

DRAFT - 2020 Water Shortage Contingency Plan

Adopted To be Added



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Overview

The California Water Code (CWC) Section 10632 requires that every urban water supplier shall prepare and adopt a Water Shortage Contingency Plan (WSCP) as part of its Urban Water Management Plan (UWMP). The first Irvine Ranch Water District (IRWD) WSCP was adopted in 1987 to provide guidance on implementing actions to reduce water demands in the event of a water shortage. Since then, IRWD's WSCP has been revised several times. The last significant revision to the WSCP occurred in 2018.

Following the 2012-2016 drought in California, IRWD prepared and adopted an updated WSCP in May 2018. The 2018 WSCP incorporates the lessons learned during the 2012-2016 California drought, as well as new elements from the state's long-term framework document, *Making Water Conservation a California Way of Life, Implementing Executive Order B-37-16*, which was released in April 2017.

IRWD's 2018 WSCP provided procedures for responding to various levels of supply shortages. The use of local supplies, storage and other supply augmentation measures can mitigate shortages, and be used as necessary and appropriate during declared shortage levels. The remaining shortage levels, after use of local emergency supplies, can be addressed by employing a range of demand management measures (DMM) that can vary depending on the level and duration of the shortage condition. The 2018 WSCP defined a list of voluntary measures, non-rate response measures, and potential rate response measures for each level of shortage. While these measures are to be applied incrementally, IRWD's 2018 WSCP built in a level of flexibility to adopt additional measures to ensure the appropriate level of demand reduction.

This 2020 WSCP update has been prepared to incorporate new legislated requirements including supply reliability processes, annual water supply and demand assessment procedures, a seismic hazard assessment, and additional prescriptive elements. IRWD maintains the flexibility to amend the WSCP periodically and independently of the UWMP.

WSCP Requirements & Sections

This 2020 WSCP addresses and incorporates the required elements set forth by CWC Section 10632, including the following new requirements:

- Key attributes of the urban water supplier's water supply reliability analysis conducted pursuant to Water Code Section 10635. [Section 10632(a)(1)]
- Six standard water shortage levels corresponding to progressive ranges of up to 10-, 20, 30-, 40-, and 50-percent shortages and greater than 50-percent shortage. [Section 10632(a)(3)(A)]

- Locally appropriate “shortage response actions” for each shortage level, with a corresponding estimate of the extent the action will address the gap between supplies and demands. [Section 10632(a)(4)]
- Procedures for conducting and approving an annual water supply and demand assessment with prescribed elements that is required by CWC Section 10632.1. [Section 10632(a)(2)]
- Monitoring and reporting requirements and procedures to assure appropriate data is collected to monitor customer compliance and to respond to any state reporting requirements. [Section 10632(a)(9)]
- A reevaluation and improvement process to assess the functionality of the urban water supplier’s WSCP and to make appropriate adjustments as may be warranted. [Section 10632(a)(10)]
- In addition to the requirements of paragraph (3) of subdivision (a) of CWC Section 10632, beginning January 1, 2020, the WSCP shall include a seismic risk assessment and mitigation plan to assess the vulnerability of each of the various facilities of a supplier’s water system and to mitigate those vulnerabilities. An urban water supplier shall update the seismic risk assessment and mitigation plan when updating its urban water management plan as required by Section 10621. An urban water supplier may comply with this section by submitting, pursuant to Section 10644, a copy of the most recent adopted local hazard mitigation plan or multihazard mitigation plan under the federal Disaster Mitigation Act of 2000 (Public Law 106-390) if the local hazard mitigation plan or multihazard mitigation plan addresses seismic risk. [Section 10632.5(a)]

These new requirements and prescriptive elements have been incorporated into this 2020 WSCP update, and where applicable, additions to the 2018 WSCP have been emphasized. This WSCP is organized into the following sections:

Section 1 – Analysis of Supply Reliability and Seismic Risk Assessment

Section 2 – Annual Water Supply and Demand Assessment Procedures

Section 3 – Six Standard Shortage Stages

Section 4 – Additional Shortage Response Actions

Section 5 – Communication Protocols

Section 6 – Compliance and Enforcement

Section 7 – Legal Authorities

Section 8 – Financial Consequences

Section 9 – Monitoring and Reporting

Section 10 – WSCP Refinement Procedures

Past Implementation of WSCP

On January 17, 2014, Governor Brown proclaimed a Drought State of Emergency, which called on Californians to voluntarily reduce water consumption by 20%. In September 2014, IRWD's Board of Directors (Board) responded to the drought and the Governor's Emergency Proclamation by declaring a Level 1 Shortage Warning. In response to worsening statewide drought conditions, on April 1, 2015, the Governor issued an Executive Order that mandated a 25% statewide reduction in urban potable water use compared to 2013 water use levels. For IRWD, the State Water Resources Control Board (SWRCB) mandated a water use reduction target of 16% compared to 2013 levels. In July 2015, IRWD's Board declared a Level 2 Shortage Condition aimed at reducing demands by 10-25% in response to the SWRCB's mandate.

In April of 2017, Governor Brown lifted the drought emergency declaration while retaining a commitment to advance conservation and drought planning and response measures throughout the state. Response measures and other lessons learned from the recent drought and declaration of a Level 2 Shortage Condition in 2015 were previously incorporated into IRWD's 2018 WSCP.

Section 1 – Analysis of Supply Reliability and Seismic Risk Assessment

In 2008, IRWD completed a Water Reliability Study which forecasted potential water supply gaps due to climate change and environmental restrictions on the State Water Project (SWP). The SWP is operated and managed by the Department of Water Resources (DWR). Since 2008, IRWD has offset potential water supply gaps by making continued investments into conservation, diversifying its water portfolio and drought resilient supplies, and by securing groundwater banking resources.

In 2016, IRWD prepared a Water Supply Reliability Evaluation (Evaluation) which provided an understanding of how current and projected conditions, such as imported water supply shortages, climate change, and facility outages could impact water supply. The 2016 Evaluation included an analysis of IRWD's ability to maintain a minimum level of service under reasonably foreseeable hydrologic and system outage conditions and emergency scenarios, or combination of such scenarios, based on a rigorous and transparent probability analysis.

1.1 Supply Reliability Scenario Planning

IRWD's 2016 Evaluation considered multiple potential scenarios that could affect the reliability of IRWD's water supplies. A brief summary of the scenarios is described below:

a) Planned Conditions:

Planned conditions were based on 2016 conditions including water supply projects planned by IRWD and imported water supplies already planned by the Metropolitan Water District of Southern California (Metropolitan), the regional provider of imported water to Southern California. The scenario assumed no new water supply investments.

b) Major California Drought:

Increased duration and frequency of major California droughts would impact the availability of Santa Ana River recharge to the Orange County Groundwater Basin and the availability of imported water to Metropolitan from the SWP.

c) Colorado River Shortage:

The Colorado River is consistently over-allocated and Metropolitan's imported supply from the Colorado River Aqueduct (CRA) has a lower priority within California's allocation. Ongoing discussions between basin states were addressing to what extent, if any, California would participate in a cutback and under what conditions the cutback would be implemented.

d) Climate Change:

Reduction in the total snowpack due to warmer storms could mean reduced imports of CRA and SWP water. Saltwater intrusion of the San Francisco Bay Delta (Bay Delta) due to sea level rise could pose as the greatest long-term risk to the SWP water supplies. Climate change was also estimated to affect the availability of recharge to the Orange County Groundwater Basin.

e) Delta Levee Failure:

A seismic event in the Bay Delta causing a levee failure can flood the Bay Delta islands with salt water and interrupt SWP exports due to impaired water quality. The level of impact would depend on the extent of damage (i.e., number of levee failures, specific Bay Delta islands, and season).

f) Bay Delta Environmental Restrictions:

Restrictions from the Bay Delta to protect local wildlife have reduced SWP allocations. There is potential for future restrictions to protect the environment. The "California Water Fix" was expected to increase the reliability of SWP deliveries by bypassing the Bay Delta, and thus reduce environmental impacts on the Bay Delta.

g) Facility Outages and Seismic Events:

Local plant outages or seismic events that damage treatment or conveyance facilities may create disruptions to imported and local water supply deliveries. Local seismic events could potentially disrupt services from either the Baker Water Treatment Plant or local groundwater well fields. Potential effects on Metropolitan deliveries could result in outages as long as six months, depending on severity. See Section 1.2 Catastrophic Interruption and Section 1.4 Seismic Risk Assessment and Mitigation Plan below for additional information.

To evaluate the overall reliability of IRWD's potable water supply system, these scenarios were simulated using IRWD's Integrated Resources Planning Distribution System Model (IRPDSM), a comprehensive distribution system model which simulates deliveries and storage of imported water through IRWD's distribution system.

For every scenario modeled, the simulation results indicated that only minor shortages (up to 2%) have a 16% or smaller chance of occurrence in any month during the modeled 25-year span from 2015 to 2040. The small percentage model results reflect minor hydraulic capacity constraints (based on average capacities) that could be alleviated through operational adjustments. For each of the scenarios modeled, there is sufficient availability of water supplies to IRWD to meet projected demands.

Table 1-1 indicates the shortage levels in the WSCP as they correlate with the reliability scenarios described above. The scenarios in **Table 1-1** are each represented as a single scenario and not combinations of scenarios unless specifically stated. For example, scenarios that could produce a Level 1 shortage of up to 10 percent are either planned conditions, a Colorado River shortage, or the impacts of climate change.

Table 1-1: IRWD Reliability Scenarios, Shortage Levels and Projected Use of Water Banking Supplies

Modeled Reliability Scenario	IRWD WSCP Shortage Level	Anticipated Water Bank Usage (AFY)
Facility Outages and Seismic Events	No Shortage Identified	Access may be limited
Planned Conditions	Level One	300 to 3,000
Colorado River Shortage	Shortage Warning (up to 10%)	
Climate Change		
Major California Drought	Level Two Significant Shortage (up to 20%)	7,300 to 11,500
Major California Drought and Bay Delta Environmental Restrictions	Level Three Significant Shortage (up to 30%)	14,800 to 18,100
Delta Levee Failure		
Catastrophic Delta Levee Failure and Beyond Currently Forecasted Events	Level Four Severe Shortage (up to 40%)	18,100+
	Level Five Crisis Shortage (up to 50%)	
	Level Six Crisis Shortage (exceeding 50%)	

These identified shortage levels are prior to and independent of utilizing emergency supplies from IRWD’s Water Banking Program (IRWD Water Bank). **Table 1-1** identifies how each of the shortage conditions would be offset using water from the IRWD Water Bank. Water banking is a highly reliable and cost-efficient practice of recharging low-cost water to underground storage aquifers during wet periods and recovering this water for later use. IRWD’s Water Bank provides an important water management tool to improve imported water reliability and protect IRWD customers from imported water shortages. With use of the Water Bank, as an emergency supply option, no supply shortage gaps were identified in any of the scenarios modeled in the 2016 Evaluation. A major earthquake resulting in a catastrophic Delta levee failure would result in shortages beyond currently forecasted events, ranging from a Level 4 to Level 6 shortage. IRWD would rely on its water banking emergency supplies for 18,100 AFY or more in such a catastrophic event. See Section 1.3 below for additional information on catastrophic events and major Delta levee failures.

An additional water supply available to IRWD during shortage conditions would be to pump above the Basin Production Percentage (BPP) set by the Orange County Water District (OCWD). This would be a feasible and available source of water, should IRWD’s Water Banking Program not have available supplies in the amounts listed in **Table 1-1**. However, pumping additional groundwater could be subject to surcharges imposed by OCWD. As discussed in more detail below, the Water Banking Program would be used in combination with other

response actions under the implementation of IRWD’s WSCP. It should be noted that none of the scenarios modeled resulted in a Shortage Level greater than Level 3 (up to 30%). A major earthquake and catastrophic Delta levee failure would create significant disruptions in SWP supplies to Southern California and is expected to result in at least a Level 3 shortage. Depending on the extent of the damage it could result in shortages that are beyond currently forecasted events, with shortages ranging from Level 4 to Level 6.

1.2 Catastrophic Interruption

Catastrophic supply interruptions could be the result of regional power outages, earthquakes, floods, water supply interruptions, structural damage from an explosive device, and threat of or possible contamination to the water system. IRWD’s response to a catastrophic interruption of water supply would depend on the cause, severity, and anticipated duration of the emergency. A potential shortage resulting in a reduction of available supplies can be addressed through a combination of alternative supplies and storage, combined with low level implementation of the WSCP. Since IRWD's major potable water sources include both imported water (including IRWD’s Water Banking Program) and local groundwater, it is unlikely that an outage of both sources would occur simultaneously.

