

2020 Water Shortage Contingency Plan

Prepared for
Rainbow Municipal Water District
Fallbrook, California
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In association with:



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Table of Contents

List of Figures	ii
List of Tables	ii
List of Abbreviations	iii
1. Introduction	1-1
2. Water Supply Reliability Analysis Summary.....	2-1
2.1 Water System Reliability.....	2-1
2.2 Key Risks for a Potential Shortage Condition	2-1
3. Annual Water Supply and Demand Assessment Procedures.....	3-1
4. Six Standard Water Shortage Stages.....	4-3
5. Shortage Response Actions.....	5-1
5.1 Demand Reduction Actions.....	5-1
5.1.1 Special Water Feature Distinction.....	5-1
5.2 Supply Augmentation and Other Actions.....	5-2
5.3 Shortage Response Action Effectiveness.....	5-8
6. Emergency Response Plan	6-1
6.1 Seismic Risk Assessment and Mitigation Plan	6-1
7. Communication Protocols.....	7-1
8. Compliance and Enforcement.....	8-1
8.1 Ensuring Ordinance Compliance	8-1
8.2 Enforcement of Demand Reduction Actions.....	8-1
8.3 Exemptions and Appeals.....	8-2
9. Legal Authorities.....	9-1
10. Financial Consequences of WSCP Activation	10-1
10.1 Potential Revenue Reductions and Expense Increases.....	10-1
10.2 Mitigation Actions to Address Revenue Reductions.....	10-1
10.3 Cost of Compliance.....	10-1
11. Monitoring and Reporting.....	11-1
12. WSCP Refinement, Adoption, Submittal, and Availability.....	12-1
12.1 Refinement Procedures.....	12-1
12.2 Adoption, Submittal, and Availability	12-1
Attachment A: Seismic Risk Assessment and Mitigation Plan.....	A

List of Figures

Figure 3-1. Annual Assessment Procedure and Decision-Making Process.....3-1

List of Tables

Table 4-1. Water Shortage Contingency Plan Levels (DWR Table 8-1)4-3

Table 5-1. Demand Reduction Actions (DWR Table 8-2).....5-3

Table 5-2. Supply Augmentation and Other Actions (DWR Table 8-3).....5-7

Table 5-3. Shortage Gap Reduction from Demand Reduction and Supply Augmentation Actions5-8

List of Abbreviations

AFY	acre-feet per year
AMI	advanced metering infrastructure
Annual	
Assessment	annual water supply and demand assessment
CWC	California Water Code
District	Rainbow Municipal Water District
DWR	Department of Water Resources
EOC	Emergency Operations Center
ERP	Emergency Response Plan
SCADA	supervisory control and data acquisition system
PSAWR	Permanent Special Agriculture Water Rate
UWMP	Urban Water Management Plan
Water Authority	San Diego County Water Authority
WSCP	Water Shortage Contingency Plan

Section 1

Introduction

The Water Shortage Contingency Plan (WSCP) documents how Rainbow Municipal Water District (District) will respond in the event of a water shortage. A water shortage means that the available water supply cannot sufficiently meet the normally expected customer water use at a given point in time. This WSCP provides guidance for managing and mitigating a potential shortage of water supply. In the event of any water shortage emergencies, this WSCP should be followed in coordination with the District's emergency response plan.

The San Diego County Water Authority (Water Authority) is a wholesale water supplier that provides 100 percent of the supply to the District in normal years. The Water Authority has their own WSCP that guides their response to a water shortage.

The WSCP is an element of the District's Urban Water Management Plan (UWMP), both of which are updated every five years in accordance with the California Water Code and submitted to the Department of Water Resources (DWR). The WSCP must be able to be amended separately from the UWMP. As such there is the flexibility to be able to separate the WSCP from the UWMP for future needs.

The WSCP is structured as recommended by DWR in the 2020 Urban Water Management Plan Guidebook. The WSCP consists of the following elements:

- **Section 2:** Water Supply Reliability Analysis Summary
- **Section 3:** Annual Water Supply and Demand Assessment Procedures
- **Section 4:** Six Standard Water Shortage Stages
- **Section 5:** Shortage Response Actions
- **Section 6:** Emergency Response Plan
- **Section 7:** Communication Protocols
- **Section 8:** Compliance and Enforcement
- **Section 9:** Legal Authorities
- **Section 10:** Financial Consequences of WSCP Activation
- **Section 11:** Monitoring and Reporting
- **Section 12:** WSCP Refinement, Adoption, Submittal, and Availability

Section 2

Water Supply Reliability Analysis Summary

The water supply reliability analysis is documented in Section 7 of the UWMP. To comply with the Water Code, the analysis is summarized in this section. The reliability of supplies and the key issues that may create shortage conditions relative to the District's water supply portfolio are summarized below.

2.1 Water System Reliability

The water system reliability analysis to meet demands in normal, single dry, and multiple dry years over a five-year drought period is described narratively and in tabulated format in Section 7 of the UWMP. Historically, the Water Authority supply has been very reliable with only occasional supply reductions during droughts impacting California or the Colorado River Watershed. The District anticipates there will be no supply shortages within the District's service area in a normal year, single dry-year or multiple dry- years through 2045.

2.2 Key Risks for a Potential Shortage Condition

Though the District's supply is highly reliable, there are scenarios that could result in the District declaring water shortage stage conditions. For example, water shortage stages may be declared if the California Governor enacts an Executive Order calling for water demand reductions. Below is a list of the key risks to the District that could potentially result in a shortage condition.

- Regional drought circumstances that lead to water supply allocations/cutbacks from the Water Authority
- Regulatory restrictions enacted upon imported supplies
- Earthquakes or other hazards that may cause catastrophic failure of conveyances for water supplies imported via the Water Authority, which partially originate from the State Water Project or the Colorado River Aqueduct

Section 3

Annual Water Supply and Demand Assessment Procedures

The annual water supply and demand assessment (Annual Assessment) shall be conducted annually and submitted to DWR on or before July 1 of each year beginning with the first Annual Assessment due by July 1, 2022. The Annual Assessment forecasts near-term water supply conditions to ensure shortage response actions are triggered in a timely manner. The Annual Assessment is submitted to DWR with information on anticipated water supply shortages, triggered shortage response actions, compliance and enforcement actions, and communication actions consistent with this WSCP.

This section presents the decision-making process that the District will use each year to determine its water supply reliability. The District will conduct an annual water supply and demand assessment that follows the steps illustrated in Figure 3-1 and described below. The decision-making process also includes the key data inputs and assessment methodology that will be used to evaluate the District’s water supply and demand. The evaluation criteria, unconstrained demand, water supply, infrastructure considerations, and other factors are included in the steps. Once DWR finalizes the Annual Assessment guidelines, this process may be modified.

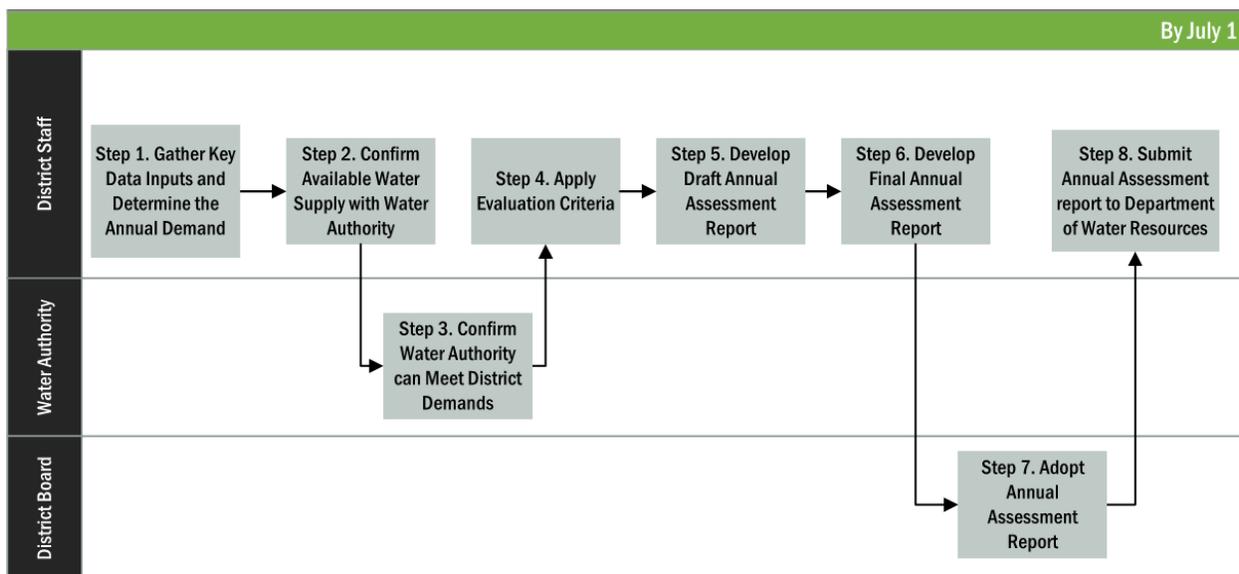


Figure 3-1. Annual Assessment Procedure and Decision-Making Process

Step 1. District Gathers Key Data Inputs and Determines the Unconstrained Demand

Prior to March 1st of each year, the District will estimate unconstrained customer demand for the current year and one dry year using a method similar to that used by the District for its 2020 UWMP water demand projections. DWR defines unconstrained customer demand as the District’s water use before any projected demand reduction response actions are implemented due to WSCP activation. The projections shall be based on recent water use, while considering impacts on demand from

changing agricultural demands, climate patterns, potential service area expansion or population growth, and other influencing factors.

Step 2. District Coordinates with Water Authority to Confirm Available Water Supply

Prior to March 1st of each year, the District will coordinate with the Water Authority to confirm that their available water supply will meet the District's unconstrained demand. The District receives 100 percent of its supply from the Water Authority without supply limitations in normal years. In times of drought, the Water Authority may determine a reduced annual water allocation for their member agencies based on a predetermined methodology.

Step 3: Water Authority Confirms Supply

The Water Authority will confirm whether the available water supply can meet the District's water demands for the current year and one subsequent dry year. The Water Authority will determine their methodology for this analysis, but the basis of this methodology is as follows:

- Consider hydrological and regulatory conditions in the current year when making their determination.
- Consider how dry-year hydrological and regulatory conditions in the subsequent year may impact their water supplies
- Identify any water transmission or storage infrastructure constraints that may impact water supply deliveries to the District
- Provide descriptive text of the available water supply to the District for both scenarios

Step 4. Apply Evaluation Criteria

The Annual Assessment is based on evaluating the key data inputs to determine water supply reliability. The water supply and demand information will be compared in an Excel table or other tool using a DWR specified timestep (i.e., monthly data, quarterly, or annual data), and reliability will be assessed by considering local conditions, potential supply uncertainties, and any possible constraints on water distribution infrastructure from events such as planned maintenance, construction, equipment outages, etc.

