,400	19,400	17,680	17,220	16,750	16,280	16,280

Service Area Water Demands without Water Use Efficiency (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Service Area Water Demands without Water Use Efficiency Accounted For	31,034	36,305	30,690	27,573	28,717	31,270	33,362	35,039

Change in Supplies from the Delta Watershed (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Water Supplies from the Delta Watershed	17,227	15,400	19,400	17,680	17,220	16,750	16,280	16,280
Change in Water Supplies from the Delta Watershed		(1,827)	2,173	453	(7)	(477)	(947)	(947)

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
Percent of Water Supplies from the Delta Watershed	55.5%	42.4%	63.2%	64.1%	60.0%	53.6%	48.8%	46.5%
Change in Percent of Water Supplies from the Delta Watershed		-13.1%	7.7%	8.6%	4.5%	-1.9%	-6.7%	-9.0%

Appendix I: Energy Intensity of Water System

Table O-1C: Recommended Energy Reporting - Multiple Water Delivery Products

Enter Start Date for Reporting Period 1/1/2020
End Date 12/31/2020

☐ Is upstream embedded in the values reported?

		Urban Water Supplier Operational Control							
		Water Management Process						Non-Consequential Hydropower (if applicable)	
		Extract and Divert	Place into Storage	Conveyance	Treatment	Distribution	Total Utility	Hydropower	Net Utility
Water Volume Units	*Total Volume of Water Entering Process (volume units)*	*6549*	*0*	*4153*	*11356*	*0*	*N/A*	*9709*	*N/A*
AF	*Retail Potable Deliveries (%)*	*100%*	*100%*	*100%*	*100%*	*100%*		*100%*	
	Retail Non-Potable Deliveries (%)								
	Wholesale Potable Deliveries(%)								
	Wholesale Non-Potable Deliveries (%)								
	Agricultural Deliveries (%)								
	Environmental Deliveries (%)								
	Other (%)								
	Total Percentage [must equal 100%]	*100%*	*100%*	*100%*	*100%*	*100%*	*N/A*	*100%*	*N/A*
	Energy Consumed (kWh)	*4533947*	*0*	*1861443*	*801978*		*7197368*	*1206418*	*8403786*
	Energy Intensity (kWh/vol. converted to MG)	*2124.6*	*#DIV/0!*	*1375.5*	*216.7*	*#DIV/0!*	*N/A*	*381.3*	*N/A*

Water Delivery Type	*Production Volume (volume units defined above)*	*Total Utility (kWh/volume)*	*Net Utility (kWh/volume)*
Retail Potable Deliveries	*22058*	*326.3*	*381.0*
Retail Non-Potable Deliveries	*0*	*0.0*	*0.0*
Wholesale Potable Deliveries	*0*	*0.0*	*0.0*
Wholesale Non-Potable Deliveries	*0*	*0.0*	*0.0*
Agricultural Deliveries	*0*	*0.0*	*0.0*
Environmental Deliveries	*0*	*0.0*	*0.0*
Other	*0*	*0.0*	*0.0*
All Water Delivery Types	*22058*	*326.3*	*381.0*

Quantity of Self-Generated Renewable Energy

289553 kWh

Data Quality *(Estimate, Metered Data, Combination of Estimates and Metered Data)*

Metered Data

Data Quality Narrative:

Validated meter data was provided by PWD.

Narrative:

PWD kept track of energy consumed and volume of water for each source, treatment, or deliver.

Appendix J: 2020 Water Shortage Contingency Plan

June 25, 2021

Job #: 2044225*00

2020 Water Shortage Contingency Plan

Palmdale Water District

PALMDALE WATER DISTRICT

A CENTURY OF SERVICE

Kennedy Jenks

Kennedy Jenks
2775 North Ventura Road, Suite 202
Oxnard, California 93036
805-973-5700

Water Shortage Contingency Plan

Final

25 June 2021

Prepared for

Palmdale Water District
2029 E. Ave Q.
Palmdale, CA 93550

KJ Project No. 2044225*00

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List of Acronyms

District	Palmdale Water District
DWR	California Department of Water Resources
ERP	Emergency Response Plan
PWD	Palmdale Water District
SWP	State Water Project
UWMP	Urban Water Management Plan
WSCP	Water Shortage Contingency Plan

DWR Checklist Table for WSCP

Water Code Section	Summary as Applies to UWMP	2020 WSCP Location
Subject: Water Shortage Contingency Planning | 2020 UWMP Guidebook Location: Chapter 8		
10632(a)	Provide a water shortage contingency plan (WSCP) with specified elements below.	Full Document
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.	Section 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.	Section 2
10632(a)(3)(A)	Define six standard water shortage levels of 10, 20, 30, 40, 50 percent shortage and greater than 50 percent shortage. These levels shall be based on supply conditions, including percent reductions in supply, changes in groundwater levels, changes in surface elevation, or other conditions. The shortage levels shall also apply to a catastrophic interruption of supply.	Section 3.1
10632(a)(3)(B)	Suppliers with an existing water shortage contingency plan that uses different water shortage levels must cross reference their categories with the six standard categories.	Section 3.1
10632(a)(4)(A)	Suppliers with water shortage contingency plans that align with the defined shortage levels must specify locally appropriate supply augmentation actions.	Section 3.2.1
10632(a)(4)(B)	Specify locally appropriate demand reduction actions to adequately respond to shortages.	Section 3.2.3
10632(a)(4)(C)	Specify locally appropriate operational changes.	Section 3.2.2
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.	Section 3.3.3.1
10632(a)(4)(E)	Estimate the extent to which the gap between supplies and demand will be reduced by implementation of the action.	Table 3-4 and 3-7
10632(a)(5)(A)	Suppliers must describe that they will inform customers, the public and others regarding any current or predicted water shortages.	Section 4.1.1
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.	Section 4.1.1
10632(a)(7)(A)	Describe the legal authority that empowers the supplier to enforce shortage response actions.	Section 2.6
10632(a)(7)(B)	Provide a statement that the supplier will declare a water shortage emergency Water Code Chapter 3.	Section 3
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.	Section 2.6
10632(a)(8)(A)	Describe the potential revenue reductions and expense increases associated with activated shortage response actions.	Section 7.1.1
10632(a)(8)(B)	Provide a description of mitigation actions needed to address revenue reductions and expense increases associated with activated shortage response actions.	Section 7.1.2
10632(a)(8)(C)	Describe the cost of compliance with Water Code Chapter 3.3: Excessive Residential Water Use During Drought.	Table 7-1
10632(a)(9)	Retail suppliers must describe the monitoring and reporting requirements and procedures that ensure appropriate data is collected, tracked, and analyzed for purposes of monitoring customer compliance.	Section 5.2
10632(a)(10)	Describe reevaluation and improvement procedures for monitoring and evaluation the water shortage contingency plan to ensure risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented.	Section 1.3

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.	Section 3.2.3

Section 1: Introduction

1.1 Overview

Water supplies may be interrupted or reduced significantly in a number of ways, such as a drought that limits supplies, an earthquake that damages water delivery or storage facilities, a regional power outage or a toxic spill that affects water quality. This Plan addresses the requirements in the California Water Code Section 10632, which requires that every urban water supplier shall prepare and adopt a Water Shortage Contingency Plan (WSCP) as part of its Urban Water Management Plan (UWMP). This WSCP serves as a guide for the intended actions by Palmdale Water District (PWD, the District) during water shortage conditions to improve preparedness for droughts and other impacts on water supplies by describing the process used to address varying degrees of water shortages.

Since the 1991 drought, PWD has approved and adopted numerous conservation resolutions from establishing a voluntary water conservation program, to implementing a water waste policy, declaring water shortage emergency conditions, identifying stages of action and response requirements, and establishing emergency water conservation regulations. Moreover, due to recent drought conditions and the Governor’s emergency declarations that required a reduction in overall potable urban water use statewide, PWD developed ordinances and other planning documents to incentivize individual customer conservation and reduce overall water demands. Budget-based tiered water rates were introduced in May 2009 and updated in October 2019.

This WSCP describes the actions PWD will take to identify and respond to water shortage.

1.2 Plan Preparation, Adoption, Submittal and Availability

PWD began preparation of this WSCP in January 2021. The public hearing for the WSCP Plan was noticed in local newspapers on May 28, 2021, as prescribed in Government Code 6066, which included the time and place of the hearing (*2029 E Ave Q, Palmdale, CA, June 14, 2021*), as well as the location where the plan was available for public inspection. Interested parties, including other local agencies, were notified of the public hearing.

The final draft of the Plan was adopted by the PWD Board of Directors by Resolution No. 21-11 (provided in Appendix A) and was submitted to the Department of Water Resources (DWR) within 30 days of approval. Additionally, the plan was made available for public review per the requirements of the Water Code.

1.3 Water Shortage Contingency Plan Refinement Procedures

PWD will convene the following departmental staff as needed to re-evaluate and improve procedures for systematically monitoring and evaluating the functionality of the WSCP to ensure shortage risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented as needed:

- Water Use Efficiency Staff
- Administrative Staff
- Operational Staff

The WSCP will be reviewed, revised, and refined as appropriate and needed following significant changes to PWD supply portfolio, but no less than every 5 years.

1.4 Relationship to the Urban Water Management Plan

Water Code Section 10632(a) requires that every urban water supplier prepare and adopt a water shortage contingency plan as part of its urban water management plan. While the water shortage contingency plan is a stand-alone document it is updated and adopted in concert with the UWMP. Content of the water shortage are informed by the analysis of water supply reliability conducted pursuant to Water Code Section 10635 (contained in the UWMP). The reliability analysis of the UWMP considers “normal”, “single-dry”, and “5-year drought”.

The reliability of PWD supply is highly dependent on the local groundwater sources, imported water availability, and local surface water availability. As shown in Table 1-1 (from Draft UWMP, subject to revision), in the near term (2021 to 2025) the total supplies are greater than demand in years 2022, 2024, and 2025. However, anticipated supplies are less than anticipated water demands in years 2021 and 2023. The WSCP identifies shortage reduction actions to reduce the shortage gap and actions to augment supplies.

Table 1-1 Near Term Water Supply Reliability Assuming 5-Year Drought

Parameter	2021	2022	2023	2024	2025
Gross Water Use	19,410	19,505	19,620	19,715	20,220
Total Supplies	16,450	26,155	17,475	19,980	24,680
Surplus/Shortfall w/o WSCP Action	***-2,960***	***6,650***	***-2,145***	***265***	***4,460***
WSCP - supply augmentation benefit	N/A	N/A	N/A	N/A	N/A
WSCP - use reduction savings benefit	4,270	N/A	4,316	N/A	N/A
Revised Surplus/(shortfall)	1,310	N/A	2,171	N/A	N/A
Resulting % Use Reduction from WSCP action	22%	N/A	22%	N/A	N/A

Note: Reformatted from UWMP Guidebook, Table 7-5 Five-Year Drought Risk Assessment Tables to address Water Code Section 10635(b)

Section 2: Procedures for the Annual Water Supply and Demand Assessment

The California Water Code Division 1, Section 350, states:

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

New provisions in Water Code Section 10632.1. require that an urban water supplier such as PWD conduct an annual water supply and demand assessment ("Annual Assessment"), on or before July 1 of each year, to be submitted to DWR. An urban water supplier that relies on imported water from the State Water Project or the Bureau of Reclamation shall submit its Annual Assessment within 14 days of receiving its final allocations, or by July 1 of each year, whichever is later. The requirement to perform the Annual Assessment begins in July 2022. The procedures for performing the Annual Assessment are to be detailed in an urban suppliers' Water Shortage Contingency Plan.

This section of the WSCP provides the written procedure for PWD's Annual Assessment.

2.1.1 Timeline for Conducting the Annual Assessment

Table 2-1 provides targets for performing the Annual Assessment and outlines actions for a normal year and one year of drought. By starting to plan in July, PWD will get a snapshot of conditions and can begin to prepare to mitigate supply and start outreach to customers to manage demand. Major actions are proposed in January 2022, when an initial estimate of supply is made and compared to demand. A final annual assessment is proposed in April 2022.

Table 2-1 Timeline for Decision Making Process to Perform Annual Assessment

Target Date	Action
Jul-Dec	• Monitor supply sources • Monitor demand trends
Jan	• Confirm anticipated weather (e.g., National Weather Service Climate Prediction Center, La Niña, US Drought Seasonal Outlook) • Confirm State Water Project (SWP initial allocation) • Confirm available groundwater • Confirm groundwater production capacity • Evaluate storage in Littlerock Dam Reservoir available to PWD • Prepare initial assessment of Supplies *(Supply Table 1)*
Feb	• Prepare informational item to the Board of Directors
Mar	• Make initial assessment of unconstrained demand (*Demand Tables 1, 2, 3*) • Make initial estimate of shortage • If shortage anticipated, form Water Shortage Task Force • Confirm current SWP allocation • Confirm groundwater production capacity • Estimate supply/storage in Littlerock Dam Reservoir available to PWD
April	• Start public outreach • Complete Draft Annual Assessment and present to Board of Directors • If necessary, prepare notices of public hearing on water shortage
May-July	• Continue public outreach • Update Annual Water Assessment, present to Board of Directors • Finalize Annual Water Assessment and submit to DWR • If necessary, declare water shortage and implement supply mitigations and demand reduction actions • Monitor customer response to water shortage messaging and other actions

2.2 Factors Affecting Demand and Supply

2.2.1 Weather Outlook

Weather affects PWD supplies in many ways. For many of the supplies, the effects of weather are seen over the long-term and are reflected in reservoir levels and groundwater levels. There are some resources and phenomena that can be considered when looking at the sources of supply:

- Potential for La Niña. ENSO (El Niño Southern Oscillation) is the warming and cooling of the ocean water along the Equator in the Eastern Pacific Ocean near South America. The warm phase is called El Niño and the cold phase is called La Niña. When the Eastern Pacific Ocean is 0.5 degrees Celsius above normal for 5 consecutive 3-month average periods, an El Niño is declared. When the Eastern Pacific Ocean is 0.5 degrees Celsius below normal for 5 consecutive 3-month average periods, a La Niña is declared. The El Niño and La Niña are declared as Weak, Moderate, or Strong depending on how far from normal the water temperature gets. When the temperature is above 1.5 degrees Celsius, it is declared as strong. When the temperature is above 1.0 degrees Celsius, it is declared as Moderate. When the temperature is above 0.5 degrees Celsius, it is declared as Weak. With El Niños, the High Desert tends experience increased precipitation, and decreased precipitation with La Niñas. The National Weather Service Climate Prediction Center provides information on potential for La Niña conditions.

- US Drought Information Seasonal Outlook. The National Weather Service Climate Prediction Center provides information geographically on drought conditions and categorizes geographies as “Drought Persists”, “Drought Remains but Improves”, “Drought Removal Likely”, and “Drought Development Likely”.

2.3 Current Year Unconstrained Demand

DWR guidance for the Annual Assessment is to consider the expected water use in the upcoming year, based on recent water use, and before any projected response actions a Supplier may trigger under its Water Shortage Contingency Plan.

2.3.1 Land Use

To evaluate water demand, PWD is required examine current and projected land uses. PWD incorporates City of Palmdale’s information on land use in its Master Plan Updates and is part of the City’s Development Advisory Board (DAB). The DAB participation will assist with relatively short-term forecasting of upcoming land use development. Using the known built and pending connections, a summarized total of the existing land use within the service area and potential future land use can used to assess total land use development.

2.3.2 Current Demand

PWD will create a table that will summarize the total water consumption (potable, recycled, and untreated) for each consumption category within the water service area for the most recent 5-year average, by month (*Demand Table 1*). Based on anticipated weather, *Demand Table 1* may be adjusted to assume an increase in current demands. *Demand Table 1* will estimate existing demand in the current calendar year and demand in the subsequent calendar year. For the purposes of the analysis the subsequent year will be assumed to be a drought year.

2.3.3 Potential Demand

PWD will create a table showing anticipated demands from “Under Construction and Approved Projects” (*Demand Table 2*) derived from the Water Service Availability Letters issuance and conditions. In *Demand Table 2* anticipated water use will be forecasted by month. The calculations in *Demand Table 2* will develop or use any recently developed demand factors inclusive of water loss and including a contingency to account for annual demand variations that are likely to occur.

Demand Table 2 will reflect anticipated demands in the current calendar year and demand in the subsequent calendar year. For the purposes of the analysis the subsequent year will be assumed to be a drought year.

2.3.4 Total Near-Term Demands

Near-term water demands (*Demand Table 3*) will be the sum of the demands reflected in *Demand Table 1* plus *Demand Table 2*.

2.4 Assessing Supply in Current Year and One Dry Year

PWD will evaluate the total water sources available, including imported water, local groundwater, local surface water, recycled water, and other sources as they are put into service. Table 2-2 summarizes the factors to be considered.

Using Table 2-2 as a guide, PWD will develop a summary of each water source available in the upcoming year assuming the current and subsequent year will be dry years. *Supply Table 1* will also be developed, in which a quantified summary of each anticipated supply source is provided for the upcoming year assuming the current and subsequent year are dry years. Anticipated water supply will be forecasted by month using past supply patterns.

2.5 Assessing Water Supply Reliability

PWD will compare *Supply Table 1* and *Demand Table 3* and determine if a supply shortage is anticipated, the level of shortage, and prepare if necessary, to implement its water shortage contingency plan.

2.6 Steps Following the Annual Assessment

The District has the power and authority to implement and enforce its shortage response actions including mandatory water conservation measures within its boundaries per Division 11 of the California Water Code as previously exercised by Resolution No. 09-04, which was adopted in March 2009. Shortage response actions are described in Section 3. PWD will declare the appropriate stage of a water shortage emergency in accordance with Chapter 3, commencing with Section 350, of Division 1 of the California Water Code. Should a water shortage be declared, PWD may coordinate with the City of Palmdale and the County of Los Angeles for the possible proclamation of a local emergency, as defined in Section 8558 of the Government Code.

Table 2-2 Annual Assessment of Supply

Source	Factors to be Evaluated in Current Year	Establishing Supply in Assumed Subsequent Dry Year
Local Groundwater	Regulatory limitations Groundwater level Any constraints on supply due to infrastructure or water quality Consider if supply would be managed differently if it is known subsequent year will be dry year	Regulatory limitations Groundwater level Any constraints on supply due to infrastructure or water quality
Local Surface Water	Regulatory limitations Any constraints on supply due to infrastructure or water quality	Regulatory limitations Any constraints on supply due to infrastructure or water quality
Imported Water (SWP)	Water supply available under contract with DWR and any existing transfers and exchanges Any constraints on supply due to infrastructure or water quality Consider if supply would be managed differently if it is known subsequent year will be dry year	Water supply available under contract with DWR and any existing transfers and exchanges Any constraints on supply due to infrastructure or water quality
Recycled Water	What is current annual recycled water production capability What is current annual demand + new (12 months) demand	What is current annual recycled water production capability What is current annual demand + new (24 months) demand

Section 3: Six Standard Water Shortage Levels

3.1 Stages of Action to Respond to Water Shortages

As required by California Water Code Section 10632(a)(3)(A), this WSCP is framed around six standard water shortage stages, which correspond to progressive ranges of percent supply reductions from zero to more than fifty percent. Table 3-1 presents a description of the six water supply shortage stages, defined as stages 1 to 6.

Each stage may be triggered by a declaration from federal or state authorities, or PWD to address events that result in a water shortage. The stages and applicable water supply conditions are summarized in Table 3-1 and Table 3-2.

Table 3-1 Rationing and Reduction Goals

Deficiency or State Mandated Reduction	Stage	Demand Reduction Goal	Type of Program	Water Shortage Condition
1-10%	1	10% reduction	Voluntary	Minor Shortage
11-20%	2	20% reduction	Voluntary/Mandatory	Moderate Shortage
21-30%	3	30% reduction	Mandatory	Severe Shortage
31-40%	4	40% reduction	Mandatory	Critical Shortage
41-50%	5	50% reduction	Mandatory	Emergency Shortage
>50%	6	>50% reduction	Mandatory	Catastrophic Failure

DWR Table 8-1

Table 3-2 Stages of PWD Water Shortage Contingency Plan

Stage	Percent Supply Reduction	Triggers
I	Up to 10%	• Results of the Annual Assessment • Federal, state or local disaster declaration that may impact water supplies • State declaration due to drought or system maintenance • Unplanned PWD water system maintenance
II	Up to 20%	• Results of the Annual Assessment • Federal, state or local disaster declaration that may impact water supplies • State declaration due to drought or system maintenance • Unplanned PWD water system maintenance requiring more time to repair

Stage	Percent Supply Reduction	Triggers
III	Up to 30%	• Results of the Annual Assessment • Federal, state or local disaster declaration that may impact water supplies • State determination due to drought or significant system failure; and/or • Unplanned PWD water system failure or emergency
IV	Up to 40%	• Federal, state or local disaster declaration that may impact water supplies • State determination due to drought or significant system failure; and/or • Unplanned PWD water system failure or emergency
V	Up to 50%	• Results of the Annual Assessment • Federal, state or local disaster declaration that may impact water supplies • State determination due to drought or significant system failure; and/or • Advanced PWD water system failure or emergency
Stage VI	50% or higher	• Results of the Annual Assessment • Federal, state or local disaster declaration that may impact water supplies • State determination due to drought or significant system failure • Natural or human-caused catastrophe disrupting delivery of water to, or within the service area • Severe PWD water system failure

3.1.1 Procedures for Water Shortage Level Determination

The results of the Annual Assessment will be used to determine the water shortage level. In case of emergencies, a special meeting may be called by a majority of the Board on less than twenty-four-hour notice and without an agenda to deal with the disruption of service. If an emergency arises which would ordinarily be brought to the attention of the Board, but insufficient time exists, the General Manager has administrative authority to take action as deemed appropriate and reasonable.

3.2 Water Shortage Response Actions

Once a shortage stage is declared, PWD may implement shortage response actions required by the customer and through operational changes, as listed in Table 3-3. These actions will be supported by communication protocols (discussed in Section 4.1.1), enforcement actions (discussed in Section 3.3.2) and monitoring and reporting efforts (discussed in Section 5.2) activities appropriate at each shortage stage level.

Table 3-3: Customer and PWD Water Shortage Actions

Stage	District Actions	Customer Actions
Stage I	• Initiate public information campaign • Increase awareness of conservation measures and water use efficiency programs • Conduct focused outreach to large water users • Consider coordination of public outreach with the cities and County • Publish Water Shortage Event Contingency Plan stages and actions per stage • Consider implementation of drought factor for customer bill calculation • Consider enforcement of conservation measures	• Comply with PWD Water Waste Policy (see Table 3-3 and Appendix B) • Voluntary water conservation • Adhere to conservation measures • Consider conversion to more efficient irrigation methods • Consider turf removal and conversion to Water Wise Landscape • Patronize local carwashes that recycle their water • Consider PWD Water Use Efficiency Rebate Programs
Stage II	• Continue previous action • Expand public information campaign • Commence enforcement of conservation measures • Implement of drought factor for customer bill • Suspend issuance of potable construction meters.	• Comply with PWD Water Waste Policy (see Table 3-3 and Appendix B) • Comply with mandatory conservation regulations • Continue previous actions
Stage III	• Continue previous actions • Intensify public information campaign • Expand enforcement of conservation measures • Provide regular media public briefings • Activate emergency connections with mutual aid agencies • Evaluate size of monetary fines for water waste • Begin water waste patrols	• Comply with PWD Water Waste Policy (see Table 3-3 and Appendix B) • Continue previous actions • Limit washing of sidewalks, driveways, walkways, parking lots, or any other hard-surfaced area by hose or flooding unless otherwise necessary • Comply with prohibited outdoor irrigation of ornamental landscape or turf with potable water through an irrigation system between 9:00 am and 6:00 pm and limit system use to two days a week
Stage IV	• Continue previous actions	• Comply with PWD Water Waste Policy (see Table 3-3 and Appendix B) • Continue previous actions • Obligation to fix leaks, breaks, or malfunctions within 48 hours
Stage V	• Continue previous actions • Enforce mandatory water consumption goals and allocations for all customers and users	• Comply with PWD Water Waste Policy (see Table 3-3 and Appendix B) • Continue previous actions
Stage VI	• Continue previous actions • Implement crisis communication plan • Activate Emergency Operations Center	• Continue previous actions • Terminate outdoor water use for irrigation, pools and

Stage	District Actions	Customer Actions
	- Coordinate actions with regulatory agencies - Coordinate actions with public safety agencies to address enforcement and fire protection issues - Recall all temporary meters and activate water fill stations - Suspend issuance of new development approvals and new water connections other than those required to be processed by state law	fountains - Water may only be used outdoors for public health and safety purposes - Be on alert for Boil Water Orders if they become necessary

3.2.1 Supply Augmentation

Any water shortage event should trigger a review of potential sources for supplemental water supply. Potential sources for supplemental water include increasing allocation of State Water Project water (infrastructure not currently available) or utilizing water from the Palmdale Regional Water Augmentation Project. Any supplemental water supply project or improvements to existing facilities to allow for entitled flows should be a priority for consideration in immediate capital projects if shortage (e.g., demands exceeding supplies) greater than ten percent is anticipated or when a Stage 3 Water Shortage Event continues for more than 18 months. Additional supply sources for consideration include replacement or rehabilitated wells increased use of reclaimed water, and other alternatives based on the actual circumstances at that time. Supply augmentation in near term is presented in Table 3-4 below.

Table 3-4 Supply Augmentation Actions

Shortage Level	Supply Augmentation Methods and Other Actions by Water Supplier *(based on DWR's WUE database categories)*	How much is this going to reduce the shortage gap?	Additional Explanation or Reference
3	Groundwater	2,000 AF	Pump Additional Groundwater
4	Groundwater	1,000 AF	Pump Additional Groundwater
5	Groundwater	1,000 AF	Pump Additional Groundwater
6	Groundwater	500 AF	Pump Additional Groundwater

Note: (DWR Table 8-3)

3.2.2 Operational Changes

PWD shall comply with the restrictions similar to those implemented for the public to the extent possible. Hydrant flushing shall be limited except as deemed necessary by the General Manager to enhance water quality or to conduct fire flow and large meter tests. Other actions include efficient water use practices identified in Table 3-5, such as minimizing waste of water in construction, following a modified outdoor landscape watering schedule for PWD facilities depending on shortage stage, and fixing any identified leaks in the distribution system or other related water infrastructure components.

3.2.3 Demand Reduction Actions

PWD permanently implements general water conservation measures and irrigation practices aimed at increasing everyday water use efficiency. Those measures, plus those to be enacted in the various stages, are presented in Table 3-5 and are also indicated in the District's Water Waste Policy.

Table 3-5. Prohibitions During Different Shortage Stages

Stage	Prohibition/Requirement
In Effect at All Times	Water waste is prohibited at all times. Water waste includes but is not limited to: • Application of potable water to outdoor landscapes in a manner that causes runoff. • Water leaks shall be repaired in a timely manner and sprinklers shall be adjusted to eliminate over-spray. • Hosing of hardscape surfaces, except where health and safety needs dictate, is prohibited. • No watering of outdoor landscapes within 48 hours of measurable rainfall. • Car washing and outside cleaning activities prohibited except when performed with buckets and automatic hose shutoff devices. • The serving of drinking water other than upon request in eating or drinking establishments is prohibited. • Operators of hotels and motels shall provide guests with the option of choosing not to have towels and linens laundered daily. The hotel or motel shall prominently display notice of this option in each guestroom. Other • Water for construction purposes, including but not limited to de-brushing of vacant land, compaction of fills and pads, trench backfill, and other construction uses shall be in an efficient manner.
Stage I	• Same as In Effect At All Times
Stage II	• All restrictions/prohibitions/initiatives from Stage I are in effect • Landscape watering between the hours of 1000 and 1800 hours is prohibited • Outdoor watering is limited to 3 days per week. • Irrigation with potable water outside of newly constructed homes and buildings not delivered by drip or microspray is prohibited. • Suspend issuance of potable water construction meters.

Stage	Prohibition/Requirement
Stage III	• All restrictions/prohibitions/initiatives from Stage I and Stage II are in effect and are mandatory. • Irrigation with potable water of ornamental turf on public street medians is prohibited. • Outdoor watering is limited to 2 days per week. • Potable water cannot be used to maintain fountains, reflection ponds and decorative water bodies for aesthetic or scenic purposes, except where necessary to support aquatic life.
Stage IV	• All restrictions/prohibitions/initiatives from Stage I, Stage II, and Stage III are in effect and are mandatory. • Outdoor watering is limited to 1 day per week. • Filling of new swimming pools, spas, hot tubs, or the draining and refilling of existing pools, etc is prohibited. Topping off is allowed to the extent that the designated water allocation is not exceeded. • Meters will onlybe installed for new accounts where the building permit was issued prior to the declaration of the water shortage.
Stage V	• Filling of new swimming pools, spas, hot tubs, or the draining and refilling of existing pools, etc is prohibited. Topping off is allowed to the extent that the designated water allocation is not exceeded. • Meters will onlybe installed for new accounts where the building permit was issued prior to the declaration of the water shortage
Stage VI	• All restrictions/prohibitions/initiatives from previous Shortage Stages are in effect and are mandatory. • No meters will be installed for new accounts. • Outdoor irrigation is prohibited, with the exception of drip or hand watering to preserve established trees.

As described in the table above, prohibitions and restrictions on water features that are artificially supplied with water, such as ornamental lakes, ponds and decorative fountains are treated differently from swimming pools and spas, as defined in Section 115921 of the California Health and Safety Code.

3.2.3.1 Emergency Response Plan

In order to prepare for catastrophic events, the PWD has prepared an Emergency Response Plan (ERP) in accordance with other state and federal regulations. The purpose of the ERP is to design actions necessary to minimize the impacts of supply interruptions due to catastrophic events.

The ERP includes PWD’s standardized response and recovery procedures to prevent, minimize, and mitigate injury and damage resulting from emergencies or disasters. The ERP includes, or is planned to include incident response procedures for the following incidents:

- Evacuation
- Earthquake
- Fire
- Wildfire
- Flood
- Power Outage
- Drought
- HazMat Release
- Security Incidents
- Bomb Threat
- Single-Employee Security Incident
- Personnel Injury
- Contamination
- Transmission/Main Break
- Distribution Line Break
- Pandemic

The plan considers the various aspects of the potential for malevolent threats or actual terrorism. The information contained in the ERP is intended to guide staff and inform other emergency responding agencies and includes plans, procedures, lists, and identification of equipment, emergency contacts, etc.

3.2.3.2 Seismic Risk Assessment and Mitigation Plan

PWD owns and operates water storage and distribution, treatment, and groundwater pumping facilities. The water distribution system is comprised of two separate systems – one for potable water and the other for recycled water. In 2021, PWD performed the following to understand, plan, for and mitigate seismic risk:

- Evaluated seismic risk zone for the PWD service area
- Identified critical water facilities and seismic and building deficiencies
- Identified mitigation measures to reduce seismic risk at facilities.

This section summarizes the 2020 seismic risk assessment and provides an update of the seismic vulnerability of the drinking water supply, treatment, storage, and distribution facilities and mitigation plan for the water system (Kennedy Jenks 2021). The Seismic Evaluation Report is included in Appendix C.

3.2.3.2.1 Seismic Evaluation and Mitigation for Steel Tanks

Geotechnical work was conducted for PWD's above-ground potable water reservoirs located on 19 sites in the Palmdale area, to classify sites for repair and retrofit needs. Design level earthquake values were identified for each tank evaluation, corresponding to the appropriate American Society of Civil Engineers design level earthquake.

A seismic evaluation was performed to identify seismic deficiencies and recommend strengthening measures for each of the welded carbon steel tanks. Work included a written description for each tank summarizing the results of the interior and exterior inspections and condition assessments; and the findings of the desktop evaluation.

Several tanks were found to have deficiencies, due to one or more of the following:

- age of the tank
- code which was applicable at the time the tank was designed,
- dimensions of the tank diameter to height ratio,

- lack of anchorage to foundations

The tank structural and seismic evaluation investigated several mitigation concepts in order to bring the tanks within code compliance. These mitigation concepts included arranging for a civil or structural engineer to inspect PWD facilities, consulting with a geotechnical engineering firm to perform site investigations and provide a more detailed analysis, increasing freeboard height to accommodate wave action, and combinations of these.

PWD will prioritize tanks for repairs and replacement based on the likelihood and consequences of various types of damage associated with code compliance issues identified.

3.2.3.2.2 Seismic Evaluation and Mitigation for Pump Stations, Pressure Reducing Valves, Wells or Well Pump Stations

Seismic assessments were performed for the booster pump stations, wells, and booster pump buildings. Work included documentation of facility descriptions, seismic deficiencies, and seismic mitigation measures. Many of these facilities had identified deficiencies associated with anchorage to foundations and walls, inadequate load path to transfer later loads, and thin slabs. Similar to the tank evaluation, additional analysis is recommended.

3.3 Benefit of Shortage Response Actions

As discussed above, supply actions and actions within PWD operations will help reduce water shortage. Closing the “gap” between supplies and demands through customer actions, will include:

- Public Information
- Enforcement
- Restrictions on Non-Essential Water Uses
- Pricing

The water shortage response actions and their anticipated effect are summarized in Table 3-7.

3.3.1 Public Information

Without exception, experience has shown that a well-informed public is generally more willing to heed requests to voluntarily conserve or alter water use patterns and will be more likely to comply if mandatory water use restrictions become necessary. DWR (2008) estimates that public information campaigns have alone reduced demand in the range of **5 to 20** percent, depending on the time, money, and effort spent. Public information supports voluntary and mandatory measures by educating and convincing the public that a critical water shortage exists and provides information on how water is used and how they can help. The DWR Drought Guidebook highlights that when the public perceives a drought to be severe, they change behaviors (such as flushing the toilet less often).

The information provided to the public should include a description of the conditions that will trigger implementation of shortage stages as well as a description of what the plan entails (restrictions, enforcement provisions, etc.). It is also advisable to provide practical “consumer” information that will help water users comply with the plan. For example, information about restrictions on lawn watering might be accompanied with information about proper lawn watering practices.

Based on past experience, with minimal public outreach, a water savings of 5 percent is assumed, with extensive public outreach a water savings of 7 percent is assumed, public information combined with enforcement (see section 3.3.2) is assumed to achieve a savings of up to 22 percent.

3.3.2 Enforcement

A study examining the effectiveness of drought management programs in reducing residential water-use (Virginia Polytechnic Institute 2006) showed considerable variation in the effectiveness of drought management programs and highlighted the importance of public information and enforcement. Results, shown in Table 3-6, indicate that overall reductions in residential water-use ranged from 0-7 percent for voluntary restrictions and from 0-22 percent for mandatory restrictions. The observed differences were statistically attributed to information efforts for voluntary restrictions and both information and enforcement efforts for mandatory restrictions.

Table 3-6 Drought Program Management Variables Effect on Residential Water-Use

Classification	Estimated Change in Water-Use	Statistically Different than No Effect?
Voluntary Restrictions		
Little or no information disseminated	-2%	No
Moderate level of information	-2%	No
Aggressive information dissemination	-7%	Yes
Mandatory Restrictions		
Low information and low enforcement	-5%	No
Moderate information and low enforcement	-6%	Yes
Aggressive information and low enforcement	-12%	Yes
Low information and moderate enforcement	-4%	No
Moderate information and enforcement	-9%	Yes
Aggressive information and moderate enforcement	-15%	Yes
Moderate information and aggressive enforcement	-20%	Yes
Aggressive information and enforcement	-22%	Yes

Source: Virginia Polytechnic Institute 2006

The analysis highlights the key role that public outreach and information plays in the success of drought response actions. Voluntary restriction programs with little to moderate levels of information dissemination had no appreciable effect on water-use. Voluntary restriction programs with active promotional efforts, however, reduced water-use by an estimated 7 percent from what would have otherwise occurred without any restriction program. Thus, for voluntary restrictions, only the most intense programs had even a moderate level of success in reducing water-use.

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Mandatory restriction programs without a significant enforcement component broadly mirrored the outcomes achieved by the voluntary programs. Programs with mandatory restrictions that invested minimal effort in information dissemination did not appreciably reduce residential water-use. Programs with no active enforcement efforts but with moderate to high levels of informational dissemination achieved 6 and 12 percent reductions in water-use, respectively. These estimated reductions are similar to those achieved by voluntary programs with aggressive informational campaigns.

The experience the City of Santa Cruz had implementing its Drought Contingency Plan and successfully reaching its reduction goals supports the importance of a strong public information program. Analysis of the implementation program identified the key ingredient to its success was "the public's understanding, awareness, and belief that the City was confronted with a true water shortage problem. Media coverage of water problems across California reinforced the situation. Without that sense of a real and imminent problem, it's likely the level of cooperation and willingness demonstrated by the community in making changes they did might have been considerably reduced." (Santa Cruz 2010)

Delivering accurate and timely information to water users, news media and local governments with updates on conditions, restrictions, and helpful contact information is key.

With aggressive information dissemination and enforcement its assumed PWD could achieve a 22 percent water savings.

3.3.3 Restrictions on Non-Essential Water Uses

PWD's water waste policy focuses on curtailing water waste and non-essential water use. Outdoor water use, including washing sidewalks and watering ornamental landscapes is targeted. These uses are typically considered to be discretionary or nonessential, are highly visible, and therefore relatively easy to monitor, and often are a substantial component of water demand, particularly during the summer months when drought conditions are likely most severe.

Given the significance and visibility of lawn watering as the predominant component of seasonal use, best management practices in drought contingency plans typically prescribe time-of-use and other restrictions on lawn watering. This often involves placing water users on a schedule which allows for staggered lawn watering days, as well as restrictions on the times during the day when lawns can be watered. Additionally, this may include the suspension of potable water construction meters.

The American Waterworks Association estimates that voluntary outdoor water use limits can result in a water savings of **up to 10 percent** and mandatory outdoor water limits can achieve **up to a 56** percent reduction in outdoor water use (AWWA 2008, AWWA 2011). Specifically, case studies found that:

- Restricting water use to every third day reduced water use by 22 percent

- Restricting water use to twice a week reduced water use by 33 percent
- Restricting water use to once a week saved 56 percent

PWD performed a detailed review of water use as part of its 2019 Financial Planning Study (PWD 2019). This analysis estimated that for residential customers, approximately 52% of water use was outdoors. Residential water demand makes up approximately 77% of PWD's overall demands Therefore:

- Voluntary outdoor water limits that saved 10% of outdoor residential demands would reduce overall water demand by 4% (0.1*0.52*0.77).
- Restricting water use to twice a week could reduce outdoor water use by 33%, reducing overall water demand by 13% (0.33*0.52*0.77).
- Restricting water use to once a week could reduce outdoor water use by 56%, reducing overall water demand by 22% (0.56*0.52*0.77).

3.3.3.1 Additional Mandatory Restrictions

The State, through the State Water Board, adopted drought emergency conservation regulations in July 2014. The Board expanded, updated, extended, and readopted the emergency regulations several times and in the prohibitions on wasteful water use practices were in place until November 25th, 2017.

As directed by Executive Order B-40-17, the State Water Board is conducting a rulemaking to put in place permanent prohibitions on wasteful water use practices. This rulemaking is part of the broader legislation, *Making Water Conservation a California Way of Life*.