A 2008 United States Geological Survey Study entitled “*The Uniform California Earthquake Rupture Forecast*” indicated that there is a 97% probability of an earthquake of magnitude 6.7 or greater in Southern California and a 37% probability of an earthquake greater than 7.5 in magnitude within the next 30 years. Local seismic events have the potential to temporarily disrupt service from either the regional facilities or local well fields. A seismic event could also cause damage to the well field that would permanently limit the production capability of one or more wells. Potential effects of earthquakes on Metropolitan deliveries could result in outages as long as six months, as shown in **Table 1- 2**. This table provides estimated outage durations for seismic events.

Table 1-2: Estimated Outage Durations from Seismic Events

Regional Facilities	Moderate Earthquake (M 6.7)	Extreme Earthquake (>M 7.0)
Metropolitan – Colorado River Aqueduct	1 month	6 months
DWR – State Water Project	Up to 6 months	6+ months
Metropolitan – Conveyance and Distribution	1 week to 2 months	1 week to 3 months
Metropolitan – Treatment Plants	Up to 1 month	Up to 6 months

Source: MWD Seismic Vulnerability Assessment, June 2013

A major seismic event in the Delta with levee failures would have more significant and longer term impacts to supplies. It would result in flooding of the Delta with saline waters and disruption of water exports to the SWP, resulting in partial or full loss of water supplies south of the Delta for up to 3 years. Delta levees are typically 15 to 20 feet high protecting island interiors that are 10 to 15 feet below sea level. DWR's 2009 Delta Risk Management Strategy (DMRS) estimated that there is a 66% probability of at least one magnitude 6.7 or greater earthquake in the Bay Area before 2032. Such an event has the potential to cause multiple Delta islands to flood from levee failures. For a 20-island breach event, the total cost of levee repair and dewatering is estimated to be \$1.8 billion and would require 25 months on average, from the date of the earthquake. A Delta Levee failure of this magnitude would result in the disruption and potentially prolonged reduction of SWP deliveries to southern California and IRWD. In its 2020 UWMP Metropolitan estimates that a catastrophic outage would result in the use of emergency stored supplies and mandatory cuts of 25% to imported supplies to retail suppliers.

Depending on the cause and severity of the local plant outage or seismic event, potential damages to treatment and conveyance facilities may extend from short to long-term disruptions in imported and local water supply deliveries. Unlike drought conditions, which manifest over several years, the response measures available to respond to a catastrophic interruption are limited. During such an event, the IRWD Board, at its discretion, may choose to implement mandatory measures at earlier levels of shortages. See also Section 1.4 Seismic Risk Assessment and Mitigation Plan below for additional information. For additional information on response to severe drought events and consecutive multi-dry year analyses refer to the UWMP, Sections 6 and 7.

1.3 Multiple Dry Year Analysis and Drought Risk Assessment

IRWD's 2020 UWMP includes an assessment of IRWD's reliability during normal, dry, and multiple dry water years as well as a Drought Risk Assessment (DRA). The DRA and WSCP share a similar purpose and are developed to jointly assess IRWD's current and future water reliability, especially during extended periods of drought. The water reliability analyses indicate that IRWD is reliable throughout all conditions including single dry year, multiple dry year, as well as during an extended drought. **Table 1-3** shows the results of the potable multiple dry year water reliability analysis. See IRWD 2020 UWMP Section 7 for the full normal, single-dry, and multiple dry year analysis and tables.

Results of the DRA indicates that IRWD has sufficient supplies to meet its projected demands, even during multiple dry years (**Table 1-4**). Supplies are expected to exceed IRWD's projected water use for all future years evaluated (**Table 1-3 and Table 1-4**). Recycled water is considered a drought resistant supply. Therefore, **Table 1-3** and **Table 1-4** show only potable supplies and demands. For additional tables and non-potable results refer to the 2020 UWMP Section 7 and Appendix E.

The DRA indicates that even in five years of consecutive drought there is a water supply surplus without the use of WSCP response actions. Historic customer usage indicates that both with and

without a drought mandate, customer usage decreased between 3-5% in subsequent years of drought between 2005 and 2020 (See UWMP Section 7). This decrease is likely a result of continued, voluntary IRWD actions to encourage water use efficiency, conservation, statewide and regional drought messaging, as well as the use of recycled water wherever applicable. When Metropolitan WSCP response actions trigger a Level 10 shortage condition (more than 50%), IRWD would only be in a Level 1 shortage condition (less than 10%, see WSCP Section 3.1). For additional details on the Multiple Dry Year Analysis and DRA refer to 2020 UWMP Section 7.

Table 1-3: Multiple Dry Year Water Reliability Analysis – Potable Water

DWR Table 7-4 A Retail: Multiple Dry Years Supply and Demand Comparison - Potable					
		2025	2030	2035	2040
First year	Supply totals	113,859	113,859	113,859	113,859
	Demand totals	64,740	72,665	80,589	88,514
	Difference	49,119	41,194	33,270	25,345
Second year	Supply totals	113,859	113,859	113,859	113,859
	Demand totals	62,798	70,485	78,171	85,859
	Difference	51,061	43,374	35,688	28,000
Third year	Supply totals	113,859	113,859	113,859	113,859
	Demand totals	60,914	68,370	75,826	83,283
	Difference	52,945	45,489	38,033	30,576
Fourth year	Supply totals	113,859	113,859	113,859	113,859
	Demand totals	59,086	66,319	73,551	80,784
	Difference	54,773	47,540	40,308	33,075
Fifth year	Supply totals	113,859	113,859	113,859	113,859
	Demand totals	57,314	64,330	71,345	78,361
	Difference	56,545	49,529	42,514	35,498
NOTES: Supply values represent potable supplies from Table 7-1. Demands adjusted for single dry year conditions in year one, then adjusted down 3% per year for each subsequent year of drought, as referenced in UWMP Section 7 (7.1, 7.2), based on historic drought analysis.					

Source: IRWD 2020 UWMP, DWR Table 7 - 4.A

Table 1-4: Five-Year Drought Risk Assessment Tables – Potable Water

DWR Submittal Table 7-5 Five-year Drought Risk Assessment Tables to address Water Code Section 10635(b) - Potable	
2021	Total
Total Water Use - <i>Potable</i>	53,299
Total Supplies - <i>Potable</i>	101,506
Surplus/Shortfall w/o WSCP Action	48,207
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	-533
Revised Surplus/(shortfall)	47,674
Resulting % Use Reduction from WSCP action	-1%
2022	Total
Total Water Use [Use Worksheet]	51,700
Total Supplies [Supply Worksheet]	101,506
Surplus/Shortfall w/o WSCP Action	49,806
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	1,599
Revised Surplus/(shortfall)	51,405
Resulting % Use Reduction from WSCP action	3%
2023	Total
Total Water Use [Use Worksheet]	50,149
Total Supplies [Supply Worksheet]	101,506
Surplus/Shortfall w/o WSCP Action	51,357
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	1,551
Revised Surplus/(shortfall)	52,908
Resulting % Use Reduction from WSCP action	3%
2024	Total
Total Water Use [Use Worksheet]	48,644
Total Supplies [Supply Worksheet]	101,506
Surplus/Shortfall w/o WSCP Action	52,862
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	1,504

Revised Surplus/(shortfall)	54,366
Resulting % Use Reduction from WSCP action	3%

2025	Total
Total Water Use [Use Worksheet]	47,185
Total Supplies [Supply Worksheet]	113,859
Surplus/Shortfall w/o WSCP Action	66,673
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	1,459
Revised Surplus/(shortfall)	68,133
Resulting % Use Reduction from WSCP action	3%

Source: IRWD 2020 UWMP, DWR Table 7 - 5.A

1.4 Seismic Risk Assessment and Mitigation Plan

LAW

10632.5. (a) In addition to the requirements of paragraph (3) of subdivision (a) of Section 10632, beginning January 1, 2020, the plan shall include a seismic risk assessment and mitigation plan to assess the vulnerability of each of the various facilities of a water system and mitigate those vulnerabilities.

(b) An urban water supplier shall update the seismic risk assessment and mitigation plan when updating its urban water management plan as required by Section 10621.

(c) An urban water supplier may comply with this section by submitting, pursuant to Section 10644, a copy of the most recent adopted local hazard mitigation plan or multihazard mitigation plan under the federal Disaster Mitigation Act of 2000 (Public Law 106-390) if the local hazard mitigation plan or multihazard mitigation plan addresses seismic risk.

As stated in the CWC Section 10632.5.(a), beginning January 1, 2020, the 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. An urban water supplier may comply with this section by submitting, pursuant to Section 10644, a copy of the most recent adopted local hazard mitigation plan or multi-hazard mitigation plan under the federal Disaster Mitigation Act of 2000 (Public Law 106-390) if the local hazard mitigation plan or multi-hazard mitigation plan addresses seismic risk.

In March 2020, IRWD completed and submitted the “Water System Risk and Resilience Assessment (RRA): A Comprehensive Analysis Consistent with America’s Water Infrastructure Act of 2018 (AWIA)” in coordination with the Metropolitan Water District of Orange County (MWDOC) and the Water Emergency Response Organization of Orange County (WEROC). The

document was accepted and certified as complete from the Environmental Protection Agency, **Exhibit B**.

In addition, IRWD has completed numerous seismic studies for individual projects and facilities including dam seismic hazard potentials, water system disruption potential in the case of major earthquake, and full system vulnerabilities similar to the AWIA RRA.

IRWD also has prepared an Emergency Operations Plan, updated in September 2020, that includes an extensive specific hazard response plan for earthquakes including mitigation action, response actions, responsible authorities, and phases of response.

Furthermore, IRWD is currently in the process of preparing an updated Local Hazard Mitigation Plan (LHMP) expected to be completed in August of 2021 and certified by FEMA in December of 2021. Pending approval and adoption, the 2021 LHMP will be amended to the IRWD 2020 UWMP Update as an additional appendix. Although not fully certified, the seismic analysis and mitigation recommendations present in the pending IRWD 2021 LHMP are consistent with the information presented below and have been referenced in preparing these materials. In particular, mitigation actions have been included from LHMP draft materials as prepared by consulting engineers at Michael Baker International.

IRWD is in the process of evaluating the seismic performance of its five dams and reservoirs as part of its Dam Safety Program. IRWD continually monitors, inspects and maintains its dams and reservoirs. Its engineers and dam safety experts are implementing a state-of-the-art Dam Safety Program that will exceed all current state standards, and even provide a roadmap for other agencies to follow. This new program combines the traditional tried and true safety standards with a modern Risk-Informed Decision-Making process, known as RIDM.

RIDM is a rigorous, systematic and thorough approach to dam safety that identifies and reduces any risks. Incorporating RIDM will create one of the most robust dam safety and reservoir management programs in the nation. Irvine Ranch Water District's Dam Safety Program builds on industry best practices to ensure that our dams and reservoirs will always be safe.

A. Excerpts from IRWD Water System Risk and Resilience Assessment (RRA)

Due to the sensitive nature of IRWD's RRA report, certain sections are not appropriate to be released as part of the UWMP and WSCP. The following excerpts have been pulled from the existing RRA Seismic Risk Assessment and Mitigation plan to demonstrate the essential content in assessing seismic risk. In addition, Herndon Solutions Group (HSG) has prepared a technical memo addressing the UWMP directly attached as **Exhibit C** below.

The RRA study establishes the risk baseline for the IRWD's water system and complies with the ANSI/AWWA J100 National Standard for Risk and Resilience Management of Water and Wastewater Systems. HSG was asked to facilitate IRWD's RRA with information collected from

IRWD's assessment team, led by the Horsley Witten Group, Inc. (HW), between August 2019 and March 2020. Following are excerpts from the RRA assessment.

I. Overview of Water Emergency Preparedness in Orange County

Water distribution and treatment in Orange County involves dozens of agencies and utilities working together and relies on integrated regional systems and facilities. There are many retail water utilities in Orange County, each with its own distinct service area and sources of potable water. The retail water agencies include water districts and city water departments.

MWDOC serves more than 2.3 million Orange County, California, residents through 28 cities, water districts, and investor-owned utilities or MAs. MWDOC's service area covers all of Orange County except the cities of Anaheim, Fullerton, and Santa Ana.

WEROC, administered by MWDOC, coordinates emergency response and mutual aid planning for all 35 Orange County water and wastewater agencies including Anaheim, Fullerton, and Santa Ana. WEROC provides its participating agencies and volunteer staff with planning support, emergency preparedness, and response training. In the event of a major emergency affecting Orange County, these volunteers would mobilize at the WEROC emergency operations centers to coordinate response. WEROC works closely with the County of Orange, Orange County Fire Authority, California State Water Resource Control Board Division of Drinking Water, and other entities to ensure a holistic approach and a well-coordinated emergency response.

II. Assessment Approach

IRWD provided an asset database, which included all assets in IRWD's potable water system. Since the preliminary asset list was too large to perform an assessment on in accordance with AWIA, HSG and HW worked with Allen Shinbashi of IRWD to preliminarily identify critical potable assets. These selected assets were presented to the assessment team and the initial list was reviewed and updated, as necessary.