Step 5. Develop Draft Annual Assessment Report

The District will compile the draft Annual Assessment report using the key data inputs, evaluation criteria, and results of the analysis. The report will contain a description and quantification of each source of water supply for the current year and one subsequent dry year. The report will also identify and quantify any anticipated water supply shortages. If any water shortages are anticipated, the report will indicate which water shortage level of the Water Shortage Contingency Plan to recommend for initiation.

Step 6. Develop Final Annual Assessment Report

The District will conduct an internal review and approval process of the draft, in order to prepare the Final Annual Assessment Report. The Final Report will be submitted to the District's Board of Directors for approval.

Step 7. Adopt Annual Assessment Report

The District's Board of Directors will review and adopt the Annual Assessment report, declaring a water shortage if necessary.

Step 8. Submit Annual Assessment Report to DWR

The District will submit the Annual Assessment report to DWR on or before July 1st of each year.

Section 4

Six Standard Water Shortage Stages

The District has developed a six-stage WSCP that defines the shortage levels based upon the percent of water supply shortage in comparison to unconstrained demand, as shown in Table 4-1. The District's WSCP contains six-stages to provide a consistent regional and statewide approach to conveying the relative severity of water supply shortage conditions. The six standard water shortage levels correspond to progressively increasing estimated shortage conditions and align with the response action the District would implement to meet the severity of the impending shortages.

Table 4-1. Water Shortage Contingency Plan Levels (DWR Table 8-1)		
Shortage Level	Percent Shortage Range ¹	Water Shortage Condition
1	Up to 10%	Water supply conditions are sufficient to meet 90 to 100% of projected unconstrained demand for the next two years.
2	Up to 20%	Water supply conditions are sufficient to meet 80 to 90% of projected unconstrained demand for the next two years.
3	Up to 30%	Water supply conditions are sufficient to meet 70 to 80% of projected unconstrained demand for the next two years.
4	Up to 40%	Water supply conditions are sufficient to meet 60 to 70% of projected unconstrained demand for the next two years.
5	Up to 50%	Water supply conditions are sufficient to meet 50 to 60% of projected unconstrained demand for the next two years.
6	>50%	Water supply conditions are sufficient to meet less than 50% of projected unconstrained demand for the next two years.

Notes: Water shortage condition is based on unconstrained demand compared to projected supply. Projected supply is based on water deliveries from the Water Authority.

Section 5

Shortage Response Actions

Shortage response actions are aligned with the defined shortage levels defined in Table 4-1. Shortage response actions include locally appropriate supply augmentation actions and locally appropriate demand reduction actions such as operational changes, mandatory prohibitions against specific water use practices, and state mandated prohibitions. Each shortage response action is intended to reduce a portion of the gap between supplies and demand. The percent of water demand reduction for each action is estimated in Section 5.1.

5.1 Demand Reduction Actions

Prioritized use of available potable water during shortages is based on the difference between basic needs (i.e., drinking, toilet flushing) and discretionary uses (i.e., landscape irrigation), and legal requirements set forth in the California Water Code (CWC), Sections 350-358. Water reduction actions implemented during shortages will not affect the following water use types:

- Minimum health and safety allocations for interior residential needs (includes single family, multifamily, hospitals and convalescent facilities, retirement and mobile home communities, student housing, firefighting, and public safety)
- Commercial, industrial, institutional/governmental operations, where water is used for manufacturing, to meet minimum health and safety allocations for employees and visitors, or to maintain jobs and economic base of the community, but not for landscape uses
- Commercial growers or nurseries

Locally appropriate demand reduction actions to adequately respond to shortages are specified in Table 5-1 on page 5-3. Table 5-1 includes:

- Demand reduction actions by shortage level. All demand reduction actions in lower levels continue to be implemented as the shortage level increases, unless otherwise noted in the table.
- Estimated annual reduction in water by volume and percent for each demand reduction action.
- Customer Outreach/Penalty, charge, or other enforcement for each demand reduction action.

The assumptions and references for the estimated annual reduction in water by volume are provided in Attachment A.

5.1.1 Special Water Feature Distinction

Water features that are not pools or spas are analyzed and defined separately from pools and spas in the WSCP. Non-pool or non-spa water features including ponds, lakes, waterfalls, and fountains that do not require the use of potable water for health and safety considerations, are defined as decorative water features and recreational water features and are included as such in the response actions and are enforced and monitored as part of the WSCP process.

Under all conditions and stages, the WSCP prohibits using potable water in an ornamental fountain or other decorative water feature, except where the water is part of a recirculating system. At Shortage Level 4 all decorative water features that use potable water must be drained and kept dry.

5.2 Supply Augmentation and Other Actions

Locally appropriate supply augmentation actions and operational changes are listed in Table 5-2. Because the District is reliant on water deliveries from the Water Authority, localized supply augmentation options are currently limited.

Table 5-1. Demand Reduction Actions (DWR Table 8-2)

Shortage Level	Demand Reduction Actions	How much is this going to reduce the shortage gap? (AFY)	How much is this going to reduce the shortage gap? (%)	Additional Explanation or Reference	Penalty, Charge, or Other Enforcement?
1 through 5	Landscape - Restrict or prohibit runoff from landscape irrigation	43	0.30	Prohibit the application of potable water on outdoor landscapes in a manner that causes excessive runoff such that water flows onto adjacent property, non-irrigated areas, private and public walkways, roadways, parking lots or structures.	None in Shortage Level 1, Customer Outreach/Penalty above Shortage Level 1
1 through 6	Other - Require automatic shut off hoses	43	0.30	Prohibit 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. ^a	None in Shortage Level 1, Customer Outreach/Penalty above Shortage Level 1
1 through 6	Other - Prohibit use of potable water for washing hard surfaces	87	0.61	Prohibit the application of potable water to driveways and sidewalks.	None in Shortage Level 1, Customer Outreach/Penalty above Shortage Level 1
1 through 6	Water Features - Restrict water use for decorative water features, such as fountains	43	0.30	Prohibit the use of potable water in a fountain or other decorative water feature, except where the water is part of a recirculating system.	None in Shortage Level 1, Customer Outreach/Penalty above Shortage Level 1
1 through 5	Landscape - Other landscape restriction or prohibition	43	0.30	Prohibit the application of potable water to outdoor landscapes during and within 48 hours after measurable rainfall. ^a	None in Shortage Level 1, Customer Outreach/Penalty above Shortage Level 1
1 through 6	CII - Restaurants may only serve water upon request	4	0.03	Prohibit the serving of drinking water other than upon request in eating or drinking establishments, including but not limited to restaurants, hotels, cafes, cafeterias, bars, or other public places where food or drink are served and/or purchased.	None in Shortage Level 1, Customer Outreach/Penalty above Shortage Level 1
1	Landscape - Limit landscape irrigation to specific days	760	5.31	Limit residential and commercial landscape irrigation to no more than three (3) assigned days per week on a schedule established by the General Manager and posted by the District. ^a	None in Shortage Level 1, Customer Outreach/Penalty above Shortage Level 1
1 through 5	Landscape - Prohibit certain types of landscape irrigation	16	0.11	Prohibit the irrigation with potable water of ornamental turf on public street medians.	None in Shortage Level 1, Customer Outreach/Penalty above Shortage Level 1
1 through 5	Landscape - Prohibit certain types of landscape irrigation	129	0.90	Prohibit 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	None in Shortage Level 1, Customer Outreach/Penalty above Shortage Level 1

Table 5-1. Demand Reduction Actions (DWR Table 8-2)					
Shortage Level	Demand Reduction Actions	How much is this going to reduce the shortage gap? (AFY)	How much is this going to reduce the shortage gap? (%)	Additional Explanation or Reference	Penalty, Charge, or Other Enforcement?
				Building Standards Commission and the Department of Housing and Community Development.	
2 3 through 5	Landscape - Limit landscape irrigation to specific days	1,140 1,032	7.97 7.21	Limit residential and commercial landscape irrigation to no more than two (2) assigned days per week on a schedule established by the General Manager and posted by the District. ^a	Customer Outreach/Penalty
2 3 through 5	Landscape - Limit landscape irrigation to specific times	597	4.17	Limit lawn watering and landscape irrigation using sprinklers to no more than ten (10) minutes per watering station per assigned day. This provision does not apply to landscape irrigation systems using water efficient devices, including but not limited to weather-based controllers, drip/micro-irrigation systems and stream rotor sprinklers. ^a	Customer Outreach/Penalty
2 through 6	Offer Water Use Surveys	574	4.01	Offer District customers water use surveys to identify existing passive leaks or inefficiencies in plumbing or irrigation systems.	Incentive
3 4 through 6	Moratorium or Net Zero Demand Increase on New Connections	129 120	0.90 0.84	No new potable water service shall be provided, no new temporary meters or permanent meters shall be provided, and no statements of immediate ability to serve or provide potable water service (such as, will serve letters, certificates, or letters of availability) shall be issued, unless (1) a valid, unexpired building permit has already been issued for the project; (2) In the opinion of the District Board of Directors the project is necessary to protect the public's health, safety, and welfare; or (3) The applicant provides substantial evidence of an enforceable binding commitment that water demands for the project will be offset prior to the provision of a new water meter(s) to the satisfaction of the District.	None
3 through 5	Landscape - Prohibit certain types of landscape irrigation	557	3.89	Water landscaped areas, including trees and shrubs located on residential and commercial properties, and not irrigated by a landscape irrigation system governed by section 5 (b) (1), on the same schedule set forth in section 5 (b) (1) by using a bucket, hand-held hose with positive shut-off nozzle, or low-volume non-spray irrigation. ^a	Customer Outreach/Penalty

Table 5-1. Demand Reduction Actions (DWR Table 8-2)