The specific outcome of the permanent prohibitions cannot be known at this time. The emergency conservation regulations in effect through November 2017 included the following prohibitions:

- Application of potable water to outdoor landscapes in a manner that causes runoff such that water flows onto adjacent property, non-irrigated areas, private and public walkways, roadways, parking lots, or structures;
- The use of a hose that dispenses potable water to wash a motor vehicle, except where the hose is fitted with a shut-off nozzle or device attached to it that causes it to cease dispensing water immediately when not in use
- The application of potable water to driveways and sidewalks
- The use of potable water in a fountain or other decorative water feature except where the water is part of a recirculating system
- The application of potable water to outdoor landscapes during and within 48 hours after measurable rainfall
- The serving of drinking water other than upon request in eating or drinking establishments
- Irrigation with potable water of ornamental turf on public street medians.

The emergency conservation regulations further required that:

- 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

- Commercial, industrial, and institutional properties shall limit outdoor irrigation of ornamental landscapes or turf with potable water to no more than two days per week

PWD's water use restrictions are consistent with the State's prohibitions to prevent water waste. However, dependent on the declared drought stage, PWD may have restrictions and requirements in addition to those of the State such as:

- Limiting outdoor irrigation of ornamental landscape or turf with potable water to certain hours and to certain days of the week (all customer types, not just Commercial, Industrial, or Institutional properties)
- Prohibiting all outdoor irrigation with potable water
- Prohibiting filling of swimming pools, spas, and wading pools

3.3.4 Drought Surcharge Rates

PWD has a drought rate structure to recover costs related to increased effort during drought. While not a specifically meant to reduce water demand, drought surcharge rates are expected to decrease water demands.

Past studies reveal that water use decreases when utilities install water meters and impose commodity charges. AWWA estimates that water use decreases between 15 to 40 percent when customers are charged a commodity rate rather than a flat rate (AWWA 2008). This indicates that customers are price sensitive and will adjust habits to reduce their cost of water. The actual extent that increasing rates during a drought can result in decreased water use is uncertain.

AWWA studies indicate that the effectiveness of pricing to reduce water use is very dependent on the affluence of the water utility customer base. As a rule of thumb, AWWA estimates that marginal price increases in water (up to 10 percent) reduce water use by 1.5 to 7 percent; price increases greater than 10 percent are necessary to achieve water use reductions greater than 10 percent (AWWA 2008).

Based on AWWA data its assumed that water use reductions of 10 to 15 percent will be achieved with drought rates.

Table 3-7. Effectiveness Demand Reduction and Other Actions

Shortage Level	Demand Reduction Actions	Reduction in Shortage Gap	Explanation	Penalty, Charge, or Other Enforcement?
1	Expand Public Information Campaign	7%	Based on AWWA 2008 assumes savings of 7%	No
2	Expand Public Information Campaign	22%	Based on AWWA 2008 assumes savings of 22% with enforcement	Yes
2	Implement or Modify Drought Rate Structure or Surcharge	10%	Based on AWWA 2011 assumes savings of 10%	Yes
3	Expand Public Information Campaign	22%	Based on AWWA 2008 assumes savings of 22% with enforcement	Yes
3	Implement or Modify Drought Rate Structure or Surcharge	10%	Based on AWWA 2011 assumes savings of 10%	Yes
3	Landscape - Other landscape restriction or prohibition	4%	Outdoor water limited to 3 days a week. Based on AWWA 2011.	Yes
4	Expand Public Information Campaign	22%	Based on AWWA 2008 assumes savings of 22% with enforcement	Yes
4	Implement or Modify Drought Rate Structure or Surcharge	15%	Based on AWWA 2011 assumes savings of 15%	Yes
4	Landscape - Other landscape restriction or prohibition	13%	Outdoor water limited to 2 days a week. Based on AWWA 2011.	Yes
5	Expand Public Information Campaign	22%	Based on AWWA 2008 assumes savings of 22% with enforcement	Yes
5	Implement or Modify Drought Rate Structure or Surcharge	15%	Based on AWWA 2011 assumes savings of 15%	Yes
5	Landscape - Other landscape restriction or prohibition	22%	Outdoor water limited to 1 day a week. Based on AWWA 2011.	Yes

Table 3-7. cont.

Shortage Level	Demand Reduction Actions	Reduction in Shortage Gap	Explanation	Penalty, Charge, or Other Enforcement?
6	Expand Public Information Campaign	22%	Based on AWWA 2008 assumes savings of 22% with enforcement	Yes
6	Implement or Modify Drought Rate Structure or Surcharge	15%	Based on AWWA 2011 assumes savings of 15%	Yes
6	Landscape - Other landscape restriction or prohibition	52%	Outdoor water use prohibited	Yes

DWR Table 8-2

Section 4: Communications Protocols

4.1.1 Communications Protocols and Customer Outreach

Customer participation is a key element in responding to a supply shortage, while general media coverage of a drought is likely to increase awareness. Multiple communication channels will continue to be used by PWD staff to communicate water shortage conditions and necessary actions to the PWD Board of Directors, customers, residential homeowners associations, business chambers, inter-governmental bodies, essential facilities (schools, hospitals, fire and police department), and other stakeholders. Communication methods include the following:

- Public water conservation forums hosted at PWD headquarters, off- site locations, or through virtual platforms.
- Attendance and agenda presentation at local city council meetings.
- Attendance and agenda presentations at home-owners association and business chamber meetings.
- Direct mailings and bill inserts to customers and account holders.
- Press releases.
- PWD publications, e.g., “The Pipeline”.
- Updated posting of issues and information on PWD website.
- Advertisements in local publications and cable channels.
- Cards, table tents, door hangers and other leave-behind reminders.
- Social media updates and postings

Table 4-1 describes communication protocols and procedures to be used by PWD for outreach to customers to reduce demand during each defined shortage stage. The shortage stages are further defined in Section 3.1.

Table 4-1 Communication Protocols and Procedures to Support Shortage Response Actions

Shortage Stage	Percent Supply Reduction	Communication Protocols and Procedures *(Outreach to customers when each Stage is declared)*
I	Up to 10%	- Declaration and notification of water supply shortage I by resolution, and adoption at a public meeting in accordance with state law. - Notification of supply shortage in Public Newspaper
II	Up to 20%	- Declaration and notification of water supply shortage II by resolution, and adoption at a public meeting in accordance with state law. - Notification of supply shortage in Public Newspaper - Advertisement in Local Public Newspaper - Commence social media updates - Notify top 5 water users in each customer class, e.g. residential, and CII
III	Up to 30%	- Declaration and notification of water supply shortage III by resolution, and adoption at a public meeting in accordance with state law. - Notification of supply shortage in Public Newspaper - Advertisement in Local Public Newspaper and local cable channel - Schedule regular media, city council and County briefings - Continue social media updates - Targeted Messaging to customers - Notify top 10 water users in each customer class, e.g. residential, and CII
IV	Up to 40%	- Declaration and notification of water supply shortage IV by resolution, and adoption at a public meeting in accordance with state law. - Notification of supply shortage in Public Newspaper - Advertisement in Local Public Newspaper and local cable channel -Continue regular media, city council and County briefings - Continue social media updates - Targeted Messaging to customers - Notify top 15 water users in each customer class, e.g. residential, and CII
V	Up to 50%	- Declaration and notification of water supply shortage V by resolution, and adoption at a public meeting in accordance with state law. - Notification of supply shortage in Public Newspaper - Advertisement in Local Public Newspaper and local cable channel - Continue regular media, city council and County briefings - Continue social media updates - Targeted Messaging to customers - Notify top 20 water users in each customer class, e.g. residential, and CII
VI	50% of More	- Declaration and notification of water supply shortage VI by resolution, and adoption at a public meeting in accordance with state law. - Notification of supply shortage in Public Newspaper - Advertisement in Local Public Newspaper and local cable channel - Continue regular media, city council and County briefings - Continue social media updates - Targeted Messaging to customers - Notify top 25 water users in each customer class, e.g. residential, and CII

Section 5: Monitoring and Reporting

Monitoring is essential to ensure that the response actions are achieving their intended water use reduction purposes, or if improvements or new actions need to be considered.

5.1 Mechanism to Determine Reductions in Water Use and to Meet State Reporting Requirements

The PWD has meters on all residential, commercial and landscape service connections in the service area and requires meters on all new connections. These meters record the amount of water consumption at each location. These meters in combination with billing information will be used to monitor actual reductions in water use.

5.2 Monitoring and Reporting

Certain aspects of water conservation can be readily monitored and evaluated, such as metered water use and production quantities. Other aspects such as public education are more difficult to measure in terms of effectiveness. Additionally, weather patterns make it more difficult to compare one year’s water demand and conservation results with another year's usage.

When severe shortages occur and some degree of mandatory reduction is required, a program’s effectiveness can be judged directly by water billings. In these cases, targeted results must be met, and even reluctant customers will, on the whole, meet the goals. Specific methods to evaluate effectiveness of water conservation programs to be employed by PWD are:

1. Monitoring of Metered Water Usage – This will determine how much has been used. Compiling statistics to track usage of customer groups to determine trends is currently being done through the water billing computer system. Meter readings/billings can be compared and analyzed to determine the effectiveness of conservation for all customer classes.

2. Monitoring Production Quantities – In normal water supply conditions, production figures are recorded daily by the District’s automated system. The Water Production Supervisor and the Production Lead monitor the accuracy of the monthly production totals. The totals are incorporated into the monthly water supply report to the State by the Water Treatment Supervisor.

To verify that conservation reduction goals are being met, production and metered usage reports will be provided to General Manager during each stage of the conservation period. Water production figures will be compared to previous year production figures for the same time period to ascertain if conservation goals are being reached. Results will be posted on the Palmdale Water website, as appropriate.

Additional actions available to PWD include:

1. Transition of remaining customer water meters to "smart meters" and investment in automated system to improve customer interface to allow more timely monitoring by customer of water use patterns.
2. Provide incentives to property owners to install individual meters or sub-meters in multi-family structures to for resident/property owners to track water usage.

Table 5-1 lists specific monitoring and reporting methods for each shortage stage that can be used to measure the effectiveness of reducing the shortage gap. As the stages progress into a greater percent supply reduction needed, the monitoring and reporting will increase in frequency, intensity, and resources.

Table 5-1 Monitoring and Reporting to Support Shortage Response Actions

Shortage Stage (% supply reduction)	Monitoring and Reporting Methods (How to measure effectiveness of reducing the shortage gap)
I (Up to 10%)	- Water-Use Monitoring Mechanisms - Prepare and review monthly water use reports
II (Up to 20%)	All Previous Monitoring and Reporting Methods AND: - Run and review monthly water use reports
III (Up to 30%)	All Previous Monitoring and Reporting Methods AND: - Run and review monthly water use reports
IV (Up to 40%)	All Previous Monitoring and Reporting Methods AND: - Run and review monthly water use reports
V (Up to 50%)	All Previous Monitoring and Reporting Methods AND: - Run and review monthly water use reports
VI (Up 50% of More)	All Previous Monitoring and Reporting Methods - Run and review monthly water use reports

Section 6: Enforcement

The District has the power and authority to implement and enforce its shortage response actions including mandatory water conservation measures within its boundaries per Resolution No. 09-04, which was adopted in March 2009.

Enforcement actions for violations of water conservation measures are summarized in Table 6-1. PWD customers are encouraged to report water conservation violations through use of the PWD hotline.

Table 6-1 Penalties for Customer Violations

Violation Level	Penalties or Charges
1st Violation	The customer shall be notified in writing. The notice shall include a warning that further violations could result in stricter penalties.
2nd Violation	A 2nd violation is punishable by a fine of up to $50.
3rd Violation	A 3rd violation is punishable by a fine of up to $250.
4th Violation	A 4th violation is punishable by a fine of up to $500.
5th Violation	A 5th violation may result in termination of service and a $1,000 reconnection fee
Violation Assessment Period	Any violations occurring within twelve months of each other will be considered consecutive and result in escalating penalties. The period for assessing. consecutive penalties may be extended beyond 12 months by resolution of the Board.

In accordance with the PWD Water Waste policy, a receipt of notice regarding a claim of water waste or misuse, the Customer shall have five days to file a request for reconsideration with the General Manager, and fifteen days after the General Manager's decision to file a written appeal with the Board. A hearing on the appeal will be conducted in the next Board meeting following the appeal, with the Board's decision from the hearing designated as final and conclusive.

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Section 7: Financial Consequences of Actions during Shortages

Water providers face significant financial challenges during droughts. During periods of reduced consumption, revenue from water sales decline while expenses remain relatively constant. A reduction in construction activities can also reduce water service connection fees collected. At the same time, as consumption decreases, some expenditures are expected to increase, including staff costs for community education, enforcement of ordinances, monitoring and evaluation of water use, and drought planning. Operations and maintenance costs may also increase because of the need to identify and quickly repair all water losses.

PWD recognizes the financial impacts of reduced customer deliveries and connections during droughts. The following sections describe potential revenue reductions, expense increases, mitigation actions and the cost of compliance with reducing residential water use during drought.

7.1.1 Revenue Impacts of Reduced Sales and Increased Costs

Currently, about 55 percent of PWD'S O&M costs are covered by fixed revenues. As a result, water conservation efforts can significantly impact revenues and the ability to cover fixed, non-variable costs.

Reductions in potable water use could result in an operating shortfall for the Potable Water Enterprise. While operating expenses are reduced with lower sales, fixed costs cannot be fully recovered when there are significant reductions in sales, thereby resulting in a net operating loss. PWD has planned for this shortfall by creating a reserve fund.

In the case of future water use reductions resulting from the implementation of the PWD WSCP, PWD would likely experience impacts to operating revenue and would draw as necessary and as possible from reserves. In addition, one of the objectives of the budget-based tiered rate structure implemented on January 1, 2020 is to improve revenue stability. Therefore, while revenue would inevitably fluctuate with water use reductions, PWD has established appropriate means to manage these impacts with use of drought surcharge, as indicated in the 2019 Financial Planning report. Future or continued reductions in consumption would ultimately cause a rate structure adjustment that would generate enough revenue to fund operations without drawing from reserves. Table 7-1 presents an amended summary of findings from the 2019 Financial Planning Report with respect to revenue impacts from demand reduction, based on data from 2020.

Table 7-1. Revenue Impacts of Reduced Water Demand

Demand Reduction	Annual Revenue Reduction ($ million)	State Water Purchase Offset ($ million)	Ancillary Costs ($ million)[1]	Net Cost of Compliance ($ million)[4]
10%	-$0.71	+$0.38	$0.23	-$0.10
20%	-$1.42	+$0.76	$0.25	-$0.41
30%	-$2.14	+$1.13	$0.28	-$0.73
40%	-$2.85	+$1.51	$0.27	-$1.07
50%	- $3.56	+$1.88	$0.26	-$1.42

1. Estimated as a percent of Operations and Maintenance expenses to reflect increased costs for expanded public outreach campaigns, increased meter reading, operational and administrative support during each drought stage to implement demand reduction actions.
2. Calculated sum of annual revenue reduction plus reduced imported water purchased plus ancillary costs.

7.1.2 Mitigation Actions to Address Revenue Reductions

A reduction in water revenue could be mitigated by use of the established reserve fund, deferral, or avoidance of capital fund expenditures, use of less costly water supplies (if possible), and implementation of drought surcharge rates. This would meet short-term cash flow needs, although it should only be considered on a short-term basis.

A summary of measures to overcome revenue and expenditure impacts is provided in Table 7-2.

Table 7-2. Measures to Overcome Revenue Impacts During Shortage

Measure	Summary of Effects
Use of Reserve Funds	Use of reserves may provide short-term rate stabilization but would require delays in capital expenditures and rebuilding of reserves after the water shortage.
Re-evaluate Capital Expenditure Plans	Delay major construction projects for facilities as well as upgrades and replacements.
Shift Water Sources to Less Costly Supplies if Possible	Reduce costs associated with purchase, treatment, and distribution of water.
Drought Surcharge Rates	Increase revenue.

Drought surcharges are recommended based on the Board Resolution No 09-04 and are summarized in the table below.

Table 7-3. Proposed Drought Surcharges

Drought Mandate	CY 2020	CY 2021	CY 2022	CY 2023	CY 2024
20% Surcharge	$ 0.35	$ 0.38	$ 0.40	$ 0.42	$ 0.45
30% Surcharge	$ 0.54	$ 0.58	$ 0.61	$ 0.65	$ 0.69
40% Surcharge	$ 0.79	$ 0.84	$ 0.89	$ 0.94	$ 1.00

Source: PWD Financial Planning, Revenue Requirements, Cost of Service, and Rate Setting Analysis, 2019

7.1.3 Financial Consequences of Limiting Excessive Water Use

Per the California Water Code Section 365 et al., retail water suppliers are required to prohibit or discourage excessive water use. Reporting this is not a required part of the UWMP; however, Water Code Section 10632(a)(8)(C) requires the financial consequences of these actions be reported as part of the UWMP.

Water Code Section 367 states that there are three types of drought emergencies:

- Declared statewide drought emergency
- When a supplier implements its mandatory reductions per their WSCP
- A declared local drought emergency

Water Code Section 366 states that a retail water supplier must prohibit excessive use through one of two strategies:

- Rate structure. Specifically, a rate structure that includes block tiers, water budgets, or rate surcharges over and above base rates for excessive water use by a residential water customer.
- An excessive water use ordinance, Specifically an ordinance that includes a procedure to identify and address excessive water use by metered single-family residential customers and customers in multiunit housing complexes in which each unit is individually metered or submetered and may include a process to issue written warnings to a customer and perform a site audit of customer water usage prior to deeming the customer in violation.

PWD already has in place budget-based rates that discourage excessive water use. Should a drought emergency occur, PWD would already have the necessary processes in place to discourage excessive use. As discouraging excessive use is already a part of PWD’s normal operations, the financial consequences of prohibiting excessive use would be minimal.

References

American Water Works Association, 2011. Drought Preparedness and Response. Manual of Water Supply Practices, M60.

American Water Works Association, 2008. Forecasting Urban Demand. Second Edition.

Palmdale Water District. 2019. Financial Planning, Revenue Requirements, Cost of Service, and Rate Setting Analysis. October.

Virginia Polytechnic Institute and State University Blacksburg, Virginia, 2006. The Effectiveness of Drought Management Programs in Reducing Residential Water-Use in Virginia.

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Appendix A

Resolution Adopting the 2021 Urban Water Management Plant and Water Shortage Contingency Plan

PALMDALE WATER DISTRICT
RESOLUTION NO. 21-11

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE PALMDALE WATER DISTRICT ADOPTING, DIRECTING FILING OF, AND IMPLEMENTING THE PALMDALE WATER DISTRICT 2020 URBAN WATER MANAGEMENT PLAN, THE 2015 URBAN WATER MANAGEMENT PLAN AMENDMENT, AND THE 2020 WATER SHORTAGE CONTINGENCY PLAN

WHEREAS, the California Legislature enacted Assembly Bill 797 during the 1983-1984 Regular Session of the California Legislature (Water Code Section 10610 et.seq.) known as the Urban Water Management Plan Act (the Act).

WHEREAS, the California Water Code Section 10632 requires that every urban water supplier shall prepare and adopt a Water Shortage Contingency Plan (WSCP) as part of its Urban Water Management Plan (UWMP); and

WHEREAS, the WSCP is consistent with the California Water Code Sections 350 through 359 and Section 10632 and guidance provided by the California Department of Water Resources Urban Drought Guidebook; and

WHEREAS, the Act mandates that every urban water supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually prepare, and every five (5) years thereafter update, its UWMP, the primary objective of which is to plan for the conservation and efficient use of water.

WHEREAS, the 2020 UWMP, 2015 UWMP amendment, and the 2020 WSCP (together known as the Plans) must be adopted by July 1, 2021 and filed with the California Department of Water Resources, the California State Library, and the City of Palmdale within thirty days of adoption; and

WHEREAS, the Palmdale Water District prepared and filed a UWMP with the California Department of Water Resources in December 1985, December 1990, December 1995, December 2000, December 2005, December 2010, and December 2015; and

WHEREAS, the Act further requires that the adopted UWMP's and WSCP be available for public review during normal business hours for thirty (30) days following its submission to the Department of Water Resources; and

WHEREAS, as an urban water supplier providing water service to over 117,000 customers, Palmdale Water District is subject to the Act and has, therefore, prepared and circulated for public view a draft 2020 UWMP, a draft 2015 UWMP Addendum, and a draft 2020 WSCP in compliance with the requirements of the Act, and a properly noticed public hearing regarding the proposed Plan was duly held by the Palmdale Water District on June 14, 2021.

NOW, THEREFORE, BE IT RESOLVED by the Board of the Directors of the Palmdale Water District as follows:

1. The 2020 Urban Water Management Plan, the 2015 Urban Water Management Plan Amendment, and the 2020 Water Shortage Contingency Plan are hereby approved and adopted.

2. The General Manager is hereby authorized and directed to file the Plans with the California Department of Water Resources, the California State Library, and the City of Palmdale within thirty days of adoption in accordance with the Act.

3. When required by conditions contained in the Plans, the General Manager is authorized to declare a Water Shortage Emergency and to implement water conservation programs as detailed in the Plans, including recommendations to the Board of Directors regarding necessary procedures, rules, and regulations to carry out effective and equitable water conservation programs.

4. The General Manager and staff are hereby further authorized and directed to take such other and further actions as may be reasonably necessary to carry out the purposes and intent of the Plan.

PASSED AND ADOPTED at the Regular Meeting of the Palmdale Water District Board of Directors held on June 14, 2021.

Gloria A. Dizmang

GLORIA DIZMANG, President,
Palmdale Water District Board of Directors

ATTEST:

Kathy MacLaren-Gomez

KATHY MAC LAREN-GOMEZ, Secretary,
Palmdale Water District Board of Directors

APPROVED AS TO FORM:

Aleshire & Wynder, LLP, General Counsel

Appendix B

Palmdale Waste of Water Policy

WASTE OF WATER POLICY

Palmdale Water District is engaged in the production, transmission, storage and distribution of water to its Customers in accordance with California law.

California law prohibits the waste or unreasonable use of water and requires that the District take all appropriate actions to prevent such waste and unreasonable use of this finite resource.

Water waste includes but is not limited to:

- Application of potable water to outdoor landscapes in a manner that causes runoff.
- Failure to repair water leaks or to adjust sprinkler overspray in a timely manner.
- Hosing of hardscape surfaces, except where health and safety needs dictate.
- The use of potable water in a fountain or other decorative water feature, except where the water is part of a recirculating system.
- Irrigation with potable water of ornamental turf on public street medians.
- Watering of outdoor landscapes within 48 hours of measurable rainfall.
- Car washing and outside cleaning activities except when performed with buckets and automatic hose shutoff devices.
- The serving of drinking water other than upon request in eating or drinking establishments.
- Failure of operators of hotels and motels to provide guests with the option of choosing not to have towels and linens laundered daily. (The hotel or motel shall prominently display notice of this option in each guestroom.)
- Inefficient use of water for construction purposes.
- Irrigation with potable water outside of newly constructed homes and buildings not delivered by drip or microspray is prohibited.

Categories of Water Waste:

The District recognizes that water waste can vary significantly in severity and for this reason will classify and deal with three levels of water waste.

Level 1 Water Waste:

This is the least severe category of water waste which includes any violation of the Water Waste Policy and any other form of water waste that leads to minor but avoidable water loss. Examples of this would be overspray from improperly adjusted sprinklers or small leaks leading to wetting of the sidewalk.

Penalties for Level 1 Water Waste:

Penalties for Level 1 waste violation will be an initial warning. Failure to repair the violation will result in a $50 fine. An additional new $50 fine will be assessed if the follow up inspection shows that the violation is unrepaired. Follow up inspection will occur no more frequently than once every 14 days. If a Level 1 water waste violation continues unrepaired for greater than 60 days, then the District may elevate the penalties to Level 2 fines as described below.

Level 2 Water Waste:

This category includes any form of water waste where water is visibly and measurably flowing off the property. Examples of this would be a sheared off sprinkler or an irrigation system that is stuck on. Follow up inspection will occur no more frequently than once every 7 days.

Penalties for Level 2 Water Waste:

The penalties will mirror the penalties found in the Water Shortage Contingency Plan. These penalties are currently as follows:

1st Notice of Violation- The customer shall be notified in writing. The notice shall include a warning that further violations could result in stricter penalties.

2nd Notice of Violation- is punishable by a fine of up to $50.

3rd Notice of Violation- is punishable by a fine of up to $250.

4th Notice of Violation- is punishable by a fine of up to $500.

5th Notice of Violation- may result in termination of service.

Level 3 Water Waste:

This category includes any form of water waste where water leaving the property appears uncontrollable or poses a threat to public safety. Examples of this would be a broken water line flowing unrestrained off the property or water leaving the property causing a public safety threat due to icing or flooding.

Penalties for Level 3 Water Waste:

Level 3 water waste will result in the shutdown of service until the repair has been successfully accomplished. Repeat incidences of severe water waste will mirror the penalties found in the Water Shortage Contingency Plan.

District Process:

1. Upon notification or observation of waste or misuse of water, the District shall:

    (a) Make a photographic record of such activity;

    (b) Provide notice to the Customer in writing or by means of a door tag; and

    (c) Log the warning on the Customer's service record.

2. In the event of a recurring violation, the District shall:

    (a) Assess the appropriate fine upon the Customer for each notification of violation occurring after the warning has been given;

    (b) Give notice to the Customer in writing that if such waste or misuse continues, the Customer may be subject to increased penalties up to and including disconnection of service.

3. Upon determination that a violation is still unresolved and a final notice needs to be issued, the District shall:

    (a) Give written notice to the Customer that disconnection of the service will occur within five (5) working days of the date of the notice;

    (b) Disconnect the Customer's service after the appropriate time has been allotted; and

    (c) Charge the Customer a disconnection charge for waste or misuse of water as set forth in Appendix D and a turn-on fee as set forth in Appendix D if service is later restored. Service will be restored only when the Customer has provided evidence satisfactory to the District that waste and unreasonable use of water will no longer occur.

The District recognizes that there may be mitigating or intervening circumstances that bear upon a Customer's apparent misuse of water. Upon receipt of any notice regarding purported misuse or waste of water, the Customer shall have five (5) working days within which to file a written request for reconsideration with the General Manager. If the Customer is not satisfied with the General Manager's decision, the Customer shall have fifteen (15) days after the General Manager's decision within which to file a written appeal with the Board. The Board shall conduct a hearing on the appeal at the next Board meeting immediately following the appeal. The Board's decision following such hearing shall be final and conclusive.

ADOPTED BY THE BOARD OF DIRECTORS OF PALMDALE WATER DISTRICT AT A REGULAR MEETING HELD OCTOBER 11, 2017

Appendix C

Seismic Evaluation Report

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Seismic Risk Evaluation and Mitigation Report

25 June 2021

Prepared for

Palmdale Water District
2029 East Avenue Q
Palmdale, CA 93550

KJ Project No. 2044225*00

Table of Contents

List of Appendices

Section 1: Draft Seismic Risk Analysis

1.1 Overview

The Act requires urban water suppliers to evaluate potential seismic risk to the facilities in their system and produce a mitigation plan. This section describes the review of the of the existing documentation and preliminary evaluation seismic risk the Palmdale Water District's (PWD) existing facilities. This section also provides recommendations for mitigation of the existing risks. Current structural design practice is to design structures for ground motion with a 2.5% probability of exceedance in any 50-year period. This design earthquake is highly dependent on conditions at any given location. Earthquake magnitude is an estimate of the total energy released by a given earthquake and cannot be directly translated into the design earthquake used for structural design. However, The U.S Geological Survey estimates that there is a 99% chance that California will experience a 6.7 magnitude earthquake within 30 years. The Current design earthquake has a lower probability of occurring than an earthquake of similar magnitude to the 1994 Northridge Earthquake, 6.7.

The facilities review as part of this assessment include approximately 29 well sites, 14 booster pump station, and 19 steel water storage tanks, one underground concrete water storage tank, Lake Palmdale, and Little Rock Reservoir. The facilities described in this report were constructed between 1965 and the present day. There are significant gaps in the construction documentation of many of these facilities. Final seismic risk mitigation planning will require site visits by a Structural or Civil Engineer experienced in design of water treatment facilities to evaluate the existing conditions. Where possible an initial determination of the seismic loads at the facilities has been determined in accordance with the 2010 Edition Minimum Design Loads Associate for Buildings and Other Structures (ASCE 7-10) using the web-based Hazard Maps by the Applied Technology Council (ATC). The 2010 edition was used in this stage because ASCE 7-16 as referenced in the current California Building Code (CBC) requires site specific geotechnical investigations for most conditions and structures. When implementing the final mitigation recommendations, a geotechnical investigation will be required for most of the Palmdale Water District's facilities.

1.2 Water Storage Tank Evaluation Summary

The seismic evaluation of SCV Water was conducted by applying the seismic design provision of the 2011 edition of Welded Carbon Steel Tanks for Water Storage by the American Water Works Association (AWWA D100-11). SCV Water currently operates over 90 steel water storage tanks. For our analysis we were provided the diameter, height to the overflow and maximum capacity of the storage tank. Using this information, ASCE 7-10 seismic parameters, and the seismic provision of AWWA D100-11, we determined the seismic loads, sloshing wave height, and anchorage requirements of SCV Water's storage tanks. Final design of welded and bolted steel water storage tanks is typically conducted by specialty contractors and submitted during construction. The construction drawings rarely indicate the final plate thicknesses, location and size of columns, size and location of anchors or other significant aspects of design beyond size and design criteria. Further field investigations will be required quantify further risk.

Storage tanks build prior to 1984 are unlikely to be compliant with current building standards are unlikely to have been designed for lateral loads due to seismic events. Storage tanks built between 1984 and 2011 were probably designed with seismic loads however they may not be designed to withstand seismic loads determined in accordance with the current building code. Those storage tanks designed after 2011 are likely designed to meet current building code requirements.

Table 1: Tank Design Use Group

AWWA D100-11 Design Use Group and Seismic Importance Factor		
Use Group	*Importance Factor, I_e	Description
I	1	Tanks that provide service to facilities deemed essential for post-earthquake recovery and essential to the life, health, and safety of the public, including post-earthquake recovery
II	1.25	Tanks that provide service to facilities that are deemed important to the welfare of the public.
III	1.5	All Other

*Importance factor is used to amplify loads from earthquakes.

16 of the existing storage tanks require anchorage to the foundations. Neither the PWD standard tank details nor construction documents indicate that these tanks are anchored. The remaining storage tanks will experience uplift due to seismic loads but do not require anchors at the foundation. The sloshing wave height and required freeboard varies between nine and 16 feet in height. In most cases this exceeds the existing freeboard which is typically three feet from the maximum operating height to the roof structure. Record drawings of the underground concrete storage tank were not available for review however, the tank was designed and build in 1994 and built in accordance with ACI 350, Code Requirements for Reinforced Concrete Structures. Investigations should be conducted to determine what the existing conditions of the structure are and determine if any deficiencies may exist.

Table 2: Anchorage and Freeboard Requirements.

		Tank Details					AWWA D100-11 Welded Carbon Steel Tanks Chapter 13 Seismic Design^{1,2}											
								Table 28	13.2.1	Table 24	Eqn 13-36		Eqn 13-52	Table 29		Eqn 13-57		
Tank Site	Address	*Date Built*	*Dia*	*Size*	*Top of Knuckle*	*Overflow Height*	*Freeboard Assumed to be 3 feet unless drawings indicate otherwise*	*Ri 3 if anchored 2.5 if unanchored*	*Seismic Use Group ^{3}*	*I_E, assume that all tanks are Seismic Use Group III*	Overturning Ratio, J	Anchor Requirements	Sloshing Wave Height (d), ft	Minimum Required Freeboard (D), ft	Actual Freeboard (Roof Height-Overflow)	Allowable Lateral Load, V_{allow} (kip)	Total Lateral Seismic Load, Vt (Kip)	Sliding Check
3 MG Tank Site	850 East Avenue S	1960	124	3,000,000	Unknown	34	3	2.5	iii	1.5	2.54	Provide Anchors	16.65	16.65	3	12851	7225.517287	OK
5 MG Tank	2404 Old Nadeau Road		160	5,000,000	Unknown	20	3	2.5	iii	1.5	0.57	Tank Is Stable	10.08	10.08	3	12338	3533.246096	OK
6MG	641 East Ave S	1999	206	6,000,000	Unknown	24	3	2.5	iii	1.5	0.64	Tank Is Stable	9.58	9.58	3	24349	6291.49113	OK
25th Street	26496 Cemetery Road	1976	106	2,000,000	Unknown	30	3	2.5	iii	1.5	2.23	Provide Anchors	15.53	15.53	3	8304	4860.105574	OK
		1967	154	4,000,000	Unknown	30	3	2.5	iii	1.5	1.51	Uplift but Stable	14.15	14.15	3	17380	7130.096891	OK
45th Street	36510 45th St East	1988	130	3,000,000	Unknown	30	3	2.5	iii	1.5	1.77	Provide Anchors	14.95	14.95	3	12488	5845.275811	OK
		1990	150	4,000,000	Unknown	32	3	2.5	iii	1.5	1.74	Provide Anchors	14.33	14.33	3	17687	7540.066766	OK
		1990	150	4,000,000	Unknown	32	3	2.5	iii	1.5	1.74	Provide Anchors	14.33	14.33	3	17687	7540.066766	OK
47th Street	35645 47th St East	1967	106	2,000,000	Unknown	30	3	2.5	iii	1.5	2.24	Provide Anchors	15.64	15.64	3	8301	4879.725022	OK
		1990	132	3,000,000	Unknown	30	3	2.5	iii	1.5	1.87	Provide Anchors	16.32	16.32	3	12801	6303.069693	OK
50th Street	5001 East Ave, T-8	2007	150	4,000,000	Unknown	30	3	2.5	iii	1.5	1.55	Provide Anchors	14.22	14.22	3	16514	6902.168294	OK
		2007	150	4,000,000	Unknown		3	2.5	iii	1.5	1.55	Provide Anchors	14.22	14.22	3	16514	6902.168294	OK
Ana Verde	36800 Tovey Avenue	1963	40	300,000	Unknown	32	3	2.5	iii	1.5	5.44	Provide Anchors	9.95	9.95	3	1363	1351.046084	OK
El Camino Lower	36809 El Camino Dr.	1988	106	2,000,000	Unknown	32	3	2.5	iii	1.5	2.42	Provide Anchors	15.24	15.24	3	8916	5163.807319	OK
El Camino U.G^4	36336 El Camino Road	1994	104	1,500,000	Unknown	26												
El Camino Upper	33030 Ridge Route Rd	1963	40	300,000	Unknown	32	3	2.5	iii	1.5	5.00	Provide Anchors	7.22	7.22	3	1371	1262.693411	OK
Walt Dahlitz	115 East Avenue S	1993	104	1,500,000	Unknown	31	3	2.5	iii	1.5	1.80	Provide Anchors	9.80	9.80	3	8455	3868.50122	OK
Well 14	36401 20th ST East		27	100,000	Unknown	22	3	2.5	iii	1.5	4.80	Provide Anchors	6.24	6.24	3	435	399.685968	OK
Well 18 and 19	4640 Barrel Springs Road	1963	22	41,000	Unknown	30	3	2.5	iii	1.5	11.47	Provide Anchors	8.06	8.06	3	387	488.3004155	Needs Anchors
Well 5	1036 Barrel Spring Road	1963	30	1,463,945	Unknown	22	3	2.5	iii	1.5	5.05	Provide Anchors	9.29	9.29	3	526	561.5710227	Needs Anchors

1. Design spectral response acceleration parameters, S_{D1} and S_{DS}, have been determined using the Applied Technology Council's (ATC) web-based hazard maps in accordance with the American Society of Civil Engineers Standard 7, Minimum Design Loads for Buildings and Other Structures (ASCE 7-10)

2. The Design spectrum for impulsive components, Sai and the Design Spectrum for convective components, Sac have been determined in accordance with Chapter 13 of the AWWA D100-11, Welded Carbon Steel Tanks for Water Storage. These parameters are expressed as a percentage of the acceleration due to gravity, g.

3. Minimum required freeboard is equal to the sloshing wave height for Use Group III and may be reduced for Use Group I and II
4. AWWA D100 calculations do not apply to the El Camino Underground tank. Construction drawings are not available to perform an analysis currently.

To determine if the storage tank walls and roof systems are adequate to resist potential seismic loads, field visits will be required to determine the existing plate thicknesses and structural sections used in construction. Further analysis will then be performed determine the capacity of the storage tank structural system. For those storage tanks that required anchors, greater freeboard, or do not have the structural capacity to meet demand we recommend reducing the operating capacity and overflow height to reduce the seismic demands on the structures. Water storage tanks designed in accordance with AWWA D100 and D103 can be classified in one of three seismic use groups as described in Table 1. The initial analysis has been conducted assuming all of the storage tanks are in Use Group III, essential for post-earthquake recovery and essential to the life, health, and safety of the public, including post-earthquake fire suppression. For those facilities that are not required for post-earthquake recovery, the use group may be designated as Use Group II, tanks that provide direct service to facilities that are teemed important to the welfare of the public. In rare cases they may be assigned to Use Group I, those that are not essential to the health and safety of the public. This will reduce the design seismic load by twenty-five percent and fifty percent.

Field investigation are necessary to determine the structural capacity of the existing storage tanks. Thickness of the tank shells and roofs will be determined using an ultrasonic thickness gauge, the size number and location of columns will be determined. In our experience the most common mode of failure for steel storage tanks is buckling of the lowest shell plate. Due do relatively significant consequences in the event of failure, we recommend that the steel tanks be given high priority for further investigation and mitigation efforts.

1.3 Source Water Supply

The District’s source water consists of the Palmdale Lake, Little Rock Reservoir and more than 20 well sites. The Little Rock Lake Reservoir under the jurisdiction of the California Division of Safety of Dams. The Division of Safety of Dams inspects the Little Rock Reservoir Dam on an annual basis and periodically reviews the stability of dams considering improved design approaches. The Little Rock Dam represents minimal risk to the District due to the inspection and review by the Division of Damn Safety. The Little Rock Dam Recreation Areas include several small buildings and structures. These structures pose negligible risk to the public in the event of an earthquake. The facilities at the Little Rock Reservoir and Palmdale Lake are summarized in Table 3 below.

There are several facilities at Palmdale lake including a concrete box culvert, concrete spillway, and drainage channel. These structures consist of relatively minor reinforced concrete at or below grade. The primary risk to these structures is the potential for liquefiable soils in the area. In the event of failure, they pose a relatively minor risk to the public, however geotechnical investigations should eventually be conducted to determine susceptibility to earthquake damage.