Next, the assessment team identified and prioritized the set of threats against which the assessment was to be conducted. All J100 reference threats were considered in addition to two specific threats included by the team: drought and earthquake liquefaction. The final list of 145 threat-asset pairs were assessed for their consequences from the threat, vulnerability to the threat, and likelihood of occurrence. The final risk baseline values were presented to the assessment team for an evaluation of accuracy and completeness.

III. Key System Elements

IRWD's potable water facilities include the Dyer Road Wellfield, the Baker Water Treatment Plant, the Irvine Desalter Project which treats drinking water in the Irvine sub-basin, the Deep Aquifer Treatment System that removes the tinted color from local groundwater, Wells 21 and 22 Desalter Project, that recovers and treats local impaired groundwater for potable use, and 36 drinking water reservoirs with a combined 150 MG storage capacity. Potable water is distributed through 1,760 miles of distribution pipelines.

IV. Vulnerability Assessment

After identifying critical assets and the threats of concern, each critical asset was paired to every identified threat. The assessment team then evaluated the plausibility of the identified threat having significant consequence to the critical asset and prioritized those threat-asset pairs of concern to their system. Out of a possible 1,264 pairs, a total of 145 threat-asset pairs were ultimately selected to be included in the assessment. These threat-asset pairs represent the most significant concern to the District.

V. Earthquake Liquefaction

Liquefaction takes place when loosely packed, water-logged sediments at or near the ground surface lose their strength in response to strong ground shaking. Liquefaction occurring beneath buildings and other structures can cause major damage during earthquakes. For example, during the 1989 Loma Prieta, California, earthquake, liquefaction of the soils and debris used to fill in a lagoon caused major subsidence, fracturing, and horizontal sliding of the ground surface in the Marina district in San Francisco. The risk assessment team identified earthquake liquefaction to be a threat of concern to potable water assets located in liquefaction zones. Earthquake liquefaction is a concern for the Michelson Ops Complex (which includes the Michelson Operations Center, the Chemical Storage Facility and the LAW RP Fuel Facility) and the Dyer Road Groundwater (GW) Complex (which includes the Dyer Road GW Well System, the Dyer Road IDF, and the Dyer Road PDF).

B. Seismic Mitigation Actions

Due to the inherent seismic risk associated with infrastructure based in Southern California the following mitigation actions have already been implemented or are currently being considered to alleviate potential risks:

- Implement low-cost, easy to implement, earthquake mitigation measures in facilities (e.g., bracing items to walls, anchoring equipment to the slab, installing earthquake-activated shut-off valves, providing flexible connections to piping or conduit).
- Monitor changes and updates to building codes and seismic regulations to determine if IRWD-owned critical facilities may need seismic retrofits as they age and building codes are updated.
- Implementing earthquake mitigation measures for critical operations.
- Include assessment and mitigation of potential liquefaction conditions in the scope of any new building or infrastructure project.
- Perform monthly checks on permanent, and portable backup generators.
- Maintain WEROC membership for communication and collaboration opportunities with regional water districts, including identification and implementation of mitigation actions with shared benefits.
- Consider implementing backup communication systems such as satellite phones and amateur radio.
- Consider moving backup servers to locations that are not on the same earthquake fault lines as the primary servers or to cloud-based services.
- Consider developing and seeking funding for an evaluation program to determine the seismic vulnerability of critical assets.
- Regularly conduct earthquake and evacuation drills with all staff.

Section 2 – Annual Water Supply and Demand Assessment Procedures

The IRWD Board, in accordance with the provisions of the CWC, will determine and declare the shortage level based on an assessment of the available supplies and demands. The evaluation process is conducted to determine if a shortage declaration is needed, and at what level. The shortage level is calculated by projecting total short-term water demands within IRWD's service area and comparing those demands to the available water supplies. The supply analysis includes evaluation of hydrologic and regulatory conditions that could impact supplies such as imported water, groundwater, and surface water. Drought resilient, hydrologically independent supplies, such as recycled water, are considered fully reliable and can be excluded from the required estimated shortage reduction.

Starting in 2022, each supplier will be required by the CWC to submit an annual water supply and demand assessment to DWR by July 1 of each year. Procedures for determining IRWD’s annual water supply and demand assessment (WSDA) are provided below.

2.1 Water Supply and Demand Assessment Requirements

LAW

10632.1. An urban water supplier shall conduct an annual water supply and demand assessment pursuant to subdivision (a) of Section 10632 and, on or before July 1 of each year, submit an annual water shortage assessment report to the department with information for anticipated shortage, triggered shortage response actions, compliance and enforcement actions, and communication actions consistent with the supplier’s water shortage contingency plan. An urban water supplier that relies on imported water from the State Water Project or the Bureau of Reclamation shall submit its annual water supply and demand assessment within 14 days of receiving its final allocations, or by July 1 of each year, whichever is later.

10632. (a) Every urban water supplier shall prepare and adopt a water shortage contingency plan as part of its urban water management plan that consists of each of the following elements:

- (1) The analysis of water supply reliability conducted pursuant to Section 10635.
- (2) The procedures used in conducting an annual water supply and demand assessment that include, at a minimum, both of the following:
 - (A) The written decision-making process that an urban water supplier will use each year to determine its water supply reliability.
 - (B) The key data inputs and assessment methodology used to evaluate the urban water supplier’s water supply reliability for the current year and one dry year, including all of the following:
 - (i) Current year unconstrained demand, considering weather, growth, and other influencing factors, such as policies to manage current supplies to meet demand objectives in future years, as applicable.
 - (ii) Current year available supply, considering hydrological and regulatory conditions in the current year and one dry year. The annual supply and demand assessment may consider more than one dry year solely at the discretion of the urban water supplier.
 - (iii) Existing infrastructure capabilities and plausible constraints.
 - (iv) A defined set of locally applicable evaluation criteria that are consistently relied upon for each annual water supply and demand assessment.
 - (v) A description and quantification of each source of water supply.

2.2 Annual Water Supply and Demand Assessment Procedures

CWC Section 10632(a)(2) requires that urban water suppliers prepare and submit an annual WSDA. IRWD’s annual WSDA is a determination of the near-term outlook for supplies and demands and identification of any expected shortage that may prompt response actions in the

current year. IRWD's annual WSDA supply and demand estimates may differ from IRWD's projections used for long term planning and are not intended for that purpose.

Available supplies are assessed through ongoing coordination with wholesalers, groundwater managers, and IRWD facility operators and staff. Due to the nature of IRWD's water supply system, many supplies are tracked and managed directly by IRWD on an operational basis. IRWD's diversified water portfolio allows for multiple sources to be available to meet projected customer demands in varying circumstances.

To project water demands for the WSDA reliability analysis, IRWD uses historical customer water usage data. This data is evaluated in conjunction with local weather conditions, estimated water use requirements, and is adjusted to account for population growth. IRWD has implemented successful water use efficiency and outreach programs since the early 1990's. These efforts, combined with the long-term use of budget-based rates, have resulted in IRWD having relatively consistent levels of customer water use demands, and less discretionary water use over time. The WSDA considers this customer use trend in the overall analysis.

The following WSDA methodology includes a written decision-making process to determine water supply reliability. Once completed, the WSDA is reviewed by the IRWD Board of Director's Water Resources, Policy and Communications Committee (WRP Committee) and subsequently considered by IRWD's full Board for approval.

A. Key Data Inputs

The following data components are important inputs to the preparation of IRWD's annual WSDA.

- 1) The first component of the WSDA, is the estimated acre-feet (AF) of water sales derived from customer usage data. This is based on actual water sales from previous fiscal years (FY). The customer usage data is categorized by water type (treated, untreated, recycled) as well as customer type. Actual water sales are tracked and finalized at the end of each FY in a database managed by the IRWD Finance Department.
- 2) The second component of the WSDA is the availability of water supplies by water type (treated, untreated, recycled) in AF. IRWD's Operations Department provides estimates for treated and untreated water supplies. IRWD Recycled Water Operations provides estimates for production of recycled water-based supplies. Certain supply sources may be limited by existing contractual agreements or wholesaler capacities. Any limitations in supply availability are incorporated into the annual supply assessment.
- 3) The third component of the WSDA are adjustments for weather variability (based on dry year and wet year conditions), growth (based on population data from the Center for Demographic Research (CDR), as well as any changes to existing infrastructure capacities or plausible constraints.

B. Assessment Methodology and Procedures

The preparation of IRWD's annual WSDA uses the following methodology and procedures, which may be expanded and amended in the future. Any such changes will accomplish the same goal of assessing the IRWD's water supply reliability and potential shortages. Should the assessment indicate a potential shortage, the triggered shortage response actions, compliance and enforcement actions, and communication actions will be consistent with the WSCP as required in CWC Sections 10632 and 10632.1.

Step 1: Access Historic Customer Use Data

The basis of the IRWD WSDA is historic customer water use data, compiled in a local database and maintained by the IRWD Finance Department. At the end of each fiscal year, the actual water uses, and sales are verified for accuracy. Customer demand projections for the purpose of the WSDA are based on actual water deliveries as tracked by the Finance Department and stored in the local database from 2005 to present (e.g., Water Consolidated and Acre files). Customer usage is sorted by supply type and calculated for each FY (July - June) in AF. Units of AF are used throughout the entire WSDA. In accordance with CWC 10632(a)(2)(B), IRWD considers the projected current year available supply and demand as Year 1 and one dry year as Year 2.

Step 2: Determine Available Supplies

Estimating available supplies is accomplished by determining the volume of each supply source reasonably anticipated to be available that year and the estimated percentage loss during treatment or delivery based on past operations data. These values are estimated by IRWD facility operators monitoring available supplies (Baker Water Treatment Plant, Irvine Desalter Project, Dyer Road Well Field, Deep Aquifer Treatment System, Wells 21 and 22, Michelson Water Recycling Plant, Los Alisos Water Recycling Plant, recycled water storage reservoirs), and through coordination with water supply partners including but not limited to groundwater managers (Orange County Water District (OCWD)), and wholesalers (Metropolitan and MWDOC) to confirm expected availability of supplies for each year.

In addition to estimating available supplies to meet annual customer demands, estimates are also calculated for supplies held in emergency storage in IRWD's Water Banking Program that can be made available. Through IRWD's water banking operations in Kern County, IRWD maintains supplies in emergency storage that can be recovered and delivered into IRWD's service area through a Coordinated Operating, Water Storage, Exchange and Delivery Agreement with Metropolitan and MWDOC, (Coordinated Operating Agreement, see "Available Supply Coordination: Water Banking" section below).

IRWD is involved in numerous programs to help reduce dependence upon imported water (the most expensive source). These programs may influence the timing of the various sources and

supply availability. Please see “Description and Quantification Section” below for more detail on individual supply sources.

Available Supply Coordination: OCWD & Groundwater

For groundwater supplies, coordination efforts are implemented with OCWD, which manages the Orange County Groundwater Basin (Basin). Approximately 50 percent of IRWD’s overall supply comes from its groundwater wells in the Basin. Each year the OCWD sets a target amount of pumping and establishes a Basin Pumping Percentage (BPP) for the groundwater producers. The BPP is the ratio of groundwater production to total water demands expressed as a percentage. To discourage pumping above the established BPP, any groundwater production above the BPP is charged a Basin Equity Assessment (BEA) which is set so that the cost of groundwater pumping is similar to the cost of imported water. Some of IRWD’s treated groundwater supplies are exempt from the BEA.

The majority of the potable groundwater used by IRWD is produced from its Dyer Road Well Field (DRWF) located in the City of Santa Ana. The DRWF consists of 16 wells that pump from the clear water zone of the Basin and two wells (with colored-water treatment facilities) that pump from the deep, tinted-water zone of the Basin. The tinted-water portion of the DRWF is referred to as the Deep Aquifer Treatment System (DATS). Through an existing agreement, the DRWF production is limited to 28,000 AFY per year (AFY) consisting of 20,000 AFY of clear groundwater and an additional 8,000 AFY of “matching” clear groundwater, provided a minimum of 8,000 AFY of colored groundwater is pumped from the deep aquifer zone.

Available Supply Coordination: Metropolitan & MWDOC (Imported Water)

IRWD receives imported water through MWDOC. MWDOC is a wholesale member agency Metropolitan. IRWD submits imported water supply requests to MWDOC, which then incorporates the request into a regional order of water for imported supplies to Metropolitan. Both Metropolitan and MWDOC provide wholesaler information indicating their ability to meet IRWD anticipated imported water demands. Metropolitan and MWDOC both state in their UWMP and WSCP that these imported supplies are reliable through multiple, consecutive years of drought. The wholesale agencies are also involved with coordination of deliveries from IRWD’s Water Banking Program to be used in the event of imported water shortages.

Available Supply Coordination: Water Banking

IRWD has diversified its water supply reliability by developing cost effective water banking projects, as emergency storage, in Kern County, California. IRWD has constructed a fully operational Water Banking Program that makes it possible for IRWD and its banking partners to store excess water during “wet” hydrologic periods. The stored water is then available for use during “dry” periods to offset reduced water supplies under periods of severe drought or during periods of supply interruptions.