Shortage Level	Demand Reduction Actions	How much is this going to reduce the shortage gap? (AFY)	How much is this going to reduce the shortage gap? (%)	Additional Explanation or Reference	Penalty, Charge, or Other Enforcement?
3 and 4	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	132	0.92	Repair all leaks within seventy-two (72) hours of notification by the District unless other arrangements are made with the General Manager.	Customer Outreach/Penalty
3 through 6	Other water feature or swimming pool restriction	43	0.30	Stop filling or re-filling swimming pools, spas, ornamental fountains, lakes, ponds, or other water features, except to the extent needed to sustain aquatic life, provided that such animals are of significant value and have been actively managed within the water feature prior to declaration of a drought response level under this ordinance.	Customer Outreach/Penalty
4 through 5	Landscape - Limit landscape irrigation to specific days	611	4.27	During the months of November through May, landscape irrigation is limited to no more than once per week on a schedule established by the General Manager and posted by the District. This section shall not apply to commercial growers or nurseries.	Customer Outreach/Penalty
4 through 6	Other water feature or swimming pool restriction	43	0.30	All decorative water features that use potable water must be drained and kept dry	Customer Outreach/Penalty
4 through 6	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water	43	0.30	Stop washing vehicles except at commercial carwashes that recirculate water, or by high pressure/low volume wash systems.	Customer Outreach/Penalty
4	Other	1,322	9.24	The District may establish up to a 10% reduction in water allocation for any property served by the District. ^b	Customer Outreach/Penalty
5	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	66	0.46	Repair all leaks within forty-eight (48) hours of notification by the District unless other arrangements are made with the General Manager.	Customer Outreach/Penalty
5	Other	2,645	18.84	The District may establish up to a 20% reduction in water allocation for any property served by the District ^b	Customer Outreach/Penalty
6	Landscape - Prohibit all landscape irrigation	1,942	13.57	Stop all landscape irrigation ^{ac}	Customer Outreach/Penalty
6	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	397	2.77	Repair all water leaks within twenty-four (24) hours of notification by the District unless other arrangements are made with the General Manager	Customer Outreach/Penalty

Table 5-1. Demand Reduction Actions (DWR Table 8-2)					
Shortage Level	Demand Reduction Actions	How much is this going to reduce the shortage gap? (AFY)	How much is this going to reduce the shortage gap? (%)	Additional Explanation or Reference	Penalty, Charge, or Other Enforcement?
6	Other	3,967	27.72	The District may establish up to a 30% reduction in water allocation for any property served by the District. ^b	Customer Outreach/Penalty

Notes:

- a. This reduction action shall not apply to commercial growers or nurseries.
- b. The District may establish a water allocation for any property served by the District using a method that does not penalize persons for previous implementation of conservation methods or the installation of water saving devices. The decision to establish a water allocation and the method utilized to determine the amount of the allocation shall be at the sole discretion of District.
- c. If recycled water is available, it may be used to (1) maintain trees and shrubs on a limited schedule and by using a bucket, hand-held hose with a positive shut-off nozzle, or low-volume non-spray irrigation, (2) maintain existing landscaping necessary for fire protection as specified by the Fire Marshal of the local fire protection agency having jurisdiction over the property to be irrigated, (3) maintain existing landscaping for erosion control, (4) maintain landscaping within active public facilities, including parks and playing fields, day care centers, school grounds, cemeteries, and golf course greens, provided that such irrigation does not exceed two (2) days per week, (5) provide watering of livestock, and (6) supply public works projects and actively irrigated environmental mitigation projects.

Table 5-2. Supply Augmentation and Other Actions (DWR Table 8-3)				
Shortage Level	Supply Augmentation Methods and Other Actions by Water Supplier	How much is this going to reduce the shortage gap? (AFY)	How much is this going to reduce the shortage gap? (%)	Additional Explanation or Reference
1 through 6	Expand Public Information Campaign	217.30	1.5	Offer workshops, increased use of bill inserts
2 through 6	Expand Public Information Campaign	43.46	0.3	Promotion of District-wide advanced metering infrastructure (AMI) hourly water use data to communicate with customers. The District offers rebates for AMI capable meters to their customers so they can easily access insights into their water use.

5.3 Shortage Response Action Effectiveness

The purpose of implementing demand reduction and supply augmentation actions is to reduce water demand and increase other sources of supply to make up for the water shortage gaps. If implemented, the demand reduction and supply augmentation actions outlined in Table 5-1 and Table 5-2 will allow the District to sufficiently meet the water shortage gaps at each shortage level. Table 5-3 presents the WSCP shortage gap reduction goals and compares them to the total shortage gap reduction possible if all demand reduction and supply augmentation actions are implemented for the associated shortage level.

Table 5-3. Shortage Gap Reduction from Demand Reduction and Supply Augmentation Actions						
	Shortage Level					
	1	2	3	4	5	6
WSCP Shortage Gap Reduction Goal (%)	10	20	30	40	50	>50
Shortage Gap Reduction due to Demand Reduction Actions (%) ^a	8	19	28	42	50	55
Shortage Gap Reduction due to Supply Augmentation Actions (%) ^a	2	2	2	2	2	2
Total Shortage Gap Reduction (%)	10	21	30	44	52	57

a. Based upon assumed reduction percentages from Table 5-1 and compared to total actual water use for 2020.

b. Based upon assumed supply augmentation percentages from Table 5-2 and compared to total actual water use for 2020.

Section 6

Emergency Response Plan

A catastrophic water shortage could occur when a natural disaster such as an earthquake results in damage to water supply conveyances, other state water infrastructure, or District water facilities. This could possibly result in deficient water supplies for the region and/or the District. In response to potential natural disasters and other emergencies, the District prepared an Emergency Response Plan (ERP) in 2018. The ERP includes standardized response and recovery procedures to minimize customer water service interruptions and to prevent, minimize, and mitigate human injury and infrastructure damage resulting from emergencies or disasters of human-made or natural origin. The information contained in the ERP is intended to prepare and guide staff and inform emergency response agencies. The ERP includes plans, procedures, lists, and identification of equipment that may be useful during an emergency. The ERP includes the following sections:

- **Section 1:** Introduction
- **Section 2:** Emergency Planning Process
- **Section 3:** Mutual Aid System
- **Section 4:** Water System Information and Hazard Identification
- **Section 5:** Preparedness Phase Operations
- **Section 6:** Response Phase Overview
- **Section 7:** EOC Staff Assignments and Responsibility
- **Section 8:** Restoration and Recovery Phase
- **Section 9:** Mitigation Phase

Additionally, the ERP provides specific guidelines for the four items listed below. These guidelines will give District emergency responders support when determining the necessary response actions to manage an incident in a timely manner.

- Establishing an Emergency Operations Center (EOC) including the location and resources required, as well as a secondary EOC if the primary EOC is compromised.
- Organization and responsibilities of the EOC personnel to evaluate and direct the overall response to the emergency.
- Strategies for emergency response, repair, and restoration of the water system.
- Responsibilities of District personnel during the emergency response.

6.1 Seismic Risk Assessment and Mitigation Plan

A seismic risk assessment of the District's critical water system assets, including storage tanks, pump stations, and critical transmission and distribution pipelines was conducted. This assessment includes a description of the likelihood of occurrence near the critical facilities, a list of the assets that may be impacted, potential impacts, and suggested mitigation measures. The seismic risk assessment is documented as a technical memorandum, and it is included as Attachment A.

Section 7

Communication Protocols

Timely and effective communication is a key element of water shortage contingency planning implementation. The District's communication protocols and procedures in the event of a water shortage are intended for activation only with District Board authorization. Under a water shortage condition, the District would assess the actual water supply and demand information and conditions to determine whether activating the WSCP is warranted. If activation is warranted, the General Manager will call for an emergency Board meeting to request District Board authorization, if needed. The District would recommend activation of the appropriate stage and request District Board authorization to initiate the measures necessary to achieve the appropriate demand reduction target. The public would be encouraged to understand and be involved in the decision-making process and provide feedback to the District Board on such an action.

The list below outlines the specific communication methods to inform customers, the public, interested parties, and local, regional, and the state government of any current or anticipated water shortage stage and the associated water demand reduction actions:

- Customers, the public, and other interested parties:
 - Announcements on District website homepage
 - Press releases via the River Village News
 - Public information and awareness program with workshops, park signage, water bill inserts, and educational programs at schools
- Local, regional, and state government
 - Email officials at cities and counties impacted by the water shortage
 - Email or place phone call to designated officials at regional and state level (DWR)

Section 8

Compliance and Enforcement

The District adopted Ordinance No 16-10: An Ordinance of Rainbow Municipal Water District Adopting a Drought Response Conservation Program in June 2016 which provides a description of penalties and the District's authority to fine or terminate water service. The ordinance will be revised in accordance with the water shortage stages, demand reduction actions, and other measures outlined in this WSCP. The ordinance will go before the District's Board for approval after the WSCP has been revised and adopted.

8.1 Ensuring Ordinance Compliance

When water shortage stages are enacted, the District will ensure compliance with the ordinance by launching education and communication programs with District customers. If violations are identified, the fines described in Section 8.2 may apply if the offender has already been issued a warning. In the event of a water shortage, customers participating in the Permanent Special Agriculture Water Rate (PSAWR) program must affirmatively accept the condition that service may be interrupted during water supply shortages before other classes of water service are interrupted. During shortages, the District notifies customers participating in PSAWR through, newsletters, mailers, and the District website.

8.2 Enforcement of Demand Reduction Actions

Any person who uses, causes to be used, or permits the use of water in violation of the ordinance is guilty of an offense punishable as outlined below. Each day that a violation of the ordinance occurs is a separate offense.

Similarly, the District will ensure compliance with and enforce provisions of the WSCP reduction actions taken at each shortage level as noted in Table 5-1 by the following means:

- Prior to issuing administrative fines for violations, the District will first conduct public outreach and issue a warning to customers not in compliance. The District will provide the customer with a fact sheet about water shortage demand reduction actions to explain why the measures are in place.
- Administrative fines may be levied for each subsequent violation, with increasing fees as follows:
 - \$100 for a first violation.
 - \$200 for a second violation within one year from occurrence of the first violation.
 - \$500 for each additional violation within one year of the first violation.
- Installation of a flow-restricting device in the meter.
- Violations may be prosecuted as a misdemeanor punishable by imprisonment in the county jail for not more than 30 days or by a fine not exceeding \$1,000, or by both as provided in CWC section 377.
- Willful violations of the mandatory conservation measures and water use restrictions applicable during a Level 6 Drought Emergency condition may be enforced by discontinuing service to the property at which the violation occurs, as provided by CWC section 356.

All remedies provided for herein shall be cumulative and not exclusive.

8.3 Exemptions and Appeals

If, due to unique circumstances, a specific requirement of this WSCP would result in undue hardship and disproportionate impact to a District customer, then an exemption may be granted or conditionally granted by following the procedures detailed below.

1. **Request an Exemption or Appeal.** The customer shall submit a letter to the District requesting an exemption or appeal.
2. **Provide supporting documentation.** The exemption application shall be accompanied by photographs, maps, drawings, and other information, including a written statement of the applicant.
3. **Basis is found to support exemption.** An exemption shall be granted only if the District finds, based on the information provided in the application, supporting documents, any additionally requested information, and the District's records of water use information for the property, all of the following:
 - a. The exemption does not grant special privilege inconsistent with those available to all other District customers.
 - b. Unique circumstances specific to the applicant are found to have a disproportionate impact on the property or use that exceeds the impacts to customers generally.
 - c. The granted exemption will not cause harm to adjacent properties and will not impede the District's ability to fulfill the purpose of the WSCP.