The typical well site consists of vertical turbine pumps embedded directly into the soil and represent minimal risk of failure during or after an earthquake. Many of the well sites are co-located with booster pumpstations and tank sites. Site visits by a qualified civil or structural engineer should be conducted to verify the existing conditions at each site. Above ground piping is generally rigid and represents minimal risk of failure during an earthquake. It is typical for the piping systems at older well sites to lack support for lateral loads due to earthquakes. The inspections should take note of any pipe supports that are not anchored into concrete foundation. Where available, record drawings typically indicate that chemical storage tanks, generators and other equipment is anchored to foundations. The current building code requires anchors for steel storage tanks for liquids to fail in a ductile manner. It is unlikely that the anchorage for the existing facilities meet this requirement. The installations of older facilities are unlikely to follow current standard practices. The well sites are summarized in Table 4. Below. Facilities have been assigned a relative risk between one and 10. This assessment is subjective and intended to assist the district in prioritizing further investigation and mitigation. The factors increasing relative risk include the age of structures, lack of necessary record drawings, noted deficiencies.

Table 3: Miscellaneous Facilities

Site	Address	Facilities				
		Date Built	*Generator*	*Structural Record Drawings*	*Structures*	*Noted Risk/Deficiences*
Little Rock Canal	Mulitple	1995	No	1995	Cast-in-Place Concrete Canal	None Noted, subgrade reinforced concrete walls designed and built in 1995.
Little Rock Dam and Reservoir	33883 Cheseboro Road	1992	No	1992	Concrete buttressed earthwork Dam Reinforced Concrete Vault	Under the jurisdiction of the Bureau of Dam Safety, yearly inspection, and periodic review for structural soundness.
Little Rock Dam Recreation Area 1	Adjacent to Little Rock Reservoir	1997	No	1997	Walk-in campsite toilets, wood framed roof over CMU and Gazebo	None Noted.
Little Rock Dam Recreation Area 2	Adjacent to Little Rock Reservoir	1996	No	1996	N/A	None Noted
Little Rock Dam Recreation Area 3	Adjacent to Little Rock Reservoir	1994	No	1994	Cantilever column shelter structures	None noted
Little Rock Dam Recreation Area 4	Adjacent to Little Rock Reservoir	1994	No	1994	None	None Noted
Little Rock Dam Recreation Area 5	Adjacent to Little Rock Reservoir	1994	No	1994	Walk-in campsite toilets, wood framed roof over CMU	None Noted
Little Rock Dam Recreation Area 6	Adjacent to Little Rock Reservoir	1994	No	1994		None Noted
Little Rock Sluice Gate and Siphon	Adjacent to Little Rock Reservoir	Modifications 1998	No	1998	Cast-in-place concrete siphon structure	None Noted
Palmdale Lake Box Culvert	South East of Palmdale Lake	1992	No	1992	Cast-in-place box culvert	None Noted
Palmdale Lake Spillway	North shore of Palmdale Lake	1988	No	1988	Cast-in-place Concrete spillway	Subgrade should be investigated by a Geotechnical Engineer for potential erosion or liquefiable soils.
Palmdale Lake Drainage Channel	Adjacent to Palmdale Lake	1992	No	1992	Concrete lined channel	None noted

Table 4: Well Site Summary

Well Site	Address	Facilities										
		Date Built	*Building*	*Fuel Storage*	*Chemical Storage*	*Pump HP*	*Capacity (GPM)*	*Structural Record Drawings*	*Roof Type*	*Lateral System*	*Noted Risk/Deficiences*	Relative Risk [1]
2A	39400 20th St East	1968	Yes		NaOCl	125	265	1968	Steel deck over steel and wood framing	Solid grouted CMU and wood studs	Potential irregularity due to the mixed resisting System	4
3A	2163 East Ave P-8	1960	Yes	Propane	Salt	500	1,551	1992		Solid Grouted CMU with wood studs	Potential irregularity due to the mixed resisting System	3
4A	2475 East Ave P-8	1970	Yes		Salt/ NaOCl	200	778	Not Available				3
5	1036 Barrel Springs Rd	1965	yes			5	99	Not Available	Steel Deck over steel framing	Steel Braced Frame Steel Moment Frame	Rod Bracing is prone to buckling. Columns are pinned with (2) at shallow embedment	8
6A	39455 10th St East	1983	Yes		NaOCl	125	265	Not Available		Steel moment Frame	Drawings were inadequate to determine specific risks	8
7A	39395 25th St East	1985	Yes		Salt/ NaOCl	500	1,589	Not Available	Steel Deck over steel framing	Pre-engineered metal building	Inspection is required to determine specific vulnerabilities.	8
8A	2200 East Ave P	1987	Yes		NaOCl	600	2,024	Not Available			Drawings were inadequate to determine specific risks	8
10	3701 East Ave P-8	1956	Yes		NaOCl	100	254	1956	Steel Frame	Steel Framed	Drawings were inadequate to determine specific risks. The building is 65 years	8
11A	39501 15th St East	1963	Yes				1,161	1999	Wood deck over 2x wood framing	Wood stud shear wall	None	3
14 [2]	39401 20th St East	1965	Yes		Salt	250	1,188				None Noted	3
15	1003 East Ave P	1960	Yes		Salt/ NaOCl	590	998	1999	Wood deck over wood framing	Wood stud shear walls	None Noted	1
16	4125 East Ave S-4	1960	Yes		NaOCl	40	150	Not Available			Drawings were inadequate to determine specific risks	7
17	718 Denise Ave	1966	Yes			20	110	1996	Wood deck over wood framing	Wood stud shear walls	Thin floor slab may provide inadequate anchorage	3
18 and 19 [2]	4640 Barrel Springs Rd	1954	Yes		NaOCl	5	96					4
		1961					127					
20	5680 Pearl Blossom Hwy	1973			NaOCl	60	227	2001	Wood deck over wood framing	Wood stud shear walls	Thin floor slab may provide inadequate anchorage	3
21	36525 52 St East	1973			NaOCl	30	227	1999	Wood deck over wood framing	Wood stud shear walls	Thin floor slab may provide inadequate anchorage	1
22	5401 East Ave S	1974			None	75	347	1999	Wood deck over wood framing	Wood stud shear walls	Thin floor slab may provide inadequate anchorage	1
23A	2202 East Ave P-3	1977	Yes		NaOCl	250	743	1999	Wood deck over wood framing	Wood stud shear walls	Thin floor slab may provide inadequate anchorage	1
25	3750 70th St East	1989	Yes		Salt/ NaOCl	125	514	1992	Wood deck over wood framing	Solid CMU	Thin floor slab may provide inadequate anchorage	2
26	4701 Katrina Place	1989	Yes			50	304	1992	Wood deck over wood framing	Wood stud shear walls	Thin floor slab may provide inadequate anchorage	2
29	37700 67th st East	1989	Yes		NaOCl	40	250	1989			Drawings were inadequate to determine specific risks	
30	7392 East Ave R	1989	Yes		Salt/NaOCl	150	498	1990	Wood deck over wood framing	Solid CMU	Thin floor slab may provide inadequate anchorage	3
32	37301 35th St East	1989	Yes		NaOCl	60	293	1992	Wood deck over wood framing	Wood stud shear walls	Thin floor slab may provide inadequate anchorage	2
33	7160 East Ave R	1991	Yes		Salt/ NaOCl	75	418		Wood deck over wood framing	Solid CMU	Thin floor slab may provide inadequate anchorage	2
35	36549 60th St East	1991	Yes		Salt/ NaOCl	75	444		Wood deck over wood framing	Solid CMU	Thin floor slab may provide inadequate anchorage	2

1. Relative risk is a subjective measure based on risk to life and post-earthquake operation intended to assist in the District to prioritize further investigation
2. See Table 5 for building structures.

1.4 Booster Pump Stations

Pump stations consist of above grade or below grade structures with multiple pumps wet wells, and additional equipment. Like steel water storage tanks older facilities are less likely to be designed for lateral loads equivalent to modern building standards. Those designed and built later than 2000 are unlikely to pose a substantial risk in the event of an earthquake. Site visits should verify that the existing equipment is anchored to the foundations and walls, and that there is an adequate load path to transfer lateral loads from the roof and walls to the foundations. The booster pump station facilities are summarized in Table 4 below.

1.5 Well and Booster Pump Buildings

Where record drawings are available, they indicate that most of the buildings are relatively small one-story structures. The structural systems include reinforced concrete masonry unit shear walls, wood stud shear walls, and steel framed walls. The roof structures are wood or metal diaphragms over steel or wood framing. The 3 MG Tanks and 5 MG Tank pump stations includes two buildings with a mixed structural system. This may introduce irregularities in performance due lateral earthquake loads. Many buildings have relatively thin slabs. While this is common in earlier designs, the current building code typically requires greater depth of embedment for equipment anchors. The building structure at Well Site 10 appears to be a steel tube framed structure of a type that would no longer be permitted by the building code. The available documentation was not sufficient to fully analyze the system.

1.6 Mitigation Planning

The District should identify which facilities are required to operate immediately following an earthquake, are required for the health and safety of the public, and those that are not either. The highest priority should be given to those facilities that supply fire suppression systems, including water storage tanks and transmission system. The first step in mitigating the risks identified in this report will be to arrange for a civil or structural engineer experienced in design of water treatment and distribution systems to inspect the Districts facilities. Once the District and Kennedy Jenks has identified the most critical and at-risk facilities, the District should consult with a geotechnical engineering firm to perform site investigations of the most crucial facilities to allow a qualified engineer to perform a more accurate and detailed analysis and provide the most appropriate mitigation efforts.

For those storage tanks that require anchorage and or have insufficient freeboard height to accommodate wave action the district may take immediate action to reduce the risk. As shown in Table 2, the District may choose to reduce the operational capacity to prevent instability, increase freeboard, and reduce the sloshing wave height. The District may determine that some of the storage tanks are not required for immediate post-earthquake recovery and do not pose a substantial risk to human life. In those cases, the Seismic Use Group will be reduced to reduce the required freeboard and demands due to seismic loads. This may result in no further action being required. Kennedy Jenks recommends providing anchors for all steel water storage tanks.

Table 5: Booster Pump Station Summary

Booster Pump Station Site	Address	Facilities											
		Date Built	*Building*	*Fuel Storage*	*Chemical Storage*	*Pump HP*	*Capacity (GPM)*	*Generator*	*Structural Record Drawings*	*Roof Type*	*Lateral System*	*Noted Risk/Deficiences*	Relative Risk [1]
3 MG Tanks	850 East Ave	1965	(2) CMU (1) Wood Framed		NaOCl	(6) 50 (1) 150	(7) 3500	Yes	1965	(2) Steel deck over steel and wood framing (1) Alumin Sheet over Wood	(2) Partially Grouted CMU (1) Aluminun and Wood Shear Wall	1. The building is lightly reinforced and partially grouted, it may not be up to current building standards 2. The building slab is 4", equipment is unlikely to have adequate anchorage	4
5 MG Tank	2404 Old Nadeua RD	1960	Yes	Propane	NaOCl	40	_	No	1992		Solid Grouted CMU with wood studs	Potential irregularity do the the mixed resisting System	4
6 MG Tank	700 East Avenue S	1999	Yes		Salt/ NaOCl	(1) 100 (1) 150 (2) 200 (2) 250 (2) 250	(1) 2000 (1) 2800 (2) 7000 (3) 3500	No	1999	(1) Open web steel joists (1) Steel deck over steel framing (1) Subgrade concrete structure for the hydropnuematic tank	Solid Grouted CMU	Relatively Thin Slab may result in inadequate anchorage for some equipment. Single story solid grouted CMU structures are very resistant to earthquake damage.	3
25th Street	26946 Cemetary Rd	1987/ 1996/ 2001	yes		Salt/ NaOCl	50 100	99	315 Kw	Not Available	Wood deck over 2x wood framing	Wood stud shearwall	Wood Stud buildings tend to be resiliant to earthquakes provided adeqate attachments are present. The 3 1/2" may result in inadequate anchorage for equipment. Structural drawings from the orignal construction are not availabe for review.	3
45th Street	36510 45th St E		Yes		NaOCl	(3) 150 (3) 125	(3) 3500 (3) 3500	NO	1998 2004 2001	(1) Wood Deck over Wood Framing (2) Steel deck over steel framing	(1) Wood stud shear wall (2) Solid grouted CMU	Both wood stud and Solid Grouted CMU shear wall structures are resistent to earthquake loads. All three buildings appear to have complete load paths. The generator buildng floor slab is only 4" thick and may not provide adequate anchorage to any floor mounted equipment.	8
Avenue T-8	4250 E. Ave. T-8	1995	Yes		Salt/NaOCl	(2) 15 (1) 50	(3) 3250	No	Addition 1998	Wood deck over 2x wood framing	Wood stud shearwall	Construction drawings for the original building are not available for review, wood framed structures are generally resistent to earthquake.	8
El Camino Lower	36336 El Camino Dr	2000	Yes		NaOCl	(1) 40 (1) 75	Not recorded on Drawings	No	2000	Wood deck over wood framing	Solid grouted CMU	Wood diaphrams with solid grouted CMU wall are generally resistent to earthquakes loads.	8
El Camino Under Ground					NaOCl								8
Well 14	36401 20th St E	1997	Yes		Salt	250	1,188		1997	Wood deck over 2x wood framing	Solid grouted CMU and wood stud shear walls	Potential irregularity do the the mixed resisting System. Construction drawings from the original building were not avaible for review.	8
Well 5	39401 20th St East	1663	Yes		Salt	250	1,188		Not avaiable				3
Alta Valley Well 18 and 19	4640 Barrel Springs Road	1976 1997	Yes		NaOCl	5	96 127		1976 1997	Wood deck over wood framing	Wood stud shearwall	Relatively thin slab may result in inadequate anchorage for some equipment. Single story solid grouted CMU structures are very resistant to earthquake damage.	3
3600 ft boosters	601 Lakeview Dr	1966	Yes			20	110		Not availalable			Record drawings were not avaible for the existing building, field investigations are required.	1
3900 boosters	36200 El Camino Dr	1954	Yes		NaOCl	5	96						7
		1961					127						3
Hilltop	35609 Cheseboro Rd	Multiple	Yes		NaOCl	60	227		Not Available			Record drawings are not aviable, howerver the small size of the buidlng represents minimal risk.	2

Appendix A: Detailed Calculations

															AWWA D100-11 Welded Carbon Steel Tanks Chapter 13 Seismic Design																																								
Tank Site	Address	Coordinates		Tank Details												Table 28	13.2.1	Table 24	ATC[1]	Eqn 13-9[1,2]	Eqn 13-22	Eqn 13-12/13[2]				13-27	13-25/26	Eqn 13-28/29	Estimate	Estimate	Estimate	Eqn 13-16		Eqn 13-24/25		Eqn 13-30			Eqn 13-26	Eqn 13-31	Eqn 13-23	Eqn 13-37		Eqn 13-41	Eqn 13-36		Eqn 13-53/54			Eqn 13-52	Table 29		Eqn 13-57		
		Latitude	Longitude	*Tank Type*	*Piping Connection*	*Footing*	*Anchorage*	*Date Built*		*Dia*	*Size*	*Bottom of the Knuckle*	*Top of Knuckle*	*Overflow Height*	*Freeboard Assumed to be 3 feet unless drawings indicate otherwise*	*Ri 3 if anchored 2.5 if unanchored*	*Seismic Use Group*	*I_E, assume that all tanks are Seismic Use Group III*	*Sd1, per ATC Seismic Hazard Maps*	*Sai, g Based on Sds from ASCE 7-10*	Sloshing Period, Tc(Ss	*Sac, g Based on Sd1 from ASCE 7-10*	*D/H*	*3.67*D/H*	*Volume ft^3 Vol = π*(Dia^2)/4*	Total Weight, lbf W = Vol*62.4pcf	Impulsive Weight, Moves with Tank, (Wi)	Centroid of the lateral Force due to Sloshing (Xi), ft	Weight of the Roof (Wr), lbf	Weight of the Shell (Ws), lbf	Weight of the Floor (Wf), lbf	Implusive Design Acceleration (Ai)	Impulsive Lateral Force (Vi), kip	Overturning Moment due to Impulsive Lateral Force(Mi), ft-kip	Convective Weight (Wc), lbf	Centroid of the lateral force do to convective mass (Xc), ft	Convective Design Acceleration (Ai)	Convective Lateral Force (Vc), kip	Overturning Moment due to Convective Lateral Force(Mc), ft-kip	Design Lateral Force at the top of the foundation (Vf), kip	Design Overturning Moment (Ms), ft-kip Ms = $\sqrt{(Mi^2+Mc^2)}$	Maximum Resting Weight of the Tank Contents (wL), lbf/ft		Weight of the Tank Shell and Roof Resisting Overturning (wt), lbf/ft	Overturning Ratio, J	Anchor Requirements	Convective Design Accelaration, Af			Sloshing Wave Height (d), ft	Minimum Required Freeboard (D), ft	Actual Freeboard (Roof Height-Overflow)	Allowable Lateral Load, V_{allow} (kip)	Total Lateral Seismic Load, Vt (Kip)	Sliding Check
3 MG Tank Site	850 East Avenue S	34.56	-118.11	Welded				1960		124	3,000,000		Unknown	34	3	2.5	iii	1.5	1.315	1.805	7.35	0.27	3.647	1.006	410594	25621040	8082906	13	92459	138480	92459	0.774	6503	82912	16424329	18	0.192	3150	57649	7226	100984	2185	5396	474	2.54	Provide Anchors	0.27	0.29	0.27	16.65	16.65	3	12851	7225.51729	OK
5 MG Tank	2404 Old Nadeau Road	34.53	-118.08							160	5,000,000		Unknown	20	3	2.5	iii	1.5	1.302	1.764	11.13	0.13	8.000	0.459	402124	25092529	3621894	8	153938	104550	153938	0.756	3050	22875	19810034	10	0.090	1784	18144	3533	29197	1676	4096	361	0.57	Tank Is Stable	0.18	0.13	0.13	10.08	10.08	3	12338	3533.2461	OK
6MG	641 East Ave S	34.56	-118.15					1999		206	6,000,000		Unknown	24	3	2.5	iii	1.5	1.316	1.804	13.03	0.09	8.583	0.428	799900	49913745	6714999	9	255176	160865	255176	0.773	5711	51395	39739497	12	0.066	2640	32159	6291	60628	1836	6328	446	0.64	Tank Is Stable	0.15	0.09	0.09	9.58	9.58	3	24349	6291.49113	OK
25th Street	26496 Cemetary Road	34.55	-118.09					1976		106	2,000,000		Unknown	30	3	2.5	iii	1.5	1.316	1.804	6.74	0.29	3.533	1.039	264742	16519902	5375203	11	67564	104870	67564	0.773	4341	48840	10436273	16	0.209	2185	35431	4860	60339	2052	4070	416	2.23	Provide Anchors	0.29	0.35	0.29	15.53	15.53	3	8304	4860.10557	OK
				Welded	Not Flexible	Ringwall with Sand Interior		1967		154	4,000,000		Unknown	30	3	2.5	iii	1.5	1.278	1.779	9.13	0.18	5.133	0.715	558795	34868813	7841520	11	142609	151052	142609	0.762	6311	71001	25267634	16	0.131	3318	51781	7130	87878	2052	5914	460	1.51	Uplift but Stable	0.21	0.18	0.18	14.15	14.15	3	17380	7130.09689	OK
45th Street	36510 45th St East	34.54	-118.05					1988		130	3,000,000		Unknown	30	3	2.5	iii	1.5	1.214	1.723	7.92	0.23	4.333	0.847	398197	24847485	6614006	11	101623	127961	101623	0.738	5129	57696	17074207	16	0.164	2805	44414	5845	72811	2052	4992	438	1.77	Provide Anchors	0.23	0.23	0.23	14.95	14.95	3	12488	5845.27581	OK
								1990		150	4,000,000		Unknown	32	3	2.5	iii	1.5	1.214	1.723	8.73	0.19	4.688	0.783	565487	35286369	8687384	12	135297	157017	135297	0.738	6731	80769	24894926	17	0.137	3398	56992	7540	98852	2120	6144	477	1.74	Provide Anchors	0.21	0.19	0.19	14.33	14.33	3	17687	7540.06677	OK
								1990		150	4,000,000		Unknown	32	3	2.5	iii	1.5	1.214	1.723	8.73	0.19	4.688	0.783	565487	35286369	8687384	12	135297	157017	135297	0.738	6731	80769	24894926	17	0.137	3398	56992	7540	98852	2120	6144	477	1.74	Provide Anchors	0.21	0.19	0.19	14.33	14.33	3	17687	7540.06677	OK
47th Street	35645 47th St East	34.53	-118.05					1967		106	2,000,000		Unknown	30	3	2.5	iii	1.5	1.325	1.81	6.74	0.30	3.533	1.039	264742	16519902	5375203	11	67564	104870	67564	0.776	4356	49003	10436273	16	0.211	2200	35674	4880	60613	2052	4070	416	2.24	Provide Anchors	0.30	0.35	0.30	15.64	15.64	3	8301	4879.72502	OK
								1990		132	3,000,000		Unknown	30	3	2.5	iii	1.5	1.325	1.81	8.02	0.25	4.400	0.834	410543	25617904	6716566	11	104774	129885	104774	0.776	5473	61576	17698347	16	0.177	3126	49427	6303	78960	2052	5069	440	1.87	Provide Anchors	0.25	0.25	0.25	16.32	16.32	3	12801	6303.06969	OK
50th Street	5001 East Ave, T-8	34.54	-118.04					2007		150	4,000,000		Unknown	30	3	2.5	iii	1.5	1.26	1.768	8.93	0.19	5.000	0.734	530144	33080971	7637298	11	135297	147203	135297	0.758	6103	68664	23796213	16	0.135	3223	50405	6902	85178	2052	5760	456	1.55	Provide Anchors	0.21	0.19	0.19	14.22	14.22	3	16514	6902.16829	OK
				Welded?	?	Concrete Ring Wall	None Shown	2007		150	4,000,000		Unknown		3	2.5	iii	1.5	1.26	1.768	8.93	0.19	5.000	0.734	530144	33080971	7637298	11	135297	147203	135297	0.758	6103	68664	23796213	16	0.135	3223	50405	6902	85178	2052	5760	456	1.55	Provide Anchors	0.21	0.19	0.19	14.22	14.22	3	16514	6902.16829	OK
Ana Verde	36800 Tovey Aveneu	34.55	-118.15	Welded	Not Flexible	Concrete Rink wall	Not Shown	1963		40	300,000		Unknown	32	3	2.5	iii	1.5	1.214	1.639	3.66	0.50	1.250	2.936	40212	2509253	1825481	12	9621	44129	9621	0.702	1327	16240	717357	22	0.355	255	5658	1351	17197	2120	1638	389	5.44	Provide Anchors	0.50	1.09	0.50	9.95	9.95	3	1363	1351.04608	OK
El Camino Lower	36809 El Camino Dr.	34.55	-118.13					1988		106	2,000,000		Unknown	32	3	2.5	iii	1.5	1.27	1.714	6.63	0.29	3.313	1.108	282391	17621228	6103267	12	67564	111862	67564	0.735	4665	55977	10784811	17	0.205	2215	38666	5164	68033	2120	4342	437	2.42	Provide Anchors	0.29	0.35	0.29	15.24	15.24	3	8916	5163.80732	OK
El Camino U.G[4]	36336 El Camino Road							1994		104	1,500,000		Unknown	26																																									
El Camino Upper	33030 Ridge Route Rd	34.54	-118.13	Welded	Flexible	Ringwall with Sand Inte	None Shown	1963		40	300,000		Unknown	32	3	2.5	iii	1.5	0.881	1.543	3.66	0.36	1.250	2.936	40212	2509253	1825481	12	9621	44129	9621	0.661	1249	15289	717357	22	0.258	185	4106	1263	15830	2120	1638	389	5.00	Provide Anchors	0.36	0.79	0.36	7.22	7.22	3	1371	1262.69341	OK
Walt Dahlitz	115 East Avenue S			Welded	Flexible	Concrete Ringwall, oil s	None Shown	1993		104	1,500,000		Unknown	31	3	2.5	iii	1.5	0.827	1.442	6.58	0.19	3.355	1.094	263341	16432470	5622265	12	65039	106378	65039	0.618	3621	42091	10122208	17	0.135	1362	22997	3869	47963	2086	4127	425	1.80	Provide Anchors	0.19	0.23	0.19	9.80	9.80	3	8455	3868.50122	OK
Well 14	36401 20th ST East			Weled?	Not Flexible	Concrete Ringwall, grav	3/4" 5' OC 8" embed			27	100,000		Unknown	22	3	2.5	iii	1.5	0.927	1.514	3.01	0.46	1.227	2.990	12596	786004	575712	8	4384	21166	4384	0.649	393	3325	220749	15	0.330	73	1119	400	3509	1758	760	275	4.80	Provide Anchors	0.46	1.23	0.46	6.24	6.24	3	435	399.685968	OK
Well 18 and 19	4640 Barrel Springs Road							1963		22	41,000		Unknown	30	3	2.5	iii	1.5	1.323	1.8	2.71	0.73	0.733	5.005	11404	711608	597846	13	2910	24053	2910	0.771	484	6262	120014	24	0.524	63	1513	488	6442	2052	845	369	11.47	Provide Anchors	0.73	2.17	0.73	8.06	8.06	3	387	488.300415	Needs Anchors
Well 5	1036 Barrel Spring Road							1963		30	1,463,945		Unknown	22	3	2.5	iii	1.5	1.311	1.782	3.18	0.62	1.364	2.691	15551	970375	680168	8	5412	23283	5412	0.764	546	4500	301560	15	0.442	133	1982	562	4918	1758	845	276	5.05	Provide Anchors	0.62	1.56	0.62	9.29	9.29	3	526	561.571023	Needs Anchors

1. Design spectral response acceleration parameters, S_{D1} and S_{DS}, have been determined using the Applied Technology Council's (ATC) web based hazard maps in accordance with the American Society of Civil Engineers Standard 7, Minimum Design Loads for Buildings and Other Structures (ASCE 7-10)

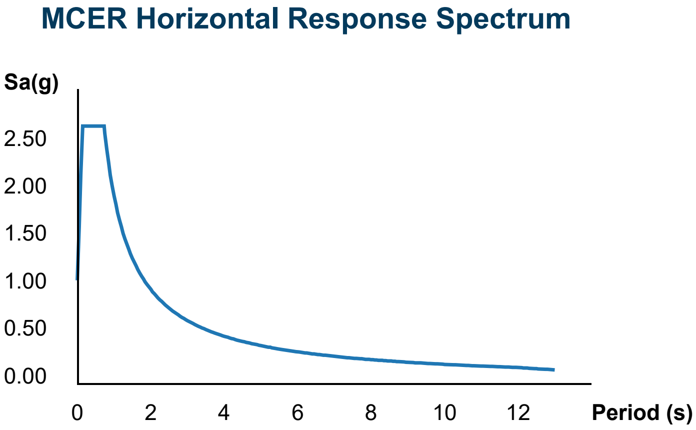
2. The Design spectrum for impulsive components, Sai and the Design Spectrum for convective components, Sac have been determined in accordance with Chapter 13 of the AWWA D100-11, Welded Carbon Steel Tnaks for Water Storage. These parameters are expressed as a percentage of the accelration due to gravity, g.

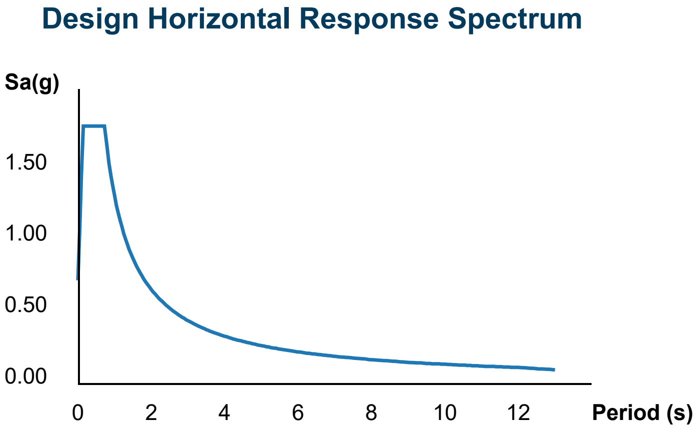
3. Facility list indicates that these facilities conatain 0 gallons and does not provide the overflow height, therefore we were not apple to determine the seismic demands on these structures.
4. AWWA D100 calculations do not apply to the El Camino Underground tank. Construction drawings are not available to perform an analysis at this time.
4. Minimum required freeboard is equal to the sloshing wave height for Use Group III and may be reduced for Use Group I and II

ATC Hazards by Location

Search Information

Coordinates:	34.557353817153206, -118.11224470422972
Elevation:	2750 ft
Timestamp:	2021-04-09T16:22:17.704Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D


MCER Horizontal Response Spectrum


Design Horizontal Response Spectrum

Basic Parameters

Name	Value	Description
S_S	2.707	MCE$_R$ ground motion (period=0.2s)
S_1	1.315	MCE$_R$ ground motion (period=1.0s)
S_{MS}	2.707	Site-modified spectral acceleration value
S_{M1}	1.973	Site-modified spectral acceleration value
S_{DS}	1.805	Numeric seismic design value at 0.2s SA
S_{D1}	1.315	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.919	Coefficient of risk (0.2s)
CR_1	0.903	Coefficient of risk (1.0s)

PGA	1.045	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	1.045	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.418	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.719	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.707	Factored deterministic acceleration value (0.2s)
S1RT	1.605	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.778	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.315	Factored deterministic acceleration value (1.0s)
PGAd	1.045	Factored deterministic acceleration value (PGA)

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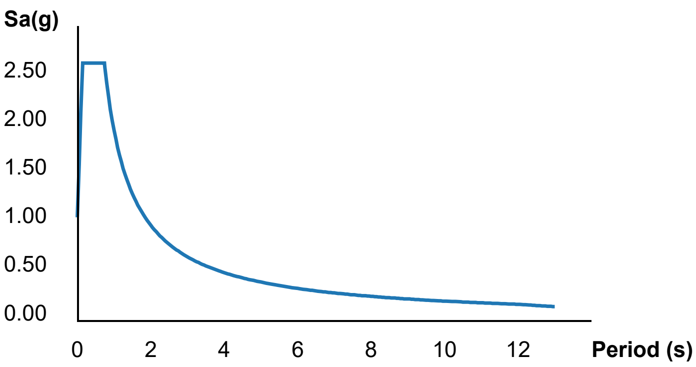
ATC Hazards by Location

Search Information

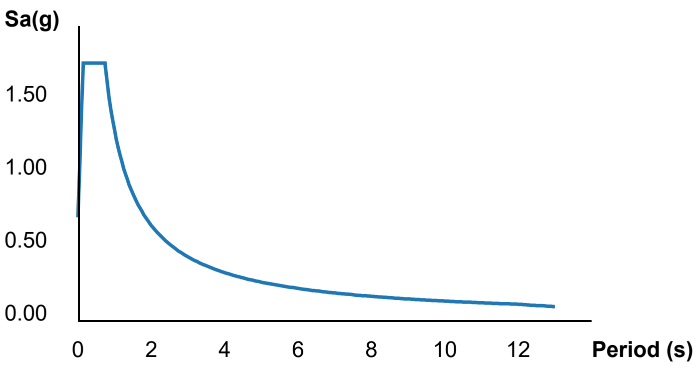
Coordinates:	34.53471326457233, -118.08343773439331
Elevation:	2968 ft
Timestamp:	2021-04-09T16:35:02.162Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

Map data ©2021 Imagery ©2021 , CNES / Airbus, Maxar Technologies, U.S. Geological Survey, USDA Farm Service Agency

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.646	MCE_R ground motion (period=0.2s)
S_1	1.302	MCE_R ground motion (period=1.0s)
S_{MS}	2.646	Site-modified spectral acceleration value
S_{M1}	1.953	Site-modified spectral acceleration value
S_{DS}	1.764	Numeric seismic design value at 0.2s SA
S_{D1}	1.302	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.924	Coefficient of risk (0.2s)
CR_1	0.904	Coefficient of risk (1.0s)

PGA	1.018	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	1.018	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.282	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.552	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.646	Factored deterministic acceleration value (0.2s)
S1RT	1.53	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.694	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.302	Factored deterministic acceleration value (1.0s)
PGAd	1.018	Factored deterministic acceleration value (PGA)

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ATC Hazards by Location

Search Information

Address:	34547
Coordinates:	34.5497, -118.132821
Elevation:	2923 ft
Timestamp:	2021-04-08T21:00:34.329Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	III
Site Class:	D

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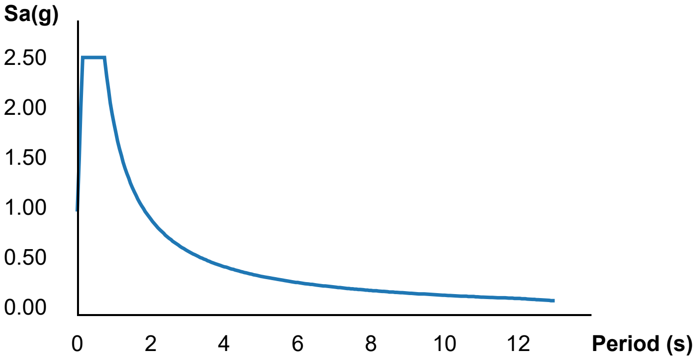
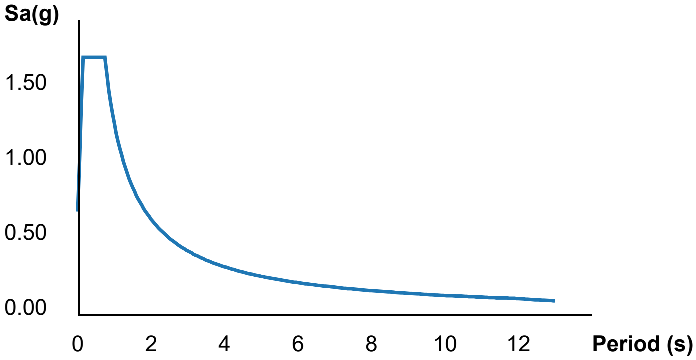
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.573	MCE$_R$ ground motion (period=0.2s)
S_1	1.271	MCE$_R$ ground motion (period=1.0s)
S_{MS}	2.573	Site-modified spectral acceleration value
S_{M1}	1.906	Site-modified spectral acceleration value
S_{DS}	1.715	Numeric seismic design value at 0.2s SA
S_{D1}	1.271	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	E	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.916	Coefficient of risk (0.2s)

CR_1	0.904	Coefficient of risk (1.0s)
PGA	0.987	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.987	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.429	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.743	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.573	Factored deterministic acceleration value (0.2s)
S1RT	1.614	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.785	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.271	Factored deterministic acceleration value (1.0s)
PGAd	0.987	Factored deterministic acceleration value (PGA)

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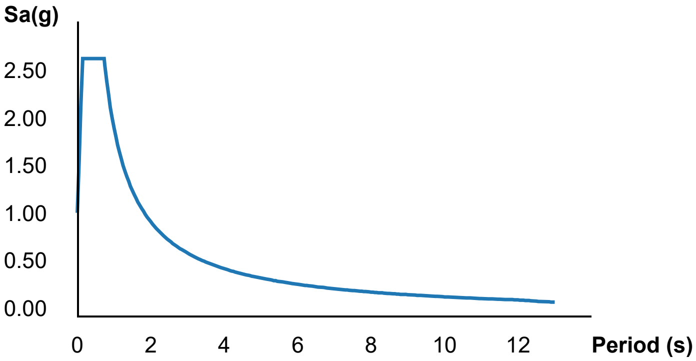
ATC Hazards by Location

Search Information

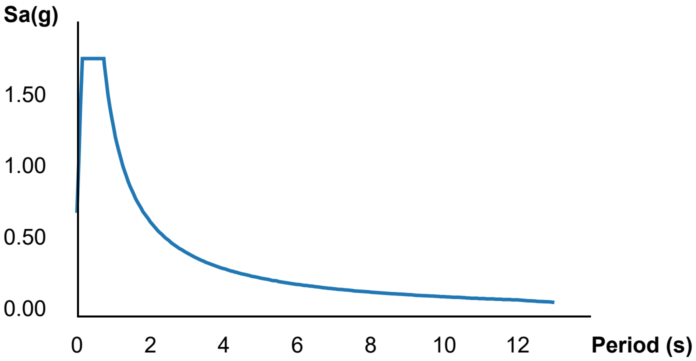
Coordinates:	34.559419345037064, -118.11618400870667
Elevation:	2750 ft
Timestamp:	2021-04-09T16:36:57.402Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

Map data ©2021 Imagery ©2021 , Maxar Technologies, U.S. Geological Survey, *USDA Farm Service Agency*

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.706	MCE_R ground motion (period=0.2s)
S_1	1.316	MCE_R ground motion (period=1.0s)
S_{MS}	2.706	Site-modified spectral acceleration value
S_{M1}	1.975	Site-modified spectral acceleration value
S_{DS}	1.804	Numeric seismic design value at 0.2s SA
S_{D1}	1.316	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.92	Coefficient of risk (0.2s)
CR_1	0.903	Coefficient of risk (1.0s)

PGA	1.046	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	1.046	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.37	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.665	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.706	Factored deterministic acceleration value (0.2s)
S1RT	1.58	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.749	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.316	Factored deterministic acceleration value (1.0s)
PGAd	1.046	Factored deterministic acceleration value (PGA)

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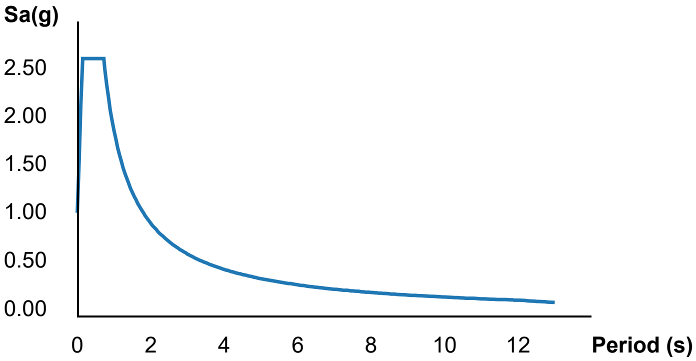
ATC Hazards by Location

Search Information

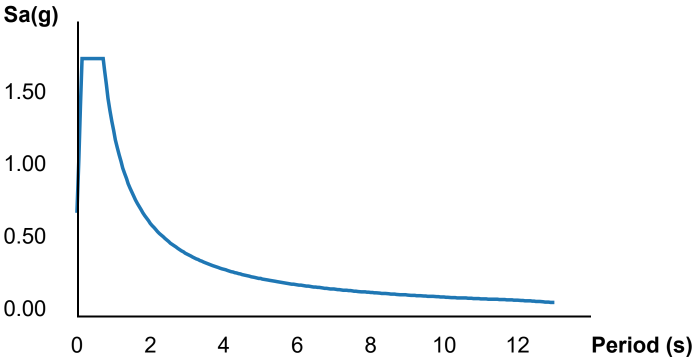
Coordinates:	34.55371, -118.087856
Elevation:	2752 ft
Timestamp:	2021-04-09T16:19:01.173Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

Map data ©2021 Imagery ©2021 , CNES / Airbus, Maxar Technologies, U.S. Geological Survey, USDA Farm Service Agency