Water banking, recharge, storage, and recovery programs will continue to provide a cost effective and reliable supplemental source of water that can be relied upon during major droughts and periods of supply interruptions. IRWD has secured water supplies for its water banking projects through unbalanced exchange partnerships with other agencies. These partnerships allow agencies with surplus water to store water in IRWD's water banking projects in return for transferring half or more of the water to IRWD. In addition, as previously stated, wheeling and exchange agreements including a long-term Coordinated Operating Agreement with MWDOC and Metropolitan allows the delivery of SWP supplies from IRWD's Water Banking Program to the IRWD service area (see "Emergency Supplies – Water Banking" below for quantification of supplies made available).

Step 3: Calculate Projected Customer Demands for Year 1

Once the historic customer demand data is obtained, IRWD updates existing customer type information and monthly water use by customer and water type. To calculate the unconstrained demand for IRWD customers, an average is taken across the past three fiscal years, by customer and water type, to determine the upcoming customer demand projections. This is the projected unconstrained customer demands for Year 1.

Step 4: Apply Adjustments for Expected Weather, Growth, and Capacity Changes

Once the base customer unconstrained demands are projected, then adjustments are made for local weather conditions, population growth and any expected capacity changes for that year. These projections are used as a comparison to validate the three-year average, to track changing demands across all fiscal years and to identify wet, normal, and dry year trends in customer demands.

Water supply and demand conditions are prone to fluctuation each year. IRWD's historic planning methods and diverse portfolio of water supplies allow for accommodating these annual fluctuations relatively easily, with additional built-in measures for significant changes when necessary. The WSDA specifically takes into account population growth when comparing customer demand changes from year to year.

Population Growth

In addition to the fiscal year average, calculations are performed comparing customer demand changes, by customer type, across all fiscal years, normalized for population growth each year. Population growth data, as calculated by the CDR at California State Fullerton, is supplied each January by MWDOC for the IRWD service area. The ongoing customer water use calculations are based on fiscal year use data for total water sources, total potable sources, and total recycled sources. Using the data obtained from CDR, these total values are then normalized across fiscal years by taking the ratios of AF per customer. The percentage change calculated between each individual water supply source is then comparable across years with respect to population growth.

Weather

When conditions are indicative of a dry year or continuous dry years additional adjustments are made by comparing historical dry year customer demands. The customer demands analysis utilizes changes in demands pre- and post- water reduction drought declaration and water use reduction mandates with data going back to 2005 through present. Local California Irrigation Management Information System (CIMIS) data, obtained from station #75 Santa Ana, is also used to track changes in service area weather conditions. Values for evapotranspiration, rainfall, and air temperature are measured at the hourly, daily, and annual scale. CIMIS data is used to track historic trends and allow for additional adjustments and refinement to projected customer demands based on past trends for similar conditions.

Capacity Changes

Capacity changes related to large scale supply availability are also considered. These include, but are not limited to, new facility operations, closed facility operations, state mandates, changes to the BPP, and water delivery schedules. For example, knowledge of a scheduled facility closure during the year for project improvements, repairs, replacements or upgrading infrastructure may alter the availability of the supply source for that upcoming year depending on the duration of the work involved. When applicable, the available supply is adjusted for the upcoming year.

After the projected demands for the upcoming fiscal year are calculated, adjustments are made to the first-year projected demands based on projected changes to operations by source due to expected weather, growth, and facility capacities.

Step 5: Calculate Projected Customer Demands for Year 2 (Single Dry Year)

For the purpose of the WSDA an additional single dry year of projected demands are also calculated for the subsequent year. This provides the projected customer demands for Year 2. The demands for a single dry year are described as follows:

Single dry year customer demand projections are based on historic trend analysis under dry year conditions. The analysis uses data for Dry, Wet, and Normal water years is obtained from DWR and cross-checked with the federal drought monitor run by National Integrated Drought Information System (NIDIS) at the state and local level. This information for different year conditions is then applied to the existing percentage change in customer historic water use calculations. In conducting the analysis, years indicated as dry are grouped and averaged for the effect of a single dry year on customer demands. Calculations using data from 2005-2020, indicate eight “Dry” fiscal year periods. The average percentage change in total customer demands for a single dry year (with and without state mandates applied) is between an 0.62% and 2.83% increase. The average percentage change in potable demands is negligible, ranging between a 1.37% decrease to a 0.52% increase. Recycled demands observe between a 4.44% to 7.23% increase in usage for a single dry year.

For a conservative estimate in the year 2020 an increase of 3% in customer demands for a single dry year would be applied across all water use types. This is the average value for an increase in a single dry year customer usage, without a drought declaration. IRWD's water supplies fully meet projected water demands for the current and next single dry year, as indicated by using this methodology.

Please note that further historical analysis for consecutive dry years, utilized for IRWD's 2020 UWMP, indicates an average decrease in customer demands across all water use types between 3-5% on average and decreasing to upwards of 10% when drought declarations were implemented. For the purpose of a single dry year analysis when a drought declaration is unlikely to be in effect, the conservative 3% increase will be used, unless otherwise indicated by updated historical dry year usage data.

Step 6: Compare Total Supply and Demands – Assess Possible Shortage

Once demand calculations for Year 1 and Year 2 have been completed, adjustments have been applied, and water supply availability has been confirmed, IRWD staff compares total demands to total supplies. Then, IRWD can ascertain if a supply shortage is anticipated.

When an anticipated shortage meets the criteria for Levels 1-6 of the WSCP, shortage response actions will be taken as described in the most recently adopted WSCP. If a shortage is anticipated, supplies may be supplemented from emergency storage in IRWD's Water Bank Program.

Step 7: Initiate Shortage Response Actions (SHORTAGE CONDITION ONLY)

In the case that additional available supplies (emergency water banking supplies) do not meet the projected unconstrained demand for both the upcoming year and single subsequent dry year, IRWD would prepare a recommendation to implement response actions from the WSCP at the appropriate level. This recommendation would be reviewed and considered by IRWD's Water Resources Policy and Communications (WRP) Committee. If the WRP Committee concurs, the recommendation would be considered by IRWD's Board at a meeting immediately following the WRP Committee meeting. WRP Committee and Board meetings are scheduled monthly. Special Committee and Board meetings can be scheduled should the shortage necessitate more urgent action. See Sections 3, 4, and 5 below.

C. Review of Decision-Making Process

The CWC requirements stress the importance of a written decision-making process for completing the WSDA. As stated in the preceding sections, IRWD conducts the annual WSDA as described by the WSDA methods including calculating consumer demand projections for a single year and subsequent dry year. IRWD adjusts the projected demands based on the

methods described for weather, growth, and capacity changes. Supplies are also estimated based on coordination efforts with wholesalers, water patterns, groundwater managers, and IRWD facility operators.

When the WSDA indicates a possible shortage in supplies, IRWD Senior Staff work with the General Manager (GM) to prepare a recommendation to implement the WSCP. The staff recommendation is brought before IRWD’s WRP Committee for consideration of approval. The recommendation is then brought before the IRWD Board to consider adoption of a resolution declaring a water shortage.

Pending Board approval, IRWD will carry-out the designated WSCP response actions for each appropriate level. This process is depicted in **Figure 2-1** below. After a typical annual WSDA is completed with no indication of shortage, the plan is submitted to the DWR as required.

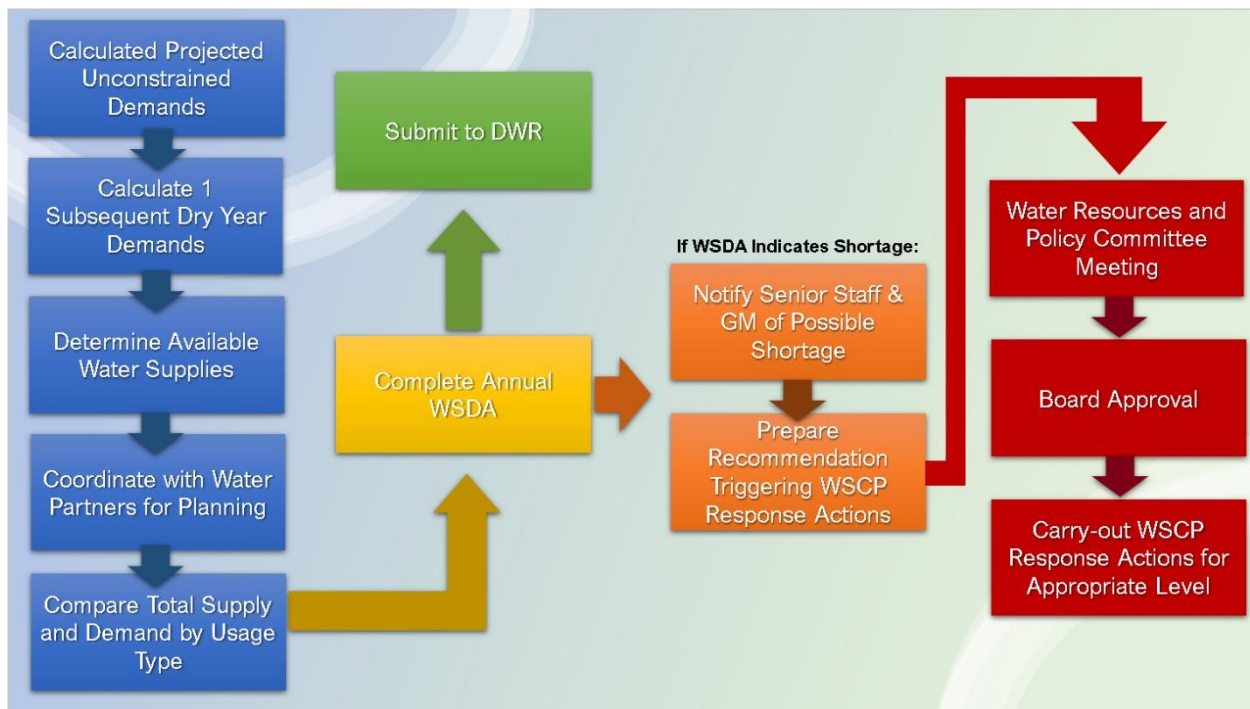


Figure 2 - 1. Decision Making Chart

D. Description and Quantification of Each Water Supply Source

As required, a description and quantification of each IRWD water supply source is provided below with the average annual supply shown in AFY. IRWD’s water supply availability estimates are as follows:

Treated (Potable) Water

- 1) Dyer Road Well Field (DRWF), 28,000 AFY. This local groundwater source water can be pumped year-round, although availability may be limited at times due to well maintenance. Under Agreement, IRWD can pump up to 28,000 AFY from DRWF, consisting of 20,000 AFY of clear groundwater and an additional 8,000 AFY of matching clear groundwater, provided a minimum of 8,000 AFY of tinted groundwater is pumped through the Deep Aquifer Treatment System (DATS) from the deep aquifer zone. It should be noted that there also exists additional flexibility to pump above these levels might be possible under extreme circumstances with short-term amendments to existing agreements.
- 2) DATS, 8,400 AFY. This is a local groundwater source. 2% of the water pumped is lost due to the treatment process. DATS water can be pumped consistently throughout the year although the treatment process may be paused periodically for maintenance.
- 3) Irvine Desalter Plant (IDP), 5,700 AFY. This is a local groundwater source. 15% of the water pumped is lost due to the treatment process. Salty water is pumped from wells and sent to the IDP facility to make it suitable for drinking purposes. This water is pumped consistently throughout the year with interruptions due to maintenance.
- 4) Wells 21 & 22 Desalter Treatment plant (Wells 21 & 22), 2,400 AFY. This plant recovers and treats local groundwater to remove nitrites and other impurities. 15% of the water pumped is lost due to the treatment process. This water is pumped consistently throughout the year with downtime for maintenance.
- 5) Baker Water Treatment Plant (Baker), 7,200 AFY. This plant is a joint regional project by five water districts. Baker uses advanced treatment technologies to produce drinking water from local surface water sources and untreated water from Metropolitan. Produced water is shared by the districts and IRWD receives about 24% of the production. 2% of the water is lost due to the treatment process. This water is produced consistently throughout the year.
- 6) Imported Water via MWDOC and Metropolitan, 15,000 AFY. Imported water supplied from Metropolitan and MWDOC serves to fill any gaps in IRWD local supplies and as such makes up a smaller percentage of the total water used in the IRWD service area. These values are subject to increase in the future if demands grow. Drinking water imported to IRWD comes from Northern California via the Sacramento-San Joaquin Delta (Delta) through the SWP and from the Colorado River via the CRA. IRWD submits imported water demand requests to MWDOC for inclusion in a regional request supplied by Metropolitan.