The rationale and reason for the exemption request is not common, recurrent, or general in nature.

Approval Authority. The General Manager shall exercise approval authority and act upon any completed application no later than 30 days after submittal and may approve, conditionally approve, or deny the exemption. The applicant requesting the exemption shall be promptly notified in writing of any action taken. Unless specified otherwise at the time an exemption is approved, the variance applies to the subject property during the term of the mandatory shortage response.

Appeals to the District Board of Directors. An applicant may appeal a decision or condition of the General Manager on a variance application. The appeal must be in the form of a written request for a hearing and shall state the grounds for the appeal. At a public meeting, the District Board of Directors shall act as the approval authority and review the appeal. The decision of the District Board of Directors is final.

Section 9

Legal Authorities

The District's legal authority to enforce demand reduction measures during water shortages is codified by local ordinance, Rainbow Drought Ordinance 16-10: An Ordinance of Rainbow Municipal Water District Adopting a Drought Response Conservation Program.

The District shall declare a water shortage emergency condition in accordance with CWC Chapter 3 (commencing with Section 350) of Division 1 as stated below:

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

The District shall coordinate with any city or county within which it provides water supply services for the possible proclamation of a local emergency under California Government Code, California Emergency Services Act (Article 2, Section 8558.)

Section 10

Financial Consequences of WSCP Activation

The financial consequence of implementing the WSCP include potential revenue reductions and expense increases for the District. The District has estimated the costs associated with the revenue losses and has developed mitigation actions to reduce these impacts.

10.1 Potential Revenue Reductions and Expense Increases

Upon implementation of a shortage stage and the associated reduction actions, the District anticipates that revenues generated from the quantity charge component of customers' bills would be reduced proportionately to the water shortage percentage. In addition to reduced revenues, the District may also experience increased expenses due to the need for staff to carry out monitoring and enforcement actions identified by each shortage stage.

10.2 Mitigation Actions to Address Revenue Reductions

Throughout extended water shortage periods, the District would attempt to avoid rate adjustments.

Potential mitigation actions include:

- Use of financial reserves - The District has financial reserves to address decreased water sales during a water shortage.
- Postponement of capital improvements - The District could delay work on non-essential capital improvements until water sales become more sustainable.

10.3 Cost of Compliance

For the District to ensure its customers comply with the ordinance and CWC Chapter 3.3, Excessive Residential Water Use During Drought, additional costs will be incurred. These costs are associated with the increased costs for monitoring and enforcement of water use reduction measures.

Section 11

Monitoring and Reporting

The District will monitor and report implementation of the WSCP by collecting, tracking, and analyzing appropriate data for the purposes of monitoring reduction in customer water demands, customer compliance, and meeting state reporting requirements. Potable water use figures are recorded daily by District staff. The District operates its water system on a computerized supervisory control and data acquisition system (SCADA), which allows instantaneous viewing of water system conditions.

During a Shortage level 1 or 2, District staff would compare the daily and monthly water distribution totals to the target distribution totals to verify that the appropriate reduction goal is being met. The District Engineering and CIP Program Manager reviews the monthly distribution reports and determines if further action is required to meet demand reduction goals. Monthly distribution reports shall be sent to the District Board. If reduction goals are not met, the District Engineering and CIP Program Manager would notify the District Board so that corrective action is considered and/or taken.

During a Shortage Level 3 and higher, the procedure described above would be followed, with the addition of a weekly distribution report to the General Manager.

Section 12

WSCP Refinement, Adoption, Submittal, and Availability

As part of the District's commitment to ensuring reliable supplies, the WSCP will be adopted by the District Board and made available to the public.

12.1 Refinement Procedures

The WSCP is routinely updated to ensure water demand reduction actions and supply augmentation measures continue to accurately reflect the District's planned response to water shortage outages. The modifications to this WSCP for 2020 were adjusted to comply with the 2019 CWC revisions. Experience with recent drought conditions and recommendations from the Water Authority for regional consistency in water shortage contingency planning also played a role in the revisions to this WSCP.

Review and update of the WSCP shall occur in parallel with the update of the UWMP, at a minimum of every five years. However, the WSCP may also be updated independently of the UWMP and with greater frequency, at the District's discretion.

12.2 Adoption, Submittal, and Availability

The updated WSCP shall be adopted, submitted, and made available as part of the same process for the 2020 UWMP per the CWC requirements. During each WSCP review and update process, the revised WSCP will go through internal review prior to adoption by the District's Board. The WSCP must be reviewed and adopted prior to or in conjunction with the UWMP review and adoption process. The WSCP may also be periodically amended independently of the UWMP, as needed. In either instance, the public review period and adoption process follows that which is defined in Government Code 6066. The associated notifications for the public hearing process and the Board adoption resolution for the WSCP are provided as appendices to the UWMP.

The updated WSCP shall be made available on the District's website no later than 30 days after it is adopted. The WSCP shall also be available as an appendix to the UWMP document, which will be posted to the District's website and DWR's public Water Use Efficiency data portal website. The UWMP and its WSCP appendix will also be submitted to the California State Library and be available for review in hardcopy format in the District's offices during normal working hours.

Attachment A: Seismic Risk Assessment and Mitigation Plan



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San Diego, CA 92101

Technical Memorandum

T: 858.514.8822

Prepared for: Rainbow Municipal Water District
Project Title: 2020 Urban Water Management Plan
Project No.: 155487

Technical Memorandum

Subject: Water System Seismic Assessment
Date: April 14, 2021
To: Malik Tamimi, Project Manager
From: Cheryl Dilks, Project Manager
Copy to: J.P. Semper

Prepared by: Amber Pulido _____

Reviewed by: Paul Selsky, P.E. _____

Limitations:

This document was prepared solely for Rainbow Municipal Water District in accordance with professional standards at the time the services were performed and in accordance with the contract between Rainbow Municipal Water District and Brown and Caldwell dated July 24, 2020. This document is governed by the specific scope of work authorized by Rainbow Municipal Water District; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by Rainbow Municipal Water District and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

Table of Contents

List of Tables.....	ii
Section 1: Seismic Assessment Purpose and Methodology.....	1
1.1 Purpose of Seismic Assessment	1
1.2 Methodology	1
Section 2: Seismic Risk for the District.....	1
Section 3: Seismic Risk Assessment	2
3.1 Source Water	3
3.2 Constructed Conveyances and Water Supply Connections.....	3
3.3 Storage and Distribution Facilities	3
3.3.1 Distribution Pipelines	3
3.3.2 Storage Facilities	4
3.3.3 Booster Pump Stations.....	4
3.3.4 Other Water Distribution System Assets	5
3.4 Electronic, Computer, or Other Automated Systems.....	5
3.5 Operations and Maintenance of the System	5
Section 4: Mitigation and Resilience Measures	6
4.1.1 Mitigation and Resilience for Water System Assets.....	6
4.1.2 Operational Strategies to Improve Water System Resilience	6
4.1.3 Emergency Response Planning	6
References.....	8
Attachment A: Guidance for Small Community Water Systems on Risk and Resilience Assessments under AWIA.....	9
Attachment B: Earthquake Incident Action Checklist.....	B-1

List of Tables

Table 1. Maximum Earthquake Magnitudes for Nearby Faults.....	2
Table 2. Earthquake Probability from VSAT 2.0	2
Table 3. Pipeline Summary by Diameter.....	3
Table 4. Storage Facilities.....	4
Table 5. Booster Pump Stations.....	5



Section 1: Seismic Assessment Purpose and Methodology

The California Water Code (CWC), Section 10632.5, states that beginning January 1, 2020, the Urban Water Management Plan (UWMP) “shall include a seismic risk assessment and mitigation plan to assess the vulnerability of each of the various facilities of a water system and mitigate those vulnerabilities.” In response to this CWC requirement, the Department of Water Resources (DWR) now requires that a seismic assessment be included as part of the UWMP. Water suppliers may comply with this requirement by submitting a local hazard mitigation plan if that plan addresses seismic risk for the water system or the Risk and Resilience Assessment (RRA) and associated Emergency Response Plan (ERP) mandated by America’s Water Infrastructure Act (AWIA) of 2018. While there is a Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) for San Diego County, there is no specific seismic assessment for the major water facilities in the Rainbow Municipal Water District (District). The District has not yet completed its RRA and ERP updated for AWIA compliance, so they are not referenced in this seismic assessment.

1.1 Purpose of Seismic Assessment

The purpose of this assessment is to comply with the CWC by conducting a seismic risk assessment of the District’s critical water system assets, including storage tanks, pump stations, and critical transmission and distribution pipelines. This assessment includes a description of the likelihood of occurrence near the critical facilities, a list of the assets that may be impacted, potential impacts, and suggested mitigation measures.

1.2 Methodology

The seismic risk assessment uses the simplified approach outlined in the earthquake components of Tables 2b, 3b, 5b, 6b, 10b, and 11 from the U.S. Environmental Protection Agency (EPA)’s *Guidance for Small Community Water Systems on Risk and Resilience Assessments under AWIA*. Completed tables are attached to this TM as Attachment A. The District may choose to complete these tables for other water system risks at a later time.

Additionally, the District’s 2016 Water and Wastewater Master Plan Update was used to extract detailed information about the critical system assets. The EPA’s March 2018 *Earthquake Resilience Guide for Water and Wastewater Utilities* was used to determine the potential seismic impacts for the critical assets. San Diego County’s MJHMP was relied upon to describe the seismic risk for the District’s service area, and the EPA’s Vulnerability Self-Assessment Tool (VSAT) 2.0 was used to determine the annual threat likelihood of earthquake in the District’s area. Mitigation and resilience measures were determined using the EPA’s *Earthquake Incident Action Checklist* (see Attachment B) and FEMA’s *A Guide to Using HAZUS for Mitigation*.

Section 2: Seismic Risk for the District

In 2017, San Diego County updated its Multi-Jurisdictional Hazard Mitigation Plan (MJHMP). The MJHMP intends to enhance public awareness and local policies around hazard mitigation, create a tool for decision-making, promote compliance with State and Federal requirements, provide inter-jurisdictional coordination, and achieve regulatory compliance. The 2017 update includes an evaluation of seismic impacts and potential mitigation actions for certain areas of the county.