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.668	MCE$_R$ ground motion (period=0.2s)
S_1	1.278	MCE$_R$ ground motion (period=1.0s)
S_{MS}	2.668	Site-modified spectral acceleration value
S_{M1}	1.917	Site-modified spectral acceleration value
S_{DS}	1.779	Numeric seismic design value at 0.2s SA
S_{D1}	1.278	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.919	Coefficient of risk (0.2s)
CR_1	0.902	Coefficient of risk (1.0s)

PGA	1.031	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	1.031	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.432	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.737	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.668	Factored deterministic acceleration value (0.2s)
S1RT	1.613	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.788	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.278	Factored deterministic acceleration value (1.0s)
PGAd	1.031	Factored deterministic acceleration value (PGA)

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ATC Hazards by Location

Search Information

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Coordinates:	34.55371, -118.087856
Elevation:	2752 ft
Timestamp:	2021-04-09T16:17:53.781Z
Hazard Type:	Seismic
Reference Document:	ASCE7-16
Risk Category:	IV
Site Class:	D-default

Basic Parameters

Name	Value	Description
S_S	2.404	MCE_R ground motion (period=0.2s)
S_1	1.025	MCE_R ground motion (period=1.0s)
S_{MS}	2.885	Site-modified spectral acceleration value
S_{M1}	* null	Site-modified spectral acceleration value
S_{DS}	1.923	Numeric seismic design value at 0.2s SA
S_{D1}	* null	Numeric seismic design value at 1.0s SA

* See Section 11.4.8

▾Additional Information

Name	Value	Description
SDC	* null	Seismic design category
F_a	1.2	Site amplification factor at 0.2s
F_v	* null	Site amplification factor at 1.0s
CR_S	0.874	Coefficient of risk (0.2s)
CR_1	0.869	Coefficient of risk (1.0s)
PGA	1.033	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	1.24	Site modified peak ground acceleration

T_L	12	Long-period transition period (s)
SsRT	3.008	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.441	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.404	Factored deterministic acceleration value (0.2s)
S1RT	1.294	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.489	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.025	Factored deterministic acceleration value (1.0s)
PGAd	1.033	Factored deterministic acceleration value (PGA)

* See Section 11.4.8

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Hazards by Location

Search Information

Coordinates:	34.544961034712664, -118.04877924893493
Elevation:	2740 ft
Timestamp:	2021-04-09T16:27:34.922Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

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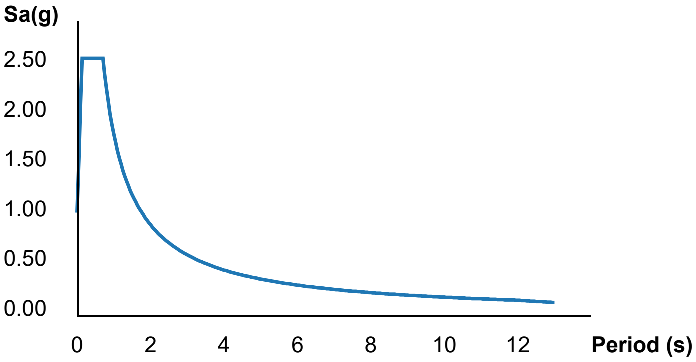
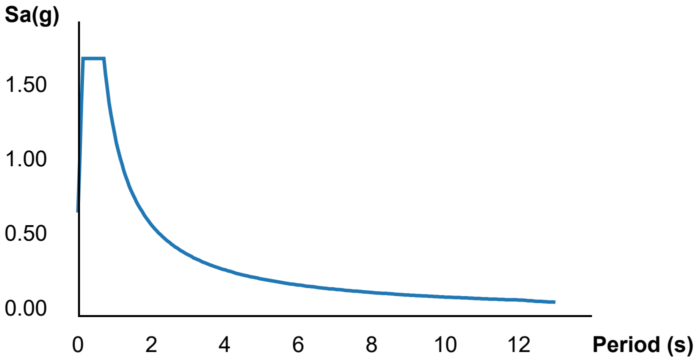
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.584	MCE$_R$ ground motion (period=0.2s)
S_1	1.214	MCE$_R$ ground motion (period=1.0s)
S_{MS}	2.584	Site-modified spectral acceleration value
S_{M1}	1.821	Site-modified spectral acceleration value
S_{DS}	1.723	Numeric seismic design value at 0.2s SA
S_{D1}	1.214	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.921	Coefficient of risk (0.2s)
CR_1	0.905	Coefficient of risk (1.0s)

PGA	0.996	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.996	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.159	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.432	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.584	Factored deterministic acceleration value (0.2s)
S1RT	1.47	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.624	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.214	Factored deterministic acceleration value (1.0s)
PGAd	0.996	Factored deterministic acceleration value (PGA)

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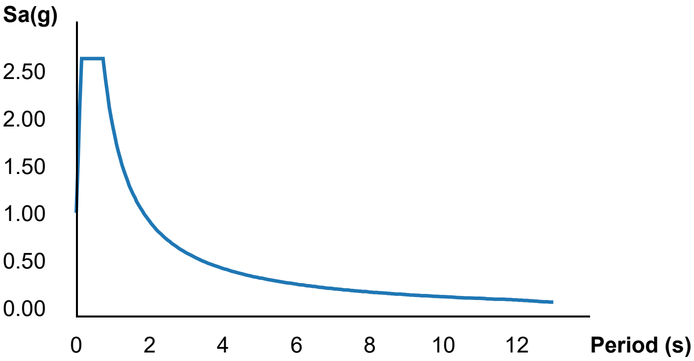
ATC Hazards by Location

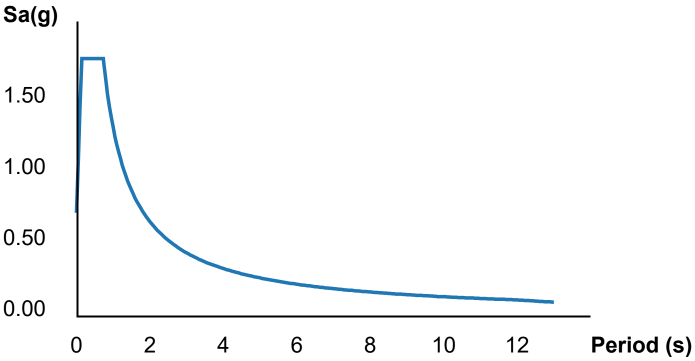
Search Information

Coordinates:	34.52903336279662, -118.04584351481934
Elevation:	2971 ft
Timestamp:	2021-04-09T16:31:06.633Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.714	MCE$_R$ ground motion (period=0.2s)
S_1	1.325	MCE$_R$ ground motion (period=1.0s)
S_{MS}	2.714	Site-modified spectral acceleration value
S_{M1}	1.987	Site-modified spectral acceleration value
S_{DS}	1.81	Numeric seismic design value at 0.2s SA
S_{D1}	1.325	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.923	Coefficient of risk (0.2s)
CR_1	0.905	Coefficient of risk (1.0s)

PGA	1.048	MCE_{G} peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_{M}	1.048	Site modified peak ground acceleration
T_{L}	12	Long-period transition period (s)
SsRT	3.142	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.404	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.714	Factored deterministic acceleration value (0.2s)
S1RT	1.461	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.614	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.325	Factored deterministic acceleration value (1.0s)
PGAd	1.048	Factored deterministic acceleration value (PGA)

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Hazards by Location

Search Information

Coordinates:	34.536316858195896, -118.04017088147585
Elevation:	2825 ft
Timestamp:	2021-04-09T16:33:04.897Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

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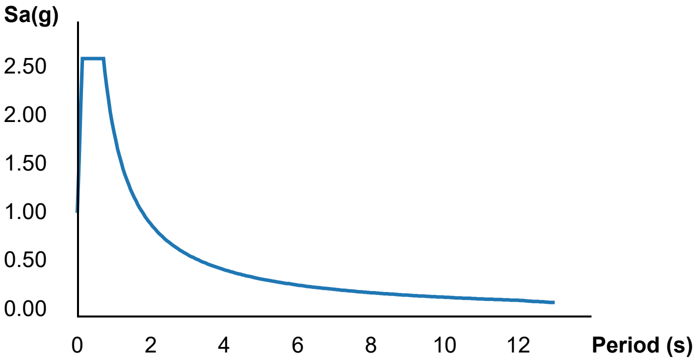
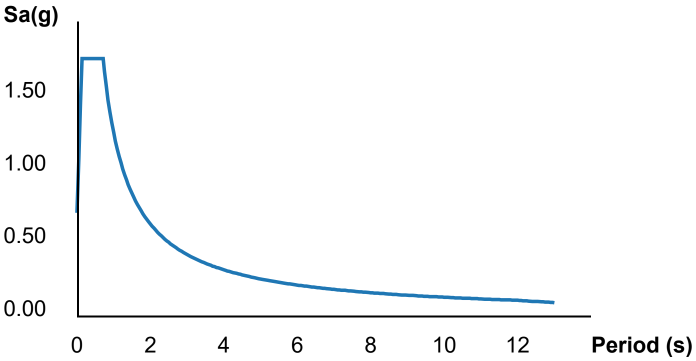
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.652	MCE$_R$ ground motion (period=0.2s)
S_1	1.26	MCE$_R$ ground motion (period=1.0s)
S_{MS}	2.652	Site-modified spectral acceleration value
S_{M1}	1.889	Site-modified spectral acceleration value
S_{DS}	1.768	Numeric seismic design value at 0.2s SA
S_{D1}	1.26	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.923	Coefficient of risk (0.2s)
CR_1	0.905	Coefficient of risk (1.0s)

PGA	1.024	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	1.024	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.121	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.381	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.652	Factored deterministic acceleration value (0.2s)
S1RT	1.449	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.602	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.26	Factored deterministic acceleration value (1.0s)
PGAd	1.024	Factored deterministic acceleration value (PGA)

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ATC Hazards by Location

Search Information

Coordinates:	34.54972773620536, -118.1502535834671
Elevation:	3116 ft
Timestamp:	2021-04-09T16:41:41.594Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

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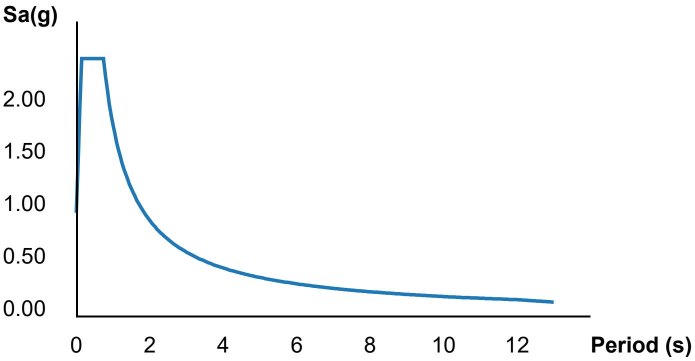
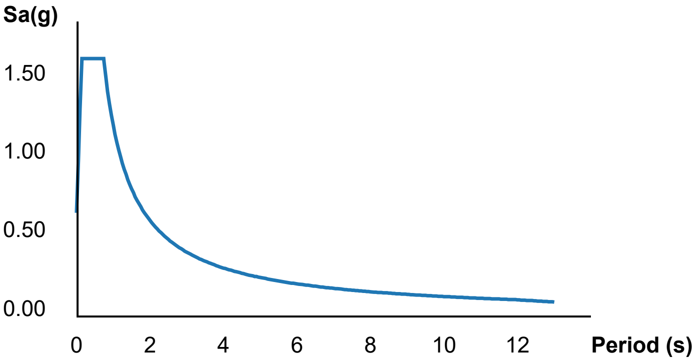
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.458	MCE_R ground motion (period=0.2s)
S_1	1.214	MCE_R ground motion (period=1.0s)
S_{MS}	2.458	Site-modified spectral acceleration value
S_{M1}	1.82	Site-modified spectral acceleration value
S_{DS}	1.639	Numeric seismic design value at 0.2s SA
S_{D1}	1.214	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.916	Coefficient of risk (0.2s)
CR_1	0.906	Coefficient of risk (1.0s)

PGA	0.945	MCE$_G$ peak ground acceleration
F$_{PGA}$	1	Site amplification factor at PGA
PGA$_M$	0.945	Site modified peak ground acceleration
T$_L$	12	Long-period transition period (s)
SsRT	3.335	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.642	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.458	Factored deterministic acceleration value (0.2s)
S1RT	1.566	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.728	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.214	Factored deterministic acceleration value (1.0s)
PGAd	0.945	Factored deterministic acceleration value (PGA)

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ATC Hazards by Location

Search Information

Address:	36809 El Camino Dr, Palmdale, CA 93551, USA
Coordinates:	34.54952240000001, -118.1326806
Elevation:	2925 ft
Timestamp:	2021-04-09T16:20:57.078Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

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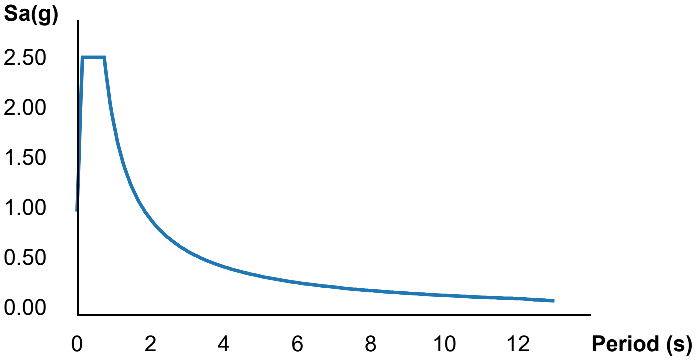
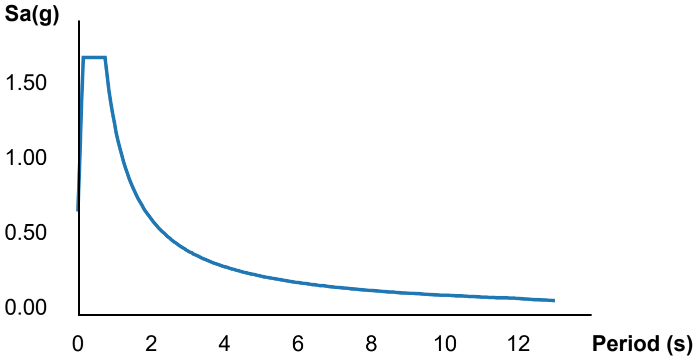
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.571	MCE_R ground motion (period=0.2s)
S_1	1.27	MCE_R ground motion (period=1.0s)
S_{MS}	2.571	Site-modified spectral acceleration value
S_{M1}	1.905	Site-modified spectral acceleration value
S_{DS}	1.714	Numeric seismic design value at 0.2s SA
S_{D1}	1.27	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.916	Coefficient of risk (0.2s)

CR_1	0.904	Coefficient of risk (1.0s)
PGA	0.986	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.986	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.426	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.74	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.571	Factored deterministic acceleration value (0.2s)
S1RT	1.613	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.783	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.27	Factored deterministic acceleration value (1.0s)
PGAd	0.986	Factored deterministic acceleration value (PGA)

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ATC Hazards by Location

Search Information

Coordinates:	34.53840630847815, -118.13288506137695
Elevation:	3359 ft
Timestamp:	2021-04-09T20:04:43.993Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

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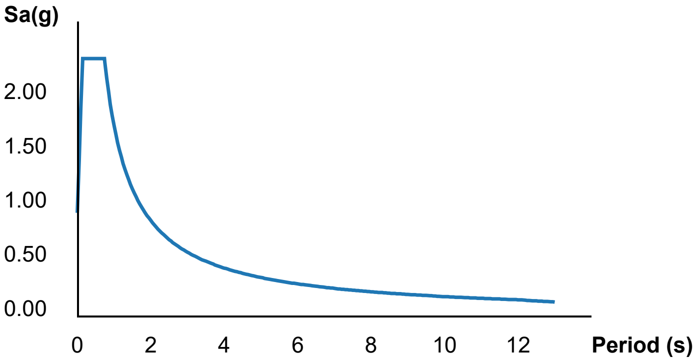
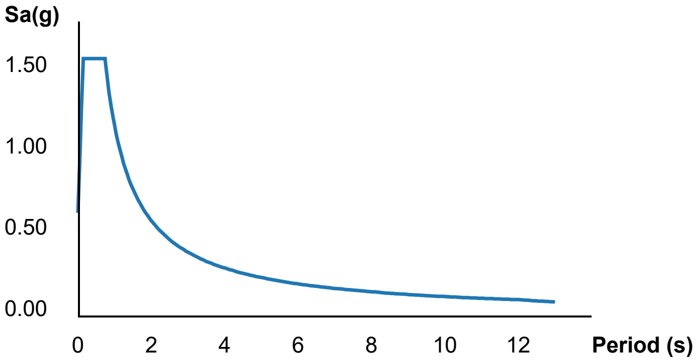
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.375	MCE_R ground motion (period=0.2s)
S_1	1.171	MCE_R ground motion (period=1.0s)
S_{MS}	2.375	Site-modified spectral acceleration value
S_{M1}	1.756	Site-modified spectral acceleration value
S_{DS}	1.583	Numeric seismic design value at 0.2s SA
S_{D1}	1.171	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.925	Coefficient of risk (0.2s)
CR_1	0.908	Coefficient of risk (1.0s)

PGA	0.917	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.917	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.236	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.499	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.375	Factored deterministic acceleration value (0.2s)
S1RT	1.505	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.657	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.171	Factored deterministic acceleration value (1.0s)
PGAd	0.917	Factored deterministic acceleration value (PGA)

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Hazards by Location

Search Information

Coordinates:	34.56128566737895, -118.12898168848265
Elevation:	2924 ft
Timestamp:	2021-04-09T20:40:24.218Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

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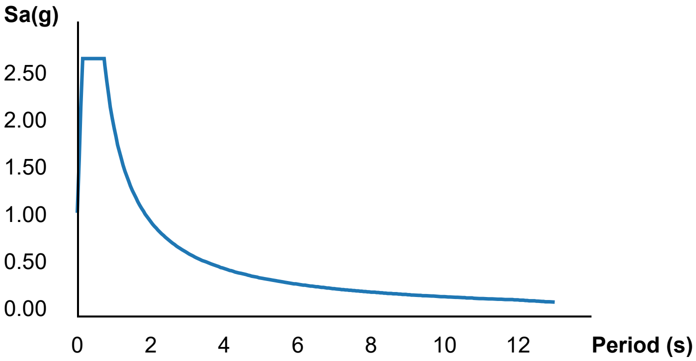
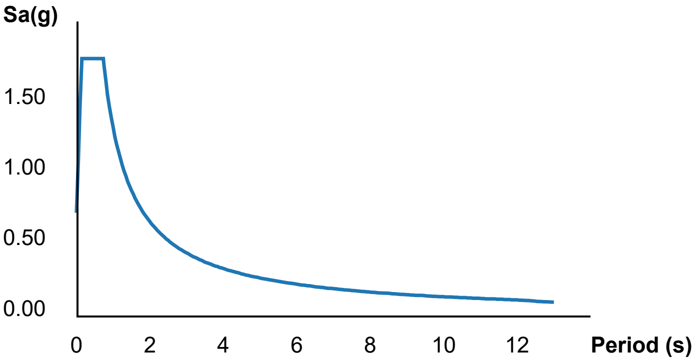
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.733	MCE$_R$ ground motion (period=0.2s)
S_1	1.331	MCE$_R$ ground motion (period=1.0s)
S_{MS}	2.733	Site-modified spectral acceleration value
S_{M1}	1.997	Site-modified spectral acceleration value
S_{DS}	1.822	Numeric seismic design value at 0.2s SA
S_{D1}	1.331	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.92	Coefficient of risk (0.2s)
CR_1	0.904	Coefficient of risk (1.0s)

PGA	1.055	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	1.055	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.306	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.594	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.733	Factored deterministic acceleration value (0.2s)
S1RT	1.547	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.71	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.331	Factored deterministic acceleration value (1.0s)
PGAd	1.055	Factored deterministic acceleration value (PGA)

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ATC Hazards by Location

Search Information

Address:	34547
Coordinates:	34.538438, -118.132863
Elevation:	3360 ft
Timestamp:	2021-04-08T22:06:10.243Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	III
Site Class:	D

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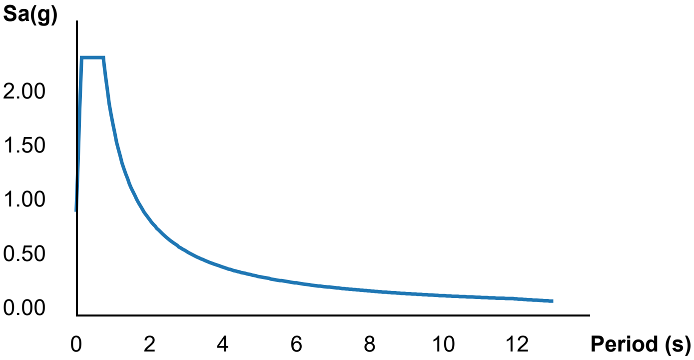
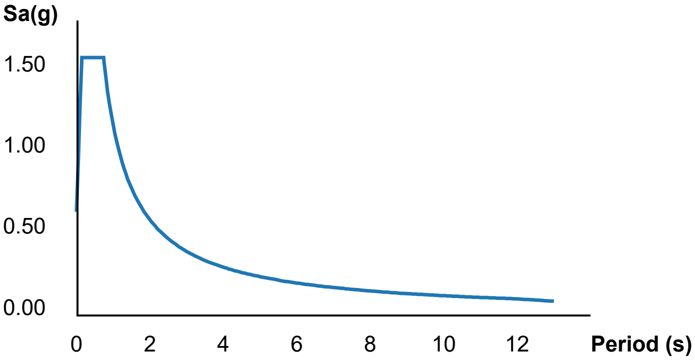
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.376	MCE$_R$ ground motion (period=0.2s)
S_1	1.171	MCE$_R$ ground motion (period=1.0s)
S_{MS}	2.376	Site-modified spectral acceleration value
S_{M1}	1.757	Site-modified spectral acceleration value
S_{DS}	1.584	Numeric seismic design value at 0.2s SA
S_{D1}	1.171	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	E	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.925	Coefficient of risk (0.2s)

CR_1	0.908	Coefficient of risk (1.0s)
PGA	0.917	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.917	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.236	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.5	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.376	Factored deterministic acceleration value (0.2s)
S1RT	1.505	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.657	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.171	Factored deterministic acceleration value (1.0s)
PGAd	0.917	Factored deterministic acceleration value (PGA)

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Hazards by Location

Search Information

Coordinates:	34.598759799594845, -118.09844223112182
Elevation:	2583 ft
Timestamp:	2021-04-09T20:48:48.917Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

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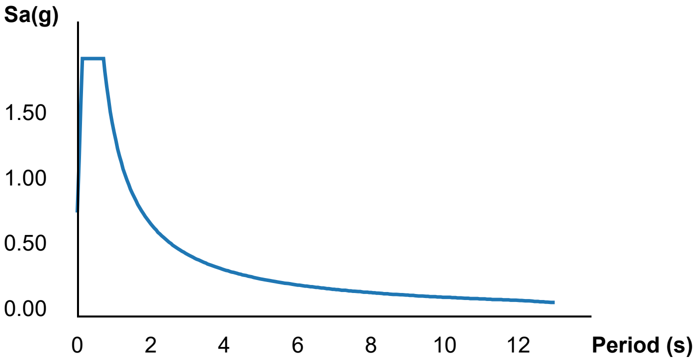
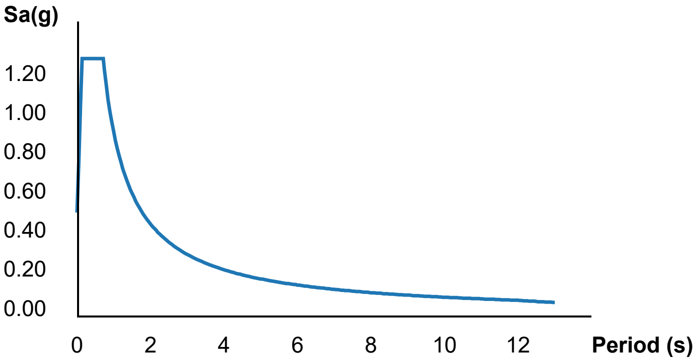
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	1.971	MCE_R ground motion (period=0.2s)
S_1	0.937	MCE_R ground motion (period=1.0s)
S_{MS}	1.971	Site-modified spectral acceleration value
S_{M1}	1.406	Site-modified spectral acceleration value
S_{DS}	1.314	Numeric seismic design value at 0.2s SA
S_{D1}	0.937	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.937	Coefficient of risk (0.2s)
CR_1	0.911	Coefficient of risk (1.0s)

PGA	0.77	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.77	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	2.602	Probabilistic risk-targeted ground motion (0.2s)
SsUH	2.776	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	1.971	Factored deterministic acceleration value (0.2s)
S1RT	1.168	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.282	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	0.937	Factored deterministic acceleration value (1.0s)
PGAd	0.77	Factored deterministic acceleration value (PGA)

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Hazards by Location

Search Information

Address:	1036 Barrel Spring Road palmdale, ca
Coordinates:	34.5457226, -118.1085956
Elevation:	2817 ft
Timestamp:	2021-05-04T20:11:47.998Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	III
Site Class:	D

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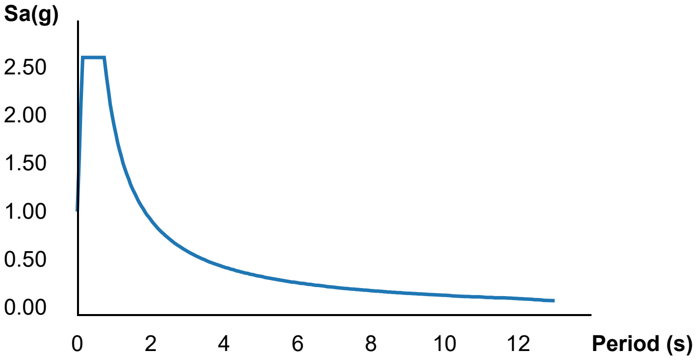
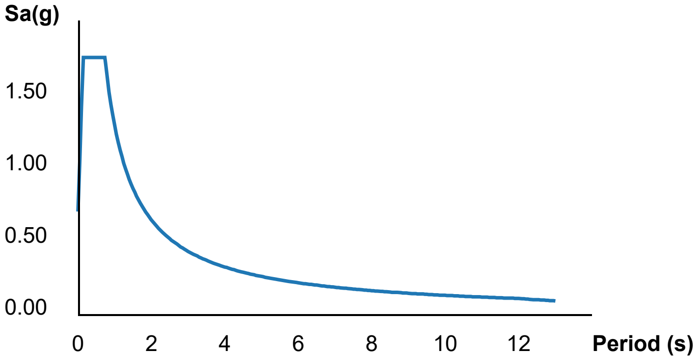
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.674	MCE_R ground motion (period=0.2s)
S_1	1.311	MCE_R ground motion (period=1.0s)
S_{MS}	2.674	Site-modified spectral acceleration value
S_{M1}	1.967	Site-modified spectral acceleration value
S_{DS}	1.782	Numeric seismic design value at 0.2s SA
S_{D1}	1.311	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	E	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.919	Coefficient of risk (0.2s)

CR_1	0.902	Coefficient of risk (1.0s)
PGA	1.029	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	1.029	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.49	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.799	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.674	Factored deterministic acceleration value (0.2s)
S1RT	1.643	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.821	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.311	Factored deterministic acceleration value (1.0s)
PGAd	1.029	Factored deterministic acceleration value (PGA)

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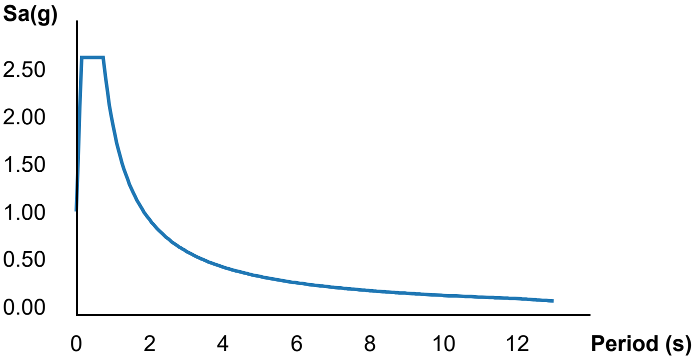
ATC Hazards by Location

Search Information

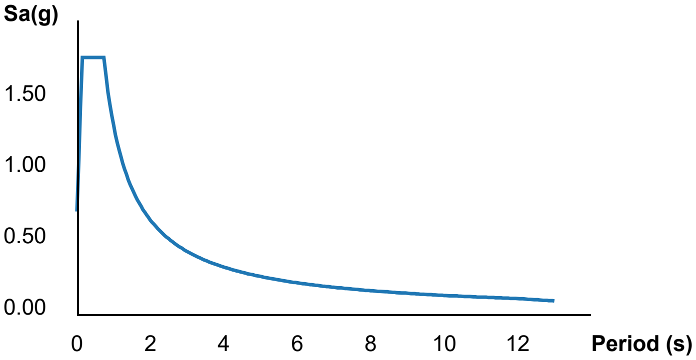
Address:	15 4640 Barrel Spring Road palmdale, ca
Coordinates:	34.5268275, -118.0540864
Elevation:	3036 ft
Timestamp:	2021-05-04T20:14:23.952Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	III
Site Class:	D

Map data ©2021 Imagery ©2021 , Maxar Technologies, U.S. Geological Survey, USDA Farm Service Agency

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.7	MCE_R ground motion (period=0.2s)
S_1	1.323	MCE_R ground motion (period=1.0s)
S_{MS}	2.7	Site-modified spectral acceleration value
S_{M1}	1.984	Site-modified spectral acceleration value
S_{DS}	1.8	Numeric seismic design value at 0.2s SA
S_{D1}	1.323	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	E	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.924	Coefficient of risk (0.2s)

CR_1	0.905	Coefficient of risk (1.0s)
PGA	1.04	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	1.04	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.149	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.409	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.7	Factored deterministic acceleration value (0.2s)
S1RT	1.464	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.617	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.323	Factored deterministic acceleration value (1.0s)
PGAd	1.04	Factored deterministic acceleration value (PGA)

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															AWWA D100-11 Welded Carbon Steel Tanks Chapter 13 Seismic Design																																								
		Coordinates		Tank Details												Table 28	13.2.1	Table 24	ATC[1]	Eqn 13-9[1,2]	Eqn 13-22	Eqn 13-12/13[2]				13-27	13-25/26	Eqn 13-28/29	Estimate	Estimate	Estimate	Eqn 13-16		Eqn 13-24/25		Eqn 13-30			Eqn 13-26	Eqn 13-31	Eqn 13-23	Eqn 13-37		Eqn 13-41	Eqn 13-36		Eqn 13-53/54			Eqn 13-52	Table 29		Eqn 13-57		
Tank Site	Address	Latitude	Longitude	Tank Type	Piping Connection	Footing	Anchorage	Date Built		Dia	Size	Bottom of the Knuckle	Top of Knuckle	Overflow Height	Freeboard Assumed to be 3 feet unless drawings indicate otherwise	Ri 3 if anchored 2.5 if unanchored	Seismic Use Group	I_E, assume that all tanks are Seismic Use Group III	Sd1, per ATC Seismic Hazard Maps	Sai, g Based on Sds from ASCE 7-10	Sloshing Period, Tc(Ss	Sac, g Based on Sd1 from ASCE 7-10	D/H	3.67*D/H	Volume ft^3 Vol = π*(Dia^2)/4	Total Weight, lbf W = Vol*62.4pcf	Impulsive Weight, Moves with Tank, (Wi)	Centroid of the lateral Force due to Sloshing (Xi), ft	Weight of the Roof (Wr), lbf	Weight of the Shell (Ws), lbf	Weight of the Floor (Wf), lbf	Implusive Design Acceleration (Ai)	Impulsive Lateral Force (Vi), kip	Overturning Moment due to Impulsive Lateral Force(Mi), ft-kip	Convective Weight (Wc), lbf	Centroid of the lateral force do to convective mass (Xc), ft	Convective Design Acceleration (Ai)	Convective Lateral Force (Vc), kip	Overturning Moment due to Convective Lateral Force(Mc), ft-kip	Design Lateral Force at the top of the foundation (Vf), kip	Design Overturning Moment (Ms), ft-kip Ms = $\sqrt{(Mi^2+Mc^2)}$	Maximum Resting Weight of the Tank Contents (wL), lbf/ft		Weight of the Tank Shell and Roof Resisting Overturning (wt), lbf/ft	Overturning Ratio, J	Anchor Requirements	Convective Design Accelaration, Af			Sloshing Wave Height (d), ft	Minimum Required Freeboard (D), ft	Actual Freeboard (Roof Height-Overflow)	Allowable Lateral Load, V_{allow} (kip)	Total Lateral Seismic Load, Vt (Kip)	Sliding Check
3 MG Tank Site	850 East Avenue S	34.56	-118.11	Welded				1960		124	3,000,000		Unknown	34	3	2.5	iii	1.5	1.315	1.805	7.35	0.27	3.647	1.006	410594	25621040	8082906	13	92459	138480	92459	0.774	6503	82912	16424329	18	0.192	3150	57649	7226	100984	2185	5396	474	2.54	Provide Anchors	0.27	0.29	0.27	16.65	16.65	3	12851	7225.51729	OK
5 MG Tank	2404 Old Nadeau Road	34.53	-118.08							160	5,000,000		Unknown	20	3	2.5	iii	1.5	1.302	1.764	11.13	0.13	8.000	0.459	402124	25092529	3621894	8	153938	104550	153938	0.756	3050	22875	19810034	10	0.090	1784	18144	3533	29197	1676	4096	361	0.57	Tank Is Stable	0.18	0.13	0.13	10.08	10.08	3	12338	3533.2461	OK
6MG	641 East Ave S	34.56	-118.15					1999		206	6,000,000		Unknown	24	3	2.5	iii	1.5	1.316	1.804	13.03	0.09	8.583	0.428	799900	49913745	6714999	9	255176	160865	255176	0.773	5711	51395	39739497	12	0.066	2640	32159	6291	60628	1836	6328	446	0.64	Tank Is Stable	0.15	0.09	0.09	9.58	9.58	3	24349	6291.49113	OK
25th Street	26496 Cemetary Road	34.55	-118.09					1976		106	2,000,000		Unknown	30	3	2.5	iii	1.5	1.316	1.804	6.74	0.29	3.533	1.039	264742	16519902	5375203	11	67564	104870	67564	0.773	4341	48840	10436273	16	0.209	2185	35431	4860	60339	2052	4070	416	2.23	Provide Anchors	0.29	0.35	0.29	15.53	15.53	3	8304	4860.10557	OK
				Welded	Not Flexible	Ringwall with Sand Interior		1967		154	4,000,000		Unknown	30	3	2.5	iii	1.5	1.278	1.779	9.13	0.18	5.133	0.715	558795	34868813	7841520	11	142609	151052	142609	0.762	6311	71001	25267634	16	0.131	3318	51781	7130	87878	2052	5914	460	1.51	Uplift but Stable	0.21	0.18	0.18	14.15	14.15	3	17380	7130.09689	OK
45th Street	36510 45th St East	34.54	-118.05					1988		130	3,000,000		Unknown	30	3	2.5	iii	1.5	1.214	1.723	7.92	0.23	4.333	0.847	398197	24847485	6614006	11	101623	127961	101623	0.738	5129	57696	17074207	16	0.164	2805	44414	5845	72811	2052	4992	438	1.77	Provide Anchors	0.23	0.23	0.23	14.95	14.95	3	12488	5845.27581	OK
								1990		150	4,000,000		Unknown	32	3	2.5	iii	1.5	1.214	1.723	8.73	0.19	4.688	0.783	565487	35286369	8687384	12	135297	157017	135297	0.738	6731	80769	24894926	17	0.137	3398	56992	7540	98852	2120	6144	477	1.74	Provide Anchors	0.21	0.19	0.19	14.33	14.33	3	17687	7540.06677	OK
								1990		150	4,000,000		Unknown	32	3	2.5	iii	1.5	1.214	1.723	8.73	0.19	4.688	0.783	565487	35286369	8687384	12	135297	157017	135297	0.738	6731	80769	24894926	17	0.137	3398	56992	7540	98852	2120	6144	477	1.74	Provide Anchors	0.21	0.19	0.19	14.33	14.33	3	17687	7540.06677	OK
47th Street	35645 47th St East	34.53	-118.05					1967		106	2,000,000		Unknown	30	3	2.5	iii	1.5	1.325	1.81	6.74	0.30	3.533	1.039	264742	16519902	5375203	11	67564	104870	67564	0.776	4356	49003	10436273	16	0.211	2200	35674	4880	60613	2052	4070	416	2.24	Provide Anchors	0.30	0.35	0.30	15.64	15.64	3	8301	4879.72502	OK
								1990		132	3,000,000		Unknown	30	3	2.5	iii	1.5	1.325	1.81	8.02	0.25	4.400	0.834	410543	25617904	6716566	11	104774	129885	104774	0.776	5473	61576	17698347	16	0.177	3126	49427	6303	78960	2052	5069	440	1.87	Provide Anchors	0.25	0.25	0.25	16.32	16.32	3	12801	6303.06969	OK
50th Street	5001 East Ave, T-8	34.54	-118.04					2007		150	4,000,000		Unknown	30	3	2.5	iii	1.5	1.26	1.768	8.93	0.19	5.000	0.734	530144	33080971	7637298	11	135297	147203	135297	0.758	6103	68664	23796213	16	0.135	3223	50405	6902	85178	2052	5760	456	1.55	Provide Anchors	0.21	0.19	0.19	14.22	14.22	3	16514	6902.16829	OK
				Welded?	?	Concrete Ring Wall	None Shown	2007		150	4,000,000		Unknown		3	2.5	iii	1.5	1.26	1.768	8.93	0.19	5.000	0.734	530144	33080971	7637298	11	135297	147203	135297	0.758	6103	68664	23796213	16	0.135	3223	50405	6902	85178	2052	5760	456	1.55	Provide Anchors	0.21	0.19	0.19	14.22	14.22	3	16514	6902.16829	OK
Ana Verde	36800 Tovey Aveneu	34.55	-118.15	Welded	Not Flexible	Concrete Rink wall	Not Shown	1963		40	300,000		Unknown	32	3	2.5	iii	1.5	1.214	1.639	3.66	0.50	1.250	2.936	40212	2509253	1825481	12	9621	44129	9621	0.702	1327	16240	717357	22	0.355	255	5658	1351	17197	2120	1638	389	5.44	Provide Anchors	0.50	1.09	0.50	9.95	9.95	3	1363	1351.04608	OK
El Camino Lower	36809 El Camino Dr.	34.55	-118.13					1988		106	2,000,000		Unknown	32	3	2.5	iii	1.5	1.27	1.714	6.63	0.29	3.313	1.108	282391	17621228	6103267	12	67564	111862	67564	0.735	4665	55977	10784811	17	0.205	2215	38666	5164	68033	2120	4342	437	2.42	Provide Anchors	0.29	0.35	0.29	15.24	15.24	3	8916	5163.80732	OK
El Camino U.G[4]	36336 El Camino Road							1994		104	1,500,000		Unknown	26																																									
El Camino Upper	33030 Ridge Route Rd	34.54	-118.13	Welded	Flexible	Ringwall with Sand Inte	None Shown	1963		40	300,000		Unknown	32	3	2.5	iii	1.5	0.881	1.543	3.66	0.36	1.250	2.936	40212	2509253	1825481	12	9621	44129	9621	0.661	1249	15289	717357	22	0.258	185	4106	1263	15830	2120	1638	389	5.00	Provide Anchors	0.36	0.79	0.36	7.22	7.22	3	1371	1262.69341	OK
Walt Dahlitz	115 East Avenue S			Welded	Flexible	Concrete Ringwall, oil s	None Shown	1993		104	1,500,000		Unknown	31	3	2.5	iii	1.5	0.827	1.442	6.58	0.19	3.355	1.094	263341	16432470	5622265	12	65039	106378	65039	0.618	3621	42091	10122208	17	0.135	1362	22997	3869	47963	2086	4127	425	1.80	Provide Anchors	0.19	0.23	0.19	9.80	9.80	3	8455	3868.50122	OK
Well 14	36401 20th ST East			Weled?	Not Flexible	Concrete Ringwall, grav	3/4" 5' OC 8" embed			27	100,000		Unknown	22	3	2.5	iii	1.5	0.927	1.514	3.01	0.46	1.227	2.990	12596	786004	575712	8	4384	21166	4384	0.649	393	3325	220749	15	0.330	73	1119	400	3509	1758	760	275	4.80	Provide Anchors	0.46	1.23	0.46	6.24	6.24	3	435	399.685968	OK
Well 18 and 19	4640 Barrel Springs Road							1963		22	41,000		Unknown	30	3	2.5	iii	1.5	1.323	1.8	2.71	0.73	0.733	5.005	11404	711608	597846	13	2910	24053	2910	0.771	484	6262	120014	24	0.524	63	1513	488	6442	2052	845	369	11.47	Provide Anchors	0.73	2.17	0.73	8.06	8.06	3	387	488.300415	Needs Anchors
Well 5	1036 Barrel Spring Road							1963		30	1,463,945		Unknown	22	3	2.5	iii	1.5	1.311	1.782	3.18	0.62	1.364	2.691	15551	970375	680168	8	5412	23283	5412	0.764	546	4500	301560	15	0.442	133	1982	562	4918	1758	845	276	5.05	Provide Anchors	0.62	1.56	0.62	9.29	9.29	3	526	561.571023	Needs Anchors

1. Design spectral response acceleration parameters, S_{D1} and S_{DS}, have been determined using the Applied Technology Council's (ATC) web based hazard maps in accordance with the American Society of Civil Engineers Standard 7, Minimum Design Loads for Buildings and Other Structures (ASCE 7-10)

2. The Design spectrum for impulsive components, Sai and the Design Spectrum for convective components, Sac have been determined in accordance with Chapter 13 of the AWWA D100-11, Welded Carbon Steel Tnaks for Water Storage. These parameters are expressed as a percentage of the accelration due to gravity, g.