Untreated Water

- 1) Irvine Lake: A limited number of customers use untreated water directly from Irvine Lake. Irvine Lake water sources include surface water runoff (native water) and imported water from Metropolitan.
 - a) Irvine Lake, native water supply, use is typically ~3,000 AFY. As noted, any native water from runoff is generally delivered to the Baker Water Treatment Plant for treatment for potable use. This estimate is based on available water in the lake and rainfall projections for the upcoming year for the Year 1 Assessment and a conservative estimate for Year 2 based on historical availability.
 - b) IRWD can use imported water stored in Irvine Lake to supplement the recycled water system when demands for recycled water exceed available recycled water supplies. This supplement to the recycled water system historically has ranged from ~1,500 to 2,500 AFY.
 - c) Some imported untreated water, via MWDOC and Metropolitan as stated above, is also used to directly meet demands for certain commercial and agricultural customers. This supply ranges from 200 to 500 AFY.

Recycled Water

In certain months, more recycled water is produced than needed and placed into storage reservoirs. In other months when more water is needed, stored water is used which reduces reliance on imported water:

- 1) Michelson Water Recycling Plant (MWRP), 28,000 AFY. More than a quarter of IRWD's current water supply is recycled water, enough to provide landscape irrigation for more than 80% of the District's business and community customers – including parks, school grounds, and golf courses. MWRP's treatment capacity is 28 million gallons per day. The MWRP enables IRWD to provide water to meet the future needs of our growing community, while decreasing IRWD's dependence on imported drinking water. This plant treats sewage to produce tertiary treated recycled water.
- 2) Los Alisos Water Recycling Plant (LAWRP), 6,100 AFY. A multi-step process is used to produce recycled water suitable for non-potable use. This plant is only operated during

months when the demand for recycled water is high during the months of April through September.

- 3) Non-Potable Wells, 4,165 AFY. Shallow groundwater well water is pumped and used for non-potable purposes. This water is pumped throughout the year with some interruptions due to maintenance.
- 4) Excess recycled water produced is stored to meet recycled customer demands. Stored recycled water is used to meet seasonal demands and reduce reliance on imported water. IRWD has four recycled water seasonal storage reservoirs that can store excess recycled water produced by IRWD's MWRP.
- 5) Any additional water required by the recycled water system during the peak summer months is purchased from Metropolitan as needed. Typically, 2,200 AFY is purchased to supplement the recycled water system.

Emergency Supplies – Water Banking

IRWD continues to further diversify its water supply portfolio by developing water banking facilities in the Kern Fan area located in the southern San Joaquin Valley of Kern County as discussed above. IRWD's Water Banking Program supplies are kept in storage and may be used during periods of shortage to further supply reliable sources of water to IRWD customers.

Through the Water Banking Program facilities and agreements, IRWD has 135,500 AF of available storage capacity (126,000 AF plus an additional 9,500 AF in the Kern Water Bank), 44,600 AF of recharge capacity and 28,750 AF of recovery capacity. As previously described, IRWD has entered into a Coordinated Operating Agreement with Metropolitan and MWDOC which allows IRWD to have SWP water recovered from the Water Bank and delivered to IRWD's service area.

In 2014, IRWD and Metropolitan entered into an agreement for transferring non-SWP water into IRWD's service area. Under this agreement, in 2015, IRWD recovered and delivered 1,000 AF of its non-SWP water to its service area. This was used July 1, 2015 through February 2016 as extraordinary supply to supplement reduced imported supplies during a water supply allocation from Metropolitan during the drought. IRWD staff continuously tracks available water for emergency supplies with accounting databases for water banking operations, water supply deliveries, and facility operations.

E. Reporting

The annual WSDA is to be completed and reviewed by the WRP Committee and then the IRWD Board. Once completed and approved by the IRWD Board, the WSDA will be submitted to DWR prior to July 1 in each year starting in 2022.

Section 3 – Six Standard Shortage Stages

LAW

Six standard water shortage levels are established by law in the CWC as follows:

Water Code Section 10632(a)(3)

(A) Six standard water shortage levels corresponding to progressive ranges of up to 10, 20, 30, 40, and 50 percent shortages and greater than 50 percent shortage. Urban water suppliers shall define these shortage levels based on the suppliers' water supply conditions, including percentage reductions in water supply, changes in groundwater levels, changes in surface elevation or level of subsidence, or other changes in hydrological or other local conditions indicative of the water supply available for use. Shortage levels shall also apply to catastrophic interruption of water supplies, including, but not limited to, a regional power outage, an earthquake, and other potential emergency events.

(B) An urban water supplier with an existing water shortage contingency plan that uses different water shortage levels may comply with the requirement in subparagraph (A) by developing and including a cross-reference relating its existing categories to the six standard water shortage levels.

The WSCP provides guidelines for responses to varying levels of supply shortages in the six standard shortage levels established by the CWC. The WSCP includes actions that can be implemented to reduce demands down to specific levels in accordance with reduced supply availability. The levels of action identified in the WSCP are shown in **Table 3-1**.

Table 3 - 1: Shortage Levels in Water Shortage Contingency Plan

IRWD Shortage Level	Percent Supply Reduction	Water Supply Condition
Level 1	0% - 10%	Shortage Warning
Level 2	11% to 20%	Significant Shortage
Level 3	21% to 30%	Severe Shortage
Level 4	31% to 40%	Severe Shortage
Level 5	41% to 50%	Crisis Shortage
Level 6	50% +	Crisis Shortage

Levels or stages of the WSCP are declared at the discretion of IRWD’s Board depending on the level and duration of the water shortage. The Board evaluates water supply conditions and, if it determines that a shortage exists, declares the corresponding level of the WSCP. As part of the declaration, it is at the discretion of the Board to implement specific water shortage restrictions, prohibitions, and DMM.

3.1 Imported Water Shortage

An imported water supply shortage represents one of the main causes of a potential supply shortage for IRWD. Metropolitan is responsible for importing water into the region through its contract with the State of California for SWP supplies and its operation of the CRA. Both sources are blended at Metropolitan’s Diemer and Weymouth Water Treatment Plants and then distributed to member agencies.

Metropolitan uses its Water Surplus and Drought Management (WSDM) Plan, Integrated Water Resources Plan (IRP), and Long-Term Conservation Plan to guide its planning, operations, and water management during both shortage and surplus conditions. In times of shortage, Metropolitan’s Board may activate its Water Supply Allocation Plan (WSAP) based on its estimate and forecast of supplies, demands, and reserve levels. If forecasted supplies and demands are determined to put pressure on Metropolitan’s storage reserves, Metropolitan’s Board may decide to limit the availability of water by implementing its WSAP. The Metropolitan WSAP has 10 levels of water supply allocations, each corresponding to an additional 5 percent reduction of supply.

Under Metropolitan’s Regional Shortage Levels shown in **Table 3-2**, IRWD’s retail level reliability is high due to IRWD’s lower dependency on imported Metropolitan supplies and additional credits and adjustments (primarily from the retail impact adjustment and demand hardening credit). IRWD’s retail level reliability (excluding recycled water) remains substantially reliable at a Regional Shortage Level 10, and Metropolitan’s WSAP allocations can be supplemented with water supplies from IRWD’s Water Banking Program or from pumping above OCWD’s BPP as a supply of last resort. If Metropolitan implements its WSAP, then supplies stored in IRWD’s Water Banking Program qualify as an “extraordinary supply” and IRWD may take delivery of that supply through Metropolitan’s system, which increases IRWD’s WSAP allocation from Metropolitan. As previously illustrated in **Table 1-1**, IRWD would not experience shortage gaps in any IRWD stages with the use of its water banking supplies. **Table 3-2** assumes normal levels of local hydrology. Refer to Section 1 for a discussion of how combinations of local hydrologic scenarios and imported supply reliability can impact IRWD’s reliability.

Table 3 - 2: Metropolitan WSAP and IRWD Shortage Levels

MWD Regional Shortage Level	Regional Shortage Percentage	Retail Impact Adjustment Maximum	IRWD Reliability	IRWD Shortage Level
Level 1	5%	2.5%	100%	Level 1
Level 2	10%	5.0%	99%	Level 1
Level 3	15%	7.5%	98%	Level 1
Level 4	20%	10.0%	97%	Level 1
Level 5	25%	12.5%	96%	Level 1
Level 6	30%	15.0%	95%	Level 1
Level 7	35%	17.5%	94%	Level 1
Level 8	40%	20.0%	93%	Level 1
Level 9	45%	22.5%	92%	Level 1
Level 10	50%	25.0%	90%	Level 1

3.2 Emergency Supplies

IRWD’s Water Banking Program provides an important water management tool to improve imported water reliability and protect IRWD customers during potential shortages. This source of supply is in addition to the supplies that are available to IRWD during non-shortage periods and is only used as “extraordinary supply” during shortages triggered by Metropolitan allocations or other conditions.

Water banking is the practice of recharging water to underground storage aquifers during wet periods and recovering this water for later use. IRWD’s stated goal in its Policy Position for Water Banking, Transfers and Wheeling (2020) is to provide a cost effective and reliable supplemental source of water that could be called upon during drought conditions or supply interruptions. In the event of a major supply interruption, this water would be available to fulfill IRWD’s estimated needs for imported water over extended periods of time. IRWD’s Water Banking Program provides IRWD the ability to store and recover this supplemental water to meet long-term supply reliability requirements. IRWD considers dependence on over-drafting the Orange County Groundwater Basin by pumping above OCWD’s BPP as a supply of last

resort. This is an available supply that exists as a backup should IRWD’s Water Banking supplies not be available in a shortage condition.

3.3 Stages of Action by Level

- The levels of shortage are declared at the discretion of IRWD’s Board depending on the assessment of the available water supplies and demands. As part of the declaration, the Board will implement specific demand management measures. Table 3-3 provides the levels of shortage that may be declared, and a combination of the potential strategies that are likely to be sufficient to achieve the necessary demand reductions according to the severity and duration of the shortage. It is at the Board’s discretion to use a combination of water shortage measures in a way it deems most appropriate. A draft Board resolution for the declaration of a specified shortage level is included as **Exhibit A**.

Table 3-3: Shortage Levels and Response Actions Considered

Shortage Level	Response Type	Supply Shortage Response Actions Considered	Estimated Savings
Level 1	Voluntary	Increase outreach efforts, targeting over-budget customers, and expand leak alert program	10%
Level 2	Voluntary	Expand residential survey program, large landscape survey program, outdoor education programs and workshops, and establish water waste reporting “hotline”	11% - 20%
	Rate Based	Review of water budgets and potential adjustments to target discretionary outdoor uses for residential and landscape customers	
	End Use Prohibitions	Discourage filling of fountains, pools, and water features and other discretionary uses	
Level 3	Operational Measures	Conduct evaluation on operational measures to reduce potable water use and expand the authorized use of recycled water	21% - 30%
	Voluntary	Increase rebate amounts, targeted outreach, and employee training at high use businesses, implement a public outreach campaign and work with public sector on raising public awareness and demonstrating reduced usage at public sites	
Level 3	Rate Based	Review of residential and landscape water budgets and target potential adjustments to limit residential and landscape customers to efficient irrigation of low drought tolerant landscaping	21% - 30%
	Voluntary	Implement direct install programs to retrofit inefficient devices and landscape equipment	
Level 4	Voluntary	Implement direct install programs to retrofit inefficient devices and landscape equipment	31% - 40%

	Rate Based	Review commercial, industrial, and public authority water budgets and consider adjustments to maximize potential savings while minimizing economic impacts	
	End Use Prohibitions	Limiting or modifying specific municipal uses such as hydrant flushing, street cleaning, and water-based recreation	
Level 5	Voluntary	Implement pay to save incentive programs for industrial customers	41% - 50%
	Rate Based	Review residential and landscape water budgets and consider adjustments to target the elimination of all non-recycled outdoor uses	
	Mandatory Measures	Eliminate non-recycled water outdoor use (100% reduction)	
Level 6	Rate Based	Review of residential water budgets and potential adjustments to target all uses not required for health and safety	51% +
	Mandatory Measures	Use of flow restrictors on severely over-budget accounts that are non-responsive to outreach, and other mandatory restrictions and enforcement, as necessary	

A. Level One (Shortage Warning – up to 10% shortage)

Level 1 is a low-level shortage warning condition intended to address supply reductions of up to 10%. Measures considered Level 1 would include the following voluntary actions:

- Increase public awareness of water supply situation and conservation opportunities
- Encourage diligent repair of water leaks

The measures used in Level 1 are designed to achieve reductions in outdoor over-irrigation. An enhanced public awareness campaign would be targeted toward customers that use water in excess of their water budget amounts to help them identify the source of their overuse and correct the problem. General conservation efforts include dedicated pages on IRWD’s website, information provided in the customer newsletter, and drought-related presentations to groups such as city council, community associations, chambers of commerce, business groups, and schools.