In the MJHMP, most hazards were given a risk level of high, medium, or low depending on several factors unique to the hazard. The plan also provided the likeliness of the hazard occurrence with either a “highly likely”, “likely” or “somewhat likely” rating. Earthquakes in the San Diego region were determined to be a



“high” risk and “somewhat likely to occur.” According to the MJHMP, there are several major active faults in San Diego County, including the Rose Canyon, La Nacion, Elsinore, San Jacinto, Coronado Bank, and San Clemente Fault Zone. The fault zones that are nearest the District’s service area are the Elsinore and San Jacinto fault zones. The San Jacinto Fault is the most active fault in the county. It branches off the major San Andreas Fault as it passes through the San Bernardino Mountains. Two other faults that can generate moderately sized but potentially damaging earthquakes are the Rose Canyon and Elsinore Faults. The MJHMP suggests maximum likely magnitudes based on the Richter scale for local faults, as shown in Table 1.

Fault	Maximum Magnitude
Coronado Bank	7.7
Elsinore	7.3
La Nacion	6.6
Rose Canyon	7.0
San Clemente	7.7
San Jacinto	7.3

Additionally, the EPA’s VSAT Web 2.0 provides a database of earthquake likelihood values by zip code. Earthquake severities are based on ranges of Peak Ground Acceleration (PGA). Refer to Table 2 below for the annual likelihood of an earthquake occurring for zip code 92028 (Fallbrook).

Earthquake Severity	Definition	Annual Threat Likelihood
EQ 1 - PGA 0.0 - 0.2	Earthquake with weak to light shaking, causing minimal structural damage.	100%
EQ 2 - PGA 0.2 - 0.4	Earthquake with moderate to strong shaking, causing light to moderate damage, particularly to poorly built or badly designed structures	0.24%
EQ 3 - PGA 0.4 - 0.8	Earthquake with very strong to severe shaking, causing moderate to heavy damage to integrity of masonry and frame structures.	0.097%
EQ 4 - PGA 0.8 - 1.1	Earthquake with violent shaking, causing heavy damage, partial building collapses, and potentially shifting structures off foundations; some underground pipes are broken.	0.012%
EQ 5 - PGA > 1.1	Earthquake with extreme shaking, causing very heavy damage to masonry, frame structures, foundations, dams, and bridges; considerable damage to underground pipelines; large landslides may occur.	0.0048%

Section 3: Seismic Risk Assessment

This section describes vulnerabilities to the District’s critical assets by using EPA’s *Guidance for Small Community Water Systems on Risk and Resilience Assessments under AWIA* as a guide.



3.1 Source Water

The District’s supply is fully reliant upon purchased imported potable water from the San Diego County Water Authority (Water Authority), which relies upon two aqueducts to convey water to southern California. An earthquake may impact the source water supply if the aqueducts experience structural failure. Seismic assessment of the aqueducts and source water supply are covered under the Water Authority’s and Metropolitan Water District of Southern California’s seismic assessment components of their Water Shortage Contingency Plans.

3.2 Constructed Conveyances and Water Supply Connections

The purchased water is delivered to the District through eight District Flow Control Facility (FCF) locations (i.e., Water Authority Aqueduct Connections) and two emergency connection locations. An earthquake may cause structural failure at the FCFs and emergency connections, potentially causing water loss from pipe breakage or cracking.

3.3 Storage and Distribution Facilities

The District has 3 operational reservoirs, 13 enclosed storage tanks, 7 booster pump stations (PS), 6 emergency pumps, and 56 pressure regulating stations within the District’s distribution system.

The District’s storage and distribution facilities and potential earthquake impacts are described in the following sections.

3.3.1 Distribution Pipelines

The District’s system includes 323 miles of distribution pipeline, ranging in diameter from 4-inch to 42-inches in diameter. Table 3 summarizes pipeline lengths by diameter. Ground shaking and liquefaction from earthquakes can cause pipes to crack at brittle joints and sink into the liquefied ground potentially causing significant sudden water loss, flood damage to nearby structures, and the inability to deliver water to some customers.

Table 3. Pipeline Summary by Diameter

Pipeline Diameter (inches)	Total Pipeline Length (miles)	Pipeline Diameter (inches)	Total Pipeline Length (miles)
4	4.5	20	10.9
6	65.1	22	1
8	114.7	24	5.8
10	17.7	27	0.3
12	42.2	30	0.6
14	20.3	36	0.4
16	27	42	0.6
18	11.7		
Total Length of Pipe			323



3.3.2 Storage Facilities

The District has 3 operational reservoirs and 13 enclosed storage tanks. The three operational reservoirs are either concrete or asphalt lined. Reservoir failure from an earthquake can cause loss of control of water supply and downstream flooding of nearby structures.

There is one pre-stressed concrete tank, and the other 12 storage tanks are circular above-ground steel tanks. Some common earthquake effects on above ground tanks are structural stability failure, water sloshing within the tank causing structural failure, sliding on the foundation, cracking or shearing of walls for concrete tanks, and elephant foot buckling for steel tanks.

Table 4 lists the operational reservoirs and storage tanks for the District and their associated pressure zones and storage capacities. Asset names have been changed to protect sensitive information.

Table 4. Storage Facilities		
Storage Facility	Pressure Zone	Capacity (MG)
Tank/Reservoir 1	Magee	3.0
Tank/Reservoir 2 ⁽¹⁾	Rainbow Heights	0.9
Tank/Reservoir 3	Rainbow Heights	4.0
Tank/Reservoir 4	Gomez	3.5
Tank/Reservoir 5	U-1	0.6
Tank/Reservoir 6	U-1	1.5
Tank/Reservoir 7	Vallecitos	0.4
Tank/Reservoir 8	Northside	22.8
Tank/Reservoir 9	North	7.8
Tank/Reservoir 10	North	4.0
Tank/Reservoir 11	Canonita	6.0
Tank/Reservoir 12	South	4.0
Tank/Reservoir 13	South	4.0
Tank/Reservoir 14	South	4.0
Tank/Reservoir 15 ⁽¹⁾	Pala Mesa	203.7
Tank/Reservoir 16	Pala Mesa	6.0
Tank/Reservoir 17	Morro Tank	4.0
Tank/Reservoir 18	Morro Res	151.5

⁽¹⁾ Out of Service Facility

3.3.3 Booster Pump Stations

There are seven booster PS facilities. The PS buildings are susceptible to structural damage from earthquakes, and the pump operations may be impacted by earthquake associated power outages. Liquefaction may occur, causing the entire facility and its assets, such as booster pumps, generators, and piping, to lose bearing strength and collapse from liquefaction of the soil underlying the structures. Table 5 lists the



District’s booster pump stations, the total number of pumps in each facility, and capacity information. Asset names have been changed to protect sensitive information.

Table 5. Booster Pump Stations				
Pump Station Name	Total Number of Pumps	Pump Station Capacity		
		Total Capacity		Firm Capacity
		gpm	MGD	MGD
PS 1	4	3,509	5.1	3.6
PS 2	3	1,615	2.3	1.5
PS 3	1	679	1.0	1.0
PS 4	2	6,296	5.8	3.2
PS 5	1	3,455	5.0	5.0
PS 6	4	4,552	6.6	4.1
PS 7	2	1,398	2.0	1.0

3.3.4 Other Water Distribution System Assets

The pressure regulating stations house one or more hydraulically actuated pressure reducing valves (PRV). Six pressure control stations have only one PRV. The other 50 stations have more than one PRV. In the event of an earthquake, these PRVs could crack or break, causing valve failure and localized flooding. Refer to the 2016 Master Plan for the full list of PRVs.

3.4 Electronic, Computer, or Other Automated Systems

The District has one centralized SCADA system to control their distribution system. Earthquakes commonly cause power outages due to damage to power lines, transformers, and generators which could disrupt SCADA functionality.

3.5 Operations and Maintenance of the System

This section describes critical assets related to the operation and maintenance of the District’s system. An earthquake may cause structural damage to the administrative and operational buildings, which may then impact internal and external system communications.

Customer Center and Operations Center

The District has a customer service center and an operations center.

Power

The District receives its power supply from San Diego Gas & Electric (SDG&E). The District is subject to any associated earthquake impacts to SDG&E’s facilities in the District’s service area.



Section 4: Mitigation and Resilience Measures

This section discusses potential actions that could be taken to improve the resiliency of the system to earthquakes and mitigate the risk of failure. Strategies to improve the District’s assets’ resilience to earthquakes and enhancements to operational strategies to improve system resilience are described in the following sections.

4.1.1 Mitigation and Resilience for Water System Assets

To mitigate the threat of earthquakes to District FCFs, reservoirs, storage tanks, distribution pipelines, booster pumps, emergency pumps, emergency connections, and other District buildings, the District should first consider conducting a complete structural assessment of the assets to seismically evaluate their performance if subjected to earthquakes of varying degrees. This evaluation can identify the “high risk” assets that should take priority for replacement or seismic design retrofits in the future. Assets associated with source water resilience, such as aqueducts, shall be addressed by the Water Authority and MWD independently.

4.1.2 Operational Strategies to Improve Water System Resilience

Given the District’s dependence on a wholesaler, improving reliability and redundancy can help strengthen preparedness and reduce response times in case of earthquake impacts to the Water Authority or MWD systems. The District could consider identifying interconnectivity strategies between nearby systems, such as City of Oceanside, Carlsbad Municipal Water District, and Vista Irrigation District to maximize reliability and resiliency. Although Water Authority supplies are considered reliable, improved interconnection with other systems could help address an earthquake event that may impact some or all District FCFs. Another strategy involves enhancing or establishing clear earthquake event communication protocols and documenting emergency equipment and other resources in advance. See Section 3.1.3 for further suggestions for the Emergency Response Plan (ERP).

The District should also consider identifying and updating lists of priority water customers (e.g., hospitals, dialysis clinics, schools) to develop a plan to restore water service to those customers first. Back-up supplies of water (bulk water delivery or bottled water supplies) should also be identified and documented in the ERP.

Because earthquakes will impact multiple utilities simultaneously, it is also recommended that the District establish coordination with SDG&E now to foster better communication and response times immediately after an earthquake. Sharing information with the power utility regarding critical asset locations could help facilitate faster power recovery to priority assets. Locations of back-up generators and fuel reserves should be updated regularly and included with the ERP.

4.1.3 Emergency Response Planning

The District should review and update their ERP to ensure all earthquake procedures, equipment lists, and emergency contacts are current. The current ERP specifically addresses earthquakes and procedures to follow in Section 4.1.1. To supplement this, the EPA’s earthquake checklist in Attachment B can serve as a helpful guide for emergency planning and response. Additionally, the following are tools that can be used to revise an ERP:

- [Earthquake Hazard Mitigation Handbook](#) (Federal Emergency Management Agency [FEMA])
- [Planning for an Emergency Drinking Water Supply](#) (EPA)
 - Incident monitoring: [USGS recent earthquake activity map](#) (U.S. Geological Survey [USGS])
- Drinking Water Emergency Response Plan Guidelines (State Water Resources Control Board [SWRCB])

- [ERP Template from Division of Drinking Water \(DDW\)'s ERP Workshop](#)
- [EPA Region 1 Water/Wastewater System Generator Preparedness Brochure](#) (EPA)

Finally, it is recommended that all District staff review the ERP, understand where the emergency operations center (EOC) is located, how it will be activated, and what their role is during an earthquake emergency. Desktop trainings and exercises for seismic scenarios are also suggested.