3. Facility list indicates that these facilities conatain 0 gallons and does not provide the overflow height, therefore we were not apple to determine the seismic demands on these structures.
4. AWWA D100 calculations do not apply to the El Camino Underground tank. Construction drawings are not available to perform an analysis at this time.
4. Minimum required freeboard is equal to the sloshing wave height for Use Group III and may be reduced for Use Group I and II

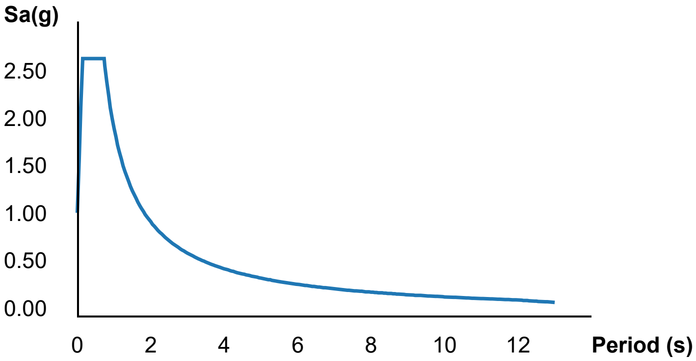
Hazards by Location

Search Information

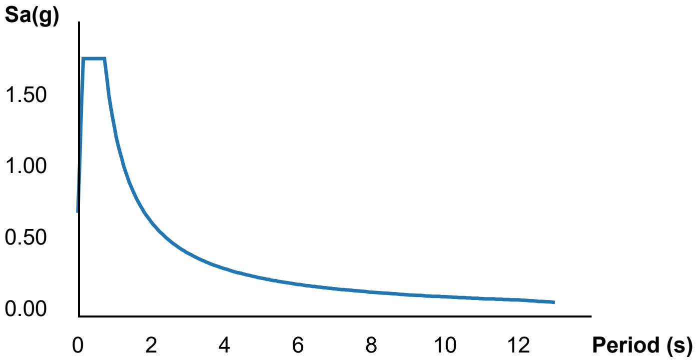
Coordinates:	34.557353817153206, -118.11224470422972
Elevation:	2750 ft
Timestamp:	2021-04-09T16:22:17.704Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

Map data ©2021 Imagery ©2021 , CNES / Airbus, Maxar Technologies, U.S. Geological Survey, USDA Farm Service Agency

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.707	MCE_R ground motion (period=0.2s)
S_1	1.315	MCE_R ground motion (period=1.0s)
S_{MS}	2.707	Site-modified spectral acceleration value
S_{M1}	1.973	Site-modified spectral acceleration value
S_{DS}	1.805	Numeric seismic design value at 0.2s SA
S_{D1}	1.315	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.919	Coefficient of risk (0.2s)
CR_1	0.903	Coefficient of risk (1.0s)

PGA	1.045	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	1.045	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.418	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.719	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.707	Factored deterministic acceleration value (0.2s)
S1RT	1.605	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.778	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.315	Factored deterministic acceleration value (1.0s)
PGAd	1.045	Factored deterministic acceleration value (PGA)

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Hazards by Location

Search Information

Coordinates:	34.53471326457233, -118.08343773439331
Elevation:	2968 ft
Timestamp:	2021-04-09T16:35:02.162Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

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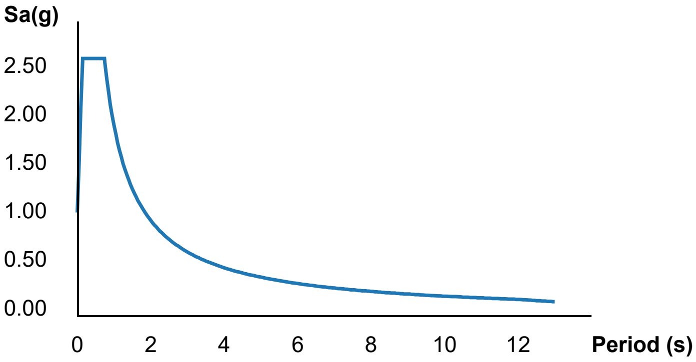
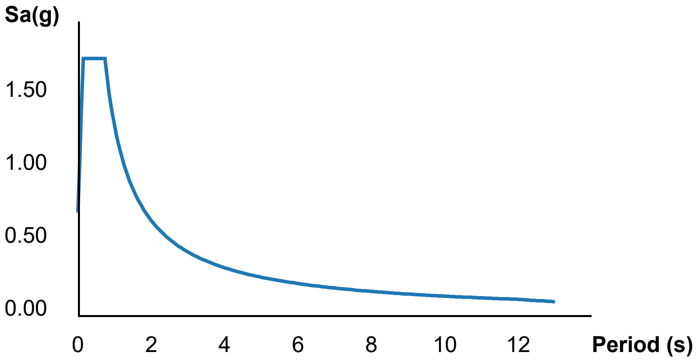
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.646	MCE_R ground motion (period=0.2s)
S_1	1.302	MCE_R ground motion (period=1.0s)
S_{MS}	2.646	Site-modified spectral acceleration value
S_{M1}	1.953	Site-modified spectral acceleration value
S_{DS}	1.764	Numeric seismic design value at 0.2s SA
S_{D1}	1.302	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.924	Coefficient of risk (0.2s)
CR_1	0.904	Coefficient of risk (1.0s)

PGA	1.018	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	1.018	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.282	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.552	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.646	Factored deterministic acceleration value (0.2s)
S1RT	1.53	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.694	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.302	Factored deterministic acceleration value (1.0s)
PGAd	1.018	Factored deterministic acceleration value (PGA)

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ATC Hazards by Location

Search Information

Address:	34547
Coordinates:	34.5497, -118.132821
Elevation:	2923 ft
Timestamp:	2021-04-08T21:00:34.329Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	III
Site Class:	D

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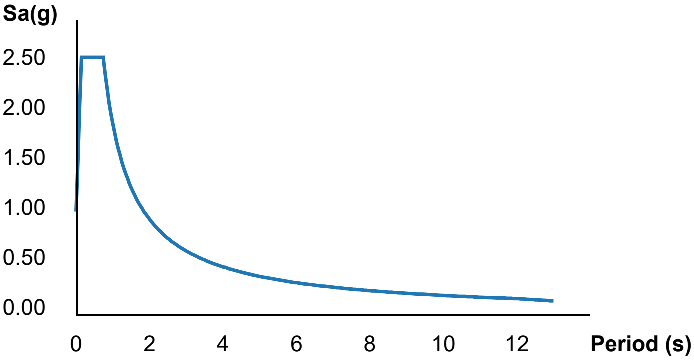
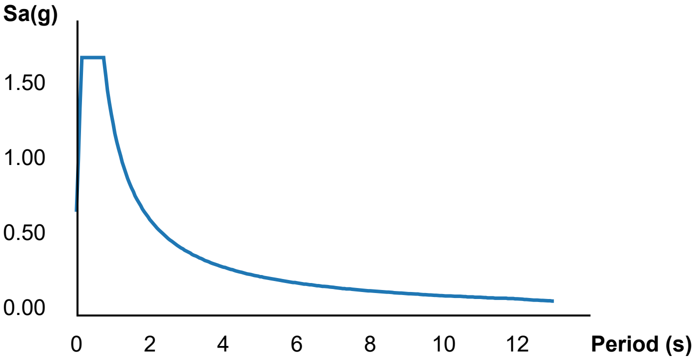
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.573	MCE_R ground motion (period=0.2s)
S_1	1.271	MCE_R ground motion (period=1.0s)
S_{MS}	2.573	Site-modified spectral acceleration value
S_{M1}	1.906	Site-modified spectral acceleration value
S_{DS}	1.715	Numeric seismic design value at 0.2s SA
S_{D1}	1.271	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	E	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.916	Coefficient of risk (0.2s)

CR_1	0.904	Coefficient of risk (1.0s)
PGA	0.987	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.987	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.429	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.743	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.573	Factored deterministic acceleration value (0.2s)
S1RT	1.614	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.785	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.271	Factored deterministic acceleration value (1.0s)
PGAd	0.987	Factored deterministic acceleration value (PGA)

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ATC Hazards by Location

Search Information

Coordinates:	34.559419345037064, -118.11618400870667
Elevation:	2750 ft
Timestamp:	2021-04-09T16:36:57.402Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

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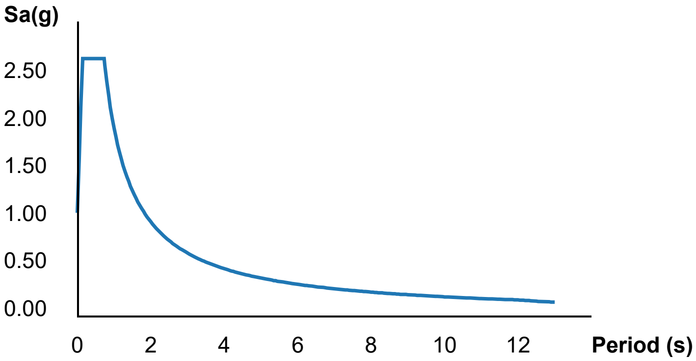
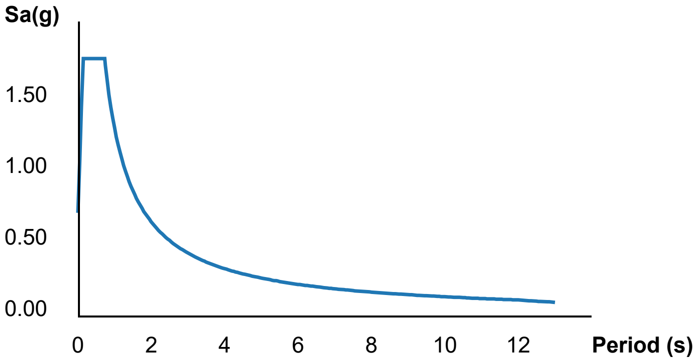
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.706	MCE_R ground motion (period=0.2s)
S_1	1.316	MCE_R ground motion (period=1.0s)
S_{MS}	2.706	Site-modified spectral acceleration value
S_{M1}	1.975	Site-modified spectral acceleration value
S_{DS}	1.804	Numeric seismic design value at 0.2s SA
S_{D1}	1.316	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.92	Coefficient of risk (0.2s)
CR_1	0.903	Coefficient of risk (1.0s)

PGA	1.046	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	1.046	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.37	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.665	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.706	Factored deterministic acceleration value (0.2s)
S1RT	1.58	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.749	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.316	Factored deterministic acceleration value (1.0s)
PGAd	1.046	Factored deterministic acceleration value (PGA)

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ATC Hazards by Location

Search Information

Coordinates:	34.55371, -118.087856
Elevation:	2752 ft
Timestamp:	2021-04-09T16:19:01.173Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

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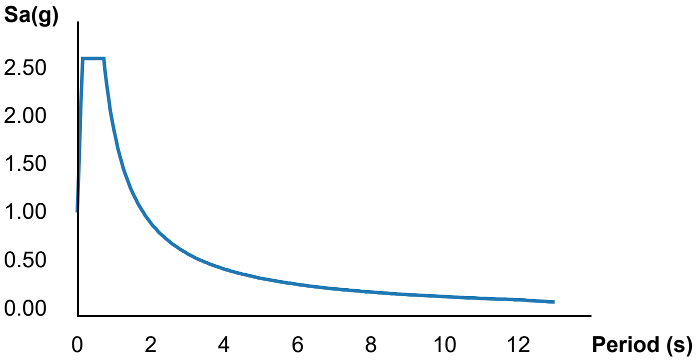
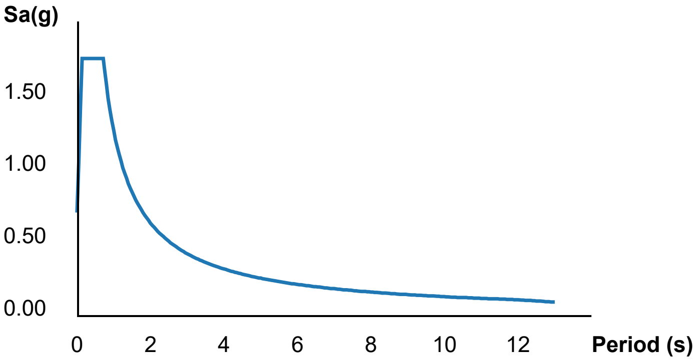
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.668	MCE_R ground motion (period=0.2s)
S_1	1.278	MCE_R ground motion (period=1.0s)
S_{MS}	2.668	Site-modified spectral acceleration value
S_{M1}	1.917	Site-modified spectral acceleration value
S_{DS}	1.779	Numeric seismic design value at 0.2s SA
S_{D1}	1.278	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.919	Coefficient of risk (0.2s)
CR_1	0.902	Coefficient of risk (1.0s)

PGA	1.031	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	1.031	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.432	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.737	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.668	Factored deterministic acceleration value (0.2s)
S1RT	1.613	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.788	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.278	Factored deterministic acceleration value (1.0s)
PGAd	1.031	Factored deterministic acceleration value (PGA)

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ATC Hazards by Location

Search Information

Coordinates:	34.55371, -118.087856
Elevation:	2752 ft
Timestamp:	2021-04-09T16:17:53.781Z
Hazard Type:	Seismic
Reference Document:	ASCE7-16
Risk Category:	IV
Site Class:	D-default

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Basic Parameters

Name	**Value**	**Description**
S_S	2.404	MCE_R ground motion (period=0.2s)
S_1	1.025	MCE_R ground motion (period=1.0s)
S_{MS}	2.885	Site-modified spectral acceleration value
S_{M1}	* null	Site-modified spectral acceleration value
S_{DS}	1.923	Numeric seismic design value at 0.2s SA
S_{D1}	* null	Numeric seismic design value at 1.0s SA

* See Section 11.4.8

▾Additional Information

Name	**Value**	**Description**
SDC	* null	Seismic design category
F_a	1.2	Site amplification factor at 0.2s
F_v	* null	Site amplification factor at 1.0s
CR_S	0.874	Coefficient of risk (0.2s)
CR_1	0.869	Coefficient of risk (1.0s)
PGA	1.033	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	1.24	Site modified peak ground acceleration

T_L	12	Long-period transition period (s)
SsRT	3.008	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.441	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.404	Factored deterministic acceleration value (0.2s)
S1RT	1.294	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.489	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.025	Factored deterministic acceleration value (1.0s)
PGAd	1.033	Factored deterministic acceleration value (PGA)

* See Section 11.4.8

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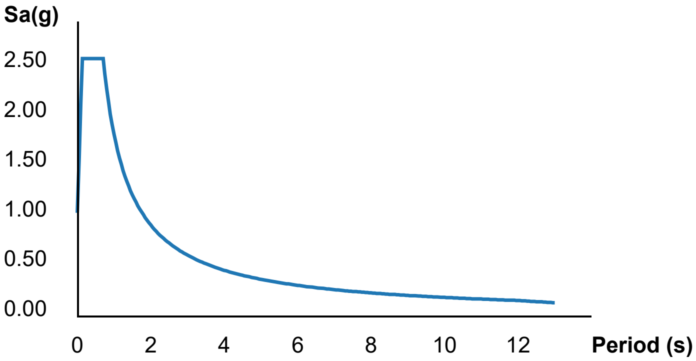
Hazards by Location

Search Information

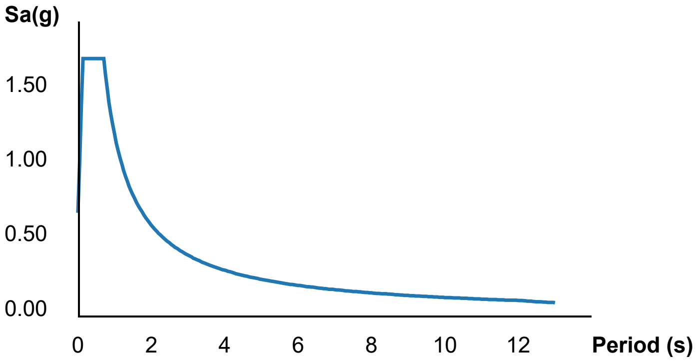
Map data ©2021 Imagery ©2021 , CNES / Airbus, Maxar Technologies, U.S. Geological Survey, USDA Farm Service Agency

Coordinates:	34.544961034712664, -118.04877924893493
Elevation:	2740 ft
Timestamp:	2021-04-09T16:27:34.922Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.584	MCE_R ground motion (period=0.2s)
S_1	1.214	MCE_R ground motion (period=1.0s)
S_{MS}	2.584	Site-modified spectral acceleration value
S_{M1}	1.821	Site-modified spectral acceleration value
S_{DS}	1.723	Numeric seismic design value at 0.2s SA
S_{D1}	1.214	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.921	Coefficient of risk (0.2s)
CR_1	0.905	Coefficient of risk (1.0s)

PGA	0.996	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.996	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.159	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.432	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.584	Factored deterministic acceleration value (0.2s)
S1RT	1.47	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.624	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.214	Factored deterministic acceleration value (1.0s)
PGAd	0.996	Factored deterministic acceleration value (PGA)

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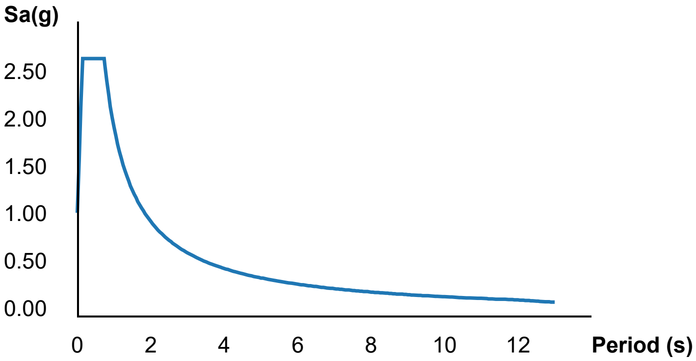
ATC Hazards by Location

Search Information

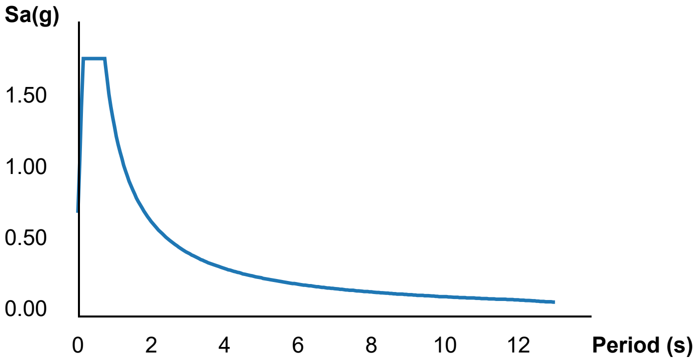
Coordinates:	34.52903336279662, -118.04584351481934
Elevation:	2971 ft
Timestamp:	2021-04-09T16:31:06.633Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

Map data ©2021 Imagery ©2021 , CNES / Airbus, Maxar Technologies, U.S. Geological Survey, USDA Farm Service Agency

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.714	MCE_R ground motion (period=0.2s)
S_1	1.325	MCE_R ground motion (period=1.0s)
S_{MS}	2.714	Site-modified spectral acceleration value
S_{M1}	1.987	Site-modified spectral acceleration value
S_{DS}	1.81	Numeric seismic design value at 0.2s SA
S_{D1}	1.325	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.923	Coefficient of risk (0.2s)
CR_1	0.905	Coefficient of risk (1.0s)

PGA	1.048	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	1.048	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.142	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.404	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.714	Factored deterministic acceleration value (0.2s)
S1RT	1.461	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.614	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.325	Factored deterministic acceleration value (1.0s)
PGAd	1.048	Factored deterministic acceleration value (PGA)

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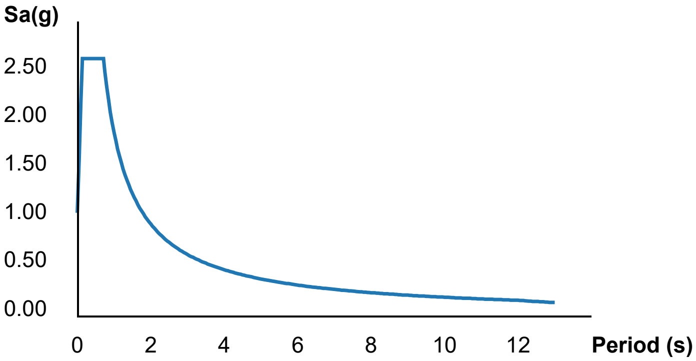
Hazards by Location

Search Information

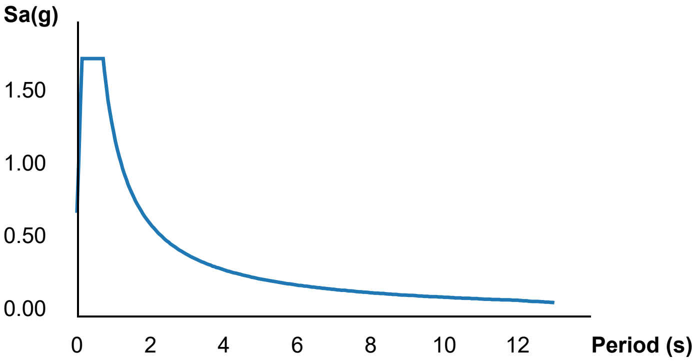
Coordinates:	34.536316858195896, -118.04017088147585
Elevation:	2825 ft
Timestamp:	2021-04-09T16:33:04.897Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

Map data ©2021 Imagery ©2021 , CNES / Airbus, Maxar Technologies, U.S. Geological Survey, USDA Farm Service Agency

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.652	MCE_R ground motion (period=0.2s)
S_1	1.26	MCE_R ground motion (period=1.0s)
S_{MS}	2.652	Site-modified spectral acceleration value
S_{M1}	1.889	Site-modified spectral acceleration value
S_{DS}	1.768	Numeric seismic design value at 0.2s SA
S_{D1}	1.26	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.923	Coefficient of risk (0.2s)
CR_1	0.905	Coefficient of risk (1.0s)

PGA	1.024	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	1.024	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.121	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.381	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.652	Factored deterministic acceleration value (0.2s)
S1RT	1.449	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.602	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.26	Factored deterministic acceleration value (1.0s)
PGAd	1.024	Factored deterministic acceleration value (PGA)

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ATC Hazards by Location

Search Information

Coordinates:	34.54972773620536, -118.1502535834671
Elevation:	3116 ft
Timestamp:	2021-04-09T16:41:41.594Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

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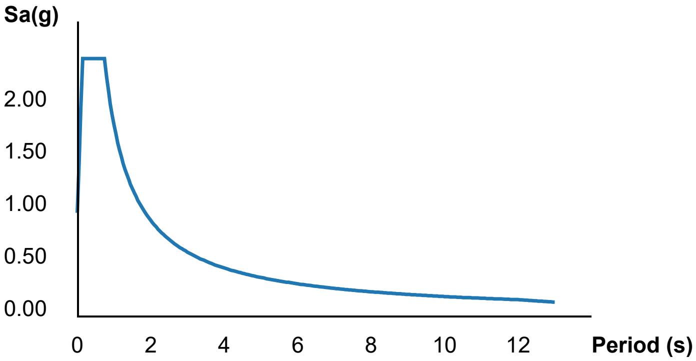
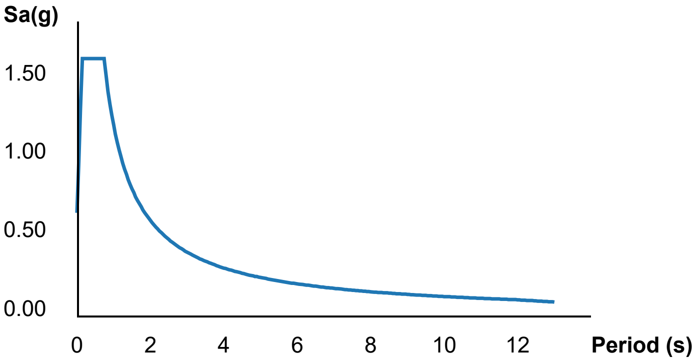
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.458	MCE$_R$ ground motion (period=0.2s)
S_1	1.214	MCE$_R$ ground motion (period=1.0s)
S_{MS}	2.458	Site-modified spectral acceleration value
S_{M1}	1.82	Site-modified spectral acceleration value
S_{DS}	1.639	Numeric seismic design value at 0.2s SA
S_{D1}	1.214	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.916	Coefficient of risk (0.2s)
CR_1	0.906	Coefficient of risk (1.0s)

PGA	0.945	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.945	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.335	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.642	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.458	Factored deterministic acceleration value (0.2s)
S1RT	1.566	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.728	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.214	Factored deterministic acceleration value (1.0s)
PGAd	0.945	Factored deterministic acceleration value (PGA)

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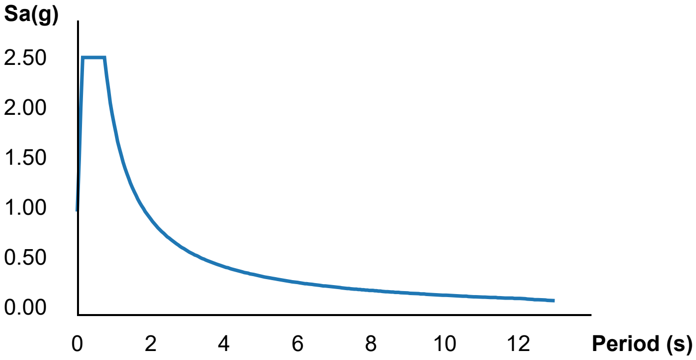
Hazards by Location

Search Information

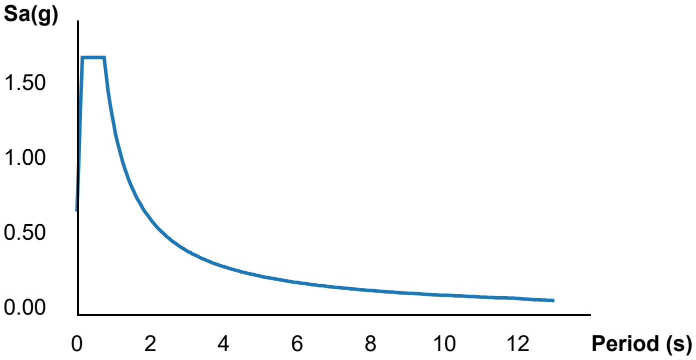
Address:	36809 El Camino Dr, Palmdale, CA 93551, USA
Coordinates:	34.54952240000001, -118.1326806
Elevation:	2925 ft
Timestamp:	2021-04-09T16:20:57.078Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

Map data ©2021 Imagery ©2021 , Maxar Technologies, U.S. Geological Survey, USDA Farm Service Agency

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.571	MCE$_R$ ground motion (period=0.2s)
S_1	1.27	MCE$_R$ ground motion (period=1.0s)
S_{MS}	2.571	Site-modified spectral acceleration value
S_{M1}	1.905	Site-modified spectral acceleration value
S_{DS}	1.714	Numeric seismic design value at 0.2s SA
S_{D1}	1.27	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.916	Coefficient of risk (0.2s)

CR_1	0.904	Coefficient of risk (1.0s)
PGA	0.986	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.986	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.426	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.74	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.571	Factored deterministic acceleration value (0.2s)
S1RT	1.613	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.783	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.27	Factored deterministic acceleration value (1.0s)
PGAd	0.986	Factored deterministic acceleration value (PGA)

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ATC Hazards by Location

Search Information

Coordinates:	34.53840630847815, -118.13288506137695
Elevation:	3359 ft
Timestamp:	2021-04-09T20:04:43.993Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

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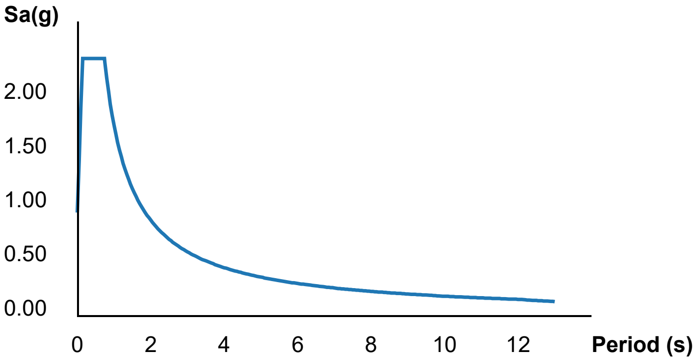
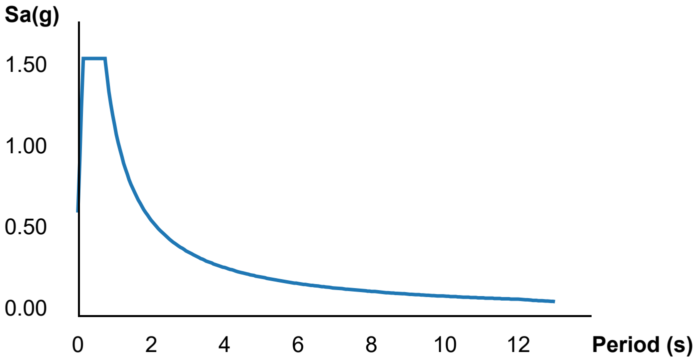


MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum

Basic Parameters

Name	Value	Description
S_S	2.375	MCE$_R$ ground motion (period=0.2s)
S_1	1.171	MCE$_R$ ground motion (period=1.0s)
S_{MS}	2.375	Site-modified spectral acceleration value
S_{M1}	1.756	Site-modified spectral acceleration value
S_{DS}	1.583	Numeric seismic design value at 0.2s SA
S_{D1}	1.171	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.925	Coefficient of risk (0.2s)
CR_1	0.908	Coefficient of risk (1.0s)

PGA	0.917	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.917	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.236	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.499	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.375	Factored deterministic acceleration value (0.2s)
S1RT	1.505	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.657	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.171	Factored deterministic acceleration value (1.0s)
PGAd	0.917	Factored deterministic acceleration value (PGA)

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Hazards by Location

Search Information

Coordinates:	34.56128566737895, -118.12898168848265
Elevation:	2924 ft
Timestamp:	2021-04-09T20:40:24.218Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

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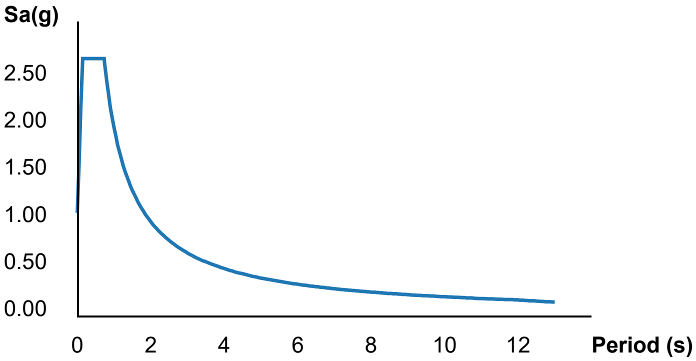
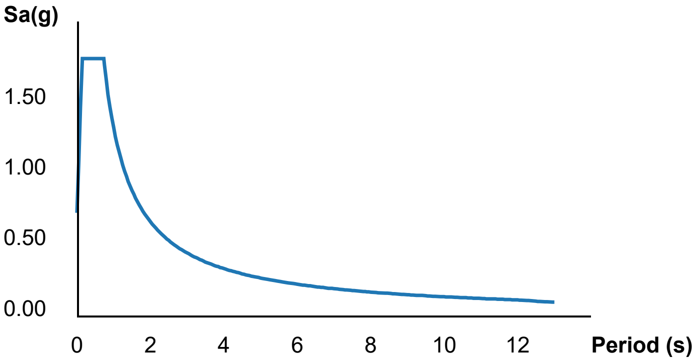
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.733	MCE$_R$ ground motion (period=0.2s)
S_1	1.331	MCE$_R$ ground motion (period=1.0s)
S_{MS}	2.733	Site-modified spectral acceleration value
S_{M1}	1.997	Site-modified spectral acceleration value
S_{DS}	1.822	Numeric seismic design value at 0.2s SA
S_{D1}	1.331	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.92	Coefficient of risk (0.2s)
CR_1	0.904	Coefficient of risk (1.0s)

PGA	1.055	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	1.055	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.306	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.594	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.733	Factored deterministic acceleration value (0.2s)
S1RT	1.547	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.71	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.331	Factored deterministic acceleration value (1.0s)
PGAd	1.055	Factored deterministic acceleration value (PGA)

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Hazards by Location

Search Information

Address:	34547
Coordinates:	34.538438, -118.132863
Elevation:	3360 ft
Timestamp:	2021-04-08T22:06:10.243Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	III
Site Class:	D

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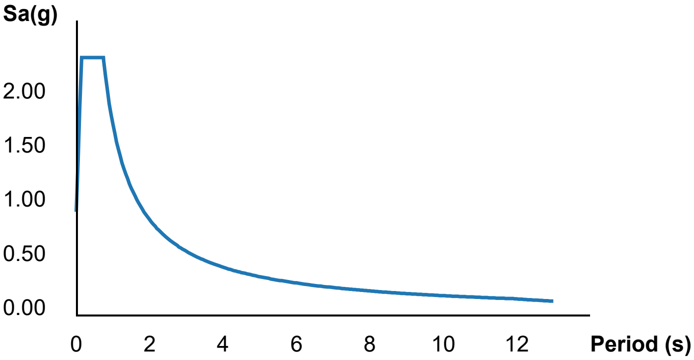
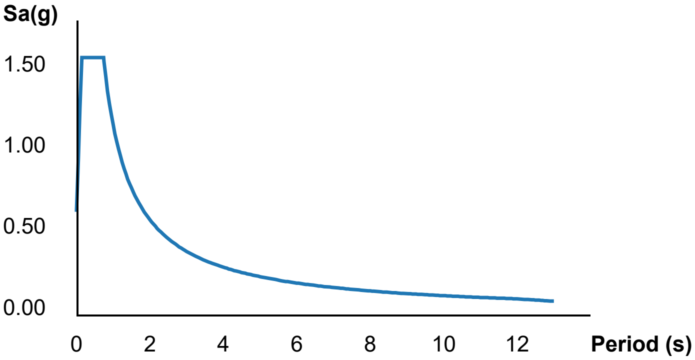
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.376	MCE_R ground motion (period=0.2s)
S_1	1.171	MCE_R ground motion (period=1.0s)
S_{MS}	2.376	Site-modified spectral acceleration value
S_{M1}	1.757	Site-modified spectral acceleration value
S_{DS}	1.584	Numeric seismic design value at 0.2s SA
S_{D1}	1.171	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	E	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.925	Coefficient of risk (0.2s)

CR_1	0.908	Coefficient of risk (1.0s)
PGA	0.917	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.917	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.236	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.5	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.376	Factored deterministic acceleration value (0.2s)
S1RT	1.505	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.657	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.171	Factored deterministic acceleration value (1.0s)
PGAd	0.917	Factored deterministic acceleration value (PGA)

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Hazards by Location

Search Information

Coordinates:	34.598759799594845, -118.09844223112182
Elevation:	2583 ft
Timestamp:	2021-04-09T20:48:48.917Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

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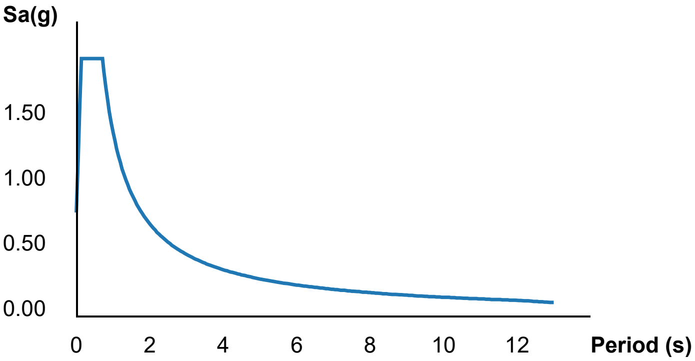
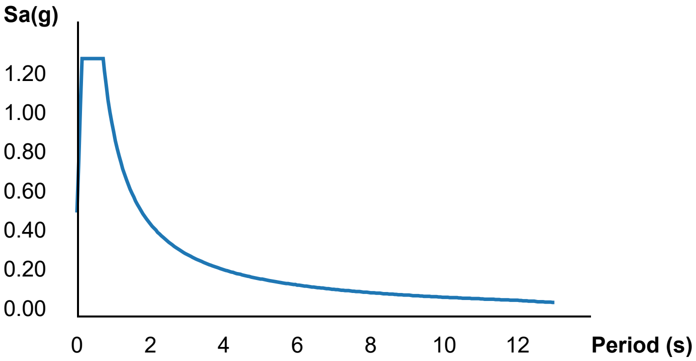
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	1.971	MCE$_R$ ground motion (period=0.2s)
S_1	0.937	MCE$_R$ ground motion (period=1.0s)
S_{MS}	1.971	Site-modified spectral acceleration value
S_{M1}	1.406	Site-modified spectral acceleration value
S_{DS}	1.314	Numeric seismic design value at 0.2s SA
S_{D1}	0.937	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.937	Coefficient of risk (0.2s)
CR_1	0.911	Coefficient of risk (1.0s)

PGA	0.77	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.77	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	2.602	Probabilistic risk-targeted ground motion (0.2s)
SsUH	2.776	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	1.971	Factored deterministic acceleration value (0.2s)
S1RT	1.168	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.282	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	0.937	Factored deterministic acceleration value (1.0s)
PGAd	0.77	Factored deterministic acceleration value (PGA)

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ATC Hazards by Location

Search Information

Address:	1036 Barrel Spring Road palmdale, ca
Coordinates:	34.5457226, -118.1085956
Elevation:	2817 ft
Timestamp:	2021-05-04T20:11:47.998Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	III
Site Class:	D

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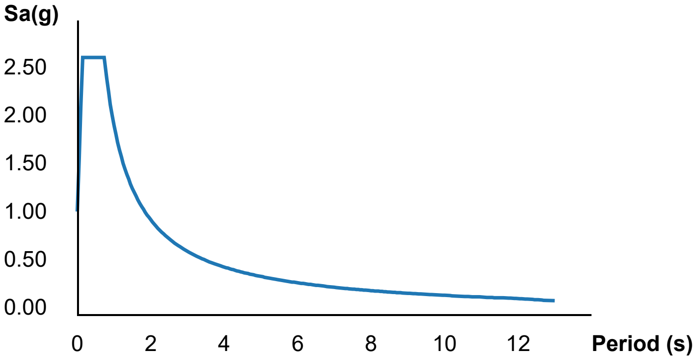
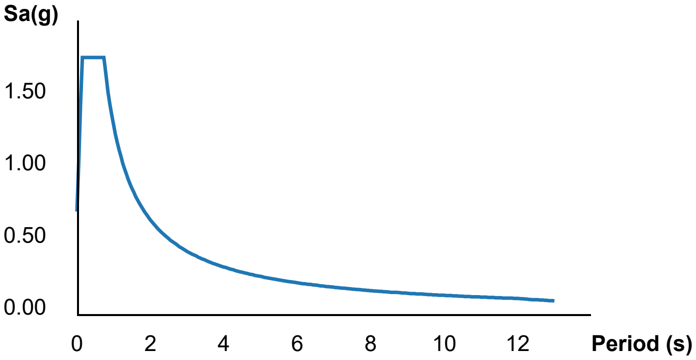
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.674	MCE$_R$ ground motion (period=0.2s)
S_1	1.311	MCE$_R$ ground motion (period=1.0s)
S_{MS}	2.674	Site-modified spectral acceleration value
S_{M1}	1.967	Site-modified spectral acceleration value
S_{DS}	1.782	Numeric seismic design value at 0.2s SA
S_{D1}	1.311	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	E	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.919	Coefficient of risk (0.2s)

CR_1	0.902	Coefficient of risk (1.0s)
PGA	1.029	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	1.029	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.49	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.799	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.674	Factored deterministic acceleration value (0.2s)
S1RT	1.643	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.821	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.311	Factored deterministic acceleration value (1.0s)
PGAd	1.029	Factored deterministic acceleration value (PGA)

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ATC Hazards by Location

Search Information

Address:	15 4640 Barrel Spring Road palmdale, ca
Coordinates:	34.5268275, -118.0540864
Elevation:	3036 ft
Timestamp:	2021-05-04T20:14:23.952Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	III
Site Class:	D

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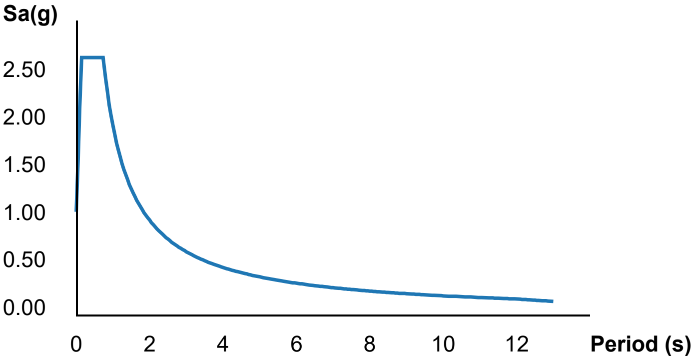
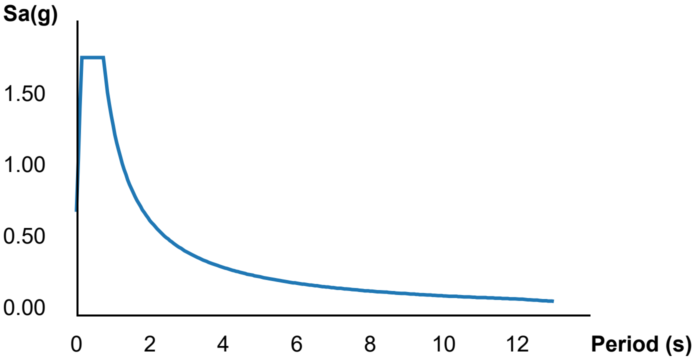
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.7	MCE$_R$ ground motion (period=0.2s)
S_1	1.323	MCE$_R$ ground motion (period=1.0s)
S_{MS}	2.7	Site-modified spectral acceleration value
S_{M1}	1.984	Site-modified spectral acceleration value
S_{DS}	1.8	Numeric seismic design value at 0.2s SA
S_{D1}	1.323	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	E	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.924	Coefficient of risk (0.2s)

CR_1	0.905	Coefficient of risk (1.0s)
PGA	1.04	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	1.04	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.149	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.409	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.7	Factored deterministic acceleration value (0.2s)
S1RT	1.464	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.617	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.323	Factored deterministic acceleration value (1.0s)
PGAd	1.04	Factored deterministic acceleration value (PGA)

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

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															AWWA D100-11 Welded Carbon Steel Tanks Chapter 13 Seismic Design																																								
Tank Site	Address	Coordinates		Tank Details												Table 28	13.2.1	Table 24	ATC^1	Eqn 13-9^{1,2}	Eqn 13-22	Eqn 13-12/13^2				13-27	13-25/26	Eqn 13-28/29	Estimate	Estimate	Estimate	Eqn 13-16		Eqn 13-24/25		Eqn 13-30			Eqn 13-26	Eqn 13-31	Eqn 13-23	Eqn 13-37		Eqn 13-41	Eqn 13-36		Eqn 13-53/54			Eqn 13-52	Table 29		Eqn 13-57		
		Latitude	Longitude	Tank Type	Piping Connection	Footing	Anchorage	Date Built		Dia	Size	Bottom of the Knuckle	Top of Knuckle	Overflow Height	Freeboard Assumed to be 3 feet unless drawings indicate otherwise	Ri 3 if anchored 2.5 if unanchored	Seismic Use Group	I_E, assume that all tanks are Seismic Use Group III	Sd1, per ATC Seismic Hazard Maps	Sai, g Based on Sds from ASCE 7-10	Sloshing Period, Tc(Ss	Sac, g Based on Sd1 from ASCE 7-10	D/H	3.67*D/H	Volume ft^3 Vol = π*(Dia^2)/4	Total Weight, lbf W = Vol*62.4pcf	Impulsive Weight, Moves with Tank, (Wi)	Centroid of the lateral Force due to Sloshing (Xi), ft	Weight of the Roof (Wr), lbf	Weight of the Shell (Ws), lbf	Weight of the Floor (Wf), lbf	Implusive Design Acceleration (Ai)	Impulsive Lateral Force (Vi), kip	Overturning Moment due to Impulsive Lateral Force(Mi), ft-kip	Convective Weight (Wc), lbf	Centroid of the lateral force do to convective mass (Xc), ft	Convective Design Acceleration (Ai)	Convective Lateral Force (Vc), kip	Overturning Moment due to Convective Lateral Force(Mc), ft-kip	Design Lateral Force at the top of the foundation (Vf), kip	Design Overturning Moment (Ms), ft-kip Ms = $\sqrt{(Mi^2+Mc^2)}$	Maximum Resting Weight of the Tank Contents (wL), lbf/ft		Weight of the Tank Shell and Roof Resisting Overturning (wt), lbf/ft	Overturning Ratio, J	Anchor Requirements	Convective Design Accelaration, Af			Sloshing Wave Height (d), ft	Minimum Required Freeboard (D), ft	Actual Freeboard (Roof Height-Overflow)	Allowable Lateral Load, V_{allow} (kip)	Total Lateral Seismic Load, Vt (Kip)	Sliding Check
3 MG Tank Site	850 East Avenue S	34.56	-118.11	Welded				1960		124	3,000,000		Unknown	34	3	2.5	iii	1.5	1.315	1.805	7.35	0.27	3.647	1.006	410594	25621040	8082906	13	92459	138480	92459	0.774	6503	82912	16424329	18	0.192	3150	57649	7226	100984	2185	5396	474	2.54	Provide Anchors	0.27	0.29	0.27	16.65	16.65	3	12851	7225.51729	OK
5 MG Tank	2404 Old Nadeau Road	34.53	-118.08							160	5,000,000		Unknown	20	3	2.5	iii	1.5	1.302	1.764	11.13	0.13	8.000	0.459	402124	25092529	3621894	8	153938	104550	153938	0.756	3050	22875	19810034	10	0.090	1784	18144	3533	29197	1676	4096	361	0.57	Tank Is Stable	0.18	0.13	0.13	10.08	10.08	3	12338	3533.2461	OK
6MG	641 East Ave S	34.56	-118.15					1999		206	6,000,000		Unknown	24	3	2.5	iii	1.5	1.316	1.804	13.03	0.09	8.583	0.428	799900	49913745	6714999	9	255176	160865	255176	0.773	5711	51395	39739497	12	0.066	2640	32159	6291	60628	1836	6328	446	0.64	Tank Is Stable	0.15	0.09	0.09	9.58	9.58	3	24349	6291.49113	OK
25th Street	26496 Cemetary Road	34.55	-118.09					1976		106	2,000,000		Unknown	30	3	2.5	iii	1.5	1.316	1.804	6.74	0.29	3.533	1.039	264742	16519902	5375203	11	67564	104870	67564	0.773	4341	48840	10436273	16	0.209	2185	35431	4860	60339	2052	4070	416	2.23	Provide Anchors	0.29	0.35	0.29	15.53	15.53	3	8304	4860.10557	OK
				Welded	Not Flexible	Ringwall with Sand Interior		1967		154	4,000,000		Unknown	30	3	2.5	iii	1.5	1.278	1.779	9.13	0.18	5.133	0.715	558795	34868813	7841520	11	142609	151052	142609	0.762	6311	71001	25267634	16	0.131	3318	51781	7130	87878	2052	5914	460	1.51	Uplift but Stable	0.21	0.18	0.18	14.15	14.15	3	17380	7130.09689	OK
45th Street	36510 45th St East	34.54	-118.05					1988		130	3,000,000		Unknown	30	3	2.5	iii	1.5	1.214	1.723	7.92	0.23	4.333	0.847	398197	24847485	6614006	11	101623	127961	101623	0.738	5129	57696	17074207	16	0.164	2805	44414	5845	72811	2052	4992	438	1.77	Provide Anchors	0.23	0.23	0.23	14.95	14.95	3	12488	5845.27581	OK
								1990		150	4,000,000		Unknown	32	3	2.5	iii	1.5	1.214	1.723	8.73	0.19	4.688	0.783	565487	35286369	8687384	12	135297	157017	135297	0.738	6731	80769	24894926	17	0.137	3398	56992	7540	98852	2120	6144	477	1.74	Provide Anchors	0.21	0.19	0.19	14.33	14.33	3	17687	7540.06677	OK
								1990		150	4,000,000		Unknown	32	3	2.5	iii	1.5	1.214	1.723	8.73	0.19	4.688	0.783	565487	35286369	8687384	12	135297	157017	135297	0.738	6731	80769	24894926	17	0.137	3398	56992	7540	98852	2120	6144	477	1.74	Provide Anchors	0.21	0.19	0.19	14.33	14.33	3	17687	7540.06677	OK
47th Street	35645 47th St East	34.53	-118.05					1967		106	2,000,000		Unknown	30	3	2.5	iii	1.5	1.325	1.81	6.74	0.30	3.533	1.039	264742	16519902	5375203	11	67564	104870	67564	0.776	4356	49003	10436273	16	0.211	2200	35674	4880	60613	2052	4070	416	2.24	Provide Anchors	0.30	0.35	0.30	15.64	15.64	3	8301	4879.72502	OK
								1990		132	3,000,000		Unknown	30	3	2.5	iii	1.5	1.325	1.81	8.02	0.25	4.400	0.834	410543	25617904	6716566	11	104774	129885	104774	0.776	5473	61576	17698347	16	0.177	3126	49427	6303	78960	2052	5069	440	1.87	Provide Anchors	0.25	0.25	0.25	16.32	16.32	3	12801	6303.06969	OK
50th Street	5001 East Ave, T-8	34.54	-118.04					2007		150	4,000,000		Unknown	30	3	2.5	iii	1.5	1.26	1.768	8.93	0.19	5.000	0.734	530144	33080971	7637298	11	135297	147203	135297	0.758	6103	68664	23796213	16	0.135	3223	50405	6902	85178	2052	5760	456	1.55	Provide Anchors	0.21	0.19	0.19	14.22	14.22	3	16514	6902.16829	OK
				Welded?	?	Concrete Ring Wall	None Shown	2007		150	4,000,000		Unknown		3	2.5	iii	1.5	1.26	1.768	8.93	0.19	5.000	0.734	530144	33080971	7637298	11	135297	147203	135297	0.758	6103	68664	23796213	16	0.135	3223	50405	6902	85178	2052	5760	456	1.55	Provide Anchors	0.21	0.19	0.19	14.22	14.22	3	16514	6902.16829	OK
Ana Verde	36800 Tovey Aveneu	34.55	-118.15	Welded	Not Flexible	Concrete Rink wall	Not Shown	1963		40	300,000		Unknown	32	3	2.5	iii	1.5	1.214	1.639	3.66	0.50	1.250	2.936	40212	2509253	1825481	12	9621	44129	9621	0.702	1327	16240	717357	22	0.355	255	5658	1351	17197	2120	1638	389	5.44	Provide Anchors	0.50	1.09	0.50	9.95	9.95	3	1363	1351.04608	OK
El Camino Lower	36809 El Camino Dr.	34.55	-118.13					1988		106	2,000,000		Unknown	32	3	2.5	iii	1.5	1.27	1.714	6.63	0.29	3.313	1.108	282391	17621228	6103267	12	67564	111862	67564	0.735	4665	55977	10784811	17	0.205	2215	38666	5164	68033	2120	4342	437	2.42	Provide Anchors	0.29	0.35	0.29	15.24	15.24	3	8916	5163.80732	OK
El Camino U.G^4	36336 El Camino Road							1994		104	1,500,000		Unknown	26																																									
El Camino Upper	33030 Ridge Route Rd	34.54	-118.13	Welded	Flexible	Ringwall with Sand Inte	None Shown	1963		40	300,000		Unknown	32	3	2.5	iii	1.5	0.881	1.543	3.66	0.36	1.250	2.936	40212	2509253	1825481	12	9621	44129	9621	0.661	1249	15289	717357	22	0.258	185	4106	1263	15830	2120	1638	389	5.00	Provide Anchors	0.36	0.79	0.36	7.22	7.22	3	1371	1262.69341	OK
Walt Dahlitz	115 East Avenue S			Welded	Flexible	Concrete Ringwall, oil s	None Shown	1993		104	1,500,000		Unknown	31	3	2.5	iii	1.5	0.827	1.442	6.58	0.19	3.355	1.094	263341	16432470	5622265	12	65039	106378	65039	0.618	3621	42091	10122208	17	0.135	1362	22997	3869	47963	2086	4127	425	1.80	Provide Anchors	0.19	0.23	0.19	9.80	9.80	3	8455	3868.50122	OK
Well 14	36401 20th ST East			Weled?	Not Flexible	Concrete Ringwall, grav	3/4" 5' OC 8" embed			27	100,000		Unknown	22	3	2.5	iii	1.5	0.927	1.514	3.01	0.46	1.227	2.990	12596	786004	575712	8	4384	21166	4384	0.649	393	3325	220749	15	0.330	73	1119	400	3509	1758	760	275	4.80	Provide Anchors	0.46	1.23	0.46	6.24	6.24	3	435	399.685968	OK
Well 18 and 19	4640 Barrel Springs Road							1963		22	41,000		Unknown	30	3	2.5	iii	1.5	1.323	1.8	2.71	0.73	0.733	5.005	11404	711608	597846	13	2910	24053	2910	0.771	484	6262	120014	24	0.524	63	1513	488	6442	2052	845	369	11.47	Provide Anchors	0.73	2.17	0.73	8.06	8.06	3	387	488.300415	Needs Anchors
Well 5	1036 Barrel Spring Road							1963		30	1,463,945		Unknown	22	3	2.5	iii	1.5	1.311	1.782	3.18	0.62	1.364	2.691	15551	970375	680168	8	5412	23283	5412	0.764	546	4500	301560	15	0.442	133	1982	562	4918	1758	845	276	5.05	Provide Anchors	0.62	1.56	0.62	9.29	9.29	3	526	561.571023	Needs Anchors

1. Design spectral response acceleration parameters, S_{D1} and S_{DS}, have been determined using the Applied Technology Council's (ATC) web based hazard maps in accordance with the American Society of Civil Engineers Standard 7, Minimum Design Loads for Buildings and Other Structures (ASCE 7-10)

2. The Design spectrum for impulsive components, Sai and the Design Spectrum for convective components, Sac have been determined in accordance with Chapter 13 of the AWWA D100-11, Welded Carbon Steel Tnaks for Water Storage. These parameters are expressed as a percentage of the accelration due to gravity, g.

3. Facility list indicates that these facilities conatain 0 gallons and does not provide the overflow height, therefore we were not apple to determine the seismic demands on these structures.
4. AWWA D100 calculations do not apply to the El Camino Underground tank. Construction drawings are not available to perform an analysis at this time.
4. Minimum required freeboard is equal to the sloshing wave height for Use Group III and may be reduced for Use Group I and II

Hazards by Location

Search Information

Coordinates:	34.557353817153206, -118.11224470422972
Elevation:	2750 ft
Timestamp:	2021-04-09T16:22:17.704Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

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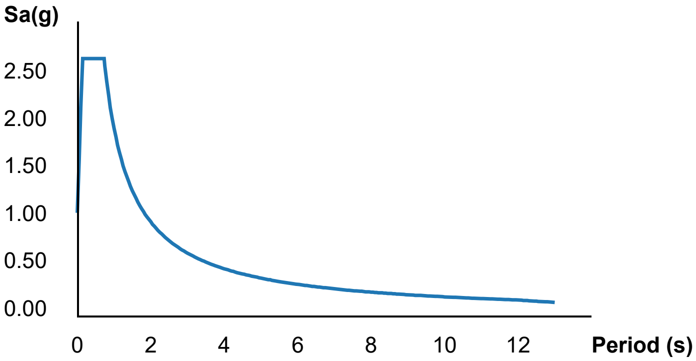
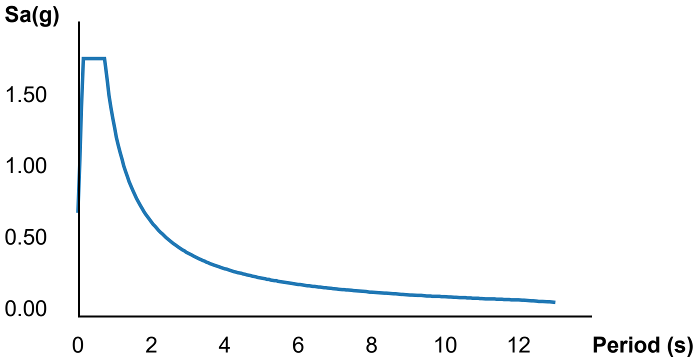
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.707	MCE$_R$ ground motion (period=0.2s)
S_1	1.315	MCE$_R$ ground motion (period=1.0s)
S_{MS}	2.707	Site-modified spectral acceleration value
S_{M1}	1.973	Site-modified spectral acceleration value
S_{DS}	1.805	Numeric seismic design value at 0.2s SA
S_{D1}	1.315	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.919	Coefficient of risk (0.2s)
CR_1	0.903	Coefficient of risk (1.0s)

PGA	1.045	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	1.045	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.418	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.719	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.707	Factored deterministic acceleration value (0.2s)
S1RT	1.605	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.778	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.315	Factored deterministic acceleration value (1.0s)
PGAd	1.045	Factored deterministic acceleration value (PGA)

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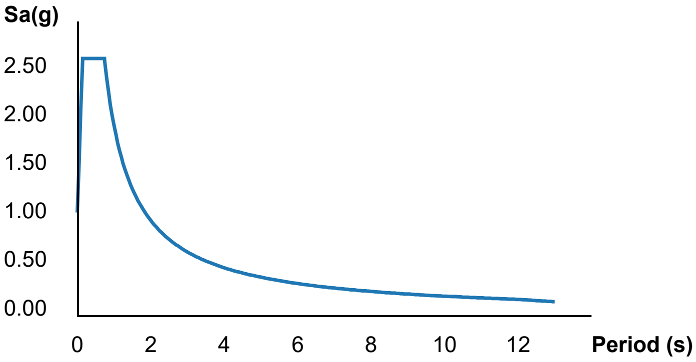
ATC Hazards by Location

Search Information

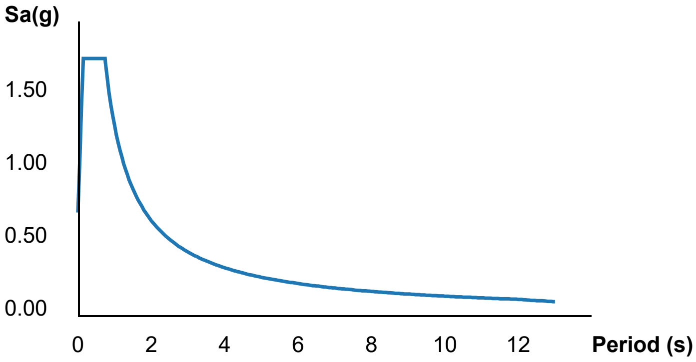
Coordinates:	34.53471326457233, -118.08343773439331
Elevation:	2968 ft
Timestamp:	2021-04-09T16:35:02.162Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

Map data ©2021 Imagery ©2021 , CNES / Airbus, Maxar Technologies, U.S. Geological Survey, USDA Farm Service Agency

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.646	MCE$_R$ ground motion (period=0.2s)
S_1	1.302	MCE$_R$ ground motion (period=1.0s)
S_{MS}	2.646	Site-modified spectral acceleration value
S_{M1}	1.953	Site-modified spectral acceleration value
S_{DS}	1.764	Numeric seismic design value at 0.2s SA
S_{D1}	1.302	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.924	Coefficient of risk (0.2s)
CR_1	0.904	Coefficient of risk (1.0s)

PGA	1.018	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	1.018	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.282	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.552	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.646	Factored deterministic acceleration value (0.2s)
S1RT	1.53	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.694	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.302	Factored deterministic acceleration value (1.0s)
PGAd	1.018	Factored deterministic acceleration value (PGA)

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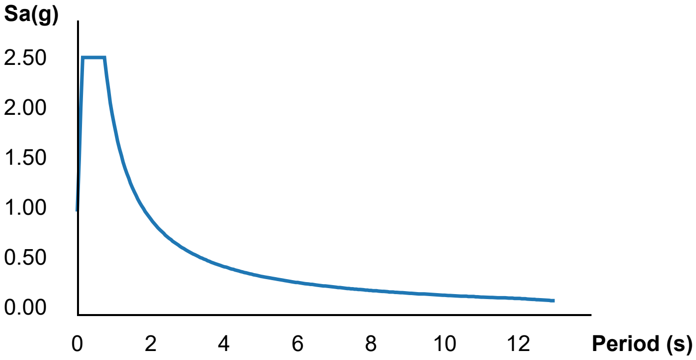
ATC Hazards by Location

Search Information

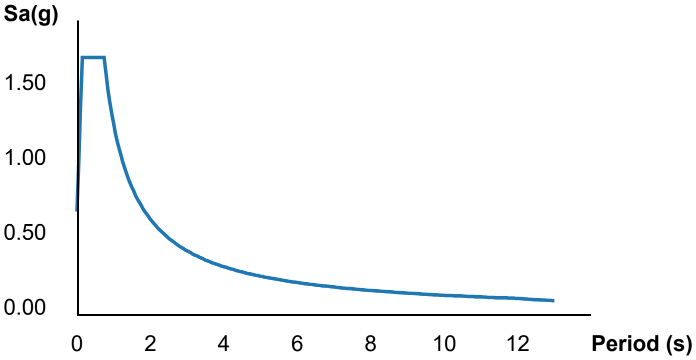
Address:	34547
Coordinates:	34.5497, -118.132821
Elevation:	2923 ft
Timestamp:	2021-04-08T21:00:34.329Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	III
Site Class:	D

Map data ©2021 Imagery ©2021 , Maxar Technologies, U.S. Geological Survey, USDA Farm Service Agency

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.573	MCE$_R$ ground motion (period=0.2s)
S_1	1.271	MCE$_R$ ground motion (period=1.0s)
S_{MS}	2.573	Site-modified spectral acceleration value
S_{M1}	1.906	Site-modified spectral acceleration value
S_{DS}	1.715	Numeric seismic design value at 0.2s SA
S_{D1}	1.271	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	E	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.916	Coefficient of risk (0.2s)

CR_1	0.904	Coefficient of risk (1.0s)
PGA	0.987	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.987	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.429	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.743	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.573	Factored deterministic acceleration value (0.2s)
S1RT	1.614	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.785	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.271	Factored deterministic acceleration value (1.0s)
PGAd	0.987	Factored deterministic acceleration value (PGA)

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Hazards by Location

Search Information

Coordinates:	34.559419345037064, -118.11618400870667
Elevation:	2750 ft
Timestamp:	2021-04-09T16:36:57.402Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

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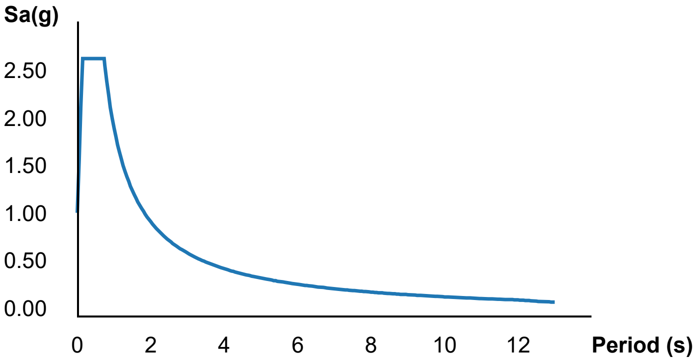
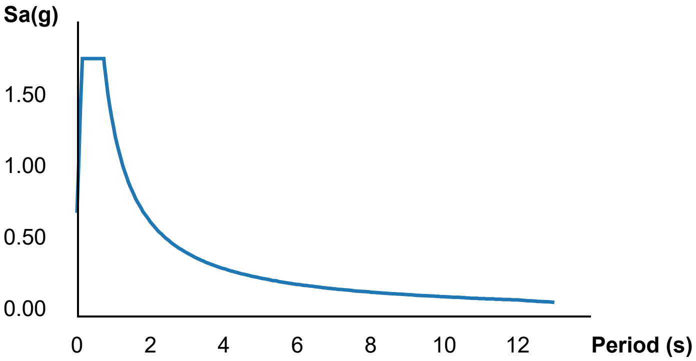
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.706	MCE$_R$ ground motion (period=0.2s)
S_1	1.316	MCE$_R$ ground motion (period=1.0s)
S_{MS}	2.706	Site-modified spectral acceleration value
S_{M1}	1.975	Site-modified spectral acceleration value
S_{DS}	1.804	Numeric seismic design value at 0.2s SA
S_{D1}	1.316	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.92	Coefficient of risk (0.2s)
CR_1	0.903	Coefficient of risk (1.0s)

PGA	1.046	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	1.046	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.37	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.665	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.706	Factored deterministic acceleration value (0.2s)
S1RT	1.58	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.749	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.316	Factored deterministic acceleration value (1.0s)
PGAd	1.046	Factored deterministic acceleration value (PGA)

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ATC Hazards by Location

Search Information

Coordinates:	34.55371, -118.087856
Elevation:	2752 ft
Timestamp:	2021-04-09T16:19:01.173Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

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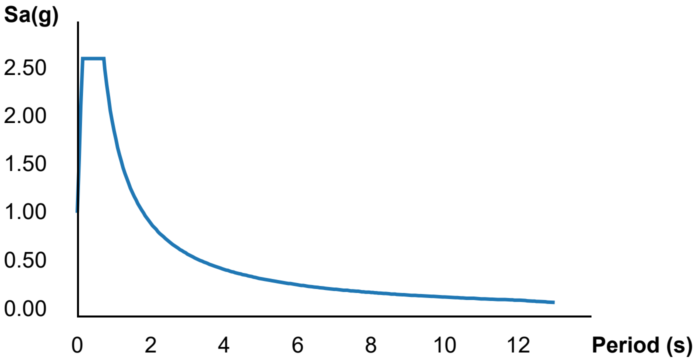
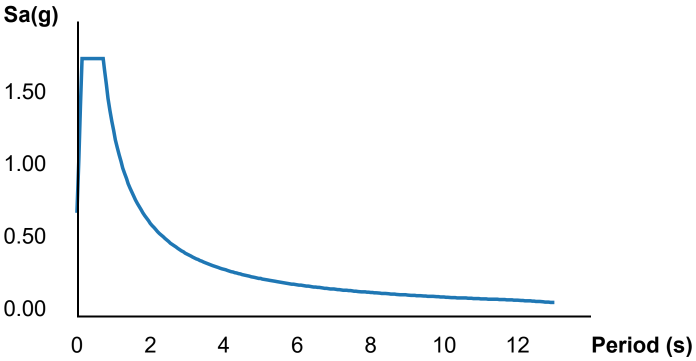
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.668	MCE_R ground motion (period=0.2s)
S_1	1.278	MCE_R ground motion (period=1.0s)
S_{MS}	2.668	Site-modified spectral acceleration value
S_{M1}	1.917	Site-modified spectral acceleration value
S_{DS}	1.779	Numeric seismic design value at 0.2s SA
S_{D1}	1.278	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.919	Coefficient of risk (0.2s)
CR_1	0.902	Coefficient of risk (1.0s)

PGA	1.031	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	1.031	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.432	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.737	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.668	Factored deterministic acceleration value (0.2s)
S1RT	1.613	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.788	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.278	Factored deterministic acceleration value (1.0s)
PGAd	1.031	Factored deterministic acceleration value (PGA)

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ATC Hazards by Location

Search Information

Coordinates:	34.55371, -118.087856
Elevation:	2752 ft
Timestamp:	2021-04-09T16:17:53.781Z
Hazard Type:	Seismic
Reference Document:	ASCE7-16
Risk Category:	IV
Site Class:	D-default

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Basic Parameters

Name	Value	Description
S_S	2.404	MCE_R ground motion (period=0.2s)
S_1	1.025	MCE_R ground motion (period=1.0s)
S_{MS}	2.885	Site-modified spectral acceleration value
S_{M1}	* null	Site-modified spectral acceleration value
S_{DS}	1.923	Numeric seismic design value at 0.2s SA
S_{D1}	* null	Numeric seismic design value at 1.0s SA

* See Section 11.4.8

▾Additional Information

Name	Value	Description
SDC	* null	Seismic design category
F_a	1.2	Site amplification factor at 0.2s
F_v	* null	Site amplification factor at 1.0s
CR_S	0.874	Coefficient of risk (0.2s)
CR_1	0.869	Coefficient of risk (1.0s)
PGA	1.033	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	1.24	Site modified peak ground acceleration

T_L	12	Long-period transition period (s)
SsRT	3.008	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.441	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.404	Factored deterministic acceleration value (0.2s)
S1RT	1.294	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.489	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.025	Factored deterministic acceleration value (1.0s)
PGAd	1.033	Factored deterministic acceleration value (PGA)

* See Section 11.4.8

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Hazards by Location

Search Information

Coordinates:	34.544961034712664, -118.04877924893493
Elevation:	2740 ft
Timestamp:	2021-04-09T16:27:34.922Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

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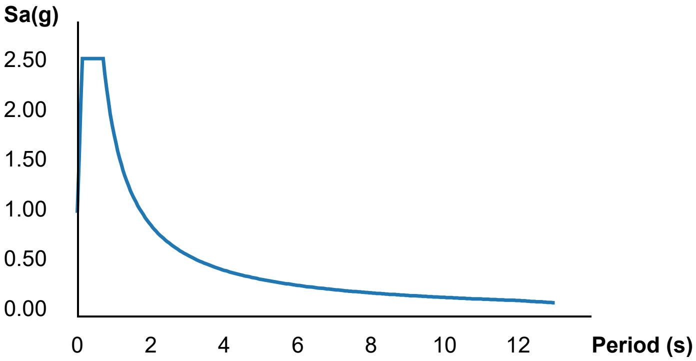
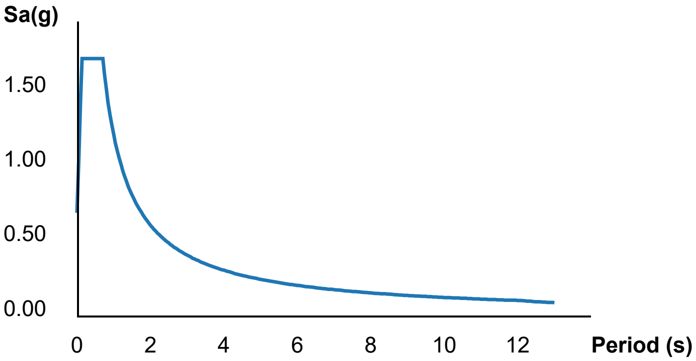
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.584	MCE$_R$ ground motion (period=0.2s)
S_1	1.214	MCE$_R$ ground motion (period=1.0s)
S_{MS}	2.584	Site-modified spectral acceleration value
S_{M1}	1.821	Site-modified spectral acceleration value
S_{DS}	1.723	Numeric seismic design value at 0.2s SA
S_{D1}	1.214	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.921	Coefficient of risk (0.2s)
CR_1	0.905	Coefficient of risk (1.0s)

PGA	0.996	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.996	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.159	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.432	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.584	Factored deterministic acceleration value (0.2s)
S1RT	1.47	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.624	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.214	Factored deterministic acceleration value (1.0s)
PGAd	0.996	Factored deterministic acceleration value (PGA)

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Hazards by Location

Search Information

Coordinates:	34.52903336279662, -118.04584351481934
Elevation:	2971 ft
Timestamp:	2021-04-09T16:31:06.633Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

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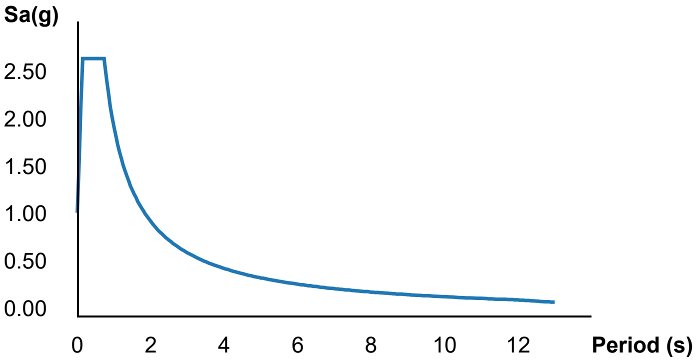
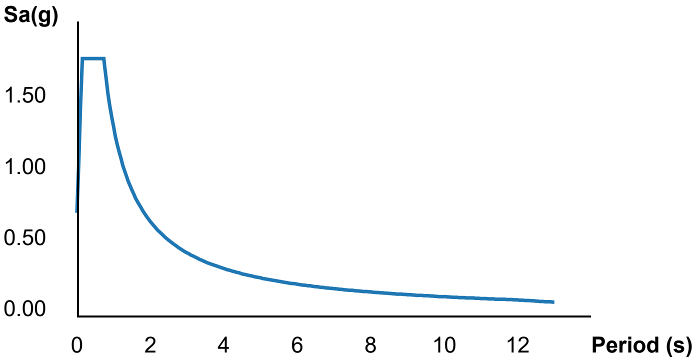
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.714	MCE$_R$ ground motion (period=0.2s)
S_1	1.325	MCE$_R$ ground motion (period=1.0s)
S_{MS}	2.714	Site-modified spectral acceleration value
S_{M1}	1.987	Site-modified spectral acceleration value
S_{DS}	1.81	Numeric seismic design value at 0.2s SA
S_{D1}	1.325	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.923	Coefficient of risk (0.2s)
CR_1	0.905	Coefficient of risk (1.0s)

PGA	1.048	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	1.048	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.142	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.404	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.714	Factored deterministic acceleration value (0.2s)
S1RT	1.461	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.614	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.325	Factored deterministic acceleration value (1.0s)
PGAd	1.048	Factored deterministic acceleration value (PGA)

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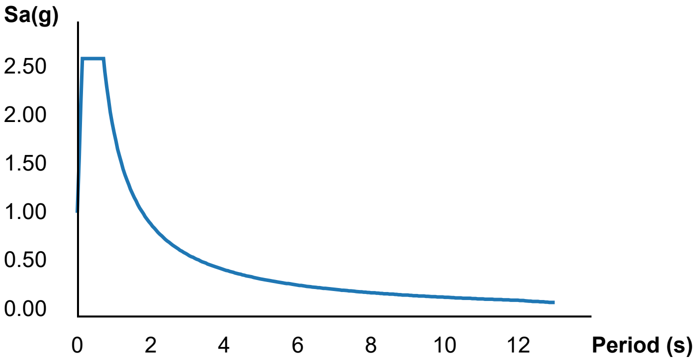
Hazards by Location