B. Level Two (Significant Shortage Condition – up to 20% shortage)

Level 2 is a significant shortage condition intended to address supply shortages between 11% and 20%. Measures considered under Level 2 would incorporate the actions taken under Level 1, and would include the following:

- Expand water conservation programs and projects, including residential survey program, large landscape survey program, outdoor education programs and workshops

- Establish water waste reporting “hotline”
- Review of water budgets and potential adjustments to target discretionary outdoor uses for residential and landscape customers.
- Prohibitions on filling of fountains, pools, and water features, as well as specific municipal uses.

The measures used in Level 2 are intended to target discretionary uses of water. These measures require shorter lead time to implement, although it should be noted that rate-based measures are subject to public notice and a rate hearing process under Proposition 218. Voluntary measures can include short-term expansion of existing programs and may include new programs that can be implemented quickly. Over-budget usage from the changes to tiers would also offset the additional administrative and implementation costs to IRWD including increased staffing to address the expansion of IRWD’s water conservation programs and projects.

C. Level Three (Significant Shortage Condition – up to 30% shortage)

Level 3 is a severe shortage condition intended to address supply shortages between 21% and 30%. Measures considered under Level 3 would incorporate the actions taken under Level 2, and would include the following:

- Enhance incentives for rebate programs, such as turf replacement installation, high efficiency clothes washers, and commercial and industrial devices.
- Targeted outreach to specific customers based on over-budget use including employee training at high use businesses, work with public sector on raising public awareness, and demonstrating reduced usage at public sites.
- Implement a public outreach campaign and work with public sector on raising public awareness and demonstrating reduced usage at public sites.
- Conduct analysis of landscape water budgets and implement potential adjustments to budget-based rates to target elimination of all outdoor water use beyond what is required to maintain drought friendly landscaping.

The measures used in Level 3 are intended to target deeper outdoor use reductions in residential and landscape customers and additional voluntary reductions from commercial, industrial, and institutional customers. These measures may require a longer time to implement due to the need for coordination workshops, establishing and prioritizing objectives, and Board approval of funding.

D. Level Four (Severe Shortage Condition – up to 40% shortage)

Level 4 is a severe shortage condition intended to address supply shortages between 31% and 40%. Measures considered under Level 4 would incorporate the actions taken under Level 3, and would include the following:

- Implement direct install programs to retrofit inefficient devices and landscape equipment.

- Conduct analysis of commercial, industrial, and public authority water budgets, and consider adjustments to maximize potential savings while minimizing economic impacts.
- Elimination of specific municipal uses such as hydrant flushing, street cleaning, and water-based recreation.

The measures used in Level 4 are intended to target commercial, industrial, and public authority customers while minimizing negative economic impacts. A Level 4 shortage would require further adjustments to budget-based rates, new measures that may require more time for direct install programs to launch, and Board approval of funding and award of contracts.

E. Level Five (Crisis Shortage Condition – up to 50% shortage)

Level 5 is a crisis shortage condition intended to address supply shortages between 41% and 50%. Measures considered under Level 5 would incorporate the actions taken under Level 4, and would include the following:

- Implement pay to save incentive programs for industrial customers.
- Review residential and landscape budgets and consider adjustments to target the elimination of all non-recycled outdoor uses.
- Eliminate non-recycled water outdoor use (100% reduction).

The measures used in Level 5 are intended to eliminate all non-recycled outdoor use. The measures may require policy changes, enforcement mechanism and consequences such as ability to levy fines or penalties for violations.

F. Level Six (Crisis Shortage Condition – exceeding 50% shortage)

Level 6 is a crisis shortage condition intended to address supply shortages exceeding 50%. Measures selected under Level 6 would be designed to incorporate the objectives listed under Level 5, and achieve the following further reductions in use:

- Review of residential water budgets and potential adjustments to target all uses not required for health and safety.
- Use of flow restrictors on severely over-budget accounts that are non-responsive to outreach and other mandatory restrictions and enforcement, as necessary.

At a Level 6, the Board may determine that it is necessary to use mandatory restrictions and possible discontinuation of non-health and safety related service to achieve the necessary demand reductions.

Section 4 – Additional Shortage Response Actions

In addition to basic measures, which are always in effect, there are different types of response measures that can be implemented by IRWD in the event of a supply shortage. These response measures represent a “toolbox” with a range of actions that can be used in combination, depending on the severity and duration of the shortage.

- a) Voluntary reduction measures through expansion and enhancement of IRWD’s conservation and outreach programs;
- b) Use of the IRWD’s budget-based rate structure;
- c) End use prohibitions and use of mandatory enforcement measures; and
- d) Operational drought control measures.

4.1 Standard IRWD Practices for Shortage Response

The following basic measures are considered good water management practices and are always in effect in IRWD’s service area regardless of whether a shortage level is declared. Additional information on these measures is contained in IRWD’s Rules and Regulations (Section 15).

Example standard IRWD water management practices include:

- Leaks:
No person shall permit leaks of water that he has the authority to eliminate.
- Gutter Flooding:
No person shall cause or permit any water furnished to any property within IRWD to run or to escape from any hose, pipe, valve, faucet, sprinkler, or irrigation device into any gutter or otherwise to escape from the property if such running or escaping can reasonably be prevented.
- Washing Hard Surface Areas:
Washing down hard or paved surfaces, including but not limited to sidewalks, walkways, driveways, parking areas, tennis courts, patios or alleys is prohibited except when necessary, to alleviate safety or sanitary hazards.
- Washing of Motor Vehicle:
No person shall wash a motor vehicle with a hose not fitted with a shut-off nozzle or similar functioning device.
- Use of Potable Water in a Fountain:
No person shall use potable water in a fountain or other decorative water feature, except where the water is recirculated.
- Application of Potable Water to Outdoor Landscapes:

No person shall apply potable water to outdoor landscapes during and within 48 hours after measurable rain.

- Irrigation of Street Medians:
No person shall use potable water to irrigate ornamental turf on public street medians.
- Newly Constructed Homes and Buildings:
No person shall use potable water to irrigate landscapes outside of newly constructed homes and buildings in a manner inconsistent with regulations or other requirements established by the California Building Standards Commission and the Department of Housing and Community Development.
- Waste:
No person shall cause or permit water under his or her control to be wasted.

In addition, IRWD has a budget-based rate structure based on the cost of service, which also limits the amount of water allocated to each customer to an amount that is reasonable for the customer's needs and property characteristics, reducing wasteful use of water. When a declared shortage condition is not in effect, basic water budgets established by IRWD are limited to the amount that is reasonable for the customer's needs and property characteristics and exclude wasteful use.

4.2 Voluntary Reduction Measures

IRWD has always taken a proactive approach to water conservation and is looked to as a leader by other water agencies throughout the state and country. IRWD implements a wide range of conservation programs designed to target all customer sectors. They are continually evaluated to maximize water savings and modified to integrate the latest water efficient technologies and practices. Specific programs that IRWD currently relies upon to promote water conservation are listed below.

- a) Free on-site assistance and customized reports for customers in all sectors to help identify opportunities for water savings, eliminate water waste, and to recommend appropriate programs and strategies to reduce water demands.
- b) Water Smart Reports that provide enhanced customer engagement through multiple communication methods.
- c) Turf replacement installation and rebate programs.
- d) Rebates for weather-based irrigation controllers, drip irrigation and rain barrels.

- e) Programs and rebates for high efficiency plumbing devices.
- f) Rebates for high efficiency clothes washers.
- g) Rebates for commercial and industrial efficiency devices, such as cooling tower conductivity controllers.
- h) Performance based incentive program for commercial, industrial, and institutional (CII) customers to upgrade equipment and improve their water processes to provide greater water use efficiency. High use CII accounts are targeted for participation in the program.
- i) Fix A Leak program.
- j) Robust system water loss prevention and meter testing programs.

During the implementation of the WSCP in 2014, 2015, and 2018 IRWD took a proactive approach in expanding and enhancing these conservation and outreach efforts as part of a Drought Action Plan. In the event of a future water shortage, IRWD will develop a similar implementation plan to increase levels of voluntary conservation using an adaptive approach, while considering the IRWD's financial stability and the ease and timing of implementation. Under this action, the following measures will be considered:

- Expand Conservation Programs:
Contract with a qualified firm or recruit temporary staff to significantly increase resources to expand existing water use efficiency programs, including the residential survey program, large landscape survey program, and outdoor education and workshops.
- Increased Rebate Funding:
Enhance incentives and rebate programs, such as turf replacement installation, high efficiency clothes washers, and commercial and industrial devices.
- Targeted Outreach:
IRWD will increase ongoing outreach efforts to more aggressively target wasteful tier customers. Additional outreach includes employee training at high use businesses, working with the public sector on raising public awareness, and demonstrating reduced usage at public sites.
- Direct Install Programs:
Implement direct install programs to retrofit inefficient devices and landscape equipment.

4.3 Use of Budget-Based Rates

IRWD’s budget-based rate structure was instituted in 1991 to promote the efficient use of water and is designed to provide customers with a significant economic incentive to use the non-wasteful amount of water required to serve indoor, landscape, commercial/industrial and institutional demands. This is accomplished by setting a customized monthly water budget for each customer account that is based upon a variety of factors such as: irrigated area, daily weather characteristics, number of residents, industrial or commercial business type, and other more unique characteristics such as the presence of a pool, livestock or specialized industrial equipment.

Water is sold to customers under a four-tier structure based upon their monthly water budget, which varies for landscape use relative to weather patterns. Customers using water within budget purchase water in the Low Volume and Base Rate tiers resulting in lower water bills. Customers using more than their budget purchase water in the Inefficient and Wasteful Tiers, resulting in higher water bills and a strong pricing signal to curb excessive use. The higher rates for over budget use incorporate the additional cost to IRWD of acquiring water supplies to meet over-budget demand, as well as the additional cost of demand management measures in a shortage. IRWD’s 2020-2021 domestic residential commodity rates for each of the four tiers are shown in **Table 4-1**.

Table 4-1: Commodity Rates for Residential Customers

Customer Tier	Percent of Budget	Rate Per CCF
Low Volume	0 – 40%	\$1.47
Base Rate	41 – 100%	\$2.00
Inefficient	101 – 140%	\$4.86
Wasteful	141% +	\$13.63

A. Adjustments to Budget-Based Rates

Application of any or a combination of water budget adjustment strategies may place customers into the higher usage tiers, which acts as a reporting and enforcement mechanism by creating a strong financial incentive for customers to reduce demands by paying their proportional cost of receiving water service. Three types of water budget adjustments can be established and refined based on customer response in such a way that specified uses are discouraged. Adjustments to the water budgets, tiers and rates will be at the discretion of the Board and subject to public notice and rate hearing process under Proposition 218.

a) Adjusting the Tier Thresholds:

This strategy does not adjust the actual water budget formula itself, but rather adjusts the percentage thresholds for the over-budget tiers. The current tiers are thresholds for the various account types. Adjusting the tier thresholds downward would have the effect of shifting more use into the higher tiers. Customers in these tiers would be

subject to increased rates depending on the extent of their use (percentage of use over budget). Reducing the tier thresholds incentivizes customers to consume less water.

b) Customer Water Budget Adjustments:

An adjustment to the water budget entails refining the water budget formula. This can be done either as a simple percentage adjustment or by adjusting a specific portion of the formula. For example, residential water budgets are made up of an indoor plus an outdoor budget component. It is possible to adjust the outdoor component downward to allow for less outdoor irrigation or to discourage it altogether depending on the need for demand reductions. Water budgets could also be set to levels that would eliminate all outdoor water use including irrigation, car washing, pool filling, agricultural use of non-recycled water etc. Under this scenario, the indoor component could be left the same or could be altered, as necessary.

c) Rate Increases for Over-Budget Use:

This approach entails adopting higher rates for over budget use and would be linked to purchases of imported water at Metropolitan’s penalty rates, among other things. The establishment of utility rates is subject to the requirements of Proposition 218, which requires that established rates do not exceed the proportional cost of service to any specific class of customers.

B. Evaluating Customer Usage

A detailed analysis of the customer usage by tier, using the most recently available data, is one of the first steps that should be undertaken in developing demand management strategies in response to shortage conditions. IRWD has developed the Water Shortage Contingency Plan Multiplier Tool to estimate demands and potential water savings from budget-based rates during shortage conditions. The tool is based on the use of a multiplier to be applied to the percentage thresholds for customer tiers. An example of a hypothetical 75% multiplier is shown in **Table 4-2**. Note that the tool does safeguard water supplies for uses that meet public health needs by maintaining the current definition of the Low Volume tier.

Table 4 - 2: Example of Multiplier Applied to Tier Definition

Customer Tier	Current Tier Definition	Multiplier (75%)
Low Volume	0 – 40%	0 – 40%
Base Rate	41 – 100%	41 - 75%
Inefficient	101 – 140%	76 – 106%
Wasteful	141% +	107% +

The use of the Water Shortage Contingency Plan Multiplier Tool is based on the following four steps:

1. Data on Usage by Customer Category:
The tool uses the most recent available monthly billing data by tier for Single Family Residential, Multi-Family Residential, Landscape, Commercial, Industrial, and Public Authority customers. All data is for non-recycled water (the tool does include an analysis of recycled water use). For longer term planning, the tool incorporates demand forecasting and estimates future demand hardening from conservation.
2. Identify Savings Potential:
The savings potential in each customer category is defined to discourage specific uses of water. During the early shortage levels, the tool targets the elimination of discretionary (primarily outdoor) uses of water, as defined by water use in the Inefficient and Wasteful tiers. At deeper levels of shortage, the tool targets additional savings, up to the elimination of all outdoor water use beyond what is required to maintain drought-friendly landscaping. During an emergency, the tool targets up to the elimination of all outdoor water use, and up to minimum indoor amount required for public health and safety needs.
3. Estimate Response Rate:
The estimated water use reductions achieved from implementing changes to the budget-based rates is calculated by assessing recent research on customer ability and willingness to comply with rate-based measures, as well as IRWD’s experience with use of budget-based rates and the previous implementation of the WSCP.
4. Determine Water Use Reductions:
The final step involves balancing water use reductions across customer categories to achieve the desired level of demand management. The multipliers as applied to each customer class will vary due to several factors, including the targeting of discretionary uses where appropriate and avoiding impacts to the economy. **Table 4-3** provides a hypothetical example of multipliers applied to each customer category and the resulting estimated savings.

Table 4-3: Example of Savings Estimate

Customer Sector	Multiplier	Estimated Savings
Single Family	0.75	15%
Multi Family	0.8	12%
Landscape	0.6	30%
Commercial	0.9	5%

Industrial	0.9	5%
Public Authority	0.9	5%
Total Non-Recycled Savings:		12%

4.4 End-Use Prohibitions

Through adopted resolutions, IRWD has provisions for mandatory prohibitions of certain end uses, if necessary, based on the water shortage level declared. Examples of consumption reduction measures used by IRWD are summarized as follows:

- Serving of drinking water:
Only to be served upon request in eating or drinking establishments.
- Car-washing and Pool-filling Bans:
Demand reductions on car-washing and pool filling that cannot be achieved through voluntary measures and financial incentives related to adjustments in the budget-based rate structure would be attained through a ban on these actions.
- Municipal Uses:
Elimination of specific municipal uses such as unrequired hydrant flushing.
- Construction Activities:
Recycled water shall be required for construction activities, including earthwork, dust control and clean-up. IRWD may, at its discretion, waive this requirement if it can be demonstrated to IRWD’s satisfaction that compliance with the requirement imposes undue hardship.
- Street Sweeping:
The use of recycled water shall be required for street sweeping activities. IRWD may, at its discretion, waive this requirement if it can be demonstrated to IRWD’s satisfaction that compliance with the requirement imposes undue hardship.
- Commercial Car Washes:
Commercial conveyor and in-bay car wash systems must reuse water if equipped.
- Common Interest Associations:
Common interest associations shall not fine or assess owners of separate interests for reducing or eliminating the watering of vegetation or lawns unless the association uses only recycled water for irrigation of the association’s common areas and recycled water is also available at the irrigated area of the separate interest.

A. Critical Shortage Measures

In an emergency, the primary function of IRWD's water supply system is to meet essential public health and safety needs. IRWD may determine that it is necessary to use mandatory restrictions and possible discontinuation of non-health and safety related service to achieve the necessary demand reductions during crisis level shortages. In addition to the measures implemented in all prior stages, IRWD may impose any combination of the following mandatory measures.

- Portable Irrigation Ban:
Outdoor irrigation would be the initial target for any demand reductions or eliminations that cannot be met through voluntary measures and financial incentives related to adjustments in the budget-based rate structure.
- Flow Restrictors:
Under extreme conditions of noncompliance, IRWD could install flow restrictors in individual service lines. Thus, water would be available for drinking, cooking, sponge baths, and slow fill of toilet tanks, but showers and other high-volume type uses would not be possible. Under these conditions individual customer reaction would be severe. It would probably be necessary to augment the customer service field service staff to maintain surveillance of these services to assure that unauthorized changes are not made by the customer.
- Mandatory Restrictions and Fines:
IRWD's ability to establish restrictions on water use and to possibly discontinue non-health and safety related service in the case of repeat violators is provided for under the CWC, Division 1, Chapters 3 and 3.5.

4.5 Operational Drought Control Measures

Recycled water has proven to be a reliable and effective drought-resilient supply since sewage flows remain virtually unaffected by dry years. During a water supply shortage, IRWD will conduct an evaluation that will focus on expanding the authorized use of recycled water where it can replace potable water use. The following is a list of recycled water customer development programs that can be expanded during a water supply shortage:

- a) Potable Irrigation Conversions
- b) Industrial Process Water Conversions
- c) Cooling Towers Conversions
- d) Street Sweeping/Construction

e) Agricultural Customers

Due to regulatory requirements, conversions and expansions of use may take longer to implement than other actions but can be expedited when feasible, particularly for projects that are already in progress.

Section 5 – Communication Protocols

IRWD’s communication plan includes the various channels IRWD will utilize to convey critical messages regarding water shortage allocations and voluntary and mandatory actions, as outlined in **Table 3-3**. Public outreach programs can help increase awareness of water shortages, while customer services and workshops can encourage ratepayers to actively participate in demand reducing strategies. A strong communication plan will educate IRWD customers, including local leaders and the business community, on the water supply situation; what actions are proposed; what the intended achievements are; and how these actions are to be implemented. While specific types of messaging are deployed at various shortage response levels, how these messages are conveyed to the public are described in the following communication plan.

The single most important step IRWD can take in implementing voluntary measures is to inform customers in order to help reduce water demand. IRWD will employ additional strategies to achieve the necessary demand reductions in a shortage situation. Most of the effort will be focused on providing additional outreach to high usage tier customers. The community can be informed through IRWD’s website, webinars, workshops, social media postings, press releases, videos, billing inserts, email campaigns, water conservation booths, community association meetings, presentations, newsletters etc. Literature will be provided on the shortage condition, conservation methods and programs as well as water-saving devices, which can be distributed through various local organizations and communication program methods. The communication methods listed below can help convey the need for immediate conservation.

- **Public Outreach Program and Social Media** – IRWD’s public outreach is aimed at promoting voluntary water conservation, something which IRWD has always done. Conservation is a constant ethic and goal, promoted throughout the service area, regardless of drought conditions. IRWD makes extensive use of its website and social media, including Facebook, Twitter, Instagram and NextDoor, to continually remind customers of the conservation message. The IRWD water use efficiency microsite and the IRWD website heavily feature conservation and easy to use irrigation scheduling guideline, information on incentives, and efficient irrigation. IRWD also informs its customers through billing inserts, mailers, videos, water conservation booths, newsletters, postcards, community association meetings, and local public events. Outreach is accomplished by having key IRWD personnel present to groups such as the city council, community associations, chambers of commerce, business groups, etc.

- **Drought Response Center** – In order to respond to increased customer requests for on-site assistance, higher call volumes, and new and expanded water efficiency program offerings, additional temporary staff and consultants will be brought on to augment the water efficiency staff. IRWD will also establish a hot line to respond to customer questions and a special email response program. A drought information webpage will also be provided. The webpage will have both local and statewide drought information in one easy to access location.
- **Campaigns** – A water conservation or shortage response campaign messages will be promoted to influence public attitudes toward water use.
- **Media** – Extensive use of all available forms of media will be employed and coordinated with other agencies. This includes public service messages on local outlets and press releases in local newspapers. The messaging and level of response will be correlated with the need for demand reductions.
- **Customer Service** – Customers will be encouraged to work collaboratively to save water and to call IRWD’s water use efficiency experts for assistance in finding water leaks or providing ways to use water more efficiently. IRWD’s Customer Service Department can assist in identifying wasteful activities within the IRWD service area. IRWD staff will contact the customer associated with the property and offer on-site assistance and recommendations to address the problem.
- **Webinars, Workshops and Tours** – IRWD already offers online and in-person workshops and tours to its customers a part of an ongoing outreach effort. During a drought, IRWD will hold such events targeted toward helping customers reduce outdoor water use and be more efficient. These workshops will be held in various locations throughout the service area to reach an increased number of customers. A self-guided garden tour will be established to assist customers in identifying drought friendly landscapes.
- **Targeting Over-Allocation Customers** – IRWD will increase ongoing outreach efforts to target wasteful tier customers more aggressively. Customers in the wasteful tier are notified through a variety of methods including mail, email, and telephone. IRWD will continue to offer on-site assistance and audits to customers to help identify the source of wasteful tier use and to provide recommendations for reducing water use.
- **Community Events** – IRWD will hold large community events that feature presentations, workshops, discussions, and hands-on learning opportunities. These events will be coordinated with the cities within the service area and with the County of Orange.

Section 6 – Compliance and Enforcement

IRWD's Rules and Regulations (Section 15) provide for enforcement and penalties that may apply to violators during a water shortage. An excess use charge based upon the budget-based rate structure, which is always in effect, is sufficient to encourage demand reduction to required levels. Depending on the level of shortage, IRWD may reduce customer water budgets, tighten the tiers, increase rates, or some combination of those strategies to obtain the necessary reductions. IRWD also has the ability to establish restrictions on water use or to discontinue service in the case of repeat violators under the Water Code of the State of California.

Section 15.6.2 of IRWD's Rules and Regulations states that "[P]rior to enforcement of the restrictions pursuant to the Rules and Regulations Section 15.4 (General Prohibitions) and 15.5 (Shortage Restrictions), any person who is suspected of violating the restrictions hereby imposed shall be given a preliminary notice in writing of such violation, with the description of violation set forth in such preliminary notice. Such person shall have 24 hours to correct such violation or terminate the use. If the violation is not corrected or the use not terminated, the General Manager may immediately:

- (a) disconnect service,
- (b) install flow-restricting devices restricting non-health and safety related water service, or
- (c) order issued a second preliminary notice."

Pursuant to Section 14.1.3 of IRWD's Rules and Regulations, from and after the publication or posting of any ordinance or resolution implementing any restrictions or mandatory measures under the WSCP, violations thereof shall be misdemeanors punishable by imprisonment in the County Jail for not more than 30 days or by fine of not more than \$1,000, or both, or as otherwise provided by law or such resolution or ordinance.

Section 7 – Legal Authorities

Under California law, including CWC Chapters 3.3 and 3.5 of Division 1, Parts 2.55 and 2.6 of Division 6, Division 13, and Article X, Section 2 of the California Constitution, the Board is authorized to implement the water shortage actions outlined in this WSCP. In all water shortage cases, shortage measures to be implemented, including adjustments to the water budgets, tiers, and rates, will be at the discretion of the Board and will be based on an assessment of the

supply shortage, customer response, and need for demand reductions. IRWD will declare a water shortage emergency in accordance with CWC Chapter 3 (commencing with Section 350_ of Division 1. IRWD will coordinate with any city or county within which it provides water supply services for the possible proclamation of a local emergency, as defined in Section 8558 of the Government Code.

The Board reserves the right to change the schedule of water, sewer, recycled water and natural treatment system service charges and other charges at any time. This section is intended to complement and be used in tandem with the budget based tiered pricing structure adopted by the District in 1991 and implemented under Section 12.1 of the IRWD Rules and Regulations on an ongoing basis as part of the District's rates and charges. Any modifications to the pricing structure must be consistent with the provisions of Proposition 218.

As described in the California Constitution, it is at the Board's discretion to use a combination of water shortage measures in a way it deems most appropriate. When specified shortage levels are to be declared, the Board will approve and issue a resolution instituting the appropriate action responses. A draft Board shortage response resolution is included below as **Exhibit A**.

Section 8 – Financial Consequences

CWC Section 10632 requires an analysis of the impacts of each of the actions taken for conservation and water restriction on the revenues and expenditures of the water supplier. The WSCP does not provide a detailed analysis of revenue and expenditure impacts of water shortages because IRWD's billing structure is designed to be insulated from revenue swings resulting from deviations between actual and budgeted water sales and from declining or reduced water sales. IRWD's billing structure consists of a fixed meter charge and a commodity charge based on the number of units of water used. Meter charges are set to meet IRWD's fixed costs of operation (e.g., salaries, supplies, etc.). The base commodity charge is set to match the cost of producing, purchasing, and delivering water. Therefore, IRWD can recover its fixed costs regardless of the quantity of water sold, whereas the water sales at any level will cover the costs of providing water. This system has proven to be effective in balancing revenue and expenditures. **Table 8 - 1** and **Table 8 - 2** show components of revenue and expenditure impacts that were evaluated and found to have either minimal or no significant impacts.