References

Atkins, Rainbow Municipal Water District Water and Wastewater Master Plan Update, Rainbow Municipal Water District, 2016.

County of San Diego – Office of Emergency Services, San Diego County – Unified District Council, Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) for San Diego County, California, 2017.

Environmental Protection Agency (EPA), “Earthquake Resilience Guide for Water and Wastewater Utilities,” Earthquake Resilience Guide for Water and Wastewater Utilities, March 2018, <https://www.epa.gov/sites/production/files/2018-02/documents/180112-earthquakeresiliencguide.pdf>.

Environmental Protection Agency (EPA), “Water Sector Incident Action Checklist – Earthquake,” Incident Action Checklist – Earthquake, January 2015, https://www.epa.gov/sites/production/files/2015-06/documents/earthquake_1.pdf.

National Institute of Building Sciences for the Federal Emergency Management Agency, “A Guide to Using HAZUS for Mitigation,” April 2002, https://www.fema.gov/pdf/plan/prevent/hazus/hazus_for_mitigation.pdf.

Attachment A: Guidance for Small Community Water Systems on Risk and Resilience Assessments under AWIA

Table 2b: Source Water (Natural Hazards)

Asset Category: <i>Source Water</i> Examples of Assets in this Category: Encompasses all sources that supply water to a water system. Possible examples include rivers, streams, lakes, source water reservoirs, groundwater, and purchased water.	
Natural Hazards Select the natural hazards in the left column that pose a <u>significant risk</u> to this asset category at the CWS.	Brief Description of Impacts If you select a natural hazard in the left column as a significant risk to the <i>Source Water</i> asset category, briefly describe in the right column how the natural hazard could impact this asset category at the CWS. Include effects on major assets, water service, and public health as applicable.
<input type="checkbox"/> Hurricane	Click or tap here to enter text.
<input type="checkbox"/> Flood	Click or tap here to enter text.
<input checked="" type="checkbox"/> Earthquake	The District’s supply is fully reliant upon purchased imported potable water from the San Diego County Water Authority (Water Authority), which relies upon two aqueducts to convey water to southern California. An earthquake may impact the source water supply if the aqueducts experience structural failure. Seismic assessment of the aqueducts and source water supply are covered under the Water Authority’s and Metropolitan Water District of Southern California’s seismic assessment components of their Water Shortage Contingency Plans.
<input type="checkbox"/> Tornado	Click or tap here to enter text.

Asset Category: <i>Source Water</i> Examples of Assets in this Category: Encompasses all sources that supply water to a water system. Possible examples include rivers, streams, lakes, source water reservoirs, groundwater, and purchased water.	
Natural Hazards Select the natural hazards in the left column that pose a <u>significant risk</u> to this asset category at the CWS.	Brief Description of Impacts If you select a natural hazard in the left column as a significant risk to the <i>Source Water</i> asset category, briefly describe in the right column how the natural hazard could impact this asset category at the CWS. Include effects on major assets, water service, and public health as applicable.
<input type="checkbox"/> Ice storm	Click or tap here to enter text.
<input type="checkbox"/> Fire	Click or tap here to enter text.
<input type="checkbox"/> Other(s), enter below: Click or tap here to enter text.	Click or tap here to enter text.

Table 3b: Pipes and Constructed Conveyances, Water Collection, and Intake (Natural Hazards)

Asset Category: Pipes and Constructed Conveyances, Water Collection, and Intake Examples of Assets in this Category: Encompasses the infrastructure that collects and transports water from a source water to treatment or distribution facilities. Possible examples include holding facilities, intake structures and associated pumps and pipes, aqueducts, and other conveyances.	
Natural Hazards Select the natural hazards in the left column that pose a <u>significant risk</u> to this asset category at the CWS.	Brief Description of Impacts If you select a natural hazard in the left column as a significant risk to the <i>Pipes and Constructed Conveyances, Water Collection, and Intake</i> asset category, briefly describe in the right column how the natural hazard could impact this asset category at the CWS. Include effects on major assets, water service, and public health as applicable.
<input type="checkbox"/> Hurricane	Click or tap here to enter text.
<input type="checkbox"/> Flood	Click or tap here to enter text.
<input checked="" type="checkbox"/> Earthquake	The purchased water is delivered to the District through eight District Flow Control Facility (FCF) locations (i.e., Water Authority Aqueduct Connections) and two emergency connection locations. An earthquake may cause structural failure at the FCFs and emergency connections, potentially causing water loss from pipe breakage or cracking.
<input type="checkbox"/> Tornado	Click or tap here to enter text.
<input type="checkbox"/> Ice storm	Click or tap here to enter text.

Asset Category: <i>Pipes and Constructed Conveyances, Water Collection, and Intake</i> Examples of Assets in this Category: Encompasses the infrastructure that collects and transports water from a source water to treatment or distribution facilities. Possible examples include holding facilities, intake structures and associated pumps and pipes, aqueducts, and other conveyances.	
Natural Hazards Select the natural hazards in the left column that pose a <u>significant risk</u> to this asset category at the CWS.	Brief Description of Impacts If you select a natural hazard in the left column as a significant risk to the <i>Pipes and Constructed Conveyances, Water Collection, and Intake</i> asset category, briefly describe in the right column how the natural hazard could impact this asset category at the CWS. Include effects on major assets, water service, and public health as applicable.
<input type="checkbox"/> Fire	Click or tap here to enter text.
<input type="checkbox"/> Other(s), enter below: Click or tap here to enter text.	Click or tap here to enter text.

Table 5b: Storage and Distribution Facilities (Natural Hazards)

<p>Asset Category: Storage and Distribution Facilities</p> <p>Examples of Assets in this Category: Encompasses all infrastructure used to store water after treatment, maintain water quality, and distribute water to customers. Possible examples include residual disinfection, pumps, tanks, reservoirs, valves, pipes, and meters.</p>	
<p>Natural Hazards</p> <p>Select the natural hazards in the left column that pose a <u>significant risk</u> to this asset category at the CWS.</p>	<p>Brief Description of Impacts</p> <p>If you select a natural hazard in the left column as a significant risk to the <i>Storage and Distribution Facilities</i> asset category, briefly describe in the right column how the natural hazard could impact this asset category at the CWS. Include effects on major assets, water service, and public health as applicable.</p>
<p><input type="checkbox"/> Hurricane</p>	<p>Click or tap here to enter text.</p>
<p><input type="checkbox"/> Flood</p>	<p>Click or tap here to enter text.</p>
<p><input checked="" type="checkbox"/> Earthquake</p>	<p>The District’s system includes 323 miles of distribution pipeline, ranging in diameter from 4-inch to 42-inches in diameter. There are 3 operational reservoirs, 13 enclosed storage tanks, 7 booster pump stations, 6 emergency pumps, and 56 pressure reducing stations within the distribution system.</p> <p>Distribution Pipelines:</p> <p>Ground shaking and liquefaction from earthquakes can cause pipes to crack at brittle joints and sink into the liquefied ground potentially causing significant sudden water loss, flood damage to nearby structures, and the inability to deliver water to some customers.</p> <p>Storage Facilities</p> <p>Reservoir failure from an earthquake can cause loss of control of water supply and downstream flooding of nearby structures. There is one pre-stressed concrete tank, and the other 12 storage tanks are circular above-ground steel tanks. Some common earthquakes effects on above ground tanks are structural stability failure, water sloshing within the tank causing structural failure, sliding on the foundation, cracking or shearing of walls for concrete tanks, and elephant foot buckling for steel tanks.</p>



Asset Category: Storage and Distribution Facilities Examples of Assets in this Category: Encompasses all infrastructure used to store water after treatment, maintain water quality, and distribute water to customers. Possible examples include residual disinfection, pumps, tanks, reservoirs, valves, pipes, and meters.	
Natural Hazards Select the natural hazards in the left column that pose a <u>significant risk</u> to this asset category at the CWS.	Brief Description of Impacts If you select a natural hazard in the left column as a significant risk to the <i>Storage and Distribution Facilities</i> asset category, briefly describe in the right column how the natural hazard could impact this asset category at the CWS. Include effects on major assets, water service, and public health as applicable.
<input checked="" type="checkbox"/> Earthquake	<p>Booster Pump Stations</p> <p>There are seven booster PS facilities. The PS buildings are susceptible to structural damage from earthquakes, and the pump operations may be impacted by earthquake associated power outages. Liquefaction may occur, causing the entire facility and its assets, such as booster pumps, generators, and piping, to lose bearing strength and collapse from liquefaction of the soil underlying the structures.</p> <p>Pressure Reducing Valves</p> <p>The pressure regulating stations house one or more hydraulically actuated pressure reducing valves (PRV). In the event of an earthquake, the PRVs could crack or break, causing valve failure and localized flooding.</p>
<input type="checkbox"/> Tornado	
<input type="checkbox"/> Ice storm	Click or tap here to enter text.
<input type="checkbox"/> Fire	Click or tap here to enter text.

Table 6b: Electronic, Computer, or Other Automated Systems (including the security of such systems) (Natural Hazards)

<p>Asset Category: <i>Electronic, Computer, or Other Automated Systems (including the security of such systems)</i></p> <p>Examples of Assets in this Category: Encompasses all treatment and distribution process control systems, business enterprise information technology (IT) and communications systems (other than financial), and the processes used to secure such systems. Possible examples include the sensors, controls, monitors and other interfaces, plus related IT hardware and software and communications, used to control water collection, treatment, and distribution. Also includes IT hardware, software, and communications used in business enterprise operations. The assessment must account for the security of these systems (e.g., cybersecurity, information security).</p>	
<p>Natural Hazards</p> <p>Select the natural hazards in the left column that pose a <u>significant risk</u> to this asset category at the CWS.</p>	<p>Brief Description of Impacts</p> <p>If you select a natural hazard in the left column as a significant risk to the <i>Electronic, Computer, or Other Automated Systems (including the security of such systems)</i> asset category, briefly describe in the right column how the natural hazard could impact this asset category at the CWS. Include effects on major assets, water service, and public health as applicable.</p>
<input type="checkbox"/> Hurricane	Click or tap here to enter text.
<input type="checkbox"/> Flood	Click or tap here to enter text.
<input checked="" type="checkbox"/> Earthquake	The District has one centralized SCADA system to control their distribution system. Earthquakes commonly cause power outages due to damage to power lines, transformers, and generators which could disrupt SCADA functionality.
<input type="checkbox"/> Tornado	Click or tap here to enter text.