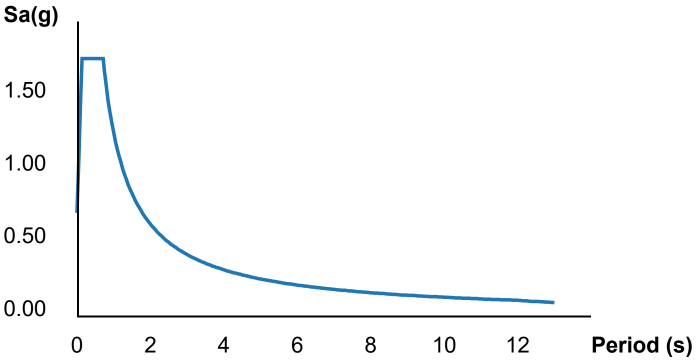
Search Information

Coordinates:	34.536316858195896, -118.04017088147585
Elevation:	2825 ft
Timestamp:	2021-04-09T16:33:04.897Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.652	MCE$_R$ ground motion (period=0.2s)
S_1	1.26	MCE$_R$ ground motion (period=1.0s)
S_{MS}	2.652	Site-modified spectral acceleration value
S_{M1}	1.889	Site-modified spectral acceleration value
S_{DS}	1.768	Numeric seismic design value at 0.2s SA
S_{D1}	1.26	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.923	Coefficient of risk (0.2s)
CR_1	0.905	Coefficient of risk (1.0s)

PGA	1.024	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	1.024	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.121	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.381	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.652	Factored deterministic acceleration value (0.2s)
S1RT	1.449	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.602	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.26	Factored deterministic acceleration value (1.0s)
PGAd	1.024	Factored deterministic acceleration value (PGA)

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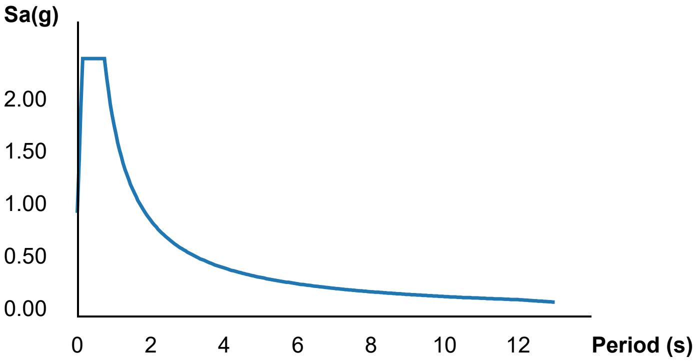
ATC Hazards by Location

Search Information

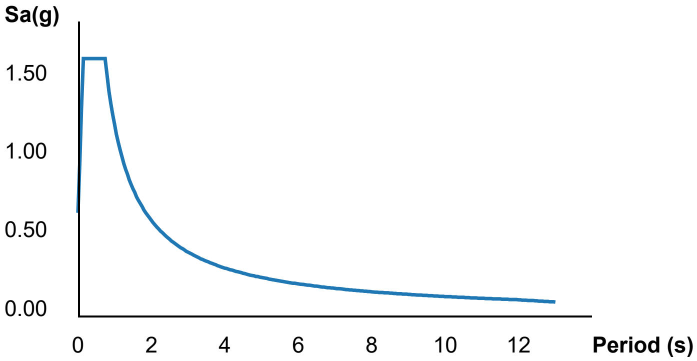
Coordinates:	34.54972773620536, -118.1502535834671
Elevation:	3116 ft
Timestamp:	2021-04-09T16:41:41.594Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

Map data ©2021 Imagery ©2021 , Maxar Technologies, U.S. Geological Survey, USDA Farm Service Agency

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.458	MCE_R ground motion (period=0.2s)
S_1	1.214	MCE_R ground motion (period=1.0s)
S_{MS}	2.458	Site-modified spectral acceleration value
S_{M1}	1.82	Site-modified spectral acceleration value
S_{DS}	1.639	Numeric seismic design value at 0.2s SA
S_{D1}	1.214	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.916	Coefficient of risk (0.2s)
CR_1	0.906	Coefficient of risk (1.0s)

PGA	0.945	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.945	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.335	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.642	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.458	Factored deterministic acceleration value (0.2s)
S1RT	1.566	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.728	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.214	Factored deterministic acceleration value (1.0s)
PGAd	0.945	Factored deterministic acceleration value (PGA)

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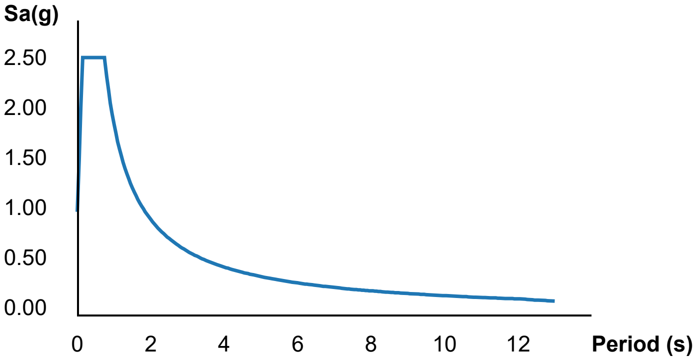
ATC Hazards by Location

Search Information

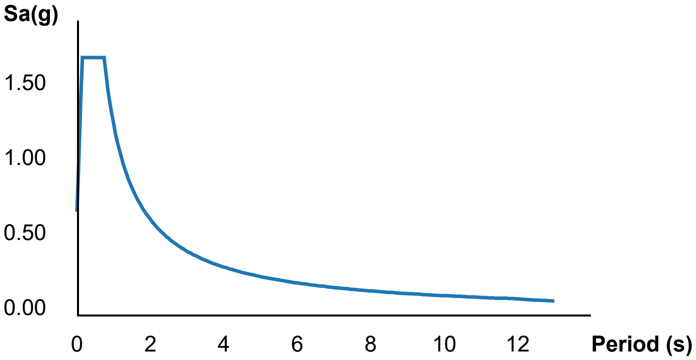
Address:	36809 El Camino Dr, Palmdale, CA 93551, USA
Coordinates:	34.54952240000001, -118.1326806
Elevation:	2925 ft
Timestamp:	2021-04-09T16:20:57.078Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

Map data ©2021 Imagery ©2021 , Maxar Technologies, U.S. Geological Survey, USDA Farm Service Agency

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.571	MCE$_R$ ground motion (period=0.2s)
S_1	1.27	MCE$_R$ ground motion (period=1.0s)
S_{MS}	2.571	Site-modified spectral acceleration value
S_{M1}	1.905	Site-modified spectral acceleration value
S_{DS}	1.714	Numeric seismic design value at 0.2s SA
S_{D1}	1.27	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.916	Coefficient of risk (0.2s)

CR_1	0.904	Coefficient of risk (1.0s)
PGA	0.986	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.986	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.426	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.74	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.571	Factored deterministic acceleration value (0.2s)
S1RT	1.613	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.783	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.27	Factored deterministic acceleration value (1.0s)
PGAd	0.986	Factored deterministic acceleration value (PGA)

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Hazards by Location

Search Information

Coordinates:	34.53840630847815, -118.13288506137695
Elevation:	3359 ft
Timestamp:	2021-04-09T20:04:43.993Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

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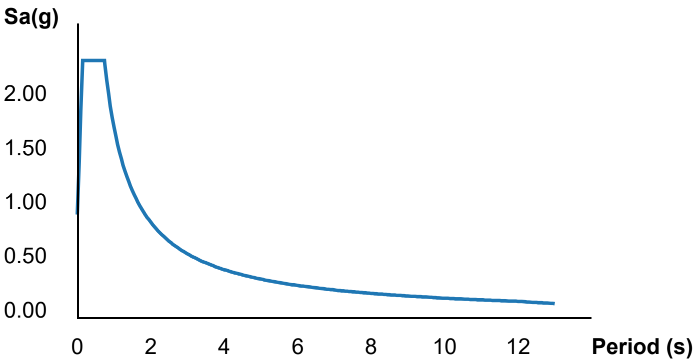
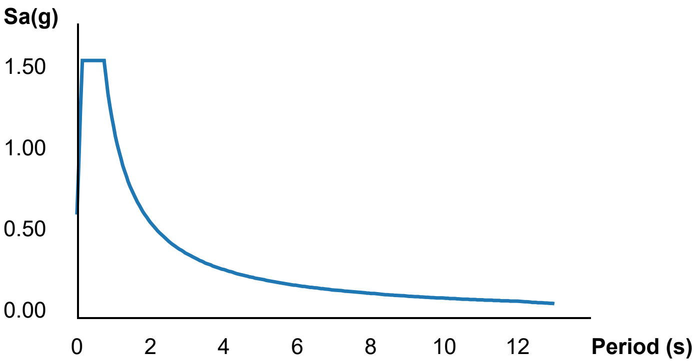
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.375	MCE$_R$ ground motion (period=0.2s)
S_1	1.171	MCE$_R$ ground motion (period=1.0s)
S_{MS}	2.375	Site-modified spectral acceleration value
S_{M1}	1.756	Site-modified spectral acceleration value
S_{DS}	1.583	Numeric seismic design value at 0.2s SA
S_{D1}	1.171	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.925	Coefficient of risk (0.2s)
CR_1	0.908	Coefficient of risk (1.0s)

PGA	0.917	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.917	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.236	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.499	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.375	Factored deterministic acceleration value (0.2s)
S1RT	1.505	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.657	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.171	Factored deterministic acceleration value (1.0s)
PGAd	0.917	Factored deterministic acceleration value (PGA)

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ATC Hazards by Location

Search Information

Coordinates:	34.56128566737895, -118.12898168848265
Elevation:	2924 ft
Timestamp:	2021-04-09T20:40:24.218Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

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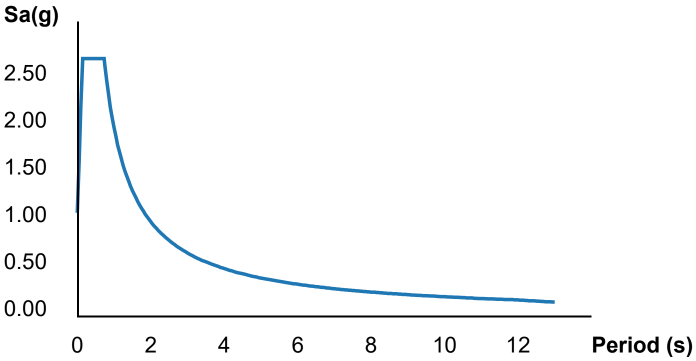
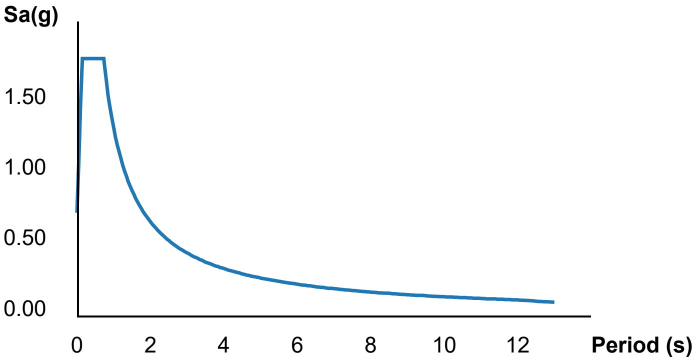
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.733	MCE_R ground motion (period=0.2s)
S_1	1.331	MCE_R ground motion (period=1.0s)
S_{MS}	2.733	Site-modified spectral acceleration value
S_{M1}	1.997	Site-modified spectral acceleration value
S_{DS}	1.822	Numeric seismic design value at 0.2s SA
S_{D1}	1.331	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.92	Coefficient of risk (0.2s)
CR_1	0.904	Coefficient of risk (1.0s)

PGA	1.055	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	1.055	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.306	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.594	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.733	Factored deterministic acceleration value (0.2s)
S1RT	1.547	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.71	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.331	Factored deterministic acceleration value (1.0s)
PGAd	1.055	Factored deterministic acceleration value (PGA)

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Hazards by Location

Search Information

Address:	34547
Coordinates:	34.538438, -118.132863
Elevation:	3360 ft
Timestamp:	2021-04-08T22:06:10.243Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	III
Site Class:	D

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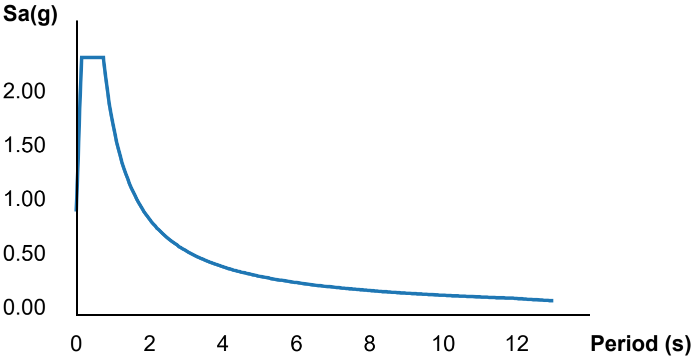
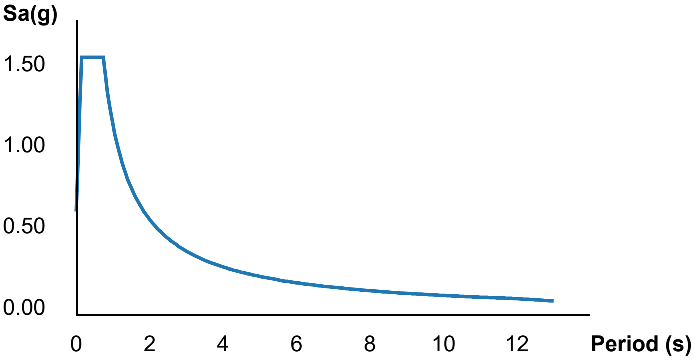
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.376	MCE$_R$ ground motion (period=0.2s)
S_1	1.171	MCE$_R$ ground motion (period=1.0s)
S_{MS}	2.376	Site-modified spectral acceleration value
S_{M1}	1.757	Site-modified spectral acceleration value
S_{DS}	1.584	Numeric seismic design value at 0.2s SA
S_{D1}	1.171	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	E	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.925	Coefficient of risk (0.2s)

CR_1	0.908	Coefficient of risk (1.0s)
PGA	0.917	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.917	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.236	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.5	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.376	Factored deterministic acceleration value (0.2s)
S1RT	1.505	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.657	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.171	Factored deterministic acceleration value (1.0s)
PGAd	0.917	Factored deterministic acceleration value (PGA)

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ATC Hazards by Location

Search Information

Coordinates:	34.598759799594845, -118.09844223112182
Elevation:	2583 ft
Timestamp:	2021-04-09T20:48:48.917Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

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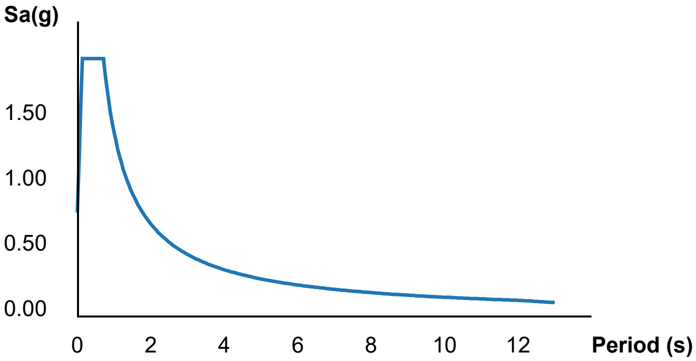
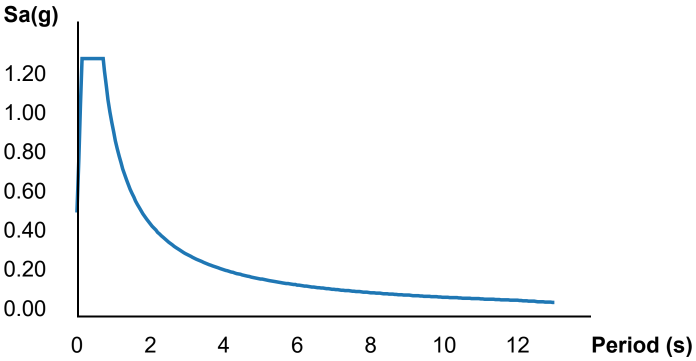
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	1.971	MCE$_R$ ground motion (period=0.2s)
S_1	0.937	MCE$_R$ ground motion (period=1.0s)
S_{MS}	1.971	Site-modified spectral acceleration value
S_{M1}	1.406	Site-modified spectral acceleration value
S_{DS}	1.314	Numeric seismic design value at 0.2s SA
S_{D1}	0.937	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.937	Coefficient of risk (0.2s)
CR_1	0.911	Coefficient of risk (1.0s)

PGA	0.77	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.77	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	2.602	Probabilistic risk-targeted ground motion (0.2s)
SsUH	2.776	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	1.971	Factored deterministic acceleration value (0.2s)
S1RT	1.168	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.282	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	0.937	Factored deterministic acceleration value (1.0s)
PGAd	0.77	Factored deterministic acceleration value (PGA)

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ATC Hazards by Location

Search Information

Address:	1036 Barrel Spring Road palmdale, ca
Coordinates:	34.5457226, -118.1085956
Elevation:	2817 ft
Timestamp:	2021-05-04T20:11:47.998Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	III
Site Class:	D

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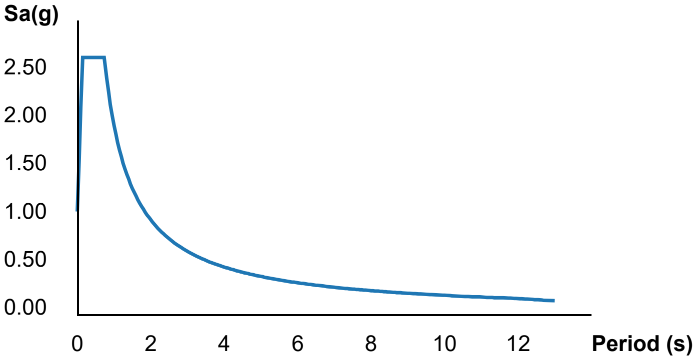
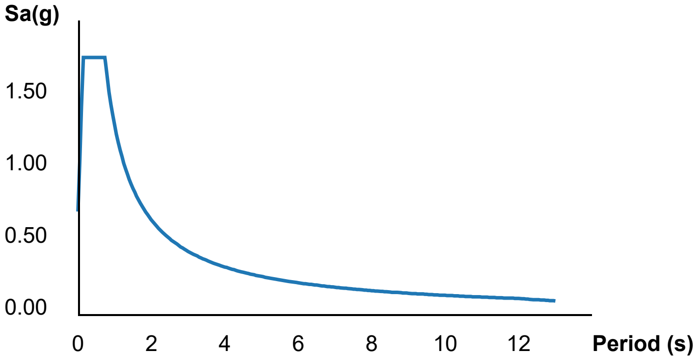
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.674	MCE_R ground motion (period=0.2s)
S_1	1.311	MCE_R ground motion (period=1.0s)
S_{MS}	2.674	Site-modified spectral acceleration value
S_{M1}	1.967	Site-modified spectral acceleration value
S_{DS}	1.782	Numeric seismic design value at 0.2s SA
S_{D1}	1.311	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	E	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.919	Coefficient of risk (0.2s)

CR_1	0.902	Coefficient of risk (1.0s)
PGA	1.029	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	1.029	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.49	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.799	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.674	Factored deterministic acceleration value (0.2s)
S1RT	1.643	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.821	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.311	Factored deterministic acceleration value (1.0s)
PGAd	1.029	Factored deterministic acceleration value (PGA)

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Disclaimer

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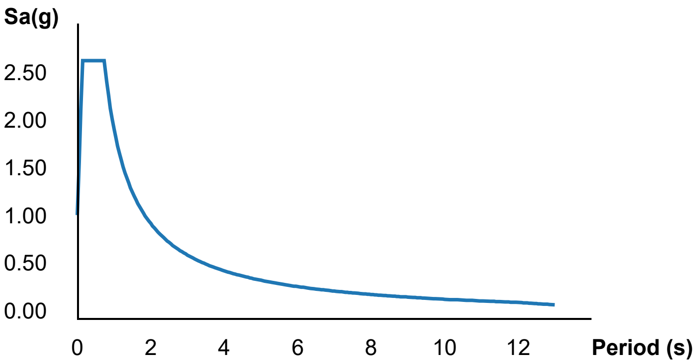
ATC Hazards by Location

Search Information

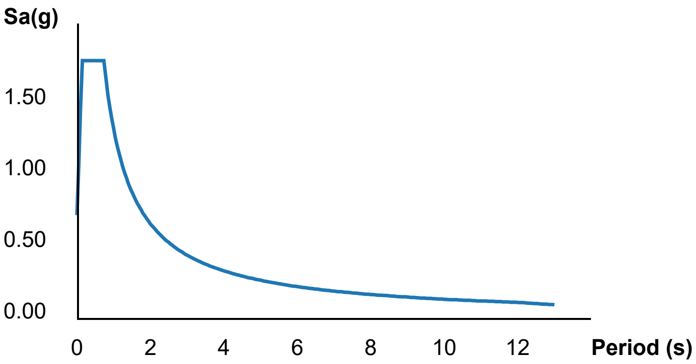
Address:	15 4640 Barrel Spring Road palmdale, ca
Coordinates:	34.5268275, -118.0540864
Elevation:	3036 ft
Timestamp:	2021-05-04T20:14:23.952Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	III
Site Class:	D

Map data ©2021 Imagery ©2021 , Maxar Technologies, U.S. Geological Survey, USDA Farm Service Agency

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.7	MCE$_R$ ground motion (period=0.2s)
S_1	1.323	MCE$_R$ ground motion (period=1.0s)
S_{MS}	2.7	Site-modified spectral acceleration value
S_{M1}	1.984	Site-modified spectral acceleration value
S_{DS}	1.8	Numeric seismic design value at 0.2s SA
S_{D1}	1.323	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	E	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.924	Coefficient of risk (0.2s)

CR_1	0.905	Coefficient of risk (1.0s)
PGA	1.04	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	1.04	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.149	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.409	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.7	Factored deterministic acceleration value (0.2s)
S1RT	1.464	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.617	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.323	Factored deterministic acceleration value (1.0s)
PGAd	1.04	Factored deterministic acceleration value (PGA)

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															AWWA D100-11 Welded Carbon Steel Tanks Chapter 13 Seismic Design							
		Coordinates		Tank Details												Table 28	13.2.1	Table 24	ATC [1]	Eqn 13-9 [1,2]	Eqn 13-22	Eqn 13-12/13 [2]
Tank Site	Address	Latitude	Longitude	Tank Type	Piping Connection	Footing	Anchorage	Date Built		Dia	Size	Bottom of the Knuckle	Top of Knuckle	Overflow Height	Freeboard Assumed to be 3 feet unless drawings indicate otherwise	Ri 3 if anchored 2.5 if unanchored	Seismic Use Group	I_E, assume that all tanks are Seismic Use Group III	Sd1, per ATC Seismic Hazard Maps	Sai, g Based on Sds from ASCE 7-10	Sloshing Period, Tc(Ss	Sac, g Based on Sd1 from ASCE 7-10
3 MG Tank Site	850 East Avenue S	34.56	-118.11	Welded				1960		124	3,000,000		Unknown	34	3	2.5	iii	1.5	1.315	1.805	7.35	0.27
5 MG Tank	2404 Old Nadeau Road	34.53	-118.08							160	5,000,000		Unknown	20	3	2.5	iii	1.5	1.302	1.764	11.13	0.13
6MG	641 East Ave S	34.56	-118.15					1999		206	6,000,000		Unknown	24	3	2.5	iii	1.5	1.316	1.804	13.03	0.09
25th Street	26496 Cemetary Road	34.55	-118.09					1976		106	2,000,000		Unknown	30	3	2.5	iii	1.5	1.316	1.804	6.74	0.29
				Welded	Not Flexible	Ringwall with Sand Interior		1967		154	4,000,000		Unknown	30	3	2.5	iii	1.5	1.278	1.779	9.13	0.18
45th Street	36510 45th St East	34.54	-118.05					1988		130	3,000,000		Unknown	30	3	2.5	iii	1.5	1.214	1.723	7.92	0.23
								1990		150	4,000,000		Unknown	32	3	2.5	iii	1.5	1.214	1.723	8.73	0.19
								1990		150	4,000,000		Unknown	32	3	2.5	iii	1.5	1.214	1.723	8.73	0.19
47th Street	35645 47th St East	34.53	-118.05					1967		106	2,000,000		Unknown	30	3	2.5	iii	1.5	1.325	1.81	6.74	0.30
								1990		132	3,000,000		Unknown	30	3	2.5	iii	1.5	1.325	1.81	8.02	0.25
50th Street	5001 East Ave, T-8	34.54	-118.04					2007		150	4,000,000		Unknown	30	3	2.5	iii	1.5	1.26	1.768	8.93	0.19
				Welded?	?	Concrete Ring Wall	None Shown	2007		150	4,000,000		Unknown		3	2.5	iii	1.5	1.26	1.768	8.93	0.19
Ana Verde	36800 Tovey Aveneu	34.55	-118.15	Welded	Not Flexible	Concrete Rink wall	Not Shown	1963		40	300,000		Unknown	32	3	2.5	iii	1.5	1.214	1.639	3.66	0.50
El Camino Lower	36809 El Camino Dr.	34.55	-118.13					1988		106	2,000,000		Unknown	32	3	2.5	iii	1.5	1.27	1.714	6.63	0.29
El Camino U.G[4]	36336 El Camino Road							1994		104	1,500,000		Unknown	26								
El Camino Upper	33030 Ridge Route Rd	34.54	-118.13	Welded	Flexible	Ringwall with Sand Inte	None Shown	1963		40	300,000		Unknown	32	3	2.5	iii	1.5	0.881	1.543	3.66	0.36
Walt Dahlitz	115 East Avenue S			Welded	Flexible	Concrete Ringwall, oil s	None Shown	1993		104	1,500,000		Unknown	31	3	2.5	iii	1.5	0.827	1.442	6.58	0.19
Well 14	36401 20th ST East			Weled?	Not Flexible	Concrete Ringwall, grav	3/4" 5' OC 8" embed			27	100,000		Unknown	22	3	2.5	iii	1.5	0.927	1.514	3.01	0.46
Well 18 and 19	4640 Barrel Springs Road							1963		22	41,000		Unknown	30	3	2.5	iii	1.5	1.323	1.8	2.71	0.73
Well 5	1036 Barrel Spring Road							1963		30	1,463,945		Unknown	22	3	2.5	iii	1.5	1.311	1.782	3.18	0.62

				13-27	13-25/26	Eqn 13-28/29	Estimate	Estimate	Estimate	Eqn 13-16		Eqn 13-24/25		Eqn 13-30			Eqn 13-26	Eqn 13-31	Eqn 13-23
Tank Site	D/H	3.67*D/H	Volume ft^3 Vol = π*(Dia^2)/4	Total Weight, lbf W = Vol*62.4pcf	Impulsive Weight, Moves with Tank, (Wi)	Centroid of the lateral Force due to Sloshing (Xi), ft	Weight of the Roof (Wr), lbf	Weight of the Shell (Ws), lbf	Weight of the Floor (Wf), lbf	Implusive Design Acceleration (Ai)	Impulsive Lateral Force (Vi), kip	Overturning Moment due to Impulsive Lateral Force(Mi), ft-kip	Convective Weight (Wc), lbf	Centroid of the lateral force do to convective mass (Xc), ft	Convective Design Acceleration (Ai)	Convective Lateral Force (Vc), kip	Overturning Moment due to Convective Lateral Force(Mc), ft-kip	Design Lateral Force at the top of the foundation (Vf), kip	Design Overturning Moment (Ms), ft-kip Ms = $\sqrt{(Mi^2+Mc^2)}$
3 MG Tank Site	3.647	1.006	410594	25621040	8082906	13	92459	138480	92459	0.774	6503	82912	16424329	18	0.192	3150	57649	7226	100984
5 MG Tank	8.000	0.459	402124	25092529	3621894	8	153938	104550	153938	0.756	3050	22875	19810034	10	0.090	1784	18144	3533	29197
6MG	8.583	0.428	799900	49913745	6714999	9	255176	160865	255176	0.773	5711	51395	39739497	12	0.066	2640	32159	6291	60628
25th Street	3.533	1.039	264742	16519902	5375203	11	67564	104870	67564	0.773	4341	48840	10436273	16	0.209	2185	35431	4860	60339
	5.133	0.715	558795	34868813	7841520	11	142609	151052	142609	0.762	6311	71001	25267634	16	0.131	3318	51781	7130	87878
45th Street	4.333	0.847	398197	24847485	6614006	11	101623	127961	101623	0.738	5129	57696	17074207	16	0.164	2805	44414	5845	72811
	4.688	0.783	565487	35286369	8687384	12	135297	157017	135297	0.738	6731	80769	24894926	17	0.137	3398	56992	7540	98852
	4.688	0.783	565487	35286369	8687384	12	135297	157017	135297	0.738	6731	80769	24894926	17	0.137	3398	56992	7540	98852
47th Street	3.533	1.039	264742	16519902	5375203	11	67564	104870	67564	0.776	4356	49003	10436273	16	0.211	2200	35674	4880	60613
	4.400	0.834	410543	25617904	6716566	11	104774	129885	104774	0.776	5473	61576	17698347	16	0.177	3126	49427	6303	78960
50th Street	5.000	0.734	530144	33080971	7637298	11	135297	147203	135297	0.758	6103	68664	23796213	16	0.135	3223	50405	6902	85178
	5.000	0.734	530144	33080971	7637298	11	135297	147203	135297	0.758	6103	68664	23796213	16	0.135	3223	50405	6902	85178
Ana Verde	1.250	2.936	40212	2509253	1825481	12	9621	44129	9621	0.702	1327	16240	717357	22	0.355	255	5658	1351	17197
El Camino Lower	3.313	1.108	282391	17621228	6103267	12	67564	111862	67564	0.735	4665	55977	10784811	17	0.205	2215	38666	5164	68033
El Camino U.G[4]																			
El Camino Upper	1.250	2.936	40212	2509253	1825481	12	9621	44129	9621	0.661	1249	15289	717357	22	0.258	185	4106	1263	15830
Walt Dahlitz	3.355	1.094	263341	16432470	5622265	12	65039	106378	65039	0.618	3621	42091	10122208	17	0.135	1362	22997	3869	47963
Well 14	1.227	2.990	12596	786004	575712	8	4384	21166	4384	0.649	393	3325	220749	15	0.330	73	1119	400	3509
Well 18 and 19	0.733	5.005	11404	711608	597846	13	2910	24053	2910	0.771	484	6262	120014	24	0.524	63	1513	488	6442
Well 5	1.364	2.691	15551	970375	680168	8	5412	23283	5412	0.764	546	4500	301560	15	0.442	133	1982	562	4918

	Eqn 13-37		Eqn 13-41	Eqn 13-36		Eqn 13-53/54			Eqn 13-52	Table 29		Eqn 13-57		
Tank Site	Maximum Resting Weight of the Tank Contents (wL), lbf/ft		Weight of the Tank Shell and Roof Resisting Overturning (wt), lbf/ft	Overturning Ratio, J	Anchor Requirements	Convective Design Accelaration, Af			Sloshing Wave Height (d), ft	Minimum Required Freeboard (D), ft	Actual Freeboard (Roof Height-Overflow)	Allowable Lateral Load, V_{allow} (kip)	Total Lateral Seismic Load, Vt (Kip)	Sliding Check
3 MG Tank Site	2185	5396	474	2.54	Provide Anchors	0.27	0.29	0.27	16.65	16.65	3	12851	7225.51729	OK
5 MG Tank	1676	4096	361	0.57	Tank Is Stable	0.18	0.13	0.13	10.08	10.08	3	12338	3533.2461	OK
6MG	1836	6328	446	0.64	Tank Is Stable	0.15	0.09	0.09	9.58	9.58	3	24349	6291.49113	OK
25th Street	2052	4070	416	2.23	Provide Anchors	0.29	0.35	0.29	15.53	15.53	3	8304	4860.10557	OK
	2052	5914	460	1.51	Uplift but Stable	0.21	0.18	0.18	14.15	14.15	3	17380	7130.09689	OK
45th Street	2052	4992	438	1.77	Provide Anchors	0.23	0.23	0.23	14.95	14.95	3	12488	5845.27581	OK
	2120	6144	477	1.74	Provide Anchors	0.21	0.19	0.19	14.33	14.33	3	17687	7540.06677	OK
	2120	6144	477	1.74	Provide Anchors	0.21	0.19	0.19	14.33	14.33	3	17687	7540.06677	OK
47th Street	2052	4070	416	2.24	Provide Anchors	0.30	0.35	0.30	15.64	15.64	3	8301	4879.72502	OK
	2052	5069	440	1.87	Provide Anchors	0.25	0.25	0.25	16.32	16.32	3	12801	6303.06969	OK
50th Street	2052	5760	456	1.55	Provide Anchors	0.21	0.19	0.19	14.22	14.22	3	16514	6902.16829	OK
	2052	5760	456	1.55	Provide Anchors	0.21	0.19	0.19	14.22	14.22	3	16514	6902.16829	OK
Ana Verde	2120	1638	389	5.44	Provide Anchors	0.50	1.09	0.50	9.95	9.95	3	1363	1351.04608	OK
El Camino Lower	2120	4342	437	2.42	Provide Anchors	0.29	0.35	0.29	15.24	15.24	3	8916	5163.80732	OK
El Camino U.G[4]														
El Camino Upper	2120	1638	389	5.00	Provide Anchors	0.36	0.79	0.36	7.22	7.22	3	1371	1262.69341	OK
Walt Dahlitz	2086	4127	425	1.80	Provide Anchors	0.19	0.23	0.19	9.80	9.80	3	8455	3868.50122	OK
Well 14	1758	760	275	4.80	Provide Anchors	0.46	1.23	0.46	6.24	6.24	3	435	399.685968	OK
Well 18 and 19	2052	845	369	11.47	Provide Anchors	0.73	2.17	0.73	8.06	8.06	3	387	488.300415	Needs Anchors
Well 5	1758	845	276	5.05	Provide Anchors	0.62	1.56	0.62	9.29	9.29	3	526	561.571023	Needs Anchors

1. Design spectral response acceleration parameters, S_{D1} and S_{DS}, have been determined using the Applied Technology Council's (ATC) web based hazard maps in accordance with the American Society of Civil Engineers Standard 7, Minimum Design Loads for Buildings and Other Structures (ASCE 7-10)

2. The Design spectrum for impulsive components, Sai and the Design Spectrum for convective components, Sac have been determined in accordance with Chapter 13 of the AWWA D100-11, Welded Carbon Steel Tnaks for Water Storage. These parameters are expressed as a percentage of the accelration due to gravity, g.

3. Facility list indicates that these facilities conatain 0 gallons and does not provide the overflow height, therefore we were not apple to determine the seismic demands on these structures.
4. AWWA D100 calculations do not apply to the El Camino Underground tank. Construction drawings are not available to perform an analysis at this time.
4. Minimum required freeboard is equal to the sloshing wave height for Use Group III and may be reduced for Use Group I and II

ATC Hazards by Location

Search Information

Coordinates:	34.557353817153206, -118.11224470422972
Elevation:	2750 ft
Timestamp:	2021-04-09T16:22:17.704Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

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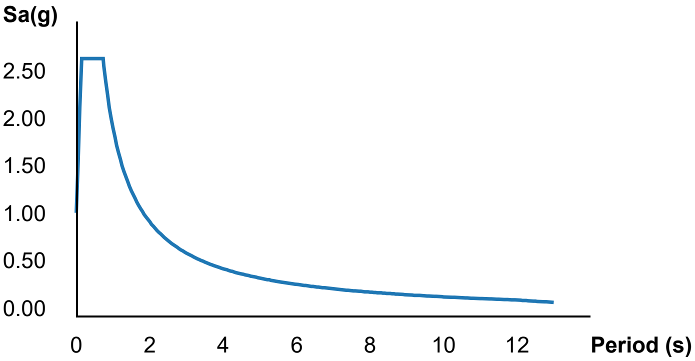
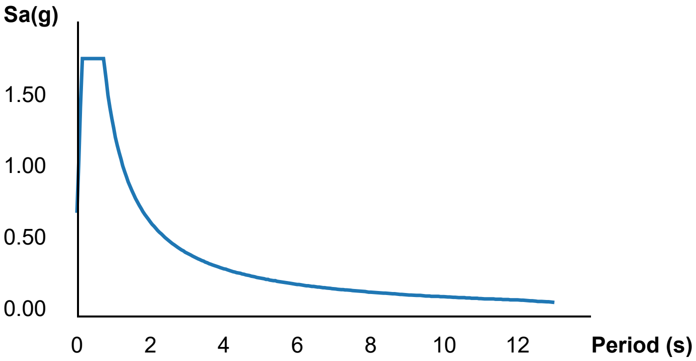
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.707	MCE_R ground motion (period=0.2s)
S_1	1.315	MCE_R ground motion (period=1.0s)
S_{MS}	2.707	Site-modified spectral acceleration value
S_{M1}	1.973	Site-modified spectral acceleration value
S_{DS}	1.805	Numeric seismic design value at 0.2s SA
S_{D1}	1.315	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.919	Coefficient of risk (0.2s)
CR_1	0.903	Coefficient of risk (1.0s)

PGA	1.045	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	1.045	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.418	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.719	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.707	Factored deterministic acceleration value (0.2s)
S1RT	1.605	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.778	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.315	Factored deterministic acceleration value (1.0s)
PGAd	1.045	Factored deterministic acceleration value (PGA)

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Hazards by Location

Search Information

Coordinates:	34.53471326457233, -118.08343773439331
Elevation:	2968 ft
Timestamp:	2021-04-09T16:35:02.162Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

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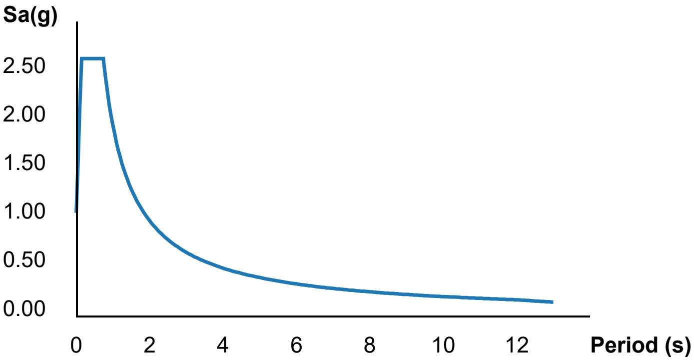
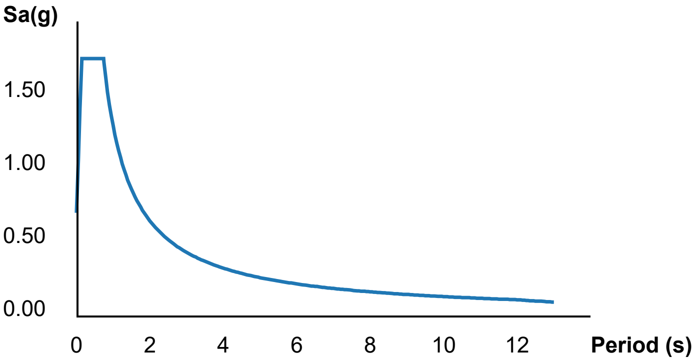
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.646	MCE$_R$ ground motion (period=0.2s)
S_1	1.302	MCE$_R$ ground motion (period=1.0s)
S_{MS}	2.646	Site-modified spectral acceleration value
S_{M1}	1.953	Site-modified spectral acceleration value
S_{DS}	1.764	Numeric seismic design value at 0.2s SA
S_{D1}	1.302	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.924	Coefficient of risk (0.2s)
CR_1	0.904	Coefficient of risk (1.0s)

PGA	1.018	MCE$_G$ peak ground acceleration
F$_{PGA}$	1	Site amplification factor at PGA
PGA$_M$	1.018	Site modified peak ground acceleration
T$_L$	12	Long-period transition period (s)
SsRT	3.282	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.552	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.646	Factored deterministic acceleration value (0.2s)
S1RT	1.53	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.694	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.302	Factored deterministic acceleration value (1.0s)
PGAd	1.018	Factored deterministic acceleration value (PGA)

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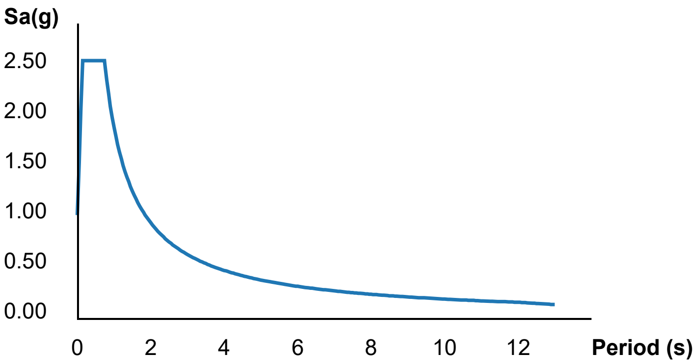
ATC Hazards by Location

Search Information

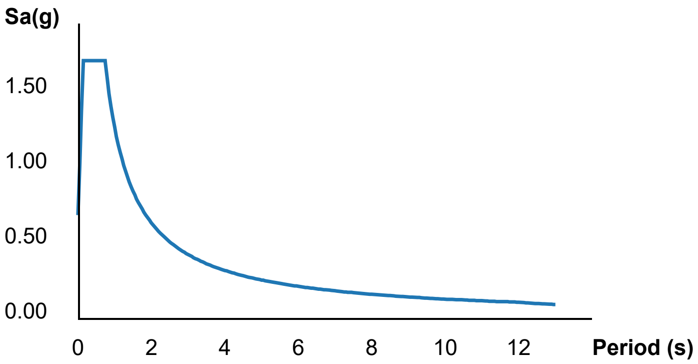
Address:	34547
Coordinates:	34.5497, -118.132821
Elevation:	2923 ft
Timestamp:	2021-04-08T21:00:34.329Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	III
Site Class:	D

Map data ©2021 Imagery ©2021 , Maxar Technologies, U.S. Geological Survey, USDA Farm Service Agency

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.573	MCE_R ground motion (period=0.2s)
S_1	1.271	MCE_R ground motion (period=1.0s)
S_{MS}	2.573	Site-modified spectral acceleration value
S_{M1}	1.906	Site-modified spectral acceleration value
S_{DS}	1.715	Numeric seismic design value at 0.2s SA
S_{D1}	1.271	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	E	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.916	Coefficient of risk (0.2s)

CR_1	0.904	Coefficient of risk (1.0s)
PGA	0.987	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.987	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.429	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.743	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.573	Factored deterministic acceleration value (0.2s)
S1RT	1.614	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.785	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.271	Factored deterministic acceleration value (1.0s)
PGAd	0.987	Factored deterministic acceleration value (PGA)

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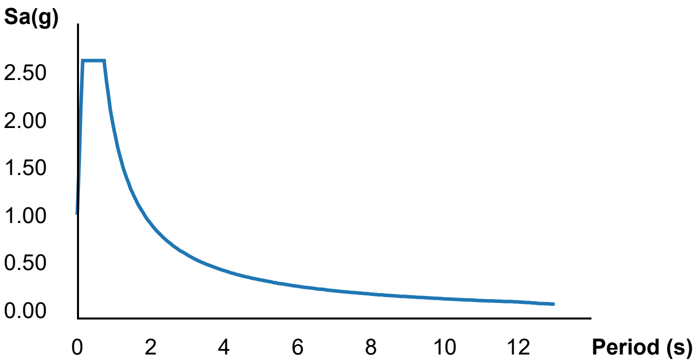
ATC Hazards by Location

Search Information

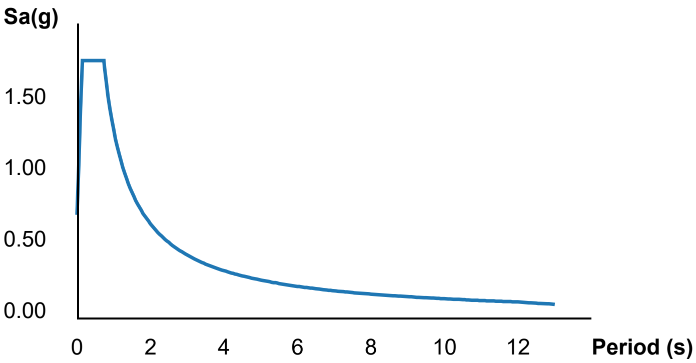
Coordinates:	34.559419345037064, -118.11618400870667
Elevation:	2750 ft
Timestamp:	2021-04-09T16:36:57.402Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

Map data ©2021 Imagery ©2021 , Maxar Technologies, U.S. Geological Survey, *USDA Farm Service Agency*

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.706	MCE_R ground motion (period=0.2s)
S_1	1.316	MCE_R ground motion (period=1.0s)
S_{MS}	2.706	Site-modified spectral acceleration value
S_{M1}	1.975	Site-modified spectral acceleration value
S_{DS}	1.804	Numeric seismic design value at 0.2s SA
S_{D1}	1.316	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.92	Coefficient of risk (0.2s)
CR_1	0.903	Coefficient of risk (1.0s)

PGA	1.046	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	1.046	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.37	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.665	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.706	Factored deterministic acceleration value (0.2s)
S1RT	1.58	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.749	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.316	Factored deterministic acceleration value (1.0s)
PGAd	1.046	Factored deterministic acceleration value (PGA)

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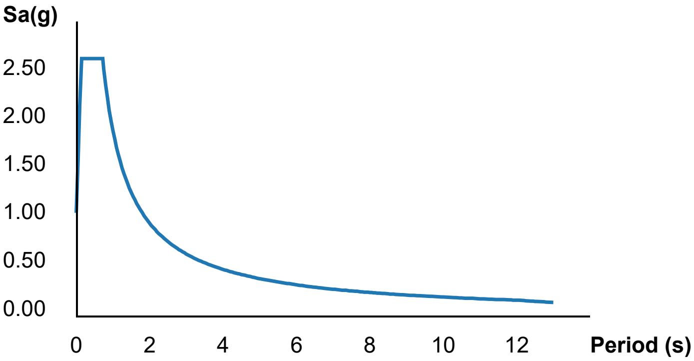
ATC Hazards by Location

Search Information

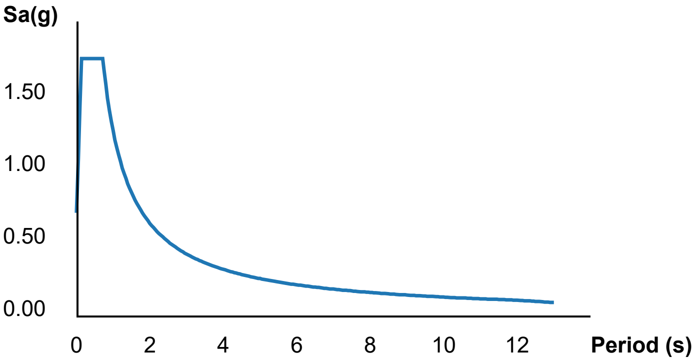
Coordinates:	34.55371, -118.087856
Elevation:	2752 ft
Timestamp:	2021-04-09T16:19:01.173Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

Map data ©2021 Imagery ©2021 , CNES / Airbus, Maxar Technologies, U.S. Geological Survey, USDA Farm Service Agency

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.668	MCE_R ground motion (period=0.2s)
S_1	1.278	MCE_R ground motion (period=1.0s)
S_{MS}	2.668	Site-modified spectral acceleration value
S_{M1}	1.917	Site-modified spectral acceleration value
S_{DS}	1.779	Numeric seismic design value at 0.2s SA
S_{D1}	1.278	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.919	Coefficient of risk (0.2s)
CR_1	0.902	Coefficient of risk (1.0s)

PGA	1.031	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	1.031	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.432	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.737	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.668	Factored deterministic acceleration value (0.2s)
S1RT	1.613	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.788	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.278	Factored deterministic acceleration value (1.0s)
PGAd	1.031	Factored deterministic acceleration value (PGA)

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ATC Hazards by Location

Search Information

Coordinates:	34.55371, -118.087856
Elevation:	2752 ft
Timestamp:	2021-04-09T16:17:53.781Z
Hazard Type:	Seismic
Reference Document:	ASCE7-16
Risk Category:	IV
Site Class:	D-default

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Basic Parameters

Name	Value	Description
S_S	2.404	MCE_R ground motion (period=0.2s)
S_1	1.025	MCE_R ground motion (period=1.0s)
S_{MS}	2.885	Site-modified spectral acceleration value
S_{M1}	* null	Site-modified spectral acceleration value
S_{DS}	1.923	Numeric seismic design value at 0.2s SA
S_{D1}	* null	Numeric seismic design value at 1.0s SA

* See Section 11.4.8

▾Additional Information

Name	Value	Description
SDC	* null	Seismic design category
F_a	1.2	Site amplification factor at 0.2s
F_v	* null	Site amplification factor at 1.0s
CR_S	0.874	Coefficient of risk (0.2s)
CR_1	0.869	Coefficient of risk (1.0s)
PGA	1.033	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	1.24	Site modified peak ground acceleration

T_L	12	Long-period transition period (s)
SsRT	3.008	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.441	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.404	Factored deterministic acceleration value (0.2s)
S1RT	1.294	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.489	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.025	Factored deterministic acceleration value (1.0s)
PGAd	1.033	Factored deterministic acceleration value (PGA)

* See Section 11.4.8

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Hazards by Location

Search Information

Coordinates:	34.544961034712664, -118.04877924893493
Elevation:	2740 ft
Timestamp:	2021-04-09T16:27:34.922Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

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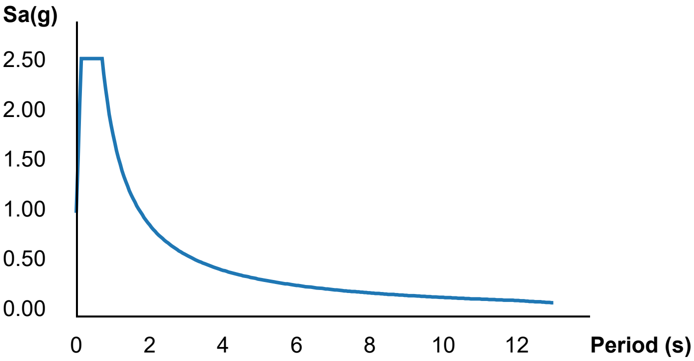
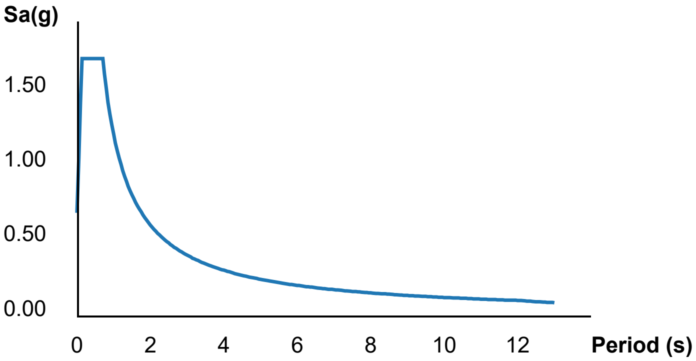
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.584	MCE$_R$ ground motion (period=0.2s)
S_1	1.214	MCE$_R$ ground motion (period=1.0s)
S_{MS}	2.584	Site-modified spectral acceleration value
S_{M1}	1.821	Site-modified spectral acceleration value
S_{DS}	1.723	Numeric seismic design value at 0.2s SA
S_{D1}	1.214	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.921	Coefficient of risk (0.2s)
CR_1	0.905	Coefficient of risk (1.0s)

PGA	0.996	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.996	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.159	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.432	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.584	Factored deterministic acceleration value (0.2s)
S1RT	1.47	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.624	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.214	Factored deterministic acceleration value (1.0s)
PGAd	0.996	Factored deterministic acceleration value (PGA)

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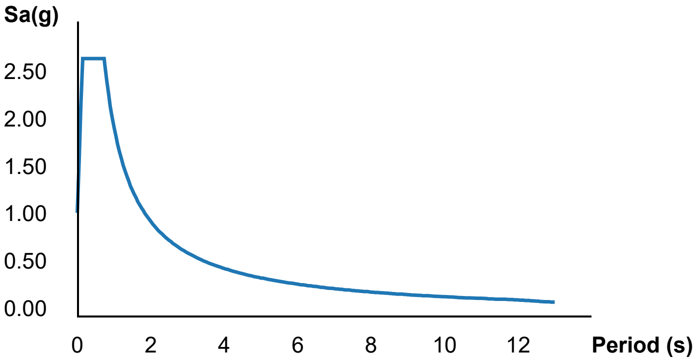
ATC Hazards by Location

Search Information

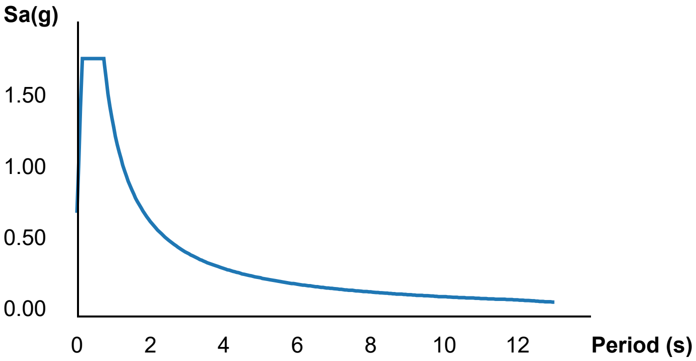
Coordinates:	34.52903336279662, -118.04584351481934
Elevation:	2971 ft
Timestamp:	2021-04-09T16:31:06.633Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

Map data ©2021 Imagery ©2021 , CNES / Airbus, Maxar Technologies, U.S. Geological Survey, USDA Farm Service Agency

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.714	MCE$_R$ ground motion (period=0.2s)
S_1	1.325	MCE$_R$ ground motion (period=1.0s)
S_{MS}	2.714	Site-modified spectral acceleration value
S_{M1}	1.987	Site-modified spectral acceleration value
S_{DS}	1.81	Numeric seismic design value at 0.2s SA
S_{D1}	1.325	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.923	Coefficient of risk (0.2s)
CR_1	0.905	Coefficient of risk (1.0s)

PGA	1.048	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	1.048	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.142	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.404	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.714	Factored deterministic acceleration value (0.2s)
S1RT	1.461	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.614	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.325	Factored deterministic acceleration value (1.0s)
PGAd	1.048	Factored deterministic acceleration value (PGA)

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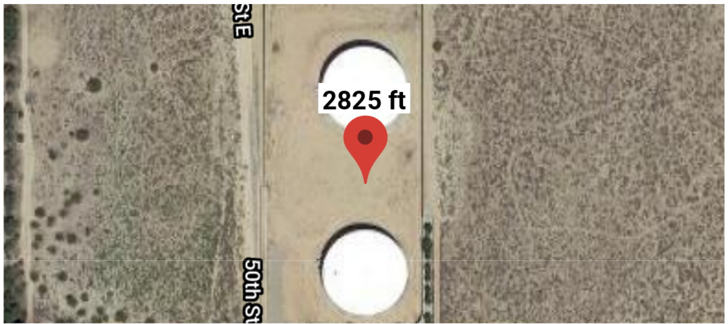
Hazards by Location

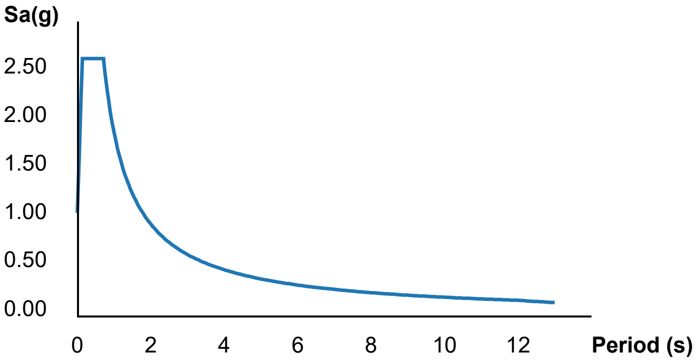
Search Information

Coordinates:	34.536316858195896, -118.04017088147585
Elevation:	2825 ft
Timestamp:	2021-04-09T16:33:04.897Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

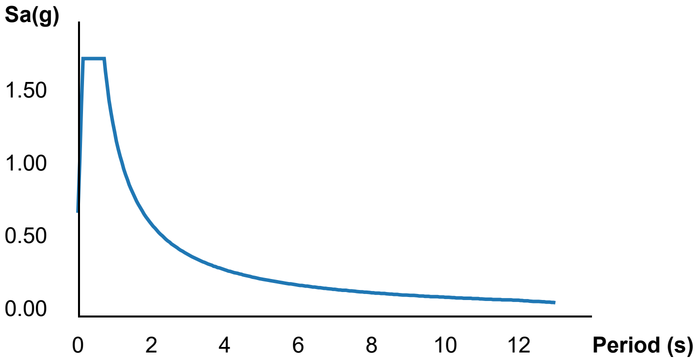


Map data ©2021 Imagery ©2021 , CNES / Airbus, Maxar Technologies, U.S. Geological Survey, USDA Farm Service Agency

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.652	MCE$_R$ ground motion (period=0.2s)
S_1	1.26	MCE$_R$ ground motion (period=1.0s)
S_{MS}	2.652	Site-modified spectral acceleration value
S_{M1}	1.889	Site-modified spectral acceleration value
S_{DS}	1.768	Numeric seismic design value at 0.2s SA
S_{D1}	1.26	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.923	Coefficient of risk (0.2s)
CR_1	0.905	Coefficient of risk (1.0s)

PGA	1.024	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	1.024	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.121	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.381	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.652	Factored deterministic acceleration value (0.2s)
S1RT	1.449	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.602	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.26	Factored deterministic acceleration value (1.0s)
PGAd	1.024	Factored deterministic acceleration value (PGA)

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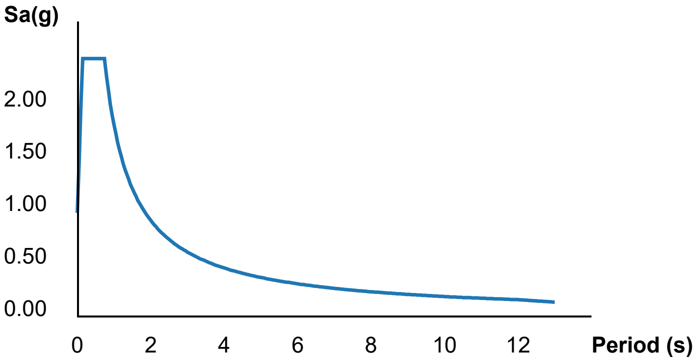
Hazards by Location

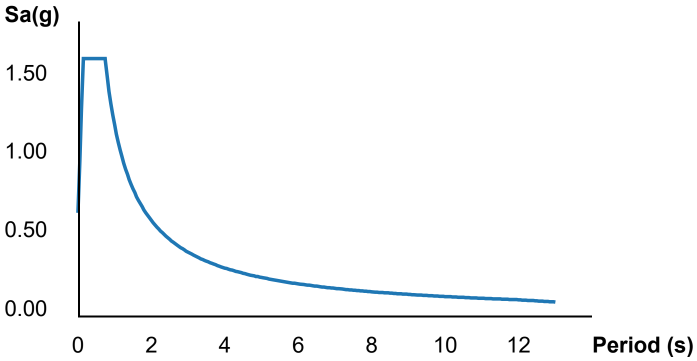
Search Information

Coordinates:	34.54972773620536, -118.1502535834671
Elevation:	3116 ft
Timestamp:	2021-04-09T16:41:41.594Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.458	MCE_R ground motion (period=0.2s)
S_1	1.214	MCE_R ground motion (period=1.0s)
S_{MS}	2.458	Site-modified spectral acceleration value
S_{M1}	1.82	Site-modified spectral acceleration value
S_{DS}	1.639	Numeric seismic design value at 0.2s SA
S_{D1}	1.214	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.916	Coefficient of risk (0.2s)
CR_1	0.906	Coefficient of risk (1.0s)

PGA	0.945	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.945	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.335	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.642	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.458	Factored deterministic acceleration value (0.2s)
S1RT	1.566	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.728	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.214	Factored deterministic acceleration value (1.0s)
PGAd	0.945	Factored deterministic acceleration value (PGA)

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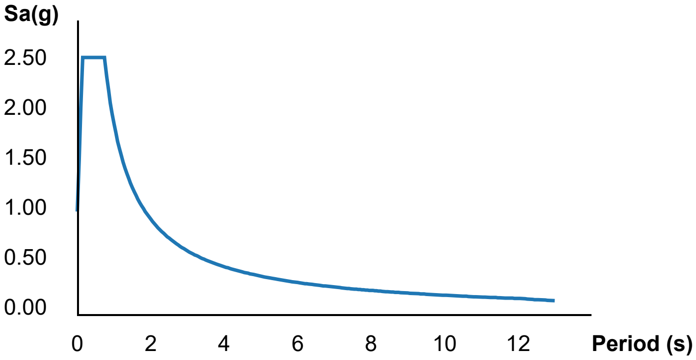
ATC Hazards by Location

Search Information

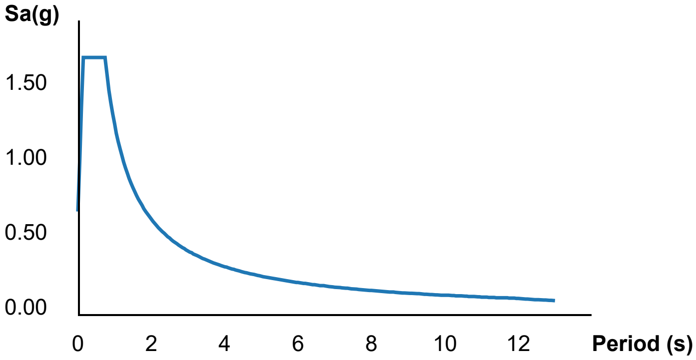
Address:	36809 El Camino Dr, Palmdale, CA 93551, USA
Coordinates:	34.54952240000001, -118.1326806
Elevation:	2925 ft
Timestamp:	2021-04-09T16:20:57.078Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

Map data ©2021 Imagery ©2021 , Maxar Technologies, U.S. Geological Survey, USDA Farm Service Agency

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.571	MCE_R ground motion (period=0.2s)
S_1	1.27	MCE_R ground motion (period=1.0s)
S_{MS}	2.571	Site-modified spectral acceleration value
S_{M1}	1.905	Site-modified spectral acceleration value
S_{DS}	1.714	Numeric seismic design value at 0.2s SA
S_{D1}	1.27	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.916	Coefficient of risk (0.2s)

CR_1	0.904	Coefficient of risk (1.0s)
PGA	0.986	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.986	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.426	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.74	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.571	Factored deterministic acceleration value (0.2s)
S1RT	1.613	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.783	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.27	Factored deterministic acceleration value (1.0s)
PGAd	0.986	Factored deterministic acceleration value (PGA)

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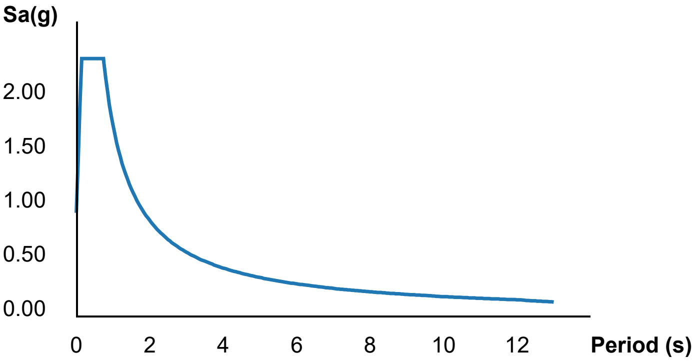
ATC Hazards by Location

Search Information

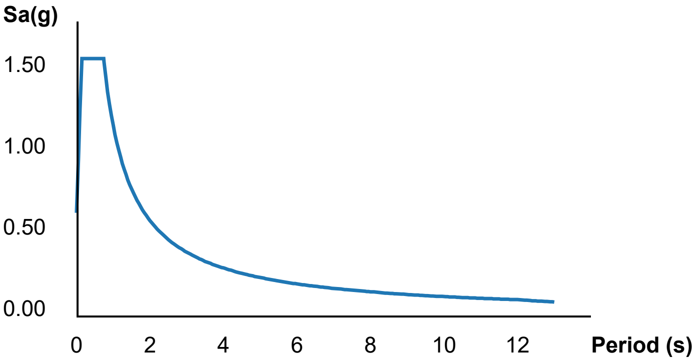
Coordinates:	34.53840630847815, -118.13288506137695
Elevation:	3359 ft
Timestamp:	2021-04-09T20:04:43.993Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

Map data ©2021 Imagery ©2021 , CNES / Airbus, Maxar Technologies, U.S. Geological Survey, USDA Farm Service Agency

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.375	MCE_R ground motion (period=0.2s)
S_1	1.171	MCE_R ground motion (period=1.0s)
S_{MS}	2.375	Site-modified spectral acceleration value
S_{M1}	1.756	Site-modified spectral acceleration value
S_{DS}	1.583	Numeric seismic design value at 0.2s SA
S_{D1}	1.171	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.925	Coefficient of risk (0.2s)
CR_1	0.908	Coefficient of risk (1.0s)

PGA	0.917	MCE$_G$ peak ground acceleration
F$_{PGA}$	1	Site amplification factor at PGA
PGA$_M$	0.917	Site modified peak ground acceleration
T$_L$	12	Long-period transition period (s)
SsRT	3.236	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.499	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.375	Factored deterministic acceleration value (0.2s)
S1RT	1.505	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.657	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.171	Factored deterministic acceleration value (1.0s)
PGAd	0.917	Factored deterministic acceleration value (PGA)

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Hazards by Location

Search Information

Coordinates:	34.56128566737895, -118.12898168848265
Elevation:	2924 ft
Timestamp:	2021-04-09T20:40:24.218Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

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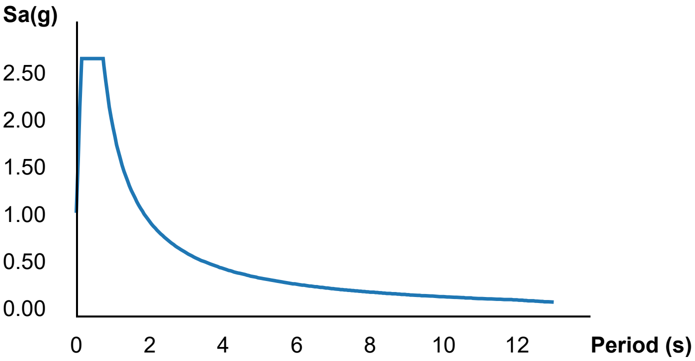
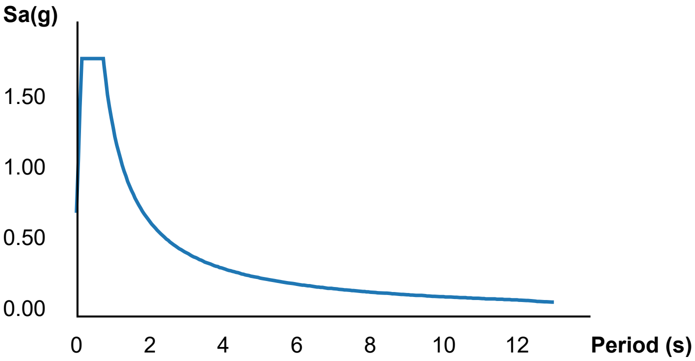
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.733	MCE_R ground motion (period=0.2s)
S_1	1.331	MCE_R ground motion (period=1.0s)
S_{MS}	2.733	Site-modified spectral acceleration value
S_{M1}	1.997	Site-modified spectral acceleration value
S_{DS}	1.822	Numeric seismic design value at 0.2s SA
S_{D1}	1.331	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.92	Coefficient of risk (0.2s)
CR_1	0.904	Coefficient of risk (1.0s)

PGA	1.055	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	1.055	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.306	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.594	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.733	Factored deterministic acceleration value (0.2s)
S1RT	1.547	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.71	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.331	Factored deterministic acceleration value (1.0s)
PGAd	1.055	Factored deterministic acceleration value (PGA)

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ATC Hazards by Location

Search Information

Address:	34547
Coordinates:	34.538438, -118.132863
Elevation:	3360 ft
Timestamp:	2021-04-08T22:06:10.243Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	III
Site Class:	D

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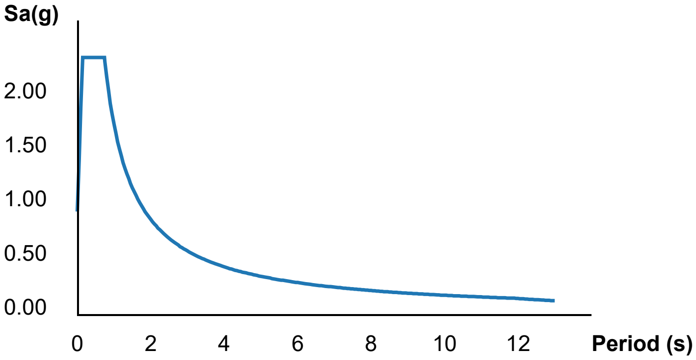
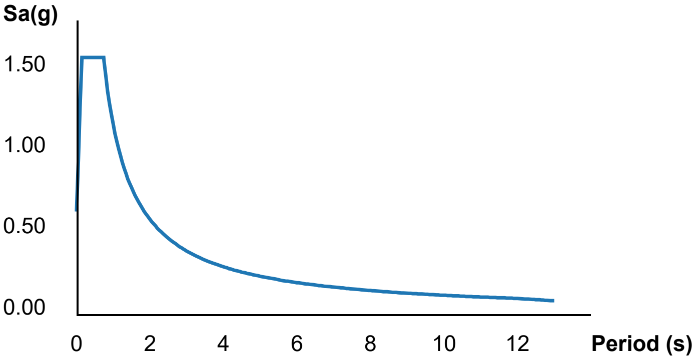
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.376	MCE$_R$ ground motion (period=0.2s)
S_1	1.171	MCE$_R$ ground motion (period=1.0s)
S_{MS}	2.376	Site-modified spectral acceleration value
S_{M1}	1.757	Site-modified spectral acceleration value
S_{DS}	1.584	Numeric seismic design value at 0.2s SA
S_{D1}	1.171	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	E	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.925	Coefficient of risk (0.2s)

CR_1	0.908	Coefficient of risk (1.0s)
PGA	0.917	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.917	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.236	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.5	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.376	Factored deterministic acceleration value (0.2s)
S1RT	1.505	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.657	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.171	Factored deterministic acceleration value (1.0s)
PGAd	0.917	Factored deterministic acceleration value (PGA)

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Hazards by Location

Search Information

Coordinates:	34.598759799594845, -118.09844223112182
Elevation:	2583 ft
Timestamp:	2021-04-09T20:48:48.917Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	IV
Site Class:	D

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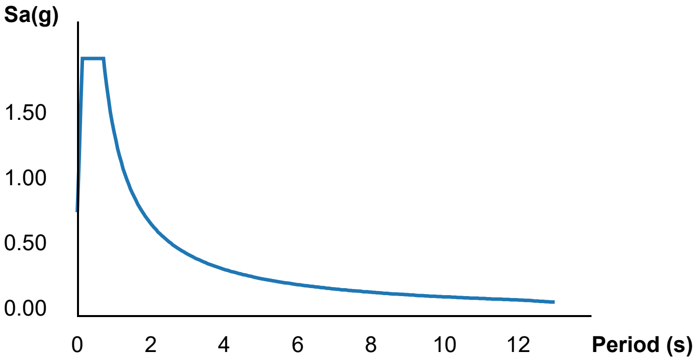
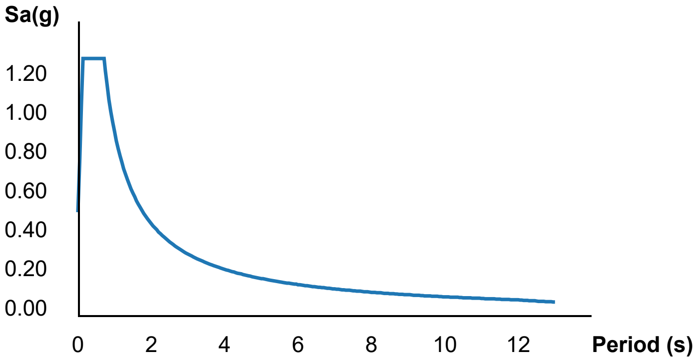
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	1.971	MCE$_R$ ground motion (period=0.2s)
S_1	0.937	MCE$_R$ ground motion (period=1.0s)
S_{MS}	1.971	Site-modified spectral acceleration value
S_{M1}	1.406	Site-modified spectral acceleration value
S_{DS}	1.314	Numeric seismic design value at 0.2s SA
S_{D1}	0.937	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	F	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.937	Coefficient of risk (0.2s)
CR_1	0.911	Coefficient of risk (1.0s)

PGA	0.77	MCE_G peak ground acceleration
F_PGA	1	Site amplification factor at PGA
PGA_M	0.77	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	2.602	Probabilistic risk-targeted ground motion (0.2s)
SsUH	2.776	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	1.971	Factored deterministic acceleration value (0.2s)
S1RT	1.168	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.282	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	0.937	Factored deterministic acceleration value (1.0s)
PGAd	0.77	Factored deterministic acceleration value (PGA)

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Hazards by Location

Search Information

Address:	1036 Barrel Spring Road palmdale, ca
Coordinates:	34.5457226, -118.1085956
Elevation:	2817 ft
Timestamp:	2021-05-04T20:11:47.998Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	III
Site Class:	D

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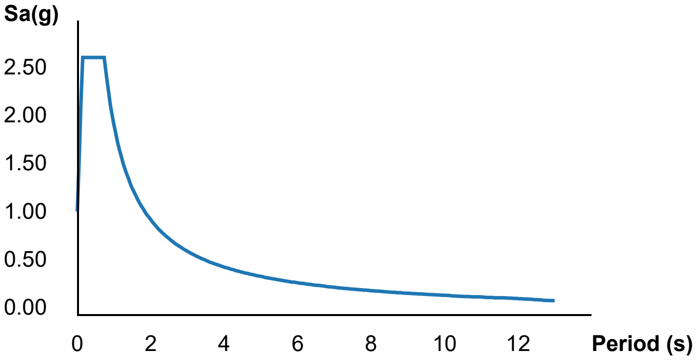
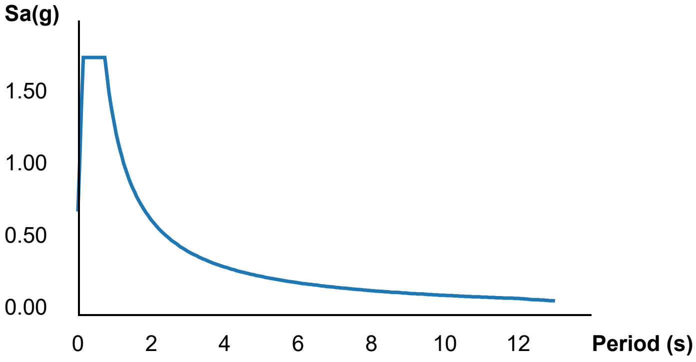
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.674	MCE$_R$ ground motion (period=0.2s)
S_1	1.311	MCE$_R$ ground motion (period=1.0s)
S_{MS}	2.674	Site-modified spectral acceleration value
S_{M1}	1.967	Site-modified spectral acceleration value
S_{DS}	1.782	Numeric seismic design value at 0.2s SA
S_{D1}	1.311	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	E	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.919	Coefficient of risk (0.2s)

CR_1	0.902	Coefficient of risk (1.0s)
PGA	1.029	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	1.029	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.49	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.799	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.674	Factored deterministic acceleration value (0.2s)
S1RT	1.643	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.821	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.311	Factored deterministic acceleration value (1.0s)
PGAd	1.029	Factored deterministic acceleration value (PGA)

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ATC Hazards by Location

Search Information

Address:	15 4640 Barrel Spring Road palmdale, ca
Coordinates:	34.5268275, -118.0540864
Elevation:	3036 ft
Timestamp:	2021-05-04T20:14:23.952Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	III
Site Class:	D

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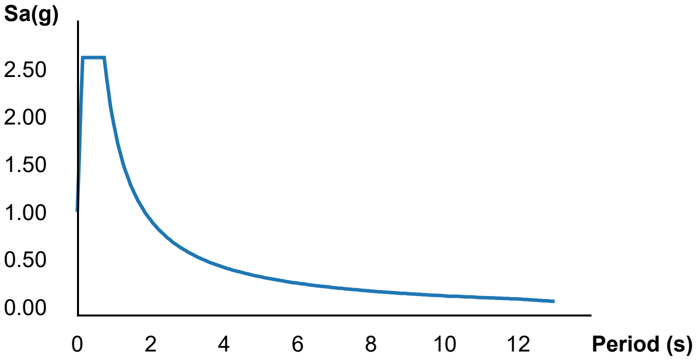
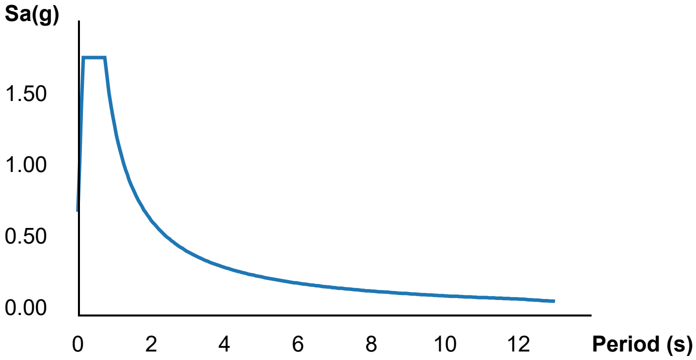
MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.7	MCE_R ground motion (period=0.2s)
S_1	1.323	MCE_R ground motion (period=1.0s)
S_{MS}	2.7	Site-modified spectral acceleration value
S_{M1}	1.984	Site-modified spectral acceleration value
S_{DS}	1.8	Numeric seismic design value at 0.2s SA
S_{D1}	1.323	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	E	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.924	Coefficient of risk (0.2s)

CR_1	0.905	Coefficient of risk (1.0s)
PGA	1.04	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	1.04	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	3.149	Probabilistic risk-targeted ground motion (0.2s)
SsUH	3.409	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.7	Factored deterministic acceleration value (0.2s)
S1RT	1.464	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.617	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.323	Factored deterministic acceleration value (1.0s)
PGAd	1.04	Factored deterministic acceleration value (PGA)

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