Table 8 - 1: Actions and Conditions of the Impact Expenditure

Type	Anticipated Revenue Reduction
Reduced Sales	Minimal to No Impact
Development of Reserves	Minimal to No Impact
Impact of Supplier’s Higher Rates (Tier 2)	Likely Passed through to Customer
Category	Anticipated Cost
Change in Quantity of Sales	Minimal to No Impact
Increased Staff Salaries/Overtime	Minimal to No Impact
Increased Costs of New Supplies/Transfers/Exchanges	Minimal to No Impact

Table 8 - 2: Proposed Measures to Overcome Revenue Impacts

Name of Measure	Summary of Effects
Review of Rate Adjustment	IRWD can revise its rate structure during water shortage stages which can increase commodity sale revenues if needed to offset Metropolitan shortage tier rates
Reserves	IRWD maintains reserves that can stabilize water rates during times of reduced water sales
Decreased or Deferred Capital and Maintenance Expenditures	If necessary, IRWD can postpone capital expenditures and defer certain maintenance expenditures

8.1 Cost of Compliance

The IRWD budget-based pricing structure encourages use within a water budget through a significantly tiered commodity pricing system and discourages wasteful use. The response measures for the levels of water supply shortage include a set of measures, referred to as DMM, that can be implemented through and along with the budget-based pricing structure.

Any additional expenditures directly resulting from water shortage action responses and compliance with these responses such as customer outreach, review of water use, and enforcement are covered by IRWD's existing revenue structure. Enforcing compliance with shortage response actions and the cost of these DMM does not pose significant change or hardship in the overall IRWD budget. Many of these responses and actions are carried out, as detailed above in Section 4 and in the public IRWD Rules and Regulations, on a regular voluntary basis and have been previously budgeted for accordingly.

Section 9 – Monitoring and Reporting

IRWD customers and facilities are fully metered, allowing for detailed accounting of water use in the service area. Monthly meter reads provide IRWD with a significant quantity of data for tracking and reporting actual reductions in water use in response to a water shortage. IRWD's budget-based rates are designed to achieve the necessary reductions in water use. Each month during a shortage, IRWD determines how much water each customer has used in relation to their budget. This comparison is used to track attainment of water use reduction goals for the agency and is included in the customer's bill to encourage compliance with the water budgets.

Section 10 – WSCP Refinement Procedures

The WSCP will be re-evaluated at least every five years in coordination with the UWMP update and more frequently at the discretion of the Board. An evaluation of the effectiveness of the water shortage response actions on demand levels will be conducted following future implementation of the WSCP. The evaluation will compare the expected percent demand reduction against actual reductions, and measures in the WSCP will be revised appropriately. IRWD will also assess the effectiveness of the communication plan so that it may be modified as appropriate in the future.

Special Water Feature Distinction

CWC Section 10632(b) indicates that for purposes of developing the WSCP an urban water supplier shall analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas, as defined in subdivision (a) of Section 115921 of the Health and Safety Code.

IRWD recognizes that limitations to pools and spas may require different considerations compared to non-pool and non-spa water features. Where applicable throughout the IRWD WSCP, these various water features have been separately identified as “fountains”, “pools”, and “water features” more generally. Please refer to Section 4.1 Standard IRWD Practices for Shortage Responses, above, for more detail on the existing IRWD Rules and Regulations for these feature types. Section 15.4.1 of IRWD's Rules and Regulations distinguish between the types of water features, such as, “[n]o person shall use potable water in a fountain or other decorative water feature, except where the water is recirculated[.]” These various distinctions have been clearly identified in the shortage level and response actions stages of this plan. IRWD maintains the ability to further refine shortage response actions to address different water feature types in the future and encourages recycled water use.

Plan Adoption, Submittal, and Availability

The WSCP has been prepared in accordance with the existing requirements as stated in the CWC, the DWR 2020 UWMP Guidebook, and DWR materials. IRWD maintains the flexibility to amend the WSCP periodically and independently of the UWMP.

The IRWD Board adopts the WSCP at a Board meeting following a public hearing. Before adoption, IRWD issues notices of the public hearing to cities, counties, and the general public in various mediums. Cities and counties are notified at least 60 days prior to the public hearing. At least two notifications are issued including publication in a local newspaper for at least one week for two successive weeks, with at least five days between publication dates. Typically, an IRWD public hearing notice is posted in the Orange County Register newspaper for multiple weeks, cities and counties are often notified by letter, and the meeting information is posted on the IRWD website. The WSCP is made available for public viewing on the IRWD website prior to the public hearing and is added to the meeting Board packet.

The final adopted WSCP will be made available no later than 30 days after adoption by the IRWD Board. In accordance with the CWC, IRWD shall make available the WSCP to our customers as well as any city or counties supplied water by IRWD. The 2020 WSCP Update shall be submitted to DWR and the California State Library as part of the 2020 UWMP Update process.

Exhibit A – Draft Water Shortage Contingency Resolution

RESOLUTION NO. 20xx- ____

RESOLUTION OF THE BOARD OF DIRECTORS OF IRVINE RANCH WATER DISTRICT DECLARING WATER SHORTAGE LEVEL _____

Irvine Ranch Water District (“**IRWD**”) has adopted Rules and Regulations for Water, Sewer, Recycled Water, and Natural Treatment System Service (the “**Rules and Regulations**”).

Section 15 of the Rules and Regulations, entitled “Water Conservation and Water Supply Shortage Program and Regulations” (“**Section 15**”) was adopted by this Board of Directors on *[date]*, following a public hearing held upon notice duly given and based on findings of necessity for the adoption of the water conservation program contained in said Section 15, and a summary was duly published following adoption, in accordance with California Water Code Section 375.

The Board of Directors has adopted an amended Water Shortage Contingency Plan, which serves as the resource and supporting document for the implementation of Section 15.

Section 15 provides that the Board of Directors may declare levels of shortage and describes six levels of shortage with approximate ranges of conditions and the corresponding water use reductions to be achieved.

The Water Shortage Contingency Plan describes an illustrative list of measures that may be implemented in each level, and Section 15 further provides that at the time of declaring a level of shortage conditions, the Board in its discretion will determine the particular response measures that will be implemented, which may include measures in a different level from the level(s) shown or other measures in lieu of or in addition to those measures.

Section 15 provides that the application of shortage level response measures or restrictions may vary as to type of water service, and that through the declaration of a shortage level, the Board will determine and set forth how and to what extent, if any, the implementation of measures or restrictions on potable water service will be applied to non-potable water services furnished by IRWD.

Because the water reduction mandate only applies to potable water, IRWD’s response measures in this declaration address potable water.

Section 15 is intended to complement and be used in tandem with the allocation-based tiered pricing structure implemented as a demand management measure on an ongoing basis as part of the District's rates and charges.

As contemplated in Section 15 and the Water Shortage Contingency Plan, the Board has, by separate action through the adoption of Resolution No. _____, implemented demand management measures through adjustments in the allocation-based pricing structure.

THE BOARD OF DIRECTORS OF IRVINE RANCH WATER DISTRICT
THEREFORE RESOLVES AS FOLLOWS:

Section 1. The Board of Directors hereby finds that a significant water shortage condition, involving a [_____] % shortage, exists and declares that Level [_____] to be in effect as of the date of this Resolution.

Section 2. The following measures shall be in effect during the Level [_____] shortage condition, including measures that are always in effect [*and measures that were implemented in Level[s] One [through ____]*].

Measures Always in Effect

[INSERT HERE]

Measures to Remain in Effect from Level[s] One [through ____]

[INSERT HERE]

Additional Measures in Effect in Level [____]

[Section 3. *The declaration of water shortage condition Level _____, made by this Board of Directors on [date], is hereby rescinded and superseded by this declaration.*]


This resolution is being signed and adopted on [date].


Signature _____

•

Exhibit B – EPA Emergency Response Plan (ERP) Certification Receipt and Confirmation

United States Environmental Protection Agency

 Advanced Shared Services (/AWIA/Home/SCSHandoff)

 Contact Us (/AWIA/Home/Contact)

America's Water Infrastructure Act (Sec. 2013(b)) / Emergency Response Plan Certification Statement

I **Emilyn Zuniga** hereby certify that **IRVINE RANCH WATER DISTRICT**, serving a population of **450526**, has completed an emergency response plan that incorporates findings of the risk and resilience assessment conducted under Section 2013(a) of America's Water Infrastructure Act of 2018 for such system (and any revisions thereto). This emergency response plan includes:

- Strategies and resources to improve the resilience of the system, including the physical security and cyber security of the system;
- Plans and procedures that can be implemented, and identification of equipment that can be utilized, in the event of a malevolent act or natural hazard that threatens the ability of the community water system to deliver safe drinking water;
- Actions, procedures, and equipment which can obviate or significantly lessen the impact of a malevolent act or natural hazard on the public health and the safety and supply of drinking water provided to communities and individuals, including the development of alternative source water options, relocation of water intakes, and construction of flood protection barriers; and
- Strategies that can be used to aid in the detection of malevolent acts or natural hazards that threaten the security or resilience of the system.

Date of certification: **09/25/2020**

The U.S. EPA and the authorized official signing this document agree that this certification may be signed electronically. The parties agree that the typed electronic signature that appears on this certification is the same as a handwritten signature for the purposes of validity, enforceability, and admissibility.

Once you have submitted your emergency response plan certification, EPA will send an email acknowledging receipt of your certification. If you have any problems, please email us at dwresilience@epa.gov (<mailto:dwresilience@epa.gov>).

Cancel

Certify

[Advanced SCS Home \(/AWIA/?area=\)](#) | [Privacy and Security Notice \(/AWIA/Home/PrivacyNotice?area=\)](#)

<http://www.epa.gov/accessibility/statement.htm> | [Terms & Conditions \(/AWIA/Home/TermsAndConditions?area=\)](#)



Exhibit C – HSG Technical Memo



Technical Memorandum

TO: California Department of Water Resources

FROM: Allen Shinbashi, Irvine Ranch Water District

SUBJECT: Urban Water Management Plan Seismic Assessment

On March 23rd, 2020, Irvine Ranch Water District certified its Risk and Resilience Assessment (RRA) with the Environmental Protection Agency to comply with America’s Water Infrastructure Act of 2018. The RRA is a multihazard assessment to identify the resilience of the water system’s critical infrastructure. The seismic assessment conducted for the purposes of the RRA is being used to satisfy the Urban Water Management Plan (UWMP) seismic requirements. The RRA includes sensitive information to the utility that could compromise its security if released to the public and is therefore protected by the Critical Infrastructure Protection Act of 2001. This technical memo has been created to summarize the seismic assessment results. The risk classifications for earthquakes impacting the identified critical assets are listed in **Table A** with high representing those assets that face the highest risk to seismic activity and low representing the assets that face the lowest risk to seismic activity. The seismic mitigation plan for the critical assets identified as high risk are listed under **Mitigation Recommendations**.

Table A. Seismic Risk by Asset

Asset Name	Risk Classification
Distribution System	High
Michelson Operations Center	Medium
Lake Forest Baker Filtration	Medium
Dyer Road Ground Water System	Low
Chemical Storage Building	Low
Headquarters Building	Low
Central Irvine Zone 1 Reservoir	Low
Foothill Zone 6 Reservoir	Low
LAWRP Fuel Facility	Low

Asset Name	Risk Classification
Coastal OC 63-Zn.4 Pump Station	Low
Santiago Canyon Zone 5	Low
Portola Hills Zone 8 Reservoir	Low
Portola Hills Zone 9 Reservoir	Low
Coastal Zone 4 Reservoir	Low
Foothill Zone 6A Reservoir	Low
Modjeska Reservoir	Low
Quail Hill Zone 3 Reservoir	Low
Lake Forest Emergency Storage #1 Zone 1 & Zone 2 (4) Reservoir	Low
Read Reservoir	Low
Coastal Zone 2 Reservoir	Low
Single Source Supply Transmission Mains	Low
Williams Canyon Reservoir	Low
East Irvine Zone 1-3 Pump Station	Low
Foothill Zone 4-6 Pump Station	Low
Portola Hills Zone 8-9 Pump Station	Low
Portola Hills Zone 6-8	Low
Lake Forest Zone 1-2 West Pump Station	Low
Shaw Reservoir	Low
Quail Hill Zone 3-4 Pump Station	Low
Dyer Road PDF	Low
Dyer Road IDF	Low
Turtle Rock ZN 3-4 Pump Station	Low
Dyer Road GW Complex LF	Low
Shaw Pump Station	Low
Read Pump Station	Low
William Canyon Pump Station	Low
Manning Pump Station	Low
Benner Reservoir	Low
Coastal Zone 4-6 Pump Station	Low
Cabinland Booster Pump Station	Low

Mitigation Recommendations:

To mitigate potential seismic risk to assets considered as high risk, the following actions are recommended including:

- 1) Regularly update and exercise IRWD’s Emergency Response Plan (ERP).
- 2) Routinely update the IRWD Earthquake Incident Specific Response Plan sections of the IRWD Emergency Operations Plan.
- 3) Consider installation of additional isolation valves in the water distribution system where possible.
- 4) Consider upgrading the most vulnerable pipeline sections, near major fault lines, with seismic-resistant pipes.