<p>Asset Category: <i>Electronic, Computer, or Other Automated Systems (including the security of such systems)</i></p> <p>Examples of Assets in this Category: Encompasses all treatment and distribution process control systems, business enterprise information technology (IT) and communications systems (other than financial), and the processes used to secure such systems. Possible examples include the sensors, controls, monitors and other interfaces, plus related IT hardware and software and communications, used to control water collection, treatment, and distribution. Also includes IT hardware, software, and communications used in business enterprise operations. The assessment must account for the security of these systems (e.g., cybersecurity, information security).</p>	
<p>Natural Hazards</p> <p>Select the natural hazards in the left column that pose a <u>significant risk</u> to this asset category at the CWS.</p>	<p>Brief Description of Impacts</p> <p>If you select a natural hazard in the left column as a significant risk to the <i>Electronic, Computer, or Other Automated Systems (including the security of such systems)</i> asset category, briefly describe in the right column how the natural hazard could impact this asset category at the CWS. Include effects on major assets, water service, and public health as applicable.</p>
<input type="checkbox"/> Ice storm	<p>Click or tap here to enter text.</p>
<input type="checkbox"/> Fire	<p>Click or tap here to enter text.</p>
<input type="checkbox"/> Other(s), enter below: Click or tap here to enter text.	<p>Click or tap here to enter text.</p>

Table 10b: The Operation and Maintenance of the System (Natural Hazards)

Asset Category: <i>The Operation and Maintenance of the System</i> Examples of Assets in this Category: Encompasses critical processes required for operation and maintenance of the water system that are not captured under other asset categories. Possible examples include equipment, supplies, and key personnel. Assessments may focus on the risk to operations associated with dependency threats like loss of utilities (e.g., power outage), loss of suppliers (e.g., interruption in chemical delivery), and loss of key employees (e.g., disease outbreak or employee displacement).	
Natural Hazards Select the natural hazards in the left column that pose a <u>significant risk</u> to this asset category at the CWS.	Brief Description of Impacts If you select a natural hazard in the left column as a significant risk to the <i>Operation and Maintenance of the System</i> asset category, briefly describe in the right column how the natural hazard could impact this asset category at the CWS. Include effects on major assets, water service, and public health as applicable.
<input type="checkbox"/> Hurricane	Click or tap here to enter text.
<input type="checkbox"/> Flood	Click or tap here to enter text.
<input checked="" type="checkbox"/> Earthquake	<p>An earthquake may cause structural damage to the administrative and operational buildings, which may then impact internal and external system communications. The District has a customer service center and a water operations center.</p> <p>The District receives its power supply from San Diego Gas & Electric (SDG&E). The District is subject to any associated earthquake impacts to SDG&E’s facilities in the District’s service area.</p>
<input type="checkbox"/> Tornado	Click or tap here to enter text.
<input type="checkbox"/> Ice storm	Click or tap here to enter text.



<p>Asset Category: <i>The Operation and Maintenance of the System</i></p> <p>Examples of Assets in this Category: Encompasses critical processes required for operation and maintenance of the water system that are not captured under other asset categories. Possible examples include equipment, supplies, and key personnel. Assessments may focus on the risk to operations associated with dependency threats like loss of utilities (e.g., power outage), loss of suppliers (e.g., interruption in chemical delivery), and loss of key employees (e.g., disease outbreak or employee displacement).</p>	
<p>Natural Hazards</p> <p>Select the natural hazards in the left column that pose a <u>significant risk</u> to this asset category at the CWS.</p>	<p>Brief Description of Impacts</p> <p>If you select a natural hazard in the left column as a significant risk to the <i>Operation and Maintenance of the System</i> asset category, briefly describe in the right column how the natural hazard could impact this asset category at the CWS. Include effects on major assets, water service, and public health as applicable.</p>
<p><input type="checkbox"/> Fire</p>	<p>Click or tap here to enter text.</p>
<p><input type="checkbox"/> Other(s), enter below: Click or tap here to enter text.</p>	<p>Click or tap here to enter text.</p>

Table 11: Countermeasures (Optional)¹

<p>Countermeasures (optional) List countermeasures in the left column the CWS could potentially implement to reduce risk from the malevolent acts and natural hazards that were selected.</p>	<p>Brief Description of Risk Reduction or Increased Resilience For each countermeasure, in the right column, describe how the countermeasure could reduce risk or increase resilience for CWS assets from malevolent acts or natural hazards that were selected in the analysis. A countermeasure may reduce risk across multiple malevolent acts, natural hazards and asset categories.</p>
<p>1. Mitigate the threat of earthquakes to water system assets.</p>	<p>To mitigate the threat of earthquakes to District FCFs, reservoirs, storage tanks, distribution pipelines, booster pumps, emergency pumps, emergency connections, and other District buildings, the District should first consider conducting a complete structural assessment of the assets to seismically evaluate their performance if subjected to earthquakes of varying degrees. This evaluation can identify the “high risk” assets that should take priority for replacement or design retrofits in the future.</p>
<p>2. Operational Strategies to Improve Water System Resilience.</p>	<p>Given the District’s dependence on a wholesaler, improving reliability and redundancy can help strengthen preparedness and reduce response times in case of earthquake impacts to the Water Authority or MWD systems. The District could consider identifying interconnectivity strategies between nearby systems, such as City of Oceanside, Carlsbad Municipal Water District, and Vista Irrigation District to maximize reliability and resiliency. Although Water Authority supplies are considered reliable, improved interconnection with other systems could help address an earthquake event that may impact some or all District FCFs.</p> <p>Another strategy involves enhancing or establishing clear earthquake event communication protocols and documenting emergency equipment and other resources in advance. The District should also consider identifying and updating lists of priority water customers (e.g., hospitals, dialysis clinics, schools) to develop a plan to restore water service to those customers first. Back-up supplies of water (bulk water delivery or bottled water supplies) should also be considered and documented in the ERP.</p> <p>Because earthquakes will impact multiple utilities simultaneously, it is also recommended that the District establish coordination with SDG&E now to establish better communication and response times immediately after an earthquake. Sharing information with the power utility regarding critical asset locations could help facilitate faster power recovery to priority assets. Locations of back-up generators and fuel reserves should be updated regularly and included with the ERP.</p>

¹ IMPORTANT NOTE: The assessment does not require a specific number of countermeasures. You may have fewer than five countermeasures or add more countermeasures on a separate sheet.

Attachment B: Earthquake Incident Action Checklist



Incident Action Checklist – Earthquake

The actions in this checklist are divided up into three “rip & run” sections and are examples of activities that water and wastewater utilities can take to: prepare for, respond to and recover from an earthquake. For on-the-go convenience, you can also populate the “My Contacts” section with critical information that your utility may need during an incident.

Earthquake Impacts on Water and Wastewater Utilities

An earthquake is caused by the shifting of tectonic plates beneath the Earth’s surface. Ground shaking from moving geologic plates collapses buildings and bridges, and sometimes triggers landslides, avalanches, flash floods, fires and tsunamis. The strong ground motion of earthquakes has the potential to cause a great deal of damage to drinking water and wastewater utilities, particularly since most utility components are constructed from inflexible materials (e.g., concrete, metal pipes). Earthquakes create many cascading and secondary impacts that may include, but are not limited to:

- Structural damage to facility infrastructure and equipment
- Water tank damage or collapse
- Water source transmission line realignment or damage
- Damage to distribution lines due to shifting ground and soil liquefaction, resulting in potential water loss, water service interruptions, low pressure, contamination and sinkholes and/or large pools of water throughout the service area
- Loss of power and communication infrastructure
- Restricted access to facilities due to debris and damage to roadways



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The following sections outline actions water and wastewater utilities can take to prepare for, respond to and recover from an earthquake.

Example of Water Sector Impacts and Response to an Earthquake

East Bay Municipal Utility District Mitigates Earthquake Impacts

Following the 1989 Loma Prieta earthquake, the East Bay Municipal Utility District (EBMUD) in Oakland, California, began developing a comprehensive seismic program to increase their ability to recover from earthquake impacts and reduce water and wastewater service interruptions. Taking a proactive approach, EBMUD was the first US water utility to comprehensively retrofit its service area facilities to address seismic weaknesses.

The utility began by assessing its entire water distribution network to determine areas of improvement. Upgrades included installation of flexible joints and hoses to minimize pipe ruptures and to facilitate rerouting of water around broken pipes. The utility also created alternative transmission routes for pipes that cross fault zones.

EBMUD did a great deal of work to reinforce aqueducts to make them more resilient to earthquake impacts, including strengthening levees at aqueduct crossings and pipe foundations at river crossings, reinforcing pipe joints on buried portions of pipe, and strengthening pipe support structures on elevated portions of the aqueduct. The utility is also designing aqueduct interconnections to create bypasses around damaged segments after a levee failure or earthquake. These bypasses allow the utility to continue providing service to customers while permanent repairs are being made.

Since 1989, EBMUD has invested more than \$350 million in their seismic program, which has been primarily funded by bonds that are being repaid through a seismic surcharge on customers’ water bill of just over one dollar per month for single-family residential homes.

Source: EBMUD’s 2011 “Earthquake Readiness: Protecting Life Safety and Public Health.”



My Contacts and Resources



CONTACT NAME	UTILITY/ORGANIZATION NAME	PHONE NUMBER
	Local EMA	
	State EMA	
	State Primacy Agency	
	WARN Chair	
	Power Utility	

Planning

- Incident monitoring:
 - [USGS recent earthquake activity map](#) (U.S. Geological Survey [USGS])
 - [NOAA National Weather Service tsunami alerts](#) (National Oceanic and Atmospheric Administration [NOAA])
- [Earthquake Hazard Mitigation Handbook](#) (Federal Emergency Management Agency [FEMA])
- [Earthquake Hazards Program](#) (USGS)
- [Earthquake Shaking Maps and Information for California Residents](#) (Association of Bay Area Governments)
- [Recent Earthquakes: Implications for U.S. Water Utilities](#) (Water Research Foundation)
- [Planning for an Emergency Drinking Water Supply](#) (EPA)
- [All-Hazard Consequence Management Planning for the Water Sector](#) (Water Sector Emergency Response Critical Infrastructure Partnership Advisory Council [CIPAC] Workgroup)
- [Vulnerability Self Assessment Tool \(VSAT\)](#) (EPA)
- [Tabletop Exercise Tool for Water Systems: Emergency Preparedness, Response, and Climate Resiliency](#) (EPA)
- [How to Develop a Multi-Year Training and Exercise \(T&E\) Plan](#) (EPA)
- [Make a Plan](#) (FEMA)

Coordination

- [Water/Wastewater Agency Response Network \(WARN\)](#) (EPA)
- [Community Based Water Resiliency](#) (EPA)

Facility and Service Area

- [Oregon Earthquake Resiliency Plan](#) (see Chapter 8: Water and Wastewater Systems) (Oregon Seismic Safety Policy Advisory Commission)
- [Seismic Guidelines for Water Pipelines](#) (American Lifelines Alliance)

Power, Energy and Fuel

- [EPA Region 1 Water/Wastewater System Generator Preparedness Brochure](#) (EPA)

Documentation and Reporting

- [Federal Funding for Utilities In National Disasters \(Fed FUNDS\)](#) (EPA)

Mitigation

- [Earthquake Publications: Building Designers, Managers and Regulators](#) (FEMA)
- [IS-323: Earthquake Mitigation Basics for Mitigation Staff](#) (FEMA)
- [HAZUS: FEMA's Methodology for Estimating Potential Losses from Disasters](#) (FEMA)
- [Earthquake Hazard Mitigation for Utility Lifeline Systems](#) (FEMA)



Actions to Prepare for an Earthquake



Planning

- Review and update your utility's emergency response plan (ERP), and ensure all emergency contacts are current.
- Conduct briefings, training and exercises to ensure utility staff is aware of all preparedness, response and recovery procedures.
- Identify priority water customers (e.g., hospitals), obtain their contact information, map their locations and develop a plan to restore those customers first.
- Develop an emergency drinking water supply plan and establish contacts (potentially through your local emergency management agency [EMA] or mutual aid network) to discuss procedures, which may include bulk water hauling, mobile treatment units or temporary supply lines, as well as storage and distribution.
- Conduct a hazard vulnerability analysis in which you review historical records to understand the past frequency and intensity of earthquakes and how your utility may have been impacted. Consider taking actions to mitigate seismic impacts to the utility, including those provided in the "Actions to Recover from an Earthquake: Mitigation" section.
- Complete pre-disaster activities to help apply for federal disaster funding (e.g., contact state/local officials with connections to funding, set up a system to document damage and costs, take photographs of the facility for comparison to post-damage photographs).

Coordination

- Join your state's Water/Wastewater Agency Response Network (WARN) or other local mutual aid network.

- Coordinate with WARN members and other neighboring utilities to discuss:
 - Outlining response activities, roles and responsibilities and mutual aid procedures (e.g., how to request and offer assistance)
 - Conducting joint tabletop or full-scale exercises
 - Obtaining resources and assistance, such as equipment, personnel, technical support or water
 - Establishing interconnections between systems and agreements with necessary approvals to activate this alternate source. Equipment, pumping rates and demand on the water sources need to be considered and addressed in the design and operations
 - Establishing communication protocols and equipment to reduce misunderstandings during the incident
- Coordinate with other key response partners, such as your local EMA, to discuss:
 - How restoring system operations may have higher priority than establishing an alternative water source
 - Potential points of distribution for the delivery of emergency water supply (e.g., bottled water) to the public, as well as who is responsible for distributing the water
- Understand how the local and utility emergency operations center (EOC) will be activated and what your utility may be called on to do, as well as how local emergency responders and the local EOC can support your utility during a response. If your utility has assets outside of the county EMA's jurisdiction, consider coordination or preparedness efforts that should be done in those areas.
- Ensure credentials to allow access will be valid during an incident by checking with local law enforcement.

Actions to Prepare for an Earthquake *(continued)*



Communication with Customers _____

- Develop outreach materials to provide your customers with information they will need after an earthquake (e.g., clarification about water advisories, instructions for private well and septic system maintenance and information about earthquake mitigation).
- Review public information protocols with local EMA and public health/primacy agencies. These protocols should include developing water advisory messages (e.g., boil water) and distributing them to customers using appropriate mechanisms, such as reverse 911.

Facility and Service Area _____

- Inventory and order extra equipment and supplies, as needed:
 - Motors
 - Fuses
 - Chemicals (ensure at least a two week supply)
 - Cellular phones or other wireless communications device
 - Emergency Supplies
 - Tarps/tape/rope
 - Cots/blankets
 - First aid kits
 - Foul weather gear
 - Plywood
 - Flashlights/flares
 - Sandbags (often, sand must be ordered as well)
 - Bottled water
 - Batteries
 - Non-perishable food

- Ensure communication equipment (e.g., radios, satellite phones) works and is fully charged.
- Develop a GIS map of all system components and prepare a list of coordinates for each facility.
- Document pumping requirements and storage capabilities, as well as critical treatment components and parameters.
- Establish a seismically hardened or offsite facility to store essential records and equipment.
- Inspect utility for structural stability and consider implementing actions to improve the utility's ability to withstand damage from earthquakes, such as:
 - Secure fixtures, shelves and equipment
 - Anchor or stabilize utility equipment to withstand earthquake forces and movements
 - Reinforce, secure or improve utility transmission lines and connections to withstand earthquake forces, soil movements and differential settlements
 - Anchor or improve tank structures to withstand earthquake forces and movements

Personnel _____

- Identify essential personnel and ensure they are trained to perform critical duties in an emergency (and possibly without communication), including the shut down and start up of the system.
- Establish communication procedures with essential and non-essential personnel. Ensure all personnel are familiar with emergency evacuation and shelter in place procedures.
- Pre-identify emergency operations and clean-up crews. Establish alternative transportation strategies if roads are impassable.

Actions to Prepare for an Earthquake *(continued)*



- Consider how evacuations or limited staffing due to transportation issues (potentially all utility personnel) will impact your response procedures.
- Identify possible staging areas for mutual aid crews if needed in the response, and the availability of local facilities to house the crews.
- Encourage personnel, especially those that may be on duty for extended periods of time, to develop family emergency plans.
- Confirm and document generator connection type, capacity load and fuel consumption. Test regularly, exercise under load and service backup generators.
- Contact fuel vendors and inform them of estimated fuel volumes needed if utility is impacted. Determine your ability to establish emergency contract provisions with vendors and your ability to transport fuel if re-fueling contractors are not available. Develop a backup fueling plan and a prioritization list of which generators to fuel in case of a fuel shortage.

Power, Energy and Fuel

- Evaluate condition of electrical panels to accept generators; inspect connections and switches.
- Document power requirements of the facility; options for doing this may include:
 - Placing a request with the US Army Corps of Engineers 249th Engineer Battalion (Prime Power): <http://www.usace.army.mil/249thEngineerBattalion.aspx>
 - Using the US Army Corps of Engineers on-line Emergency Power Facility Assessment Tool (EPFAT): <http://epfat.swf.usace.army.mil/>

- Collaborate with your local power provider and EOC to ensure that your water utility is on the critical facilities list for priority electrical power restoration, generators and emergency fuel.



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Notes:

Actions to Respond to an Earthquake



Planning

- For coastal communities with an increased risk for tsunami activity following an earthquake; review the Tsunami Incident Action Checklist for more information.

Coordination

- Notify your local EMA and state regulatory/primacy agency of system status.
- If needed, request or offer assistance (e.g., water buffalos, water sampling teams, generators) through mutual aid networks, such as WARN.
- Assign a representative of the utility to the incident command post or the community's EOC.

Communication with Customers

- Notify customers of any water advisories and consider collaborating with local media (television, radio, newspaper, etc.) to distribute the message. If emergency water is being supplied, provide information on the distribution locations.

Facility and Service Area

Overall

- Conduct damage assessments of the utility to prioritize repairs and other actions.

- Check that back-up equipment and facility systems, such as controls and pumps, are in working order, and ensure that chemical containers and feeders are intact.

Drinking Water Utilities

- Inspect the utility and service area for damage. Identify facility components (e.g., valve boxes) and fire hydrants that have been buried, are inaccessible or have been destroyed.
- Investigate drinking water wells for damage caused by liquefaction. This could result in the loss of storage for groundwater or ground subsidence.
- Ensure pressure is maintained throughout the system and isolate those sections where it is not.
- Isolate and control leaks in water transmission and distribution piping.
- Turn off water meters at destroyed homes and buildings.
- Monitor water quality, develop a sampling plan and adjust treatment as necessary.
- Notify regulatory/primacy agency if operations and/or water quality or quantity are affected.
- Utilize pre-established emergency connections or setup temporary connections to nearby communities, as needed. Alternatively, implement plans to draw emergency water from pre-determined tanks or hydrants. Notify employees of the activated sites.

Notes:

Actions to Respond to an Earthquake *(continued)*



Wastewater Utilities

- Inspect the utility and service area, including lift stations, for damage, downed trees, and power availability. Inspect the sewer system for debris and assess the operational status of the mechanical bar screen. If necessary, run system in manual operation.
- Notify regulatory/primacy agency of any changes to the operations or required testing parameters.

Documentation and Reporting

- Document all damage assessments, mutual aid requests, emergency repair work, equipment used, purchases made, staff hours worked and contractors used during the response to assist in requesting reimbursement and applying for federal disaster funds. When possible, take photographs of damage at each work site (with time and date stamp). Proper documentation is critical to requesting reimbursement.
- Work with your local EMA on the required paperwork for public assistance requests.

Personnel

- Account for all personnel and provide emergency care, if needed. Caution personnel about known hazards resulting from earthquakes.
- Deploy emergency operations and clean-up crews (e.g., securing heavy equipment). Identify key access points and roads for employees to enter the utility and critical infrastructure; coordinate the need for debris clearance with local emergency management or prioritize it for employee operations.

Power, Energy and Fuel

- Use backup generators, as needed, to supply power to system components.
- Monitor and plan for additional fuel needs in advance; coordinate fuel deliveries to the generators.
- Maintain contact with electric provider for power outage duration estimates.

Notes:

Actions to Recover from an Earthquake



Coordination

- Continue work with response partners to obtain funding, equipment, etc.

Communication with Customers

- Assign a utility representative to continue to communicate with customers concerning a timeline for recovery and other pertinent information.

Facility and Service Area

- Complete damage assessments.
- Complete permanent repairs, replace depleted supplies and return to normal service.



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Documentation and Reporting

- Compile damage assessment forms and cost documentation into a single report to facilitate the sharing of information and the completion of state and federal funding applications. Visit EPA's web-based tool, Federal Funding for Utilities—Water/Wastewater—in National Disasters (Fed FUNDS), for tailored information and application forms for various federal disaster funding programs: <http://water.epa.gov/infrastructure/watersecurity/funding/fedfunds/>
- Develop a lessons learned document and/or an after action report to keep a record of your response activities. Update your vulnerability assessment, ERP and contingency plans.
- Revise budget and asset management plans to address increased costs from response-related activities.

Mitigation

- Identify mitigation and long-term adaptation measures that can prevent damage and increase utility resilience. Consider impacts related to earthquakes when planning for system upgrades (e.g., replacing pipes, wellheads and water tanks to address seismic weaknesses).

Notes: