

**AGENDA
IRVINE RANCH WATER DISTRICT
BOARD OF DIRECTORS
REGULAR MEETING**

October 25, 2021

CALL TO ORDER 5:00 p.m.

ROLL CALL Directors LaMar, McLaughlin, Swan, and Withers, and President Reinhart

This meeting will be held in-person at the District’s headquarters located at 15600 Sand Canyon Avenue, Irvine, California. The meeting will also be broadcasted via Webex for those wanting to observe the meeting virtually.

To observe this meeting virtually, please join online using the link and information below:

Via Web:

<https://irwd.webex.com/irwd/j.php?MTID=mc51610a04c5fdff65cfe8a7c74175508>

Number (Access Code): 146 495 0905

Meeting Password: JcHGMg7TN62

PLEASE NOTE: Webex observers of the meeting will be placed into the Webex lobby when the Board enters closed session. Participants who remain in the “lobby” will automatically be returned to the open session of the Board once the closed session has concluded. Observers joining the meeting while the Board is in closed session will receive a notice that the meeting has been locked. They will be able to observe the meeting once the closed session has concluded.

PUBLIC COMMENT NOTICE

Public comments are limited to three minutes per speaker on each subject. If you wish to address the Board of Directors on any item, you may attend the meeting in person and submit a “speaker slip” to the Secretary. Forms are provided outside of IRWD’s Board Room. If attending via Webex, please submit your comment via the “chat” feature and your remarks will be read into the record at the meeting. You may also submit a public comment in advance of the meeting by emailing comments@irwd.com before 12:00 p.m. on Monday, October 25, 2021.

COMMUNICATIONS TO THE BOARD

1. A. Written:

 B. Oral:

2. ITEMS RECEIVED TOO LATE TO BE AGENDIZED

 Recommendation: Determine the need to discuss and/or take immediate action on item(s).

WORKSHOP

3. IRWD DAM SAFETY PROGRAM UPDATE

Recommendation: Receive and file.

CONSENT CALENDAR, ITEMS 4-8 (Next Resolution No. 2021-23)

4. BOARD MEETING MINUTES

Recommendation: That the minutes of the October 11, 2021, Regular Board meeting be approved as presented.

5. RATIFY/APPROVE BOARD OF DIRECTORS' ATTENDANCE AT MEETINGS AND EVENTS

Recommendation: That the Board ratify/approve the meetings and events for Steven LaMar, Karen McLaughlin, Douglas Reinhart, Peer Swan, and John Withers, as described.

6. SEPTEMBER 2021 TREASURY REPORT

That the Board receive and file the Treasurer's Investment Summary Report, the Summary of Fixed and Variable Rate Debt, and Disclosure Report of Reimbursements to Board members and staff, approve the September 2021 Summary of Payroll ACH payments in the total amount of \$2,230,546, and approve the September 2021 Accounts Payable Disbursement Summary of warrants 420951 through 421838, Workers' Compensation distributions, wire transfers, payroll withholding distributions and voided checks in the total amount of \$24,644,781.

7. IRWD STRATEGIC MEASURES

Recommendation: Receive and file.

8. LETTER OF CREDIT EXTENSIONS FOR THE SERIES 1993 AND 2009A BONDS

Recommendation: That the Board authorize staff to extend the U.S. Bank Letters of Credit for IRWD's 1993 bonds and the 2009A bonds to May 2025 at an annual cost of 0.30% and adopt a resolution, subjective to non-substantive changes, authorizing certain actions in connection with the extension of Letters of Credit for Consolidated Series 1993 and Consolidated Series 2009A bonds.

ACTION CALENDAR

9. FATS, OILS, AND GREASE PROGRAM CONSULTANT SELECTION

Recommendation: That the Board authorize the General Manager to execute a Professional Services Agreement with EEC Environmental in the amount of \$596,100 for the period of November 1, 2021 to October 31, 2024.

10. LOCAL HAZARD MITIGATION PLAN ADOPTION

Recommendation: That the Board approve and adopt the IRWD Local Hazard Mitigation Plan subject to non-substantive changes.

11. WATER SHORTAGE CONTINGENCY PLAN SHORTAGE LEVEL IMPACTS AND ASSUMPTIONS FOR WATER BUDGET ALLOCATIONS

Recommendation: That the Board approve maximum water shortage water budget adjustments associated with levels of shortage in IRWD's Water Shortage Contingency Plan.

OTHER BUSINESS

Pursuant to Government Code Section 54954.2, members of the Board of Directors or staff may ask questions for clarification, make brief announcements, and make brief reports on his/her own activities. The Board or a Board member may provide a reference to staff or other resources for factual information, request staff to report back at a subsequent meeting concerning any matter, or direct staff to place a matter of business on a future agenda. Such matters may be brought up under the General Manager's Report or Directors' Comments.

12. General Manager's Report

13. Receive oral update(s) from District liaison(s) regarding communities within IRWD's service area and provide information on relevant community events.

14. Directors' Comments


15. Adjourn.

Availability of agenda materials: Agenda exhibits and other writings that are disclosable public records distributed to all or a majority of the members of the above-named Board in connection with a matter subject to discussion or consideration at an open meeting of the Board are available for public inspection in the District's office, 15600 Sand Canyon Avenue, Irvine, California ("District Office"). If such writings are distributed to members of the Board less than 72 hours prior to the meeting, they will be available from the District Secretary of the District Office at the same time as they are distributed to Board Members, except that if such writings are distributed one hour prior to, or during, the meeting, they will be available electronically via the Webex meeting noted. Upon request, the District will provide for written agenda materials in appropriate alternative formats, and reasonable disability-related modification or accommodation to enable individuals with disabilities to participate in and provide comments at public meetings. Please submit a request, including your name, phone number and/or email address, and a description of the modification, accommodation, or alternative format requested at least two days before the meeting. Requests should be emailed to comments@irwd.com. Requests made by mail must be received at least two days before the meeting. Requests will be granted whenever possible and resolved in favor of accessibility.

October 25, 2021

Prepared by: J. Moeder / R. Mori

Submitted by: K. Burton

Approved by: Paul A. Cook 

BOARD WORKSHOP

IRWD DAM SAFETY PROGRAM UPDATE

SUMMARY:

IRWD's current Dam Safety Program includes routine monitoring, inspection, and reporting activities for all five of its dams: Rattlesnake, San Joaquin, Sand Canyon, Santiago Creek, and Syphon. In June 2020, IRWD contracted with HDR Engineering to review and enhance IRWD's current Dam Safety Program and to integrate Risk-Informed Decision Making (RIDM) into the overall program. HDR recently completed the work, and staff will provide a presentation summarizing the overall scope of the project and the associated findings, recommendations, and next steps.

BACKGROUND:

IRWD owns and operates five dams under the jurisdiction of Division of Safety of Dams (DSOD). These dams were constructed between 1933 and 1966. Traditionally, dam safety assessments, which are integral components of any dam safety program, utilize a standards-based approach (SBA) that follows established rules and guidelines for design events and loads, structural capacities, and defensive design measures. Historically, the SBA to dam safety has proven to be good practice, but that approach omits consideration of other dam safety elements such as human factors and operational issues that could potentially expose dam owners to increased levels of risk.

Another approach to dam safety that has been used at the federal level is RIDM. This approach is a more rigorous, systematic, and thorough process to achieve dam safety that focuses on identifying and reducing risks. In the late 1990s, the Bureau of Reclamation was the first agency to incorporate RIDM into its dam safety program. Since that time, RIDM is now used by several dam regulators and dam owners throughout the United States. Last year, the DSOD announced to California dam owners that it will be integrating RIDM into its regulatory oversight of dams under its jurisdiction.

In June 2020, IRWD contracted with HDR to review and enhance IRWD's current Dam Safety Program and to integrate RIDM into the overall program. HDR is an industry leader in dam safety, and in particular, a leader in RIDM processes and approaches. The project was executed in two phases with the first phase focused on data gathering and establishment of the initial Dam Safety Program framework, and the second phase focused on risk analyses, risk evaluation, and development of the final Dam Safety Program framework.

HDR recently completed the work, and staff will provide a presentation summarizing the overall scope of the project and the associated findings, recommendations, and next steps. A glossary of terms and the draft presentation are included as Exhibit "A" and "B", respectively.

FISCAL IMPACTS:

Not applicable.

ENVIRONMENTAL COMPLIANCE:

Not applicable.

COMMITTEE STATUS:

This item was not reviewed by a committee.

RECOMMENDATION:

RECEIVE AND FILE.

LIST OF EXHIBITS:

Exhibit "A" – Glossary of Terms

Exhibit "B" – Dam Safety Program Update Draft Presentation

EXHIBIT “A”

GLOSSARY OF TERMS FOR DAM SAFETY


Definition:

Risk: The product of 1) likelihood of a structure being loaded, 2) adverse structural performance, and 3) the magnitude of the resulting consequences.

Abbreviations:


DSOD	Division of Safety of Dams
DSP	Dam Safety Program
IRRM	Interim Risk Reduction Measure
PFM	Potential Failure Mode
RIDM	Risk-Informed Decision Making
SBA	Standards Based Approach
SQRA	Semi-Quantitative Risk Analysis

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IRWD's Enhanced Dam Safety Program

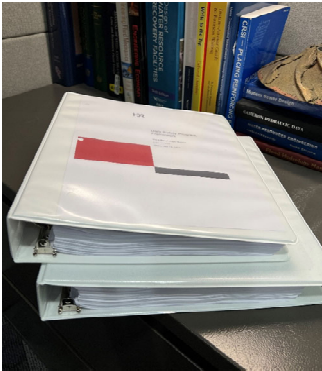
Board of Directors Meeting
October 25, 2021



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Agenda

- Background
- Dam Safety Program
 - Framework
 - Outcome of Semi-Quantitative Risk Analysis
 - Initial Action Items and Implementation Plan
- Next Steps



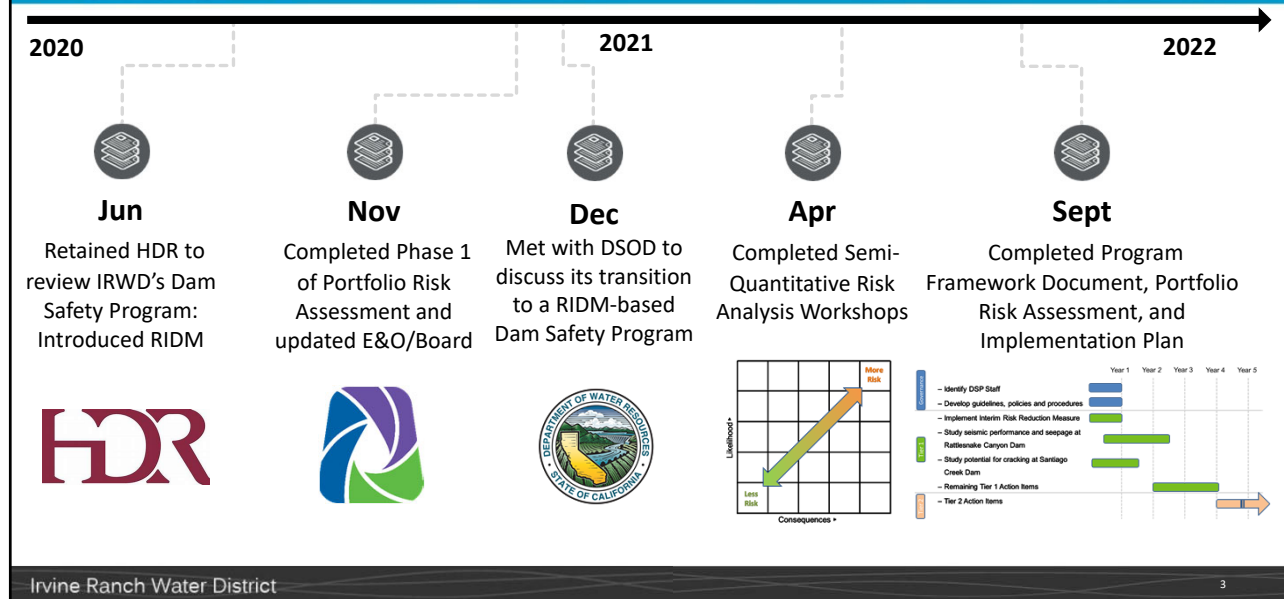
Irvine Ranch Water District

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Background



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Guiding Principles for Dam Safety

- Prioritize public safety and earn the public's trust by developing and implementing a state-of-the-art dam safety program
- Enhance the clarity and transparency of IRWD's dam safety program with IRWD's customers and the community
- Establish "Risk Informed Decision Making" strategies for dam and reservoir management consistent with industry best practices that maximize safety and water supply reliability
- Ensure that the District's dams achieve and maintain the highest condition rating issued by DSOD
- Prioritize dam safety through dam and reservoir facility monitoring, inspection, maintenance, and risk reduction as appropriate
- Establish IRWD as a leader in dam safety programs



Santiago Creek Dam

Irvine Ranch Water District

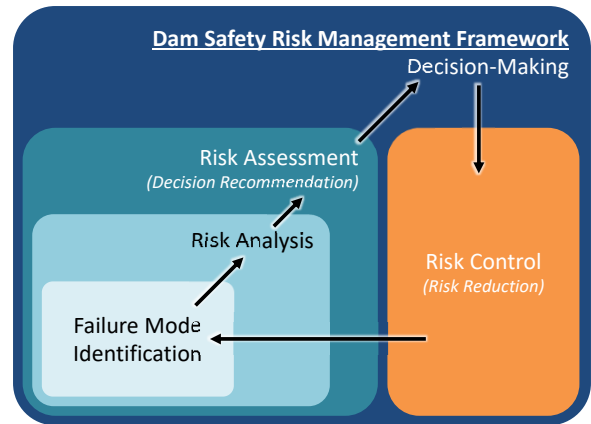
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General Approaches to Dam Safety Assessment

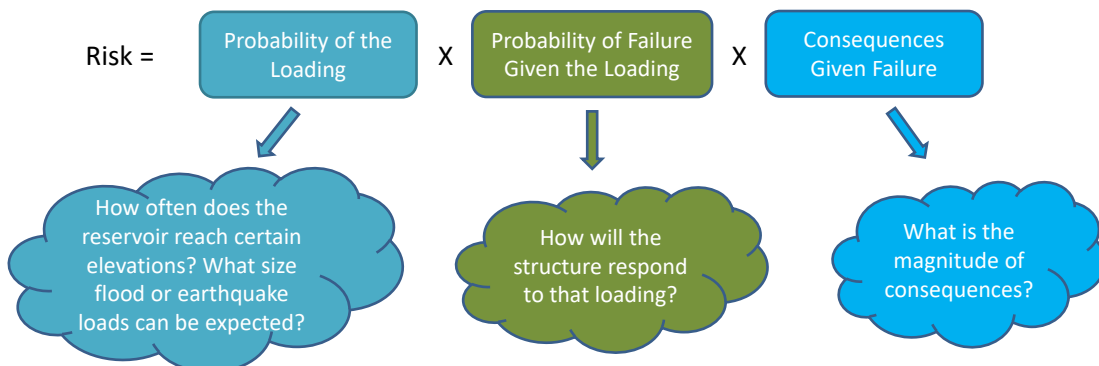
- **Standards Based Approach (SBA):**
 - Long-standing traditional approach that DSOD currently requires
 - Assesses safety based on established rules for design criteria and structural capacities
- **Risk-Informed Decision Making (RIDM):**
 - Used to verify acceptable design criteria is being applied
 - Grounded in identification of potential failure modes (PFMs)
 - Incorporates three distinct components for making dam safety decisions



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Definition of Risk

Risk analysis of a failure mode is the product of the likelihood of a structure being loaded, adverse structural performance (dam failure), and the magnitude of the resulting consequences



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Enhanced Dam Safety Program - Framework

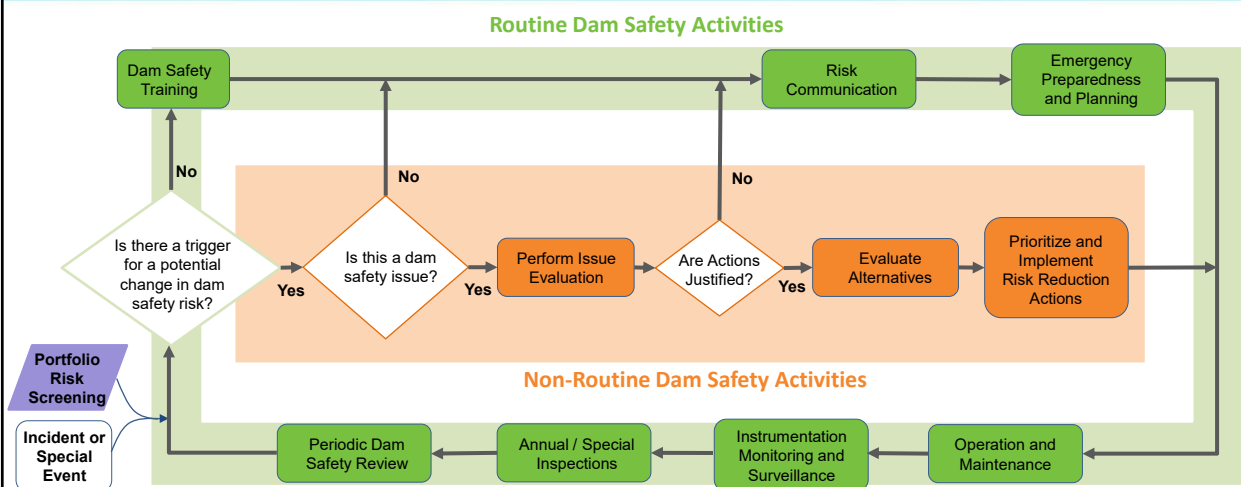
- Comprehensive program for dam safety that is consistent with best practices including RIDM
- Contains defined procedures for all dams that enhance dam safety
 - Periodic Updates to Risk Assessment
 - Routine and non-routine activities
 - Develop and maintain 5-year strategic plans, work plans, and annual reports



IRWD's Sand Canyon Reservoir

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Routine & Non-Routine Activities

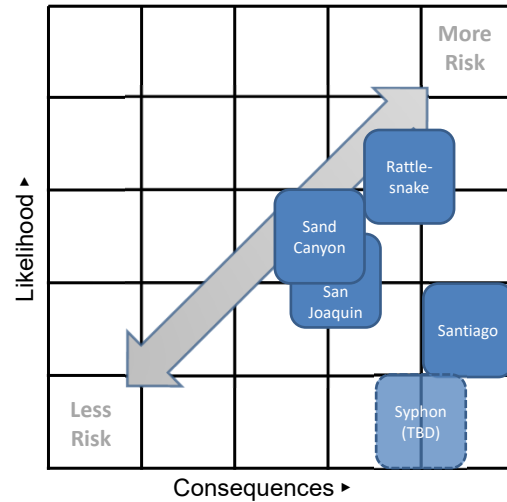


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Portfolio Risk Assessment Results

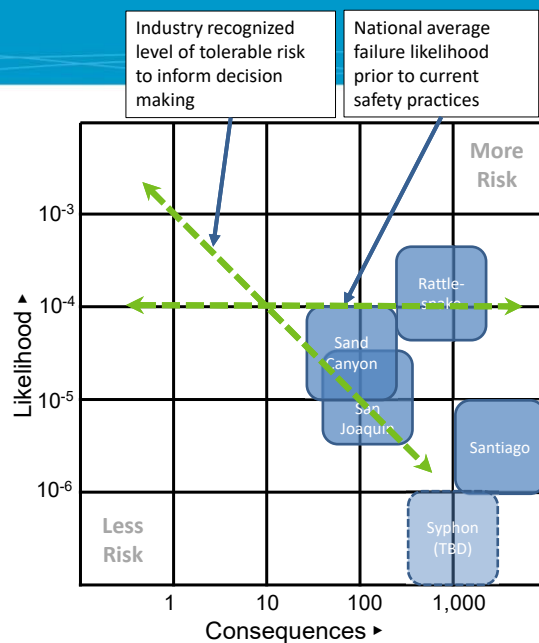
- Developed total risk for each dam to understand risk assessment for entire IRWD dam portfolio
- Consequences are a key factor
- Identified PFMs and associated uncertainties that impact the risk assessment
 - Rattlesnake Canyon Dam:
 - Seismic performance, potential for liquefaction of alluvium foundation, and seepage through the embankment
 - Santiago Creek Dam:
 - Potential for seismic induced cracking through the embankment
- Several other risks were estimated in risk analysis workshops that have a lower priority and will be studied in the future



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Portfolio Risk Assessment Results

- Industry recognized level of tolerable risk to inform decision making
- National average failure likelihood prior to current safety practices
- Used for making risk informed decisions



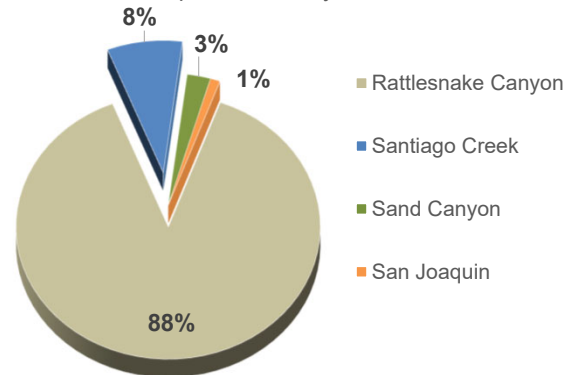
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Summary of Risk Assessment

- Action items are recommended for all IRWD's dams
 - Prioritized in categories:
 - Tier 1 – high to moderate urgency
 - Tier 2 – moderate urgency
 - Lower priority
- Rattlesnake Canyon Dam has the highest percentage of total annualized consequence by dam representing a key area of focus

IRWD Portfolio Contribution to Total Annualized Consequence Risk by Dam



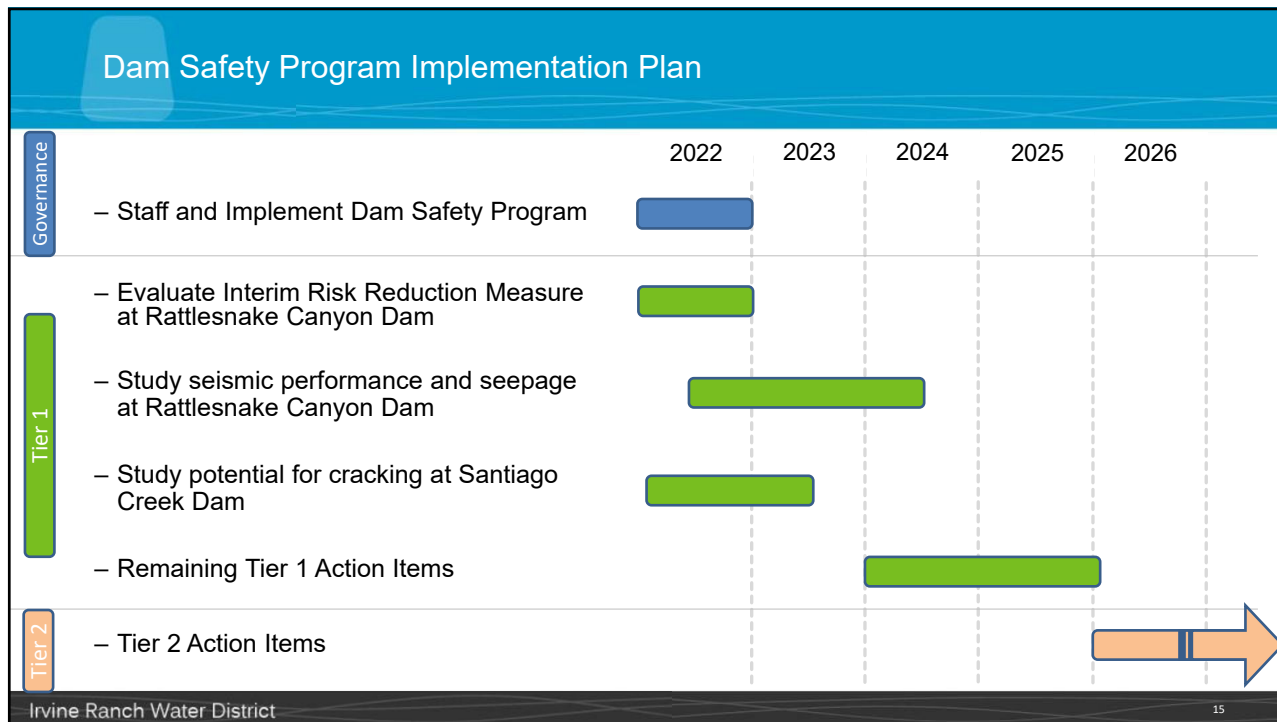
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Risk Assessment Key Findings

- No conditions requiring emergency actions were identified
- Portfolio risks are primarily driven by seismic loadings and uncertainty in the dam performance
- Some additional risks due to seepage under normal operating conditions exist

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Next Steps

- Implement Enhanced Dam Safety Program
- Proceed with
 - Analyzing seismic performance of Rattlesnake Dam
 - Conducting Santiago Creek Dam cracking study
 - Establishing on-call contract for on-going Dam Safety Program support




Santiago Creek Dam



Irvine Ranch Water District 16

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Questions/Discussion




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October 25, 2021
Prepared and
submitted by: L. Bonkowski
Approved by: Paul A. Cook 

CONSENT CALENDAR

BOARD MEETING MINUTES

SUMMARY:

Provided are the minutes of the October 11, 2021 Regular Board meeting for approval.

FISCAL IMPACTS:

None.

ENVIRONMENTAL COMPLIANCE:

Not applicable.

COMMITTEE STATUS:

Not applicable.

RECOMMENDATION:

THAT THE MINUTES OF THE OCTOBER 11, 2021 REGULAR BOARD MEETING BE APPROVED AS PRESENTED.

LIST OF EXHIBITS:

Exhibit "A" – October 11, 2021 Minutes

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EXHIBIT "A"

MINUTES OF REGULAR MEETING – OCTOBER 11, 2021

The regular meeting of the Board of Directors of the Irvine Ranch Water District (IRWD) was called to order at 5:00 p.m. by President Reinhart on October 11, 2021 in person at the District's headquarters located at 15600 Sand Canyon Avenue, Irvine, California. The meeting was also broadcast via Webex as a convenience to the public.

Directors Present: LaMar, Withers, Swan, McLaughlin, and Reinhart.

Directors Absent: None.

Also Present: General Manager Cook, Executive Director of Technical Services Burton, Executive Director of Operations Chambers, Executive Director of Finance and Administration Clary, Director of Treasury and Risk Management Jacobson, Executive Director of Water Policy Weghorst, Director of Water Quality and Regulatory Compliance Colston, Director of Water Resources Sanchez, Director of Human Resources Mitcham, Director of Strategic Communications and Advocacy/Deputy General Counsel Compton, Secretary Bonkowski, General Counsel Collins, and other staff.

WRITTEN COMMUNICATIONS: None.

ORAL COMMUNICATIONS: None.

ITEMS RECEIVED TOO LATE TO BE AGENDIZED: None.

PRESENTATION

"WE'LL HELP YOU THROUGH THIS: TRANSITIONING BACK TO NORMAL AS THE MORATORIUM ENDS"

Using a PowerPoint presentation, Director of Strategic Communications and Advocacy/Deputy General Counsel Compton reviewed the programs to assist with COVID-19 implementation and guidelines, the current situation, and next steps.

Following discussion, Director LaMar said that this item was reviewed by the Water Resources Policy and Communications Committee, and complimented staff on their efforts.

CONSENT CALENDAR

On MOTION by Withers, seconded by LaMar and unanimously carried, CONSENT CALENDAR ITEMS 5 through 8 WERE APPROVED AS FOLLOWS:

5. BOARD MEETING MINUTES

Recommendation: That the minutes of the September 27, 2021, Regular Board meeting be approved as presented.

CONSENT CALENDAR (CONTINUED)

6. RATIFY/APPROVE BOARD OF DIRECTORS' ATTENDANCE AT MEETINGS AND EVENTS

Recommendation: That the Board ratify/approve the meetings and events for Steven LaMar, Karen McLaughlin, Peer Swan, and John Withers as described.

7. 2021 LEGISLATIVE AND REGULATORY UPDATE

Recommendation: Receive and file.

8. BACKHOES PURCHASE CONTRACT AWARD

Recommendation: That the Board authorize the General Manager to execute a contract with Coastline Equipment Company in the amount of \$251,047 for the purchase of two new and unused backhoe loaders.

ACTION CALENDAR

FORMAT OF FUTURE IRWD BOARD AND COMMITTEE MEETINGS DURING COVID-19

Director of Strategic Communications and Advocacy/Deputy General Counsel Compton reported that from March 17, 2020, until September 30, 2021, local agencies could hold meetings of its governing boards and their standing committees (i.e., its legislative bodies) via entirely virtual or telephonic meetings in accordance with executive orders issued by Governor Newsom waiving certain provisions of the Brown Act. On October 1, 2021, these waivers expired. Ms. Compton said that in September 2021, AB 361 was enacted and provided that as of October 1, 2021, a local agency may conduct entirely remote virtual / teleconference meetings if the legislative body of that local agency finds that the Governor has declared a state of emergency, and either state or local officials have imposed or recommended measures to promote social distancing or the legislative body determines that, as a result of the emergency, meeting in person would present imminent risks to the health or safety of attendees. AB 361 also puts additional requirements on these meetings while waiving some of the Brown Act's rules for teleconference meetings.

Ms. Compton said that with the expiration of the executive orders and the new law under AB 361, there are now two options for the format of future IRWD Board and standing committee meetings during COVID-19. She said that the Board may continue its traditional in-person meetings under the pre-COVID-19 processes outlined in the Brown Act, or the meetings may be conducted via teleconference following the restrictions and rules outlined in AB 361. She said that staff recommends the Board affirm that meetings of the full Board and the standing Board committees continue to be held as in-person meetings operating pursuant to the provisions of the Brown Act. Additionally, she said that staff recommends the District continue to broadcast its meeting via Webex for observational purposes. This will allow members of the public to observe the meetings remotely, as a courtesy.

Following discussion, the consensus of the Board confirmed that its meetings, and the meetings of its standing committees, continue to be held as in-person meetings operating pursuant to the provisions of the Brown Act and not under the provisions of AB 361 at this time.

GENERAL MANAGER'S COMMENTS

General Manager Cook reported that there was one new COVID-19 case reported this morning with an individual who was previously vaccinated.

Mr. Cook reported that approximately 4,000 customers have overdue balances with a current outstanding debt of \$3 million.

Mr. Cook said that staff is in contact with Sea and Sage Audubon relative to assisting with the cleanup of birds being affected by the recent oil spill, and it appears that the oil company is paying for everything currently. He said that staff will continue to be in contact with Sea and Sage in case future assistance is needed.

He reminded the Board of open enrollment for insurance this month.

In response to Director Swan's inquiry, General Manager Cook provided the Board with the current plan for employees to return to work full time in the office.

COMMUNITY UPDATE

Mr. Cook said that he spoke with Consultant Newell and all is going well in Santiago Canyon, and noted tree removals in that area due to insect infestations. It was also noted that IRWD's contractor will be working in Williams Canyon as a County permit was just issued for a pipeline restoration project which will include riprap to stabilize an area by the creek.

DIRECTORS' COMMENTS

Director LaMar reported on his attendance at an OCWD Federal and Legislative briefing, an OCWD webinar regarding groundwater contamination, a WACO meeting, a California Council for Environmental and Economic Balance planning conference, an MWRP virtual community tour, an OCWD Communications and Legislative Liaison Committee meeting, and an ACWA Regions 6 and 7 San Joaquin Valley Water Forum.

Director McLaughlin reported on her attendance at an OCWD Federal and Legislative briefing, an OCWD webinar regarding groundwater, a WACO meeting, an OCWD groundwater replenishment system virtual tour, and a tour of MWRP with General Manager Cook.

Director Swan reported on his attendance at a MWDOC Water Policy Forum, a MWDOC Planning and Operations Committee meeting, a meeting with UCI staff, a Newport Chambers meeting, a Southern California Dialogue Committee meeting, and a MWDOC Board meeting. In response to his inquiry relative to the status of the Biosolids facility, General Manager Cook said that staff will provide an update at the time when staff submits the Notice of Completion for Board approval.

Director Withers reported on his attendance at an OCWD webinar regarding groundwater, and a reception in Fullerton for MWD’s newly appointed General Adel Hagekhalil. He further reported on upcoming meetings he will be attending including a lunch meeting with Mr. Paul Hernandez of the Irvine Company, and a OCWD / MWDOC Water Summit.

Director Reinhart reported on his attendance at a MWDOC Board Workshop with MWD Directors.

General Manager Cook asked that the Board meeting be adjourned in memory of Mr. Jonnathan “Jonny” Monroy, who passed unexpectedly over the weekend. Mr. Cook said that Jonny joined IRWD in October 2017, after having worked as a foreman for the electrical subcontractor constructing the IRWD Biosolids Dewatering and Energy Recovery Facilities. Mr. Cook said that given his familiarity with IRWD and the facilities under construction, Jonny was able to “hit the ground running” and immediately become a valuable addition to the Electrical / Instrumentation Team. He said that beyond using his deep knowledge of the biosolids facilities to keep things running, Jonny quickly learned the operations of IRWD’s many other complex facilities. Jonny’s expertise was recognized recently when he was promoted to Senior Electrical Technician, and to say that Jonny’s performance exceeded expectations was no exaggeration – in his most recent performance review he earned an “exceeds expectations” rating. He further said that Jonny’s passing is a terrible loss for IRWD, and especially for those of us who knew and worked with Jonny.

ADJOURNMENT

There being no further business, President Reinhart adjourned the meeting at 6:08 p.m. in memory of Jonny Monroy.

APPROVED and SIGNED this 25th day of October 2021.

President, IRVINE RANCH WATER DISTRICT

Secretary IRVINE RANCH WATER DISTRICT

APPROVED AS TO FORM:

Claire Hervey Collins, General Counsel
Hanson Bridgett LLP

October 25, 2021
Prepared and
submitted by: K. Swan
Approved by: Paul A. Cook



CONSENT CALENDAR

RATIFY/APPROVE BOARD OF DIRECTORS'
ATTENDANCE AT MEETINGS AND EVENTS

SUMMARY:

Pursuant to Resolution 2006-29 adopted on August 28, 2006, the following events and meetings require approval by the Board of Directors:

Steven LaMar

October 20 OCBC & CSUF's 27th Annual Economic Forecast Virtual Conference
November 10 IRWD Business Outreach Program Biosolids & Energy Recovery Facility

Karen McLaughlin

Nov. 30 – Dec. 2 ACWA Virtual Annual Fall Conference

Douglas Reinhart

October 12 Monthly Discussion of District Activities with the General Manager
October 13 Lake Forest Citizen Academy Utility Night
October 21 Southern California Water Collation Annual Meeting and Dinner
November 3 Irvine Lake Issues Meeting
November 8 IRWD Business Outreach Program Biosolids & Energy Recovery Facility
Tour Prep Meeting
November 10 IRWD Business Outreach Program Biosolids & Energy Recovery Facility

Peer Swan

October 21 Southern California Water Collation Annual Meeting and Dinner
November 10 IRWD Business Outreach Program Biosolids & Energy Recovery Facility
Nov. 30 – Dec. 2 ACWA Fall Conference, Pasadena

John Withers

October 13 Lake Forest Citizen Academy Utility Night
October 20 OCBC & CSUF's 27th Annual Economic Forecast Virtual Conference
October 28 2021 Annual Clark Prize Award Lecture Broadcast
November 3 Irvine Lake Issues Meeting
November 10 IRWD Business Outreach Program Biosolids & Energy Recovery Facility

RECOMMENDATION:

THAT THE BOARD RATIFY/APPROVE THE MEETINGS AND EVENTS FOR STEVEN LAMAR, KAREN MCLAUGHLIN, DOUGLAS REINHART, PEER SWAN, AND JOHN WITHERS, AS DESCRIBED HEREIN.

LIST OF EXHIBITS:

None.

October 25, 2021

Prepared by: O. Mendoza / J. Davis

Submitted by: R. Jacobson / C. Clary

Approved by: Paul A. Cook



CONSENT CALENDAR

SEPTEMBER 2021 TREASURY REPORT

SUMMARY:

The following is submitted for the Board's information and approval:

- A. The September 2021 Investment Summary Report. This Investment Summary Report conforms with the 2021 Investment Policy and provides sufficient liquidity to meet estimated expenditures during the next six months, as outlined in Exhibit "A";
- B. The Summary of Fixed and Variable Rate Debt as of September 30, 2021, as outlined in Exhibit "B";
- C. The Monthly Interest Rate Swap Summary as of September 30, 2021, as outlined in Exhibit "C";
- D. The September 30, 2021 Disbursement Summary of warrants 420951 through 421838, wire transfers, Workers' Compensation distributions, payroll withholding distributions, and voided checks in the total amount of \$24,644,781, as outlined in Exhibit "D";
- E. The Summary of Payroll ACH payments in the total amount of \$2,230,546 as outlined in Exhibit "E"; and
- F. The Disclosure Report of Reimbursements to Board members and staff for September 2021, detailing payments or reimbursements for individual charges of \$100 or more per transaction, as outlined in Exhibit "F".

FISCAL IMPACTS:

As of September 30, 2021, the book value of the investment portfolio was \$370,867,821, with a 0.44% rate of return and a market value of \$371,054,825. Based on IRWD's September 30, 2021, quarterly real estate investment rate of return of 11.65%, the weighted average return for the fixed income and real estate investments was 2.76%.

As of September 30, 2021, the outstanding principal amount of fixed and variable rate debt was \$639,025,000. The monthly weighted average all-in variable rate was 0.34%. Including IRWD's weighted average fixed rate bond issues of 3.70% and the negative cash accruals from fixed payer interest rate swaps, which hedge a portion of the District's variable rate debt, the total average debt rate was 2.91%.

Payroll ACH payments totaled \$2,230,546 and wire transfers, all other ACH payments, and checks issued for debt service, accounts payable, payroll, and water purchases for September totaled \$24,644,781.

ENVIRONMENTAL COMPLIANCE:

This item is not a project as defined in the California Environmental Quality Act Code of Regulations, Title 14, Chapter 3, Section 15378.

COMMITTEE STATUS:

This item was not submitted to a Committee; the investment and debt reports are submitted to the Finance and Personnel Committee monthly.

RECOMMENDATION:

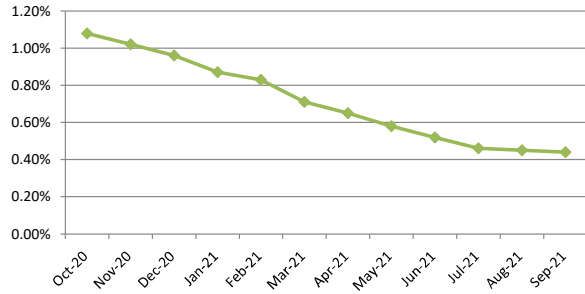
THAT THE BOARD RECEIVE AND FILE THE TREASURER'S INVESTMENT SUMMARY REPORT, THE SUMMARY OF FIXED AND VARIABLE RATE DEBT, AND DISCLOSURE REPORT OF REIMBURSEMENTS TO BOARD MEMBERS AND STAFF, APPROVE THE SEPTEMBER 2021 SUMMARY OF PAYROLL ACH PAYMENTS IN THE TOTAL AMOUNT OF \$2,230,546, AND APPROVE THE SEPTEMBER 2021 ACCOUNTS PAYABLE DISBURSEMENT SUMMARY OF WARRANTS 420951 THROUGH 421838, WORKERS' COMPENSATION DISTRIBUTIONS, WIRE TRANSFERS, PAYROLL WITHHOLDING DISTRIBUTIONS AND VOIDED CHECKS IN THE TOTAL AMOUNT OF \$24,644,781.

LIST OF EXHIBITS:

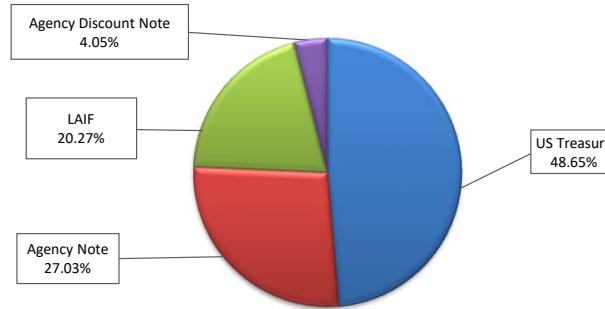
- Exhibit "A" – Investment Summary Report
- Exhibit "B" – Summary of Fixed and Variable Debt
- Exhibit "C" – Monthly Interest Rate Swap Summary
- Exhibit "D" – Monthly Summary of District Disbursements
- Exhibit "E" – Monthly Payroll ACH Summary
- Exhibit "F" – Disclosure of Reimbursements to Board Members and Staff

Exhibit "A"
**Irvine Ranch Water District
Investment Portfolio Summary
September 2021**

Monthly Fixed Income Yield



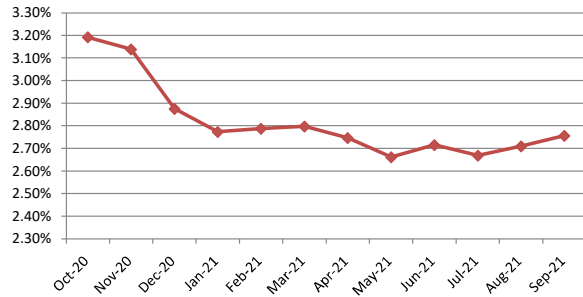
Portfolio Distribution



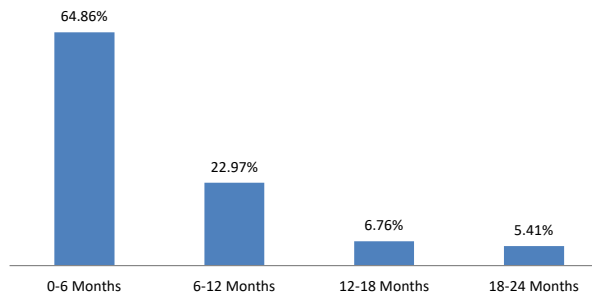
Investment Summary

Type	PAR	Book Value	Market Value
US Treasury	180,000,000	180,532,573	180,565,600
Agency Note	100,000,000	100,337,158	100,499,300
LAIF	75,000,000	75,000,000	74,990,525
Agency Discount Note	15,000,000	14,998,090	14,999,400
Grand Total	370,000,000	370,867,821	371,054,825

Weighted Average Return Including Real Estate Portfolio



Maturity Distribution



Top Issuers

Issuer	PAR	% Portfolio
US Treasury	180,000,000	48.65%
State of California Tsy.	75,000,000	20.27%
Fed Farm Credit Bank	55,000,000	14.86%
Fed Home Loan Bank	35,000,000	9.46%
Fed Natl Mortgage Assoc	15,000,000	4.05%
Fed Home Loan Mortgage Corp	10,000,000	2.71%
Grand Total	370,000,000	100.00%

IRVINE RANCH WATER DISTRICT
INVESTMENT SUMMARY REPORT

09/30/21

SETTLMT	Call Schedule	Initial Call	Maturity Date	Rating	INVESTMENT TYPE	INSTITUTION / ISSUER	PAR Amount	COUPON DISCOUNT	YIELD	ORIGINAL COST	CARRY VALUE	MARKET VALUE ⁽¹⁾ 9/30/2021	UNREALIZED ⁽²⁾ GAIN/(LOSS)
07/24/20			10/01/21		LAIF	State of California Tsy.	\$75,000,000		0.206%	\$75,000,000.00	\$75,000,000.00	74,990,524.58	(9,475.42)
07/19/21	NA	NA	10/05/21	NR	FHLB - Discount Note	Fed Home Loan Bank	5,000,000	0.040%	0.041%	4,999,566.67	4,999,811.11	5,000,000.00	188.89
08/13/20	NA	NA	10/07/21	Aaa/AA+/AAA	FNMA - Note	Fed Natl Mortgage Assoc	10,000,000	1.375%	0.143%	10,141,500.00	10,012,128.57	10,002,200.00	(9,928.57)
10/11/19	NA	NA	10/15/21	Aaa/AA+/NR	Treasury - Note	US Treasury	5,000,000	2.875%	1.540%	5,131,640.63	5,007,880.53	5,005,400.00	(2,480.53)
10/22/19	NA	NA	10/15/21	Aaa/AA+/AAA	FFCB - Note	Fed Farm Credit Bank	5,000,000	1.400%	1.642%	4,976,500.00	4,998,571.82	5,002,550.00	3,978.18
10/29/20	NA	NA	10/19/21	Aaa/NR/NR	FHLB - Note	Fed Home Loan Bank	10,000,000	0.125%	0.127%	9,999,800.00	9,999,972.96	10,000,000.00	27.04
10/27/20	NA	NA	10/26/21	NR	FFCB - Discount Note	Fed Farm Credit Bank	5,000,000	0.130%	0.132%	4,993,427.78	4,999,006.94	4,999,950.00	943.06
11/05/19	NA	NA	11/15/21	Aaa/NR/AAA	Treasury - Note	US Treasury	5,000,000	2.875%	1.610%	5,125,585.94	5,012,711.13	5,017,200.00	4,488.87
07/15/21	NA	NA	11/18/21	Aaa/NR/AAA	Treasury - Bill	US Treasury	10,000,000	0.040%	0.041%	9,998,600.00	9,999,133.33	9,999,600.00	466.67
06/11/21	NA	NA	11/26/21	Aaa/NR/AAA	Treasury - Bill	US Treasury	5,000,000	0.030%	0.030%	4,999,300.00	4,999,641.67	4,999,700.00	58.33
11/08/19	NA	NA	11/30/21	Treasury - Bill	Treasury - Note	US Treasury	5,000,000	1.750%	1.680%	5,007,031.25	5,000,840.39	5,013,850.00	13,009.61
03/17/21	NA	NA	11/30/21	Aaa/AA+/NR	Treasury - Note	US Treasury	5,000,000	1.875%	0.057%	5,064,120.00	5,026,095.35	5,014,900.00	(11,195.35)
09/28/20	NA	NA	12/03/21	Aaa/AA+/AAA	FFCB - Note	Fed Farm Credit Bank	5,000,000	0.150%	0.120%	5,001,765.00	5,000,380.85	5,000,600.00	219.15
10/30/20	NA	NA	12/15/21	Aaa/NR/AAA	Treasury - Note	US Treasury	5,000,000	2.625%	0.127%	5,140,429.69	5,035,876.20	5,026,400.00	(9,476.20)
04/23/20	NA	NA	12/20/21	Aaa/AA+/NR	FHLB - Note	Fed Home Loan Bank	10,000,000	1.625%	0.309%	10,217,480.00	10,053,472.81	10,034,500.00	(18,972.81)
06/30/21	NA	NA	12/30/21	Aaa/AA+/NR	Treasury - Bill	US Treasury	5,000,000	0.040%	0.041%	4,998,983.33	4,999,333.33	4,999,550.00	216.67
11/25/19	NA	NA	12/31/21	Aaa/NR/AAA	Treasury - Note	US Treasury	5,000,000	2.000%	1.619%	5,039,062.50	5,006,162.40	5,024,150.00	17,987.60
06/02/21	NA	NA	12/31/21	Aaa/NR/AAA	Treasury - Note	US Treasury	10,000,000	2.125%	0.027%	10,121,093.75	10,069,114.83	10,051,400.00	(17,714.83)
08/31/21	NA	NA	01/10/22	NR	FFCB - Discount Note	Fed Farm Credit Bank	5,000,000	0.040%	0.041%	4,999,266.67	4,999,272.23	4,999,450.00	177.77
05/26/21	NA	NA	01/11/22	Aaa/AA+/AAA	FNMA - Note	Fed Natl Mortgage Assoc	5,000,000	2.625%	0.031%	5,081,057.95	5,046,520.21	5,034,600.00	(11,920.21)
11/25/19	NA	NA	01/13/22	Aaa/NA/NR	FHLMC - Note	Fed Home Loan Mortgage Corp	5,000,000	2.375%	1.635%	5,077,250.00	5,013,271.15	5,032,750.00	19,478.85
08/14/20	NA	NA	01/13/22	Aaa/AA+/AAA	FHLMC - Note	Fed Home Loan Mortgage Corp	5,000,000	2.375%	0.147%	5,157,297.23	5,040,769.49	5,032,750.00	(8,019.49)
03/08/19	NA	NA	01/15/22	Aaa/AA+/NR	Treasury - Note	US Treasury	5,000,000	2.500%	2.460%	5,005,468.75	5,000,712.40	5,035,300.00	34,587.60
12/19/19	NA	NA	01/31/22	Aaa/NR/AAA	Treasury - Note	US Treasury	5,000,000	1.875%	1.641%	5,024,218.75	5,004,756.14	5,030,300.00	25,543.86
03/21/19	NA	NA	02/03/22	Aaa/AA+/AAA	FFCB - Note	Fed Farm Credit Bank	5,000,000	2.030%	2.361%	4,954,350.00	4,993,261.19	5,032,900.00	39,638.81
12/19/19	NA	NA	02/15/22	Aaa/NR/AAA	Treasury - Note	US Treasury	5,000,000	2.500%	1.652%	5,089,453.13	5,018,933.68	5,045,300.00	26,366.32
11/13/20	NA	NA	02/28/22	Aaa/NR/AAA	Treasury - Note	US Treasury	5,000,000	1.875%	0.139%	5,112,304.69	5,042,828.06	5,037,500.00	(5,328.06)
11/19/20	NA	NA	02/28/22	Aaa/NR/AAA	Treasury - Note	US Treasury	5,000,000	1.750%	0.126%	5,103,710.94	5,040,060.02	5,035,150.00	(4,910.02)
06/09/21	NA	NA	02/28/22	Aaa/NR/AAA	Treasury - Note	US Treasury	5,000,000	1.125%	0.051%	5,038,964.84	5,026,566.94	5,021,900.00	(4,666.94)
03/08/19	NA	NA	03/11/22	Aaa/AA+/NR	FHLB - Note	Fed Home Loan Bank	5,000,000	2.500%	2.549%	5,002,750.00	5,000,477.93	5,054,600.00	54,122.07
12/23/20	NA	NA	03/22/22	Aaa/AA+/AAA	FFCB - Note	Fed Farm Credit Bank	10,000,000	0.090%	0.090%	10,000,000.00	10,000,000.00	10,001,900.00	1,900.00
12/19/19	NA	NA	03/31/22	Aaa/NR/AAA	Treasury - Note	US Treasury	5,000,000	1.875%	1.645%	5,025,585.94	5,006,480.95	5,044,900.00	38,419.05
04/30/21	NA	NA	03/31/22	Aaa/NR/AAA	Treasury - Note	US Treasury	5,000,000	0.375%	0.056%	5,014,648.44	5,009,226.33	5,007,800.00	(1,426.33)
02/21/20	NA	NA	04/14/22	Aaa/AA+/AAA	FFCB - Note	Fed Farm Credit Bank	5,000,000	1.400%	1.414%	4,998,500.00	4,999,434.87	5,035,400.00	35,965.13
04/23/20	NA	NA	04/21/22	Aaa/AA+/NR	FFCB - Note	Fed Farm Credit Bank	10,000,000	1.580%	0.320%	10,250,200.00	10,082,483.52	10,083,500.00	1,016.48
08/12/21	NA	NA	05/31/22	Aaa/NR/AAA	Treasury - Note	US Treasury	10,000,000	1.750%	0.061%	10,135,156.25	10,158,995.03	10,111,700.00	(47,295.03)
04/22/21	NA	NA	06/30/22	Aaa/NR/AAA	Treasury - Note	US Treasury	10,000,000	0.125%	0.082%	10,005,078.13	10,003,533.63	10,003,100.00	(433.63)
04/30/21	NA	NA	06/30/22	Aaa/NR/AAA	Treasury - Note	US Treasury	5,000,000	0.125%	0.082%	5,002,539.06	5,001,799.99	5,001,550.00	(249.99)
05/28/21	NA	NA	06/30/22	Aaa/NR/AAA	Treasury - Note	US Treasury	5,000,000	0.125%	0.064%	5,003,320.31	5,002,519.43	5,001,550.00	(969.43)
05/20/21	NA	NA	06/30/22	Aaa/NR/AAA	Treasury - Note	US Treasury	5,000,000	1.750%	0.065%	5,093,750.00	5,069,735.22	5,062,100.00	(7,635.22)
01/15/20	NA	NA	07/15/22	Aaa/AA+/NR	FFCB - Note	Fed Farm Credit Bank	5,000,000	1.600%	1.594%	5,000,750.00	5,000,260.69	5,061,500.00	61,239.31
04/28/21	NA	NA	08/31/22	Aaa/NR/NR	Treasury - Note	US Treasury	5,000,000	0.125%	0.102%	5,001,562.50	5,001,160.71	5,001,150.00	(10.71)
04/28/21	NA	NA	09/09/22	Aaa/AA+/NR	FHLB - Note	Fed Home Loan Bank	5,000,000	2.000%	0.112%	5,128,632.30	5,096,152.00	5,089,550.00	(6,602.00)
04/22/21	NA	NA	10/31/22	Aaa/NR/AAA	Treasury - Note	US Treasury	10,000,000	0.125%	0.110%	10,002,343.75	10,004,522.70	10,000,400.00	(4,122.70)
05/20/21	NA	NA	11/30/22	Aaa/NR/AAA	Treasury - Note	US Treasury	5,000,000	0.125%	0.103%	5,001,647.15	5,001,340.70	4,999,200.00	(2,140.70)
09/30/21	NA	NA	01/31/23	Aaa/NR/AAA	Treasury - Note	US Treasury	5,000,000	0.125%	0.143%	4,998,828.13	4,998,830.53	4,997,650.00	(1,180.53)
09/09/21	NA	NA	03/31/23	Aaa/AA/AAA	Treasury - Note	US Treasury	10,000,000	0.125%	0.153%	9,995,703.13	9,995,869.56	9,990,600.00	(5,269.56)
09/30/21	NA	NA	04/30/23	Aaa/AA/AAA	Treasury - Note	US Treasury	10,000,000	0.125%	0.202%	9,987,890.63	9,987,911.62	9,986,300.00	(1,611.62)
SUB-TOTAL							\$370,000,000			\$372,248,115.21	\$370,867,821.15	\$371,054,824.58	\$187,003.43

IRVINE RANCH WATER DISTRICT
INVESTMENT SUMMARY REPORT

09/30/21

SETTLMT	Call Schedule	Initial Call	Maturity Date	Rating	INVESTMENT TYPE	INSTITUTION / ISSUER	PAR Amount	COUPON DISCOUNT	YIELD	ORIGINAL COST	CARRY VALUE	MARKET VALUE ⁽¹⁾ 9/30/2021	UNREALIZED ⁽²⁾ GAIN/(LOSS)
TOTAL INVESTMENTS							<u>\$370,000,000</u>			<u>\$372,248,115.21</u>	<u>\$370,867,821.15</u>	<u>\$371,054,824.58</u>	<u>\$187,003.43</u>
					Petty Cash					3,400.00			
					Ck Balance	Bank of America		ECR	0.19%	<u>20,002,332.77</u>			
										<u>\$392,253,847.98</u>			

⁽¹⁾ LAIF market value is as of the most recent quarter-end as reported by LAIF.
Security market values are determined using Bank of New York ("Trading Prices"), Bloomberg and/or broker dealer pricing.

⁽²⁾ Gain (loss) calculated against carry value using the trading value provided by Bank of New York/or Brokers

⁽³⁾ Real estate rate of return is based on most recent quarter end return

Outstanding Variable Rate Debt	\$247,300,000
Net Outstanding Variable Rate Debt (Less \$60 million fixed-payer swaps)	\$187,300,000
Investment Balance:	\$392,253,848
Investment to Variable Rate Debt Ratio:	209%
Portfolio - Average Number of Days To Maturity	108

	Investment Portfolio	Real Estate ⁽³⁾ Portfolio	Weighted Avg. Return
September	0.44%	11.65%	2.76%
August	0.45%	11.53%	2.71%
Change	-0.01%		0.05%

This Investment Summary Report is in conformity with the 2021 Investment Policy and provides sufficient liquidity to meet the next six months estimated expenditures.

*S - Step up

Irvine Ranch Water District
Summary of Real Estate - Income Producing Investments
9/30/2021

	ACQUISITION DATE	PROPERTY TYPE	OWNERSHIP INTEREST	ORIGINAL COST	MARKET VALUE 6/30/2021	ANNUALIZED RATE OF RETURN QUARTER ENDED 9/30/2021
Sycamore Canyon	Dec-92	Apartments	Fee Simple	\$ 43,550,810	\$ 170,000,000	21.22%
Wood Canyon Villas	Jun-91	Apartments	Limited Partner	\$ 6,000,000	\$ 32,258,924	8.52%
ITC (230 Commerce)	Jul-03	Office Building	Fee Simple	\$ 5,739,845	\$ 12,000,000	9.40%
Waterworks Business Pk.	Nov-08	Research & Dev.	Fee Simple	\$ 8,630,577	\$ 11,600,000	7.19%
Sand Canyon Professional Center - Medical Office	Jul-12	Medical Office	Fee Simple	\$ 8,648,594	\$ 11,900,000	9.40%
Sand Canyon Professional Center - General Office	Sep-20	Office Building	Fee Simple	\$ 25,985,968	\$ 33,250,000	-0.92%
Total - Income Properties				\$ 98,555,794	\$ 271,008,924	11.65%

IRVINE RANCH WATER DISTRICT INVESTMENT SUMMARY REPORT
INVESTMENT ACTIVITY
Sep-21

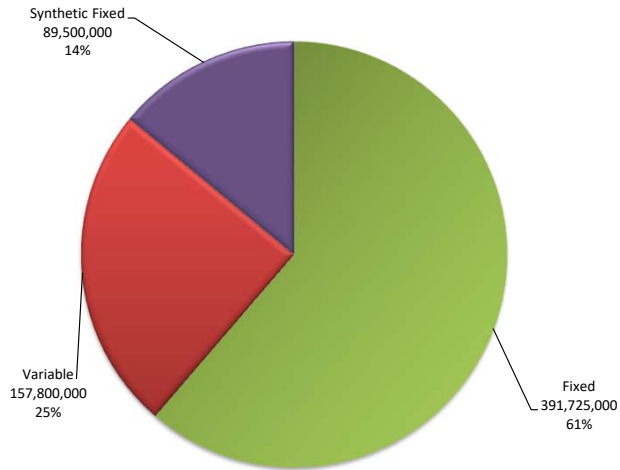
MATURITIES/SALES/CALLS

PURCHASES

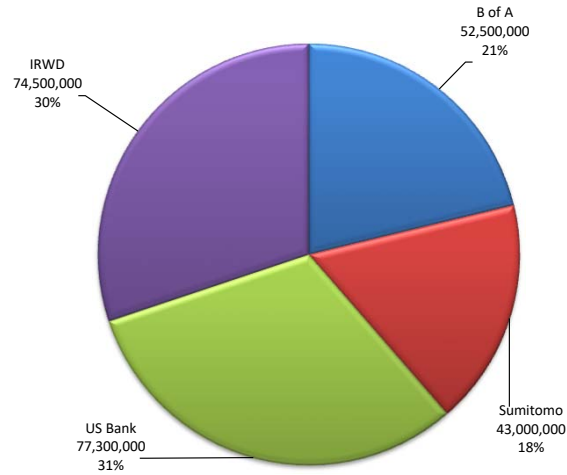
DATE	SECURITY TYPE	PAR	YIELD	Settlement Date	Maturity Date	SECURITY TYPE	PAR	YIELD TO MATURITY
9/9/2021	Treasury - Bill	\$10,000,000	0.05%	9/9/2021	3/31/2023	Treasury - Note	\$10,000,000	0.15%
9/17/2021	FHLB - Note	\$5,000,000	0.13%	9/30/2021	1/31/2023	Treasury - Note	\$5,000,000	0.14%
9/30/2021	Treasury - Note	\$10,000,000	0.13%	9/30/2021	4/30/2023	Treasury - Note	\$10,000,000	0.20%
9/30/2021	FHLB - Note	\$10,000,000	0.12%					

Exhibit "B"
Irvine Ranch Water District
Summary of Fixed and Variable Rate Debt
September 2021

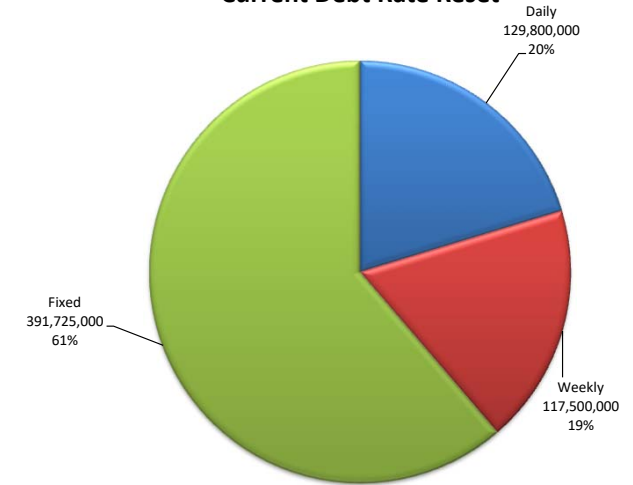
Current Debt Mix By Type



Letters of Credit / Support



Current Debt Rate Reset



Outstanding Par by Series

Series	Issue Date	Maturity Date	Remaining Principal	Percent	Letter of Credit/Support	Rmkt Agent	Mode	Reset
Series 1993	05/19/93	04/01/33	\$24,800,000	3.88%	US Bank	BAML	Variable	Daily
Series 2008-A Refunding	04/24/08	07/01/35	\$43,000,000	6.73%	Sumitomo	BAML	Variable	Weekly
Series 2011-A-1 Refunding	04/15/11	10/01/37	\$44,700,000	7.00%	IRWD	Goldman	Variable	Weekly
Series 2011-A-2 Refunding	04/15/11	10/01/37	\$29,800,000	4.66%	IRWD	Goldman	Variable	Weekly
Series 2009 - A	06/04/09	10/01/41	\$52,500,000	8.22%	US Bank	US Bank	Variable	Daily
Series 2009 - B	06/04/09	10/01/41	\$52,500,000	8.22%	B of A	Goldman	Variable	Daily
2016 COPS	09/01/16	03/01/46	\$113,325,000	17.73%	N/A	N/A	Fixed	Fixed
2010 Build America Taxable Bond	12/16/10	05/01/40	\$175,000,000	27.39%	N/A	N/A	Fixed	Fixed
Series 2016	10/12/16	02/01/46	\$103,400,000	16.18%	N/A	N/A	Fixed	Fixed
Total			\$639,025,000	100.00%				

IRVINE RANCH WATER DISTRICT
SUMMARY OF FIXED & VARIABLE RATE DEBT

September-21

ITN
Daily
Weekly

GENERAL BOND INFORMATION							LETTER OF CREDIT INFORMATION										TRUSTEE INFORMATION									
VARIABLE RATE ISSUES	Issue Date	Maturity Date	Principal Payment Date	Payment Date	Original Par Amount	Remaining Principal	Letter of Credit	Reimbursement Agreement Date	L/C Exp. Date	MOODY'S	S&P	FITCH	LOC Stated Amount	LOC Fee	Annual LOC Cost	Rmkt Agent	Reset	Rmkt Fees	Annual Cost	Trustee						
SERIES 1993	05/19/93	04/01/33	Apr 1	5th Bus. Day	\$38,300,000	\$24,800,000	US BANK	05/07/15	12/15/21	Aa3/VMIG1	AA-/A-1+	N/R	\$25,134,290	0.3300%	\$82,943	BAML	DAILY	0.10%	\$24,800	BANK OF NY						
SERIES 2008-A Refunding	04/24/08	07/01/35	Jul 1	5th Bus. Day	\$60,215,000	\$43,000,000	SUMITOMO	04/01/11	05/28/25	A1/P-1	A/A-1	A/F1	\$43,636,164	0.3150%	\$137,454	BAML	WED	0.07%	\$30,100	BANK OF NY						
SERIES 2011-A-1 Refunding	04/15/11	10/01/37	Oct 1	1st Bus. Day	\$60,545,000	\$44,700,000	N/A	N/A	N/A	Aa1/VMIG1	A-1+	AAA/F1+	N/A	N/A	N/A	Goldman	WED	0.13%	\$55,875	BANK OF NY						
SERIES 2011-A-2 Refunding	04/15/11	10/01/37	Oct 1	1st Bus. Day	\$40,370,000	\$29,800,000	N/A	N/A	N/A	Aa1/VMIG1	A-1+	AAA/F1+	N/A	N/A	N/A	Goldman	WED	0.13%	\$37,250	BANK OF NY						
SERIES 2009 - A	06/04/09	10/01/41	Oct 1	1st Bus. Day	\$75,000,000	\$52,500,000	US BANK	04/01/11	12/15/21	Aa2/VMIG 1	AA-/A-1+	AA/F1+	\$53,086,849	0.3300%	\$175,187	US Bank	DAILY	0.07%	\$36,750	US BANK						
SERIES 2009 - B	06/04/09	10/01/41	Oct 1	1st Bus. Day	\$75,000,000	\$52,500,000	B of A	04/01/11	05/16/22	Aa2/VMIG 1	A/A-1	A1/F1+	\$53,086,849	0.3000%	\$159,261	Goldman	DAILY	0.10%	\$52,500	US BANK						
					\$349,430,000	\$247,300,000	SUB-TOTAL VARIABLE RATE DEBT										\$174,944,153		0.3172%		\$554,844		0.10%		\$237,275	
																	(Wt. Avg)				(Wt. Avg)					
FIXED RATE ISSUES																										
2010 GO Build America Taxable Bonds	12/16/10	05/01/40	May (2025)	May/Nov	\$175,000,000	\$175,000,000	N/A	N/A	N/A	Aa1	AAA	NR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	US BANK						
2016 COPS	09/01/16	03/01/46	Mar 1	Mar/Sept	\$116,745,000	\$113,325,000	N/A	N/A	N/A	NR	AAA	AAA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	US BANK						
SERIES 2016	10/12/16	02/01/46	Feb (2022)	Feb/Aug	\$103,400,000	\$103,400,000	N/A	N/A	N/A	NR	AAA	AAA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	BANK OF NY						
					\$395,145,000	\$391,725,000	SUB-TOTAL FIXED RATE DEBT																			
					\$744,575,000	\$639,025,000	TOTAL- FIXED & VARIABLE RATE DEBT																			

Remarketing Agents			GO VS COP's		
Goldman	127,000,000	51%	GO:	525,700,000	82%
BAML	67,800,000	27%	COPS:	113,325,000	18%
US Bank	52,500,000	21%	Total	<u>639,025,000</u>	
	<u>247,300,000</u>				

LOC Banks		Breakdown Between Variable & Fixed Rate Mode	
SUMITOMO	43,000,000	Daily Issues	129,800,000 20%
BANK OF AMERICA	52,500,000	Weekly Issues	43,000,000 7%
US BANK	77,300,000	ITN Issues	74,500,000 12%
	<u>172,800,000</u>	Sub-Total	<u>247,300,000</u>
		Fixed Rate Issues	\$391,725,000 61%
		Sub-Total - Fixed	<u>391,725,000</u>
		TOTAL DEBT	
		FIXED & VAR.	<u>639,025,000</u> 100%

SUMMARY OF DEBT RATES
Sep-21

Rmkt Agent Mode	GOLDMAN DAILY	GOLDMAN WEEKLY	GOLDMAN WEEKLY	MERRILL LYNCH DAILY	MERRILL LYNCH WEEKLY	US BANK DAILY
Bond Issue	2009 - B	2011 A-1	2011 A-2	1993	2008-A	2009-A
Par Amount	52,500,000	44,700,000	29,800,000	24,800,000	43,000,000	52,500,000
LOC Bank	BOFA	(SIFMA + 3)	(SIFMA + 3)	US BANK	Sumitomo	US BANK
Reset		Wednesday	Wednesday		Wednesday	
9/1/2021	0.01%	0.05%	0.05%	0.01%	0.02%	0.01%
9/2/2021	0.01%	0.05%	0.05%	0.01%	0.02%	0.01%
9/3/2021	0.01%	0.05%	0.05%	0.01%	0.02%	0.01%
9/4/2021	0.01%	0.05%	0.05%	0.01%	0.02%	0.01%
9/5/2021	0.01%	0.05%	0.05%	0.01%	0.02%	0.01%
9/6/2021	0.01%	0.05%	0.05%	0.01%	0.02%	0.01%
9/7/2021	0.01%	0.05%	0.05%	0.01%	0.02%	0.01%
9/8/2021	0.01%	0.05%	0.05%	0.01%	0.02%	0.01%
9/9/2021	0.01%	0.05%	0.05%	0.01%	0.02%	0.01%
9/10/2021	0.01%	0.05%	0.05%	0.01%	0.02%	0.01%
9/11/2021	0.01%	0.05%	0.05%	0.01%	0.02%	0.01%
9/12/2021	0.01%	0.05%	0.05%	0.01%	0.02%	0.01%
9/13/2021	0.01%	0.05%	0.05%	0.01%	0.02%	0.01%
9/14/2021	0.01%	0.05%	0.05%	0.01%	0.02%	0.01%
9/15/2021	0.01%	0.05%	0.05%	0.01%	0.02%	0.01%
9/16/2021	0.01%	0.05%	0.05%	0.01%	0.02%	0.01%
9/17/2021	0.01%	0.05%	0.05%	0.01%	0.02%	0.01%
9/18/2021	0.01%	0.05%	0.05%	0.01%	0.02%	0.01%
9/19/2021	0.01%	0.05%	0.05%	0.01%	0.02%	0.01%
9/20/2021	0.01%	0.05%	0.05%	0.01%	0.02%	0.01%
9/21/2021	0.01%	0.05%	0.05%	0.01%	0.02%	0.01%
9/22/2021	0.01%	0.05%	0.05%	0.01%	0.02%	0.01%
9/23/2021	0.01%	0.05%	0.05%	0.01%	0.02%	0.01%
9/24/2021	0.01%	0.05%	0.05%	0.03%	0.02%	0.02%
9/25/2021	0.01%	0.05%	0.05%	0.03%	0.02%	0.02%
9/26/2021	0.01%	0.05%	0.05%	0.03%	0.02%	0.02%
9/27/2021	0.02%	0.05%	0.05%	0.03%	0.02%	0.02%
9/28/2021	0.02%	0.05%	0.05%	0.03%	0.02%	0.01%
9/29/2021	0.03%	0.05%	0.05%	0.03%	0.02%	0.04%
9/30/2021	0.05%	0.08%	0.08%	0.08%	0.05%	0.05%
Avg Interest Rates	0.01%	0.05%	0.05%	0.02%	0.02%	0.01%
Rmkt Fee	0.10%	0.13%	0.13%	0.10%	0.07%	0.07%
LOC Fee	0.30%			0.33%	0.32%	0.33%
All-In Rate	0.41%	0.18%	0.18%	0.45%	0.41%	0.41%
Par Amount	97,200,000		29,800,000	67,800,000		52,500,000

Interest Rate Mode	Percent of Total Variable Rate Debt	Par Outstanding	Weighted All-In Average Rate	Base Rate Average
Daily	52.49%	129,800,000	0.42%	0.01%
Weekly	47.51%	117,500,000	0.26%	0.04%
	100.00%	\$ 247,300,000	0.34%	0.03%
Fixed				
COPS 2016	28.93%	113,325,000	2.90%	
BABS 2010	44.67%	175,000,000	4.44%	(1)
SERIES 2016	26.40%	103,400,000	3.32%	
	100.00%	\$ 391,725,000	3.70%	
All-In Debt Rate Including \$60 Million Notional Amount of Swaps				2.91%

(1) Rate adjusted up from 4.35% as a result of sequestration reducing BAB's subsidy by 5.7%

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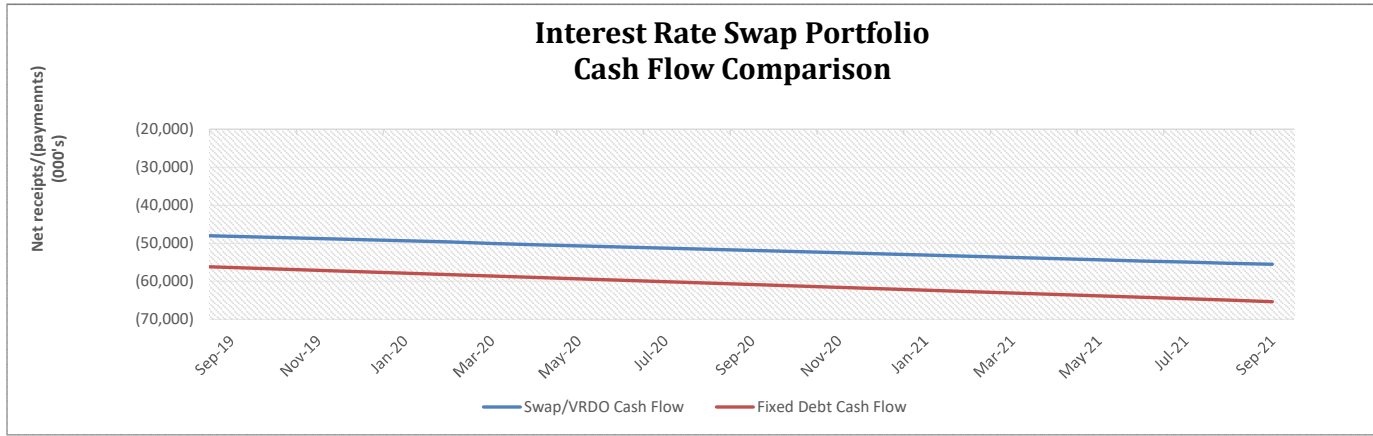
Exhibit "C"
Irvine Ranch Water District
Interest Rate Swap Summary
September 2021

	Prior Mo.	Current Mo.	12-Mo Avg
LIBOR Avg %	0.09%	0.08%	0.11%

Current Fiscal Year Active Swaps								Cash Flow				Mark to Market	
Effective Date	Maturity Date	Years to Maturity	Counter Party	Notional Amt	Type	Base Index	Fixed Rate	Prior Month	Current Month	Fiscal YTD	(Since 3/07) Cumulative Net Accrual	Current Mark to Market	Notional Difference
Fixed Payer Swaps - By Effective Date													
3/10/2007	3/10/2029	7.4	ML	30,000,000	FXP	LIBOR	5.687%	(144,329)	(135,231)	(419,420)	(20,178,687)	20,408,101	(9,591,899)
3/10/2007	3/10/2029	7.4	CG	30,000,000	FXP	LIBOR	5.687%	(144,329)	(135,231)	(419,420)	(20,178,687)	20,383,833	(9,616,167)
Totals/Weighted Avgs		7.4		\$ 60,000,000			5.687%	\$ (288,658)	\$ (270,462)	\$ (838,840)	\$ (40,357,373)	\$ 40,791,934	\$ (19,208,066)
Total Current Year Active Swaps				\$ 60,000,000				\$ (288,658)	\$ (270,462)	\$ (838,840)	\$ (40,357,373)	\$ 40,791,934	\$ (19,208,066)

Current Fiscal Year Terminated Swaps								Cash Flow				Mark to Market	
Effective Date	Maturity Date		Counter Party	Notional Amt	Type	Base Index	Fixed Rate	Prior Month	Current Month	Fiscal YTD	Cumulative Net Accrual	Current Mark to Market	Notional Difference
Total Current Year Terminated Swaps				\$ -				\$ -	\$ -	\$ -	\$ -	\$ -	\$ -

Current Fiscal Year - Total Swaps								Cash Flow				Mark to Market	
								Prior Month	Current Month	Fiscal YTD	Cumulative Net Accrual	Current Mark to Market	Notional Difference
Total Current Year Active & Terminated Swaps				\$ 60,000,000				\$ (288,658)	\$ (270,462)	\$ (838,840)	\$ (40,357,373)	\$ 40,791,934	\$ (19,208,066)



Cash Flow Comparison Synthetic Fixed vs. Fixed Rate Debt	
<u>Cash Flow to Date</u>	
Synthetic Fixed =	\$55,537,400
Fixed Rate =	\$65,340,896
Assumptions:	
- Fixed rate debt issued at 4.93% in Mar-07 (estimated TE rate - Bloomberg)	
- 'Synthetic' includes swap cash flow + interest + fees to date	

Note: This page is intentionally left blank.

Exhibit "D"

IRVINE RANCH WATER DISTRICT AP DISBURSEMENTS AND VOIDS FOR SEP 2021

CHECK OR ELECTRONIC #	PAYMENT DATE	SUPPLIERS	PAYMENT AMOUNT	PAYMENT METHOD	STATUS
420951	2-Sep-21	Garcia, Sandra E (Sandra)	2,959.30	IRWD Check	Reconciled
420952	2-Sep-21	Ledesma, Alejandro (Alex)	274.53	IRWD Check	Reconciled
420953	2-Sep-21	Oldewage, Lars D (Lars)	356.6	IRWD Check	Reconciled
420954	2-Sep-21	Paulson, David	194.95	IRWD Check	Reconciled
420955	2-Sep-21	Sinclair, Todd C (Todd)	80	IRWD Check	Reconciled
420956	2-Sep-21	Sosa, Ives (Ives)	80	IRWD Check	Reconciled
420957	2-Sep-21	ABSOLUTE STANDARDS, INC.	312.5	IRWD Check	Reconciled
420958	2-Sep-21	ACCUSTANDARD INC	54.01	IRWD Check	Reconciled
420959	2-Sep-21	AIRGAS, INC.	838.67	IRWD Check	Reconciled
420960	2-Sep-21	ALLIANT INSURANCE SERVICES,INC	1,250.00	IRWD Check	Reconciled
420961	2-Sep-21	AMAZON CAPITAL SERVICES, INC.	923.19	IRWD Check	Reconciled
420962	2-Sep-21	ANTHONY N. LARSEN	675	IRWD Check	Reconciled
420963	2-Sep-21	APPLIED ENGINEERING CONCEPTS	9,420.00	IRWD Check	Reconciled
420964	2-Sep-21	AQUA-METRIC SALES COMPANY	550.51	IRWD Check	Reconciled
420965	2-Sep-21	ARIZONA PIPELINE CO.	1,510.63	IRWD Check	Reconciled
420966	2-Sep-21	AT&T	4,600.12	IRWD Check	Reconciled
420967	2-Sep-21	AT&T	59.59	IRWD Check	Reconciled
420968	2-Sep-21	AT&T	372.86	IRWD Check	Reconciled
420969	2-Sep-21	AUTOZONE PARTS, INC.	751.31	IRWD Check	Reconciled
420970	2-Sep-21	BARTEL ASSOCIATES, LLC	1,449.40	IRWD Check	Reconciled
420971	2-Sep-21	BATTERY SYSTEMS INC	901.16	IRWD Check	Reconciled
420972	2-Sep-21	BECKMAN COULTER INC	2,332.64	IRWD Check	Reconciled
420973	2-Sep-21	BEST DRILLING AND PUMP, INC.	92,998.45	IRWD Check	Reconciled
420974	2-Sep-21	BLOOMBERG FINANCE LP	13,605.00	IRWD Check	Reconciled
420975	2-Sep-21	BROWN AND CALDWELL	5,877.23	IRWD Check	Reconciled
420976	2-Sep-21	C WELLS PIPELINE MATERIALS INC	12,078.20	IRWD Check	Reconciled
420977	2-Sep-21	CALIFORNIA BARRICADE RENTAL, INC.	4,520.00	IRWD Check	Reconciled
420978	2-Sep-21	CALIFORNIA PACIFIC HOMES	54.4	IRWD Check	Reconciled
420979	2-Sep-21	CANON SOLUTIONS AMERICA, INC.	19.67	IRWD Check	Reconciled
420980	2-Sep-21	CANTERBURY, JASON	16.43	IRWD Check	Negotiable
420981	2-Sep-21	CAPTIVE AUDIENCE MARKETING INC.	158	IRWD Check	Reconciled
420982	2-Sep-21	CARLSON, GALE	303.07	IRWD Check	Reconciled
420983	2-Sep-21	CDW GOVERNMENT LLC	189.88	IRWD Check	Reconciled
420984	2-Sep-21	CENTROID SYSTEMS, INC.	44,425.00	IRWD Check	Reconciled
420985	2-Sep-21	CHANG, JACK	38.47	IRWD Check	Reconciled
420986	2-Sep-21	CHANG, SOPHIA CHING-HSIN	69.77	IRWD Check	Negotiable
420987	2-Sep-21	CHEM TECH INTERNATIONAL INC	8,412.48	IRWD Check	Reconciled
420988	2-Sep-21	CHEN, XING	26.75	IRWD Check	Negotiable
420989	2-Sep-21	CITY OF LAKE FOREST	2,577.37	IRWD Check	Reconciled
420990	2-Sep-21	CITY OF NEWPORT BEACH	2,012.92	IRWD Check	Reconciled
420991	2-Sep-21	CITY OF ORANGE	267.48	IRWD Check	Reconciled
420992	2-Sep-21	CLA-VAL COMPANY	10,071.03	IRWD Check	Reconciled
420993	2-Sep-21	COAST PLUMBING HEATING AND AIR, INC	59.95	IRWD Check	Reconciled
420994	2-Sep-21	COASTAL IGNITION & CONTROLS, INC	427.15	IRWD Check	Reconciled
420995	2-Sep-21	COASTAL OCCUPATIONAL MEDICAL GROUP, INC.	945	IRWD Check	Reconciled
420996	2-Sep-21	COLBURN, JANINE	75.51	IRWD Check	Negotiable
420997	2-Sep-21	COLONIAL LIFE & ACCIDENT INSURANCE CO.	997.66	IRWD Check	Reconciled
420998	2-Sep-21	CONSTELLATION NEWENERGY, INC.	187,972.21	IRWD Check	Reconciled
420999	2-Sep-21	CORELOGIC INC	489.74	IRWD Check	Reconciled
421000	2-Sep-21	COUNTY OF ORANGE	25,360.00	IRWD Check	Reconciled
421001	2-Sep-21	COUNTY OF ORANGE	433.84	IRWD Check	Reconciled
421002	2-Sep-21	COX COMMUNICATIONS, INC.	113.56	IRWD Check	Reconciled
421003	2-Sep-21	D & H WATER SYSTEMS INC.	10,737.47	IRWD Check	Reconciled
421004	2-Sep-21	DE CASTRO, RALPH JEROME	383.6	IRWD Check	Reconciled
421005	2-Sep-21	DEVELOPMENT AND CONSERVATION MANAGEMENT, INC.	3,000.00	IRWD Check	Reconciled
421006	2-Sep-21	DIRECTV INC	146.99	IRWD Check	Reconciled
421007	2-Sep-21	DUDEK	7,685.00	IRWD Check	Reconciled
421008	2-Sep-21	EARTH TEK ENGINEERING CORPORATION	551.5	IRWD Check	Reconciled
421009	2-Sep-21	EAST ORANGE COUNTY WATER DISTRICT	3,195.64	IRWD Check	Reconciled
421010	2-Sep-21	ECODIRECT, INC	4,660.29	IRWD Check	Negotiable
421011	2-Sep-21	ELLMAN, RON	88.69	IRWD Check	Reconciled
421012	2-Sep-21	EMD MILLIPORE CORP.	6,059.65	IRWD Check	Reconciled
421013	2-Sep-21	ENVIRONMENTAL SCIENCE ASSOCIATES	7,133.83	IRWD Check	Reconciled

**IRVINE RANCH WATER DISTRICT
AP DISBURSEMENTS AND VOIDS FOR SEP 2021**

CHECK OR ELECTRONIC #	PAYMENT DATE	SUPPLIERS	PAYMENT AMOUNT	PAYMENT METHOD	STATUS
421014	2-Sep-21	EUROFINS CALSCIENCE, LLC	157.5	IRWD Check	Reconciled
421015	2-Sep-21	FEDEX	268.94	IRWD Check	Reconciled
421016	2-Sep-21	FERGUSON ENTERPRISES, LLC	2,415.98	IRWD Check	Reconciled
421017	2-Sep-21	FIRST AMERICAN TITLE CO.	3,250.00	IRWD Check	Reconciled
421018	2-Sep-21	FIRST CHOICE SERVICES	1,020.35	IRWD Check	Reconciled
421019	2-Sep-21	FISHER SCIENTIFIC COMPANY LLC	3,032.82	IRWD Check	Reconciled
421020	2-Sep-21	FRONTIER CALIFORNIA INC.	292.61	IRWD Check	Reconciled
421021	2-Sep-21	GEOPENTECH, INC.	2,307.50	IRWD Check	Reconciled
421022	2-Sep-21	GGG DEMOLITION INC.	875.08	IRWD Check	Reconciled
421023	2-Sep-21	GM SAGER CONSTRUCTION CO,INC.	44,500.00	IRWD Check	Reconciled
421024	2-Sep-21	GRAINGER	1,680.91	IRWD Check	Reconciled
421025	2-Sep-21	GRAYBAR ELECTRIC COMPANY	2,678.06	IRWD Check	Reconciled
421026	2-Sep-21	GSE CONSTRUCTION CO., INC	699,906.51	IRWD Check	Negotiable
421027	2-Sep-21	HAAKER EQUIPMENT COMPANY	937	IRWD Check	Reconciled
421028	2-Sep-21	HACH COMPANY	7,107.46	IRWD Check	Reconciled
421029	2-Sep-21	HARPER & ASSOCIATES ENGINEERING INC	9,310.00	IRWD Check	Reconciled
421030	2-Sep-21	HARRINGTON INDUSTRIAL PLASTICS LLC	8,770.36	IRWD Check	Reconciled
421031	2-Sep-21	HARTFORD LIFE AND ACCIDENT INSURANCE COMPANY	66.94	IRWD Check	Reconciled
421032	2-Sep-21	HELPMATES STAFFING SERVICES	1,325.20	IRWD Check	Reconciled
421033	2-Sep-21	HI-LINE INC	235.25	IRWD Check	Reconciled
421034	2-Sep-21	HILL BROTHERS CHEMICAL COMPANY	8,891.13	IRWD Check	Reconciled
421035	2-Sep-21	HOME DEPOT USA INC	1,052.30	IRWD Check	Reconciled
421036	2-Sep-21	HOPKINS TECHNICAL PRODUCTS INC	3,874.96	IRWD Check	Reconciled
421037	2-Sep-21	HUANG, PEII	44.59	IRWD Check	Reconciled
421038	2-Sep-21	HYAS GROUP, LLC	8,500.00	IRWD Check	Reconciled
421039	2-Sep-21	IDEXX DISTRIBUTION, INC	14,119.73	IRWD Check	Reconciled
421040	2-Sep-21	INDUSTRIAL METAL SUPPLY CO	209.52	IRWD Check	Reconciled
421041	2-Sep-21	INNOVATIVE MACHINE TOOL REPAIR LLC	1,258.21	IRWD Check	Reconciled
421042	2-Sep-21	IRWD-PETTY CASH CUSTODIAN	804.43	IRWD Check	Reconciled
421043	2-Sep-21	JAMBOREE SMOG	116	IRWD Check	Reconciled
421044	2-Sep-21	JAMES AND LAVON DEGRAW	25.93	IRWD Check	Reconciled
421045	2-Sep-21	JAMES BRADFORD HALDEMAN	3,195.00	IRWD Check	Reconciled
421046	2-Sep-21	JCI JONES CHEMICALS INC	8,710.43	IRWD Check	Reconciled
421047	2-Sep-21	KAN VENTURES, INC	6,500.00	IRWD Check	Reconciled
421048	2-Sep-21	KB HOMES	228.53	IRWD Check	Reconciled
421049	2-Sep-21	KREGER, ANDREW	29.93	IRWD Check	Negotiable
421050	2-Sep-21	KRONICK MOSKOVITZ TIEDEMANN & GIRARD	64,755.24	IRWD Check	Reconciled
421051	2-Sep-21	KURZ INSTRUMENTS INC	1,200.00	IRWD Check	Reconciled
421052	2-Sep-21	LANDCARE HOLDINGS, INC.	8,454.17	IRWD Check	Reconciled
421053	2-Sep-21	LE, CARMEN	56.76	IRWD Check	Reconciled
421054	2-Sep-21	LEE & RO, INC.	12,301.00	IRWD Check	Reconciled
421055	2-Sep-21	LEE, GORDON	57.57	IRWD Check	Reconciled
421056	2-Sep-21	LENNAR HOMES OF CALIFORNIA, INC.	488.27	IRWD Check	Reconciled
421057	2-Sep-21	LINE-X OF SOUTH COAST	4,731.25	IRWD Check	Reconciled
421058	2-Sep-21	LIQU, NANCY	25	IRWD Check	Reconciled
421059	2-Sep-21	LIPPMAN, DAVID	68.81	IRWD Check	Reconciled
421060	2-Sep-21	MA, DESHENG	98.75	IRWD Check	Reconciled
421061	2-Sep-21	MADDOX ELECTRIC INC.	9,288.15	IRWD Check	Reconciled
421062	2-Sep-21	MBC AQUATIC SCIENCES, INC.	1,400.00	IRWD Check	Reconciled
421063	2-Sep-21	MC FADDEN-DALE INDUSTRIAL	981.5	IRWD Check	Reconciled
421064	2-Sep-21	MCHENRY, NICOLE	82.98	IRWD Check	Voided
421065	2-Sep-21	METTLER-TOLEDO RAININ, LLC	548.5	IRWD Check	Reconciled
421066	2-Sep-21	MILES CHEMICAL COMPANY, INC.	6,108.96	IRWD Check	Reconciled
421067	2-Sep-21	MOODY'S INVESTORS SERVICE INC	2,300.00	IRWD Check	Reconciled
421068	2-Sep-21	MORGAN COMPANY	241.13	IRWD Check	Reconciled
421069	2-Sep-21	MYERS & SONS HI-WAY SAFETY, INC.	2,999.76	IRWD Check	Reconciled
421070	2-Sep-21	NEWETT, CAMERON	54.44	IRWD Check	Reconciled
421071	2-Sep-21	NEWPORT CAPITAL LLC	38.11	IRWD Check	Reconciled
421072	2-Sep-21	NTRUST INFOTECH	85.34	IRWD Check	Reconciled
421073	2-Sep-21	O'REILLY AUTO ENTERPRISES, LLC	27.45	IRWD Check	Reconciled
421074	2-Sep-21	OLIN CORPORATION	30,394.06	IRWD Check	Reconciled
421075	2-Sep-21	ORACLE AMERICA, INC.	30,568.15	IRWD Check	Reconciled
421076	2-Sep-21	ORANGE COUNTY AUTO PARTS CO	1,854.57	IRWD Check	Reconciled

**IRVINE RANCH WATER DISTRICT
AP DISBURSEMENTS AND VOIDS FOR SEP 2021**

CHECK OR ELECTRONIC #	PAYMENT DATE	SUPPLIERS	PAYMENT AMOUNT	PAYMENT METHOD	STATUS
421077	2-Sep-21	ORANGE COUNTY CURRENT AFFAIRS FORUM	1,000.00	IRWD Check	Reconciled
421078	2-Sep-21	PACIFIC STAR CHEMICAL, LLC	1,956.42	IRWD Check	Reconciled
421079	2-Sep-21	PACRIM ENGINEERING INC.	825	IRWD Check	Reconciled
421080	2-Sep-21	PARKHOUSE TIRE INC	3,642.59	IRWD Check	Reconciled
421081	2-Sep-21	PASCAL & LUDWIG CONSTRUCTORS	13,832.60	IRWD Check	Reconciled
421082	2-Sep-21	PASCAL & LUDWIG CONSTRUCTORS	262,819.33	IRWD Check	Reconciled
421083	2-Sep-21	PAULUS ENGINEERING INC	33,349.30	IRWD Check	Reconciled
421084	2-Sep-21	PAULUS ENGINEERING INC	1,651.98	IRWD Check	Reconciled
421085	2-Sep-21	PELLETIER & ASSOCIATES, INC.	315	IRWD Check	Reconciled
421086	2-Sep-21	PIPELINE PRODUCTS, INC.	219.55	IRWD Check	Reconciled
421087	2-Sep-21	PRAXAIR DISTRIBUTION INC	1,699.74	IRWD Check	Reconciled
421088	2-Sep-21	PRE-PAID LEGAL SERVICES, INC.	897.4	IRWD Check	Reconciled
421089	2-Sep-21	PRO MOBILE AUTO DETAILING	300	IRWD Check	Reconciled
421090	2-Sep-21	PRUDENTIAL OVERALL SUPPLY	9,870.00	IRWD Check	Reconciled
421091	2-Sep-21	PUCCIO, JOE	6,200.28	IRWD Check	Reconciled
421092	2-Sep-21	R.F. MACDONALD CO.	2,800.00	IRWD Check	Reconciled
421093	2-Sep-21	RAM AIR ENGINEERING INC	4,989.72	IRWD Check	Reconciled
421094	2-Sep-21	REACH EMPLOYEE ASSISTANCE INC	1,083.60	IRWD Check	Reconciled
421095	2-Sep-21	RED WING SHOE STORE	360	IRWD Check	Reconciled
421096	2-Sep-21	RELIABLE WATER SOLUTIONS, LLC	6,906.69	IRWD Check	Reconciled
421097	2-Sep-21	RELIANCE STANDARD LIFE INSURANCE COMPANY	31,542.47	IRWD Check	Reconciled
421098	2-Sep-21	RICHARDSON, PETER H	1,818.00	IRWD Check	Reconciled
421099	2-Sep-21	RINCON TRUCK CENTER INC.	3,009.59	IRWD Check	Reconciled
421100	2-Sep-21	RUPASINGHE, YADDEHI GEDARA	28.11	IRWD Check	Reconciled
421101	2-Sep-21	SANTA ANA WATERSHED PROJECT AUTHORITY	8,693.00	IRWD Check	Reconciled
421102	2-Sep-21	SANTA MARGARITA FORD	2,595.07	IRWD Check	Reconciled
421103	2-Sep-21	SCHINDLER ELEVATOR CORPORATION	236.62	IRWD Check	Reconciled
421104	2-Sep-21	SCHULTZ, ROBERT L	101.63	IRWD Check	Reconciled
421105	2-Sep-21	SEAL ANALYTICAL INC	2,065.44	IRWD Check	Reconciled
421106	2-Sep-21	SHAMROCK SUPPLY CO INC	77.54	IRWD Check	Reconciled
421107	2-Sep-21	SITEONE LANDSCAPE SUPPLY, LLC	1,049.94	IRWD Check	Reconciled
421108	2-Sep-21	SMT AUTOMOTIVE LLC	3,189.55	IRWD Check	Reconciled
421109	2-Sep-21	SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT	799.67	IRWD Check	Reconciled
421110	2-Sep-21	SOUTHERN CALIFORNIA EDISON COMPANY	153,179.55	IRWD Check	Reconciled
421111	2-Sep-21	SOUTHERN CALIFORNIA GAS COMPANY	926.67	IRWD Check	Reconciled
421112	2-Sep-21	SS MECHANICAL CONSTRUCTION CORP	8,411.77	IRWD Check	Reconciled
421113	2-Sep-21	STETSON ENGINEERS INC.	970.61	IRWD Check	Reconciled
421114	2-Sep-21	STREAKWAVE WIRELESS, INC.	6,270.88	IRWD Check	Reconciled
421115	2-Sep-21	SWAINS ELECTRIC MOTOR SERVICE	5,963.68	IRWD Check	Reconciled
421116	2-Sep-21	TAIT ENVIRONMENTAL SERVICES, INC.	1,457.50	IRWD Check	Reconciled
421117	2-Sep-21	TANKVISIONS, INC	30	IRWD Check	Reconciled
421118	2-Sep-21	TELLER, JEFFREY	74.4	IRWD Check	Negotiable
421119	2-Sep-21	TETRA TECH, INC	7,351.57	IRWD Check	Reconciled
421120	2-Sep-21	THOMAS SCIENTIFIC HOLDINGS, LLC	38.23	IRWD Check	Reconciled
421121	2-Sep-21	THOMPSON & PHIPPS INC	2,050.84	IRWD Check	Reconciled
421122	2-Sep-21	TK ELEVATOR CORPORATION	211.44	IRWD Check	Reconciled
421123	2-Sep-21	TLG PAVING COMPANY, INC	1,548.67	IRWD Check	Reconciled
421124	2-Sep-21	TOLL BROS., INC.	37.7	IRWD Check	Reconciled
421125	2-Sep-21	TOTAL RESOURCE MANAGEMENT, INC	5,567.50	IRWD Check	Reconciled
421126	2-Sep-21	TRUCK CRANE RENTAL	3,132.00	IRWD Check	Reconciled
421127	2-Sep-21	U S RIGGING SUPPLY	1,086.86	IRWD Check	Reconciled
421128	2-Sep-21	UNITED PARCEL SERVICE INC	162.3	IRWD Check	Reconciled
421129	2-Sep-21	VERIZON WIRELESS SERVICES LLC	22,080.81	IRWD Check	Reconciled
421130	2-Sep-21	VERTECH INDUSTRIAL SYSTEMS, LLC	5,122.50	IRWD Check	Reconciled
421131	2-Sep-21	VWR INTERNATIONAL, LLC	3,866.04	IRWD Check	Reconciled
421132	2-Sep-21	WAGENER LAW, A PROFESSIONAL CORPORATION	22,367.50	IRWD Check	Reconciled
421133	2-Sep-21	WASTE MANAGEMENT COLLECTIONS AND RECYCLING, INC.	2,870.47	IRWD Check	Reconciled
421134	2-Sep-21	WATER TREATMENT CHEMICALS INC	12,055.04	IRWD Check	Reconciled
421135	2-Sep-21	WATERSMART SOFTWARE INC	13,547.23	IRWD Check	Reconciled
421136	2-Sep-21	WAXIE'S ENTERPRISES, INC	647.51	IRWD Check	Reconciled
421137	2-Sep-21	WEBER WATER RESOURCES CA, LLC	112,364.28	IRWD Check	Reconciled
421138	2-Sep-21	WECK LABORATORIES INC	1,242.00	IRWD Check	Reconciled
421139	2-Sep-21	WEST COAST SAFETY SUPPLY INC	4,612.78	IRWD Check	Reconciled

**IRVINE RANCH WATER DISTRICT
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CHECK OR ELECTRONIC #	PAYMENT DATE	SUPPLIERS	PAYMENT AMOUNT	PAYMENT METHOD	STATUS
421140	2-Sep-21	WESTAMERICA COMMUNICATIONS, INC.	1,425.00	IRWD Check	Reconciled
421141	2-Sep-21	WIRELESS WATCHDOGS, LLC	1,960.00	IRWD Check	Reconciled
421142	2-Sep-21	WOODARD & CURRAN INC	2,359.50	IRWD Check	Reconciled
421143	2-Sep-21	YASIN, SALAM	14.24	IRWD Check	Negotiable
421144	2-Sep-21	YORK RISK SERVICES GROUP, INC.	8,584.25	IRWD Check	Reconciled
421145	2-Sep-21	YORKE ENGINEERING, LLC	1,357.50	IRWD Check	Reconciled
421146	2-Sep-21	Strunk, Robert	110	IRWD Check	Reconciled
421147	2-Sep-21	Haney, Lisa	432.42	IRWD Check	Negotiable
421148	2-Sep-21	Wang, Peter (Peter)	60	IRWD Check	Reconciled
421149	9-Sep-21	Bill, Cody (Cody)	204	IRWD Check	Reconciled
421150	9-Sep-21	Fabris, John	19.82	IRWD Check	Reconciled
421151	9-Sep-21	Gronlund, Brandon A	125	IRWD Check	Reconciled
421152	9-Sep-21	Jordan, Dawn M (Dawn)	22.06	IRWD Check	Reconciled
421153	9-Sep-21	Marcacci, Mark	180	IRWD Check	Reconciled
421154	9-Sep-21	Mwe, Nang	180	IRWD Check	Reconciled
421155	9-Sep-21	Ordonez, Bernardino A (Berny)	3,000.00	IRWD Check	Reconciled
421156	9-Sep-21	Sosa, Ives (Ives)	200	IRWD Check	Reconciled
421157	9-Sep-21	ABC ICE, INC	1,084.46	IRWD Check	Reconciled
421158	9-Sep-21	ACCUSOURCE, INC.	242.12	IRWD Check	Reconciled
421159	9-Sep-21	AIRGAS, INC.	3,807.16	IRWD Check	Reconciled
421160	9-Sep-21	AMAZON CAPITAL SERVICES, INC.	342	IRWD Check	Reconciled
421161	9-Sep-21	AMETEK BROOKFIELD	242.49	IRWD Check	Reconciled
421162	9-Sep-21	AQUA-METRIC SALES COMPANY	40,892.42	IRWD Check	Reconciled
421163	9-Sep-21	ASHFORD, WALT	737.2	IRWD Check	Reconciled
421164	9-Sep-21	AUTOZONE PARTS, INC.	46.26	IRWD Check	Reconciled
421165	9-Sep-21	AVIAT U.S., INC	470	IRWD Check	Reconciled
421166	9-Sep-21	BATTERIES PLUS AND BATTERIES PLUS BULBS	231.61	IRWD Check	Negotiable
421167	9-Sep-21	BORCHARD SURVEYING & MAPPING, INC.	700	IRWD Check	Reconciled
421168	9-Sep-21	BRENNTAG PACIFIC INC	41,826.61	IRWD Check	Reconciled
421169	9-Sep-21	BSI SERVICES AND SOLUTIONS (WEST) INC.	20,345.00	IRWD Check	Reconciled
421170	9-Sep-21	BURKE, WILLIAMS & SORENSEN, LLP	1,072.50	IRWD Check	Reconciled
421171	9-Sep-21	C WELLS PIPELINE MATERIALS INC	28,068.88	IRWD Check	Reconciled
421172	9-Sep-21	CALIFORNIA BARRICADE RENTAL, INC.	6,145.00	IRWD Check	Reconciled
421173	9-Sep-21	CALIFORNIA DEPARTMENT OF TAX AND FEE ADMINISTRATION	2,170.00	IRWD Check	Reconciled
421174	9-Sep-21	CALPACS (CALIFORNIA PUBLIC AGENCY COMPENSATION SURVEY)	550	IRWD Check	Negotiable
421175	9-Sep-21	CANON SOLUTIONS AMERICA, INC.	41.03	IRWD Check	Reconciled
421176	9-Sep-21	CDW GOVERNMENT LLC	6,872.50	IRWD Check	Reconciled
421177	9-Sep-21	CHARLES P CROWLEY COMPANY INC	21,581.41	IRWD Check	Reconciled
421178	9-Sep-21	CHEM TECH INTERNATIONAL INC	16,902.19	IRWD Check	Reconciled
421179	9-Sep-21	CITY OF IRVINE	5,011.62	IRWD Check	Reconciled
421180	9-Sep-21	CLA-VAL COMPANY	583.4	IRWD Check	Reconciled
421181	9-Sep-21	CLARKSTON-POTOMAC GROUP, INC.	3,975.00	IRWD Check	Reconciled
421182	9-Sep-21	CLEAN ENERGY	5,885.97	IRWD Check	Reconciled
421183	9-Sep-21	COASTAL OCCUPATIONAL MEDICAL GROUP, INC.	296.3	IRWD Check	Reconciled
421184	9-Sep-21	CONNEXUS INDUSTRIES INC.	5,926.04	IRWD Check	Reconciled
421185	9-Sep-21	CONSTELLATION NEWENERGY, INC.	177,163.38	IRWD Check	Reconciled
421186	9-Sep-21	CORE & MAIN LP	22,005.24	IRWD Check	Reconciled
421187	9-Sep-21	CORELOGIC INC	63.27	IRWD Check	Reconciled
421188	9-Sep-21	DEMARIA ELECTRIC MOTOR SERVICES, INC.	600	IRWD Check	Reconciled
421189	9-Sep-21	DEX MEDIA, INC.	182	IRWD Check	Reconciled
421190	9-Sep-21	DRIVELINES INC	370	IRWD Check	Reconciled
421191	9-Sep-21	EAGLE PRINT DYNAMICS	2,123.07	IRWD Check	Reconciled
421192	9-Sep-21	EMEDCO	407.08	IRWD Check	Reconciled
421193	9-Sep-21	ENVIRONMENTAL ENGINEERING AND CONTRACTING, INC.	19,930.00	IRWD Check	Reconciled
421194	9-Sep-21	ENVIRONMENTAL EQUIPMENT SUPPLY	444.61	IRWD Check	Reconciled
421195	9-Sep-21	ENVIRONMENTAL EXPRESS INC	433.88	IRWD Check	Reconciled
421196	9-Sep-21	ENVIRONMENTAL RESOURCE ASSOCIATES	1,419.51	IRWD Check	Reconciled
421197	9-Sep-21	ENVIRONMENTAL SCIENCE ASSOCIATES	2,986.84	IRWD Check	Reconciled
421198	9-Sep-21	EQUALTOX, LLC	9,000.00	IRWD Check	Reconciled
421199	9-Sep-21	EUCI	4,780.00	IRWD Check	Reconciled
421200	9-Sep-21	EUROFINS CALSCIENCE, LLC	1,176.00	IRWD Check	Reconciled
421201	9-Sep-21	FASTBLUE COMMUNICATIONS INC.	1,917.00	IRWD Check	Reconciled
421202	9-Sep-21	FEDEX	159.97	IRWD Check	Reconciled

**IRVINE RANCH WATER DISTRICT
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CHECK OR ELECTRONIC #	PAYMENT DATE	SUPPLIERS	PAYMENT AMOUNT	PAYMENT METHOD	STATUS
421203	9-Sep-21	FERGUSON ENTERPRISES, LLC	5,685.79	IRWD Check	Reconciled
421204	9-Sep-21	FISHER SCIENTIFIC COMPANY LLC	18,640.39	IRWD Check	Reconciled
421205	9-Sep-21	FLEET SOLUTIONS LLC	5,774.14	IRWD Check	Reconciled
421206	9-Sep-21	FRANCHISE TAX BOARD	850	IRWD Check	Negotiable
421207	9-Sep-21	FULLER TRUCK ACCESSORIES	477.84	IRWD Check	Reconciled
421208	9-Sep-21	FUSCOE ENGINEERING, INC.	3,800.00	IRWD Check	Reconciled
421209	9-Sep-21	GANAHL LUMBER CO.	1,813.03	IRWD Check	Reconciled
421210	9-Sep-21	GARY BALE REDI-MIX CONCRETE, INC.	1,328.88	IRWD Check	Reconciled
421211	9-Sep-21	GI ENDURANT LLC	32,083.00	IRWD Check	Reconciled
421212	9-Sep-21	GRAINGER	3,552.35	IRWD Check	Reconciled
421213	9-Sep-21	GRAYBAR ELECTRIC COMPANY	496.03	IRWD Check	Reconciled
421214	9-Sep-21	HAAKER EQUIPMENT COMPANY	3,865.13	IRWD Check	Reconciled
421215	9-Sep-21	HACH COMPANY	21,498.74	IRWD Check	Reconciled
421216	9-Sep-21	HARRINGTON INDUSTRIAL PLASTICS LLC	380.34	IRWD Check	Reconciled
421217	9-Sep-21	HDR ENGINEERING INC	75,493.08	IRWD Check	Reconciled
421218	9-Sep-21	HELPMATES STAFFING SERVICES LLC	1,308.64	IRWD Check	Reconciled
421219	9-Sep-21	HI-LINE INC	236.65	IRWD Check	Reconciled
421220	9-Sep-21	HILL BROTHERS CHEMICAL COMPANY	14,036.79	IRWD Check	Reconciled
421221	9-Sep-21	HOME DEPOT USA INC	467.31	IRWD Check	Reconciled
421222	9-Sep-21	IDEA HALL	12,218.68	IRWD Check	Reconciled
421223	9-Sep-21	INFOSEND, INC.	19,510.52	IRWD Check	Reconciled
421224	9-Sep-21	INTERNATIONAL BROTHERHOOD OF ELECTRICAL WORKERS LOCAL 47	3,188.36	IRWD Check	Reconciled
421225	9-Sep-21	IRON MOUNTAIN INFORMATION MANAGEMENT INC	676.61	IRWD Check	Reconciled
421226	9-Sep-21	IRVINE PIPE & SUPPLY INC	1,182.05	IRWD Check	Reconciled
421227	9-Sep-21	IRWD-PETTY CASH CUSTODIAN	1,744.15	IRWD Check	Reconciled
421228	9-Sep-21	JCI JONES CHEMICALS INC	7,360.49	IRWD Check	Reconciled
421229	9-Sep-21	JIG CONSULTANTS	322.92	IRWD Check	Reconciled
421230	9-Sep-21	KAESER COMPRESSORS, INC.	2,110.30	IRWD Check	Reconciled
421231	9-Sep-21	LANDCARE HOLDINGS, INC.	35,061.58	IRWD Check	Reconciled
421232	9-Sep-21	LEIGHTON CONSULTING, INC.	2,087.05	IRWD Check	Reconciled
421233	9-Sep-21	LINDSAY POLIC CONSULTING, INC.	5,500.00	IRWD Check	Reconciled
421234	9-Sep-21	LUM, JOEY P	133.96	IRWD Check	Negotiable
421235	9-Sep-21	MC MASTER CARR SUPPLY CO	202.75	IRWD Check	Reconciled
421236	9-Sep-21	MICHAEL BAKER INTERNATIONAL, INC.	3,960.00	IRWD Check	Reconciled
421237	9-Sep-21	MICROSOFT CORPORATION	20	IRWD Check	Reconciled
421238	9-Sep-21	NATURES IMAGE INC	9,185.00	IRWD Check	Reconciled
421239	9-Sep-21	NEPTUNE TECHNOLOGY GROUP, INC.	198,863.40	IRWD Check	Reconciled
421240	9-Sep-21	O.C. SUPERIOR CUSTOM CLEANING	960	IRWD Check	Negotiable
421241	9-Sep-21	OLIN CORPORATION	36,595.26	IRWD Check	Reconciled
421242	9-Sep-21	ORACLE AMERICA, INC.	245,982.07	IRWD Check	Reconciled
421243	9-Sep-21	ORANGE COUNTY AUTO PARTS CO	25.42	IRWD Check	Reconciled
421244	9-Sep-21	ORANGE COUNTY SANITATION DISTRICT	511,623.40	IRWD Check	Reconciled
421245	9-Sep-21	PAPER DEPOT DOCUMENT DESTRUCTION LLC	459	IRWD Check	Reconciled
421246	9-Sep-21	PARKHOUSE TIRE INC	181.5	IRWD Check	Reconciled
421247	9-Sep-21	PELLETIER & ASSOCIATES, INC.	390	IRWD Check	Reconciled
421248	9-Sep-21	PERS LONG TERM CARE	447.62	IRWD Check	Reconciled
421249	9-Sep-21	PRAXAIR DISTRIBUTION INC	461.44	IRWD Check	Reconciled
421250	9-Sep-21	PRUDENTIAL OVERALL SUPPLY	11,113.09	IRWD Check	Reconciled
421251	9-Sep-21	PSOMAS	3,735.00	IRWD Check	Reconciled
421252	9-Sep-21	PYRO-COMM SYSTEMS INC	985	IRWD Check	Reconciled
421253	9-Sep-21	QUADIENT LEASING USA, INC.	3,265.46	IRWD Check	Reconciled
421254	9-Sep-21	QUALITY ENVIRONMENTAL CONTAINERS	3,039.06	IRWD Check	Reconciled
421255	9-Sep-21	RAM AIR ENGINEERING INC	5,107.61	IRWD Check	Reconciled
421256	9-Sep-21	RED WING SHOE STORE	787.74	IRWD Check	Reconciled
421257	9-Sep-21	REFRIGERATION SUPPLIES DISTRIBUTOR	136.05	IRWD Check	Reconciled
421258	9-Sep-21	RESTEK CORPORATION	695.23	IRWD Check	Reconciled
421259	9-Sep-21	S & J SUPPLY CO INC	12,849.19	IRWD Check	Reconciled
421260	9-Sep-21	SHAMROCK SUPPLY CO INC	515.05	IRWD Check	Reconciled
421261	9-Sep-21	SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT	38,246.37	IRWD Check	Reconciled
421262	9-Sep-21	SOUTH COAST WATER CO.	95	IRWD Check	Reconciled
421263	9-Sep-21	SOUTHERN CALIFORNIA EDISON COMPANY	189,664.81	IRWD Check	Reconciled
421264	9-Sep-21	SOUTHSIDE TOWING	750	IRWD Check	Reconciled
421265	9-Sep-21	STANTEC CONSULTING SERVICES INC.	5,100.00	IRWD Check	Reconciled

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CHECK OR ELECTRONIC #	PAYMENT DATE	SUPPLIERS	PAYMENT AMOUNT	PAYMENT METHOD	STATUS
421266	9-Sep-21	SUKLE ADVERTISING INC.	46,298.82	IRWD Check	Reconciled
421267	9-Sep-21	SUNSHINE SUPPLY COMPANY, INC.	791.06	IRWD Check	Reconciled
421268	9-Sep-21	TESTAMERICA LABORATORIES, INC.	823	IRWD Check	Reconciled
421269	9-Sep-21	THE SHERWIN WILLIAMS COMPANY	1,009.94	IRWD Check	Reconciled
421270	9-Sep-21	TRUCK CRANE RENTAL	10,724.40	IRWD Check	Negotiable
421271	9-Sep-21	TRUKSPECT, INC	905.88	IRWD Check	Reconciled
421272	9-Sep-21	U.S. GAIN - A DIVISION OF U.S. VENTURE, INC.	626.05	IRWD Check	Reconciled
421273	9-Sep-21	UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA	5,394.82	IRWD Check	Reconciled
421274	9-Sep-21	UNITED PARCEL SERVICE INC	98.97	IRWD Check	Reconciled
421275	9-Sep-21	UNITED SITE SERVICES OF CALIFORNIA INC	689.7	IRWD Check	Reconciled
421276	9-Sep-21	WASTE MANAGEMENT COLLECTIONS AND RECYCLING, INC.	626.85	IRWD Check	Reconciled
421277	9-Sep-21	WATERLINE TECHNOLOGIES INC	8,538.08	IRWD Check	Reconciled
421278	9-Sep-21	WAXIE'S ENTERPRISES, INC	1,298.62	IRWD Check	Reconciled
421279	9-Sep-21	WECK LABORATORIES INC	1,294.00	IRWD Check	Reconciled
421280	9-Sep-21	WEST COAST SAFETY SUPPLY INC	5,387.50	IRWD Check	Reconciled
421281	9-Sep-21	WEST COAST SAND & GRAVEL INC.	3,901.61	IRWD Check	Reconciled
421282	9-Sep-21	WEST YOST & ASSOCIATES, INC.	2,889.50	IRWD Check	Reconciled
421283	9-Sep-21	WORKFORCE SAFETY LLC	3,000.00	IRWD Check	Negotiable
421284	9-Sep-21	WORKHORSE DIVING AND SALVAGE, LLC	28,150.00	IRWD Check	Reconciled
421285	9-Sep-21	ZEBRON CONTRACTING INC	8,750.00	IRWD Check	Reconciled
421286	16-Sep-21	Breiter, Michelle	23.52	IRWD Check	Reconciled
421287	16-Sep-21	Orozco, Gustavo A (Gus)	91	IRWD Check	Reconciled
421288	16-Sep-21	8X8 INC	9,575.16	IRWD Check	Reconciled
421289	16-Sep-21	ABM INDUSTRY GROUPS, LLC	9,926.00	IRWD Check	Reconciled
421290	16-Sep-21	ABSOLUTE STANDARDS, INC.	165	IRWD Check	Reconciled
421291	16-Sep-21	ADS CORP.	2,325.00	IRWD Check	Reconciled
421292	16-Sep-21	AECOM TECHNICAL SERVICES, INC.	27,754.00	IRWD Check	Negotiable
421293	16-Sep-21	AGERTER RAITOR, ASHLEY	49.9	IRWD Check	Reconciled
421294	16-Sep-21	AGILENT TECHNOLOGIES, INC.	34,585.32	IRWD Check	Reconciled
421295	16-Sep-21	AIRGAS, INC.	988.25	IRWD Check	Reconciled
421296	16-Sep-21	ALEXANDER'S CONTRACT SERVICES, INC.	128,384.13	IRWD Check	Reconciled
421297	16-Sep-21	ALSTON & BIRD LLP	29,995.77	IRWD Check	Reconciled
421298	16-Sep-21	AM CONSERVATION GROUP, INC.	184.24	IRWD Check	Reconciled
421299	16-Sep-21	AMAZON CAPITAL SERVICES, INC.	243.37	IRWD Check	Reconciled
421300	16-Sep-21	AMERICAN ASPHALT SOUTH INC	341	IRWD Check	Reconciled
421301	16-Sep-21	APPLIED ENGINEERING CONCEPTS	3,140.00	IRWD Check	Reconciled
421302	16-Sep-21	ARCHROCK SERVICES, L.P.	3,374.16	IRWD Check	Reconciled
421303	16-Sep-21	ASSOCIATION OF CALIFORNIA WATER AGENCIES/JPIA	38,643.51	IRWD Check	Reconciled
421304	16-Sep-21	AT&T	103.08	IRWD Check	Reconciled
421305	16-Sep-21	AT&T	1,106.82	IRWD Check	Reconciled
421306	16-Sep-21	AT&T	1,681.43	IRWD Check	Reconciled
421307	16-Sep-21	ATHENS SERVICES	2,777.04	IRWD Check	Reconciled
421308	16-Sep-21	AUTOZONE PARTS, INC.	13.86	IRWD Check	Reconciled
421309	16-Sep-21	AZTEC CONTAINER	16,140.95	IRWD Check	Reconciled
421310	16-Sep-21	BATTERIES PLUS AND BATTERIES PLUS BULBS	157.11	IRWD Check	Reconciled
421311	16-Sep-21	BEST DRILLING AND PUMP, INC.	27,455.00	IRWD Check	Reconciled
421312	16-Sep-21	BIOMAGIC INC	7,027.96	IRWD Check	Reconciled
421313	16-Sep-21	BLACK & VEATCH CORPORATION	34,844.75	IRWD Check	Reconciled
421314	16-Sep-21	BORA, SRINIVASA	70.96	IRWD Check	Negotiable
421315	16-Sep-21	C WELLS PIPELINE MATERIALS INC	141.69	IRWD Check	Reconciled
421316	16-Sep-21	CAL MICROTURBINE, INC.	950	IRWD Check	Reconciled
421317	16-Sep-21	CALIFORNIA BARRICADE RENTAL, INC.	24,543.75	IRWD Check	Reconciled
421318	16-Sep-21	CAMERON-AZIZ, NANCY	22.58	IRWD Check	Reconciled
421319	16-Sep-21	CANON FINANCIAL SERVICES, INC	8,343.52	IRWD Check	Negotiable
421320	16-Sep-21	CHAIREL CUSTOM HAY, INC.	5,556.33	IRWD Check	Reconciled
421321	16-Sep-21	CIMARRON ENERGY, INC	1,673.04	IRWD Check	Reconciled
421322	16-Sep-21	CITY OF IRVINE	628,532.97	IRWD Check	Reconciled
421323	16-Sep-21	CNC ENGINEERING	8,500.00	IRWD Check	Reconciled
421324	16-Sep-21	COASTAL OCCUPATIONAL MEDICAL GROUP, INC.	390	IRWD Check	Negotiable
421325	16-Sep-21	CONSTELLATION NEWENERGY, INC.	678.58	IRWD Check	Reconciled
421326	16-Sep-21	COOMBS SERVICE GROUP	72,700.00	IRWD Check	Reconciled
421327	16-Sep-21	CORELOGIC INC	43.44	IRWD Check	Reconciled
421328	16-Sep-21	COX COMMUNICATIONS, INC.	275.37	IRWD Check	Reconciled

**IRVINE RANCH WATER DISTRICT
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CHECK OR ELECTRONIC #	PAYMENT DATE	SUPPLIERS	PAYMENT AMOUNT	PAYMENT METHOD	STATUS
421329	16-Sep-21	CR & R INCORPORATED	427.3	IRWD Check	Reconciled
421330	16-Sep-21	D & H WATER SYSTEMS INC.	4,884.88	IRWD Check	Reconciled
421331	16-Sep-21	DELL MARKETING LP	1,832.76	IRWD Check	Reconciled
421332	16-Sep-21	DEX MEDIA, INC.	91	IRWD Check	Reconciled
421333	16-Sep-21	DG INVESTMENT INTERMEDIATE HOLDINGS 2, INC.	627	IRWD Check	Reconciled
421334	16-Sep-21	DILYTICS INC	2,800.00	IRWD Check	Reconciled
421335	16-Sep-21	DISTRICT ONE WEST BA 153, LLC	600.17	IRWD Check	Negotiable
421336	16-Sep-21	DRAKE TRAFFIC CONTROL SERVICES INC	6,620.00	IRWD Check	Reconciled
421337	16-Sep-21	E&M ELECTRIC AND MACHINERY, INC.	660	IRWD Check	Reconciled
421338	16-Sep-21	EI&C ENGINEERING INC.	28,277.00	IRWD Check	Reconciled
421339	16-Sep-21	EISEL ENTERPRISES INC	6,112.12	IRWD Check	Reconciled
421340	16-Sep-21	ENVIRONMENTAL RESOURCE ASSOCIATES	303.61	IRWD Check	Reconciled
421341	16-Sep-21	ENVIRONMENTAL SCIENCE ASSOCIATES	1,210.77	IRWD Check	Reconciled
421342	16-Sep-21	EUROFINS CALSCIENCE, LLC	1,002.75	IRWD Check	Reconciled
421343	16-Sep-21	EVERETT DOREY LLP	156	IRWD Check	Reconciled
421344	16-Sep-21	EVOQUA WATER TECHNOLOGIES LLC	128.72	IRWD Check	Reconciled
421345	16-Sep-21	FARLEY, JAMES	97.26	IRWD Check	Negotiable
421346	16-Sep-21	FERREIRA CONSTRUCTION COMPANY, INC.	42,326.49	IRWD Check	Reconciled
421347	16-Sep-21	FIDELITY SECURITY LIFE INSURANCE COMPANY	6,807.26	IRWD Check	Reconciled
421348	16-Sep-21	FIDELITY SECURITY LIFE INSURANCE COMPANY	234.53	IRWD Check	Reconciled
421349	16-Sep-21	FIDELITY SECURITY LIFE INSURANCE COMPANY	117.5	IRWD Check	Reconciled
421350	16-Sep-21	FIDELITY SECURITY LIFE INSURANCE COMPANY	746.26	IRWD Check	Reconciled
421351	16-Sep-21	FISHER SCIENTIFIC COMPANY LLC	4,065.29	IRWD Check	Reconciled
421352	16-Sep-21	FOUGHT, CYNTHIA J.	2,830.66	IRWD Check	Reconciled
421353	16-Sep-21	FRONTIER CALIFORNIA INC.	58.92	IRWD Check	Reconciled
421354	16-Sep-21	FULLER TRUCK ACCESSORIES	99.22	IRWD Check	Reconciled
421355	16-Sep-21	GARY BALE REDI-MIX CONCRETE, INC.	1,817.69	IRWD Check	Reconciled
421356	16-Sep-21	GEA MECHANICAL EQUIPMENT US, INC.	4,987.86	IRWD Check	Reconciled
421357	16-Sep-21	GM SAGER CONSTRUCTION CO,INC.	52,200.00	IRWD Check	Reconciled
421358	16-Sep-21	GRAINGER	4,781.32	IRWD Check	Reconciled
421359	16-Sep-21	GSRP ST SOLAR I LLC	13,283.18	IRWD Check	Reconciled
421360	16-Sep-21	HAAKER EQUIPMENT COMPANY	1,724.00	IRWD Check	Reconciled
421361	16-Sep-21	HACH COMPANY	2,471.06	IRWD Check	Reconciled
421362	16-Sep-21	HARRINGTON INDUSTRIAL PLASTICS LLC	7,207.97	IRWD Check	Reconciled
421363	16-Sep-21	HARRIS & ASSOCIATES, INC.	343.75	IRWD Check	Reconciled
421364	16-Sep-21	HDR ENGINEERING INC	27,269.50	IRWD Check	Reconciled
421365	16-Sep-21	HELPMATES STAFFING SERVICES LLC	3,915.20	IRWD Check	Reconciled
421366	16-Sep-21	HI-LINE INC	401.77	IRWD Check	Reconciled
421367	16-Sep-21	HILL BROTHERS CHEMICAL COMPANY	7,872.10	IRWD Check	Negotiable
421368	16-Sep-21	HOME DEPOT USA INC	348.63	IRWD Check	Reconciled
421369	16-Sep-21	HOPKINS TECHNICAL PRODUCTS INC	3,142.94	IRWD Check	Reconciled
421370	16-Sep-21	HUMANA INSURANCE COMPANY	65.3	IRWD Check	Reconciled
421371	16-Sep-21	INFOSEND, INC.	48,528.91	IRWD Check	Reconciled
421372	16-Sep-21	INNOVATIVE MACHINE TOOL REPAIR LLC	3,074.43	IRWD Check	Reconciled
421373	16-Sep-21	IRVINE PACIFIC	448.05	IRWD Check	Reconciled
421374	16-Sep-21	IRVINE PIPE & SUPPLY INC	5,342.01	IRWD Check	Reconciled
421375	16-Sep-21	IRWD-PETTY CASH CUSTODIAN	1,159.88	IRWD Check	Reconciled
421376	16-Sep-21	JAMBOREE SMOG	58	IRWD Check	Negotiable
421377	16-Sep-21	JCI JONES CHEMICALS INC	7,216.65	IRWD Check	Reconciled
421378	16-Sep-21	JIG CONSULTANTS	3,608.85	IRWD Check	Negotiable
421379	16-Sep-21	JOHN MICHAEL COVAS	198.6	IRWD Check	Negotiable
421380	16-Sep-21	KAESER COMPRESSORS, INC.	344.8	IRWD Check	Reconciled
421381	16-Sep-21	KILL-N-BUGS TERMITES AND PEST CONTROL SERVICES	3,900.00	IRWD Check	Reconciled
421382	16-Sep-21	KIMBALL MIDWEST	31.64	IRWD Check	Reconciled
421383	16-Sep-21	LAGUNA BEACH COUNTY WATER DISTRICT	11,302.99	IRWD Check	Negotiable
421384	16-Sep-21	LANDCARE HOLDINGS, INC.	116,984.10	IRWD Check	Reconciled
421385	16-Sep-21	LCS TECHNOLOGIES, INC.	8,370.00	IRWD Check	Reconciled
421386	16-Sep-21	LGC GEOTECHNICAL, INC.	2,740.00	IRWD Check	Reconciled
421387	16-Sep-21	LU'S LIGHTHOUSE, INC.	166.18	IRWD Check	Reconciled
421388	16-Sep-21	MAP COMMUNICATIONS, INC.	2,478.36	IRWD Check	Negotiable
421389	16-Sep-21	MARK KADESH	10,200.00	IRWD Check	Reconciled
421390	16-Sep-21	MC MASTER CARR SUPPLY CO	2,925.32	IRWD Check	Reconciled
421391	16-Sep-21	MCR TECHNOLOGIES INC	10,530.88	IRWD Check	Reconciled

**IRVINE RANCH WATER DISTRICT
AP DISBURSEMENTS AND VOIDS FOR SEP 2021**

CHECK OR ELECTRONIC #	PAYMENT DATE	SUPPLIERS	PAYMENT AMOUNT	PAYMENT METHOD	STATUS
421392	16-Sep-21	MERRIMAC PETROLEUM, INC.	29,431.44	IRWD Check	Reconciled
421393	16-Sep-21	MERRITT, JOHN	25.96	IRWD Check	Negotiable
421394	16-Sep-21	MIREJOVSKY, SHERRI	141.11	IRWD Check	Negotiable
421395	16-Sep-21	MORRISROE, EDWARD	406.23	IRWD Check	Reconciled
421396	16-Sep-21	MR CRANE INC	2,344.75	IRWD Check	Reconciled
421397	16-Sep-21	MRO ELECTRIC & SUPPLY CO.	5,243.00	IRWD Check	Reconciled
421398	16-Sep-21	MUNICIPAL MAINTENANCE EQUIPMENT INC	850.21	IRWD Check	Reconciled
421399	16-Sep-21	MUNICIPAL WATER DISTRICT OF ORANGE COUNTY	3,259.99	IRWD Check	Reconciled
421400	16-Sep-21	MUTUAL PROPANE	27	IRWD Check	Reconciled
421401	16-Sep-21	N1 CRITICAL TECHNOOGIES, INC	4,587.47	IRWD Check	Reconciled
421402	16-Sep-21	NATIONAL WATER RESEARCH INSTITUTE	50,000.00	IRWD Check	Reconciled
421403	16-Sep-21	O.C. SUPERIOR CUSTOM CLEANING	3,600.00	IRWD Check	Reconciled
421404	16-Sep-21	OLIN CORPORATION	33,171.00	IRWD Check	Reconciled
421405	16-Sep-21	ORACLE AMERICA, INC.	59.12	IRWD Check	Reconciled
421406	16-Sep-21	ORANGE COUNTY AUTO PARTS CO	422.68	IRWD Check	Reconciled
421407	16-Sep-21	ORANGE COUNTY MOSQUITO AND VECTOR CONTROL DISTRICT	3,423.71	IRWD Check	Negotiable
421408	16-Sep-21	ORANGE COUNTY SANITATION DISTRICT	1,590.00	IRWD Check	Reconciled
421409	16-Sep-21	ORANGE COUNTY WATER ASSOCIATION	405	IRWD Check	Reconciled
421410	16-Sep-21	ORANGE LINE OIL COMPANY	2,749.37	IRWD Check	Reconciled
421411	16-Sep-21	ORIGIN CONSULTING LLC	162,673.80	IRWD Check	Negotiable
421412	16-Sep-21	PACIFIC COAST BOLT CORP	4,744.27	IRWD Check	Reconciled
421413	16-Sep-21	PACIFIC HYDROTECH CORPORATION	252,229.34	IRWD Check	Reconciled
421414	16-Sep-21	PACIFIC HYDROTECH CORPORATION	13,275.23	IRWD Check	Reconciled
421415	16-Sep-21	PACIFIC PARTS & CONTROLS INC	826.9	IRWD Check	Reconciled
421416	16-Sep-21	PENG, SIYUAN	33.54	IRWD Check	Negotiable
421417	16-Sep-21	PENN ARCHIVE SERVICES	67.82	IRWD Check	Reconciled
421418	16-Sep-21	PEYTON, MEL	36.22	IRWD Check	Reconciled
421419	16-Sep-21	PILLAY, ANUP	208.69	IRWD Check	Reconciled
421420	16-Sep-21	QUINN COMPANY	4,488.23	IRWD Check	Reconciled
421421	16-Sep-21	QUINTANA, WATTS & HARTMANN, LLC	5,150.00	IRWD Check	Negotiable
421422	16-Sep-21	RAM AIR ENGINEERING INC	17,131.84	IRWD Check	Reconciled
421423	16-Sep-21	REFRIGERATION SUPPLIES DISTRIBUTOR	851.56	IRWD Check	Reconciled
421424	16-Sep-21	RETHWILL, DESTINY	34.44	IRWD Check	Negotiable
421425	16-Sep-21	RINCON TRUCK CENTER INC.	743.25	IRWD Check	Reconciled
421426	16-Sep-21	RLG ENTERPRISES, INC	1,529.11	IRWD Check	Reconciled
421427	16-Sep-21	SAFETY CENTER INCORPORATED	1,680.00	IRWD Check	Reconciled
421428	16-Sep-21	SAFETY-KLEEN SYSTEMS, INC	320	IRWD Check	Reconciled
421429	16-Sep-21	SANTA ANA BLUE PRINT	1,060.15	IRWD Check	Reconciled
421430	16-Sep-21	SANTA MARGARITA FORD	3,940.96	IRWD Check	Reconciled
421431	16-Sep-21	SECURITAS SECURITY SERVICES USA, INC.	6,519.00	IRWD Check	Reconciled
421432	16-Sep-21	SHERER, WILLIAM	24.73	IRWD Check	Reconciled
421433	16-Sep-21	SINCLAIR, CAMERON	25	IRWD Check	Reconciled
421434	16-Sep-21	SKIBA, SUSAN	62.56	IRWD Check	Negotiable
421435	16-Sep-21	SOLTANI, SIMA	17.7	IRWD Check	Negotiable
421436	16-Sep-21	SOUTH BAY FOUNDRY, INC	2,262.75	IRWD Check	Reconciled
421437	16-Sep-21	SOUTHERN CALIFORNIA EDISON COMPANY	1,240,649.06	IRWD Check	Reconciled
421438	16-Sep-21	SOUTHERN CALIFORNIA GAS COMPANY	10,070.65	IRWD Check	Reconciled
421439	16-Sep-21	SPARKLETTS	343.86	IRWD Check	Reconciled
421440	16-Sep-21	STRADLING YOCCA CARLSON & RAUTH	84	IRWD Check	Reconciled
421441	16-Sep-21	SUNSHINE SUPPLY COMPANY, INC.	2,586.00	IRWD Check	Reconciled
421442	16-Sep-21	SUSAN A. SIROTA	4,755.00	IRWD Check	Reconciled
421443	16-Sep-21	SWAINS ELECTRIC MOTOR SERVICE	5,700.34	IRWD Check	Negotiable
421444	16-Sep-21	T.E. ROBERTS, INC.	3,934.27	IRWD Check	Reconciled
421445	16-Sep-21	TANG, SAMUEL	26.34	IRWD Check	Reconciled
421446	16-Sep-21	TAYLOR MORRISON OF CALIFORNIA, LLC	285	IRWD Check	Negotiable
421447	16-Sep-21	TETRA TECH, INC	3,655.00	IRWD Check	Reconciled
421448	16-Sep-21	THOMPSON & PHIPPS INC	5,761.73	IRWD Check	Reconciled
421449	16-Sep-21	TITUS INDUSTRIAL GROUP, INC.	631.48	IRWD Check	Reconciled
421450	16-Sep-21	UNITED HEALTHCARE INSURANCE COMPANY	324.22	IRWD Check	Reconciled
421451	16-Sep-21	UNITED SITE SERVICES OF CALIFORNIA INC	242.57	IRWD Check	Reconciled
421452	16-Sep-21	UNIVAR SOLUTIONS USA INC.	7,232.00	IRWD Check	Reconciled
421453	16-Sep-21	USA BLUEBOOK	1,071.56	IRWD Check	Reconciled
421454	16-Sep-21	USA WASTE OF CALIFORNIA, INC.	1,707.92	IRWD Check	Reconciled

**IRVINE RANCH WATER DISTRICT
AP DISBURSEMENTS AND VOIDS FOR SEP 2021**

CHECK OR ELECTRONIC #	PAYMENT DATE	SUPPLIERS	PAYMENT AMOUNT	PAYMENT METHOD	STATUS
421455	16-Sep-21	V&A CONSULTING ENGINEERS	8,262.50	IRWD Check	Reconciled
421456	16-Sep-21	VIDO ARTUKOVICH & SON, INC./VIDMAR, INC. A JV	900,771.68	IRWD Check	Reconciled
421457	16-Sep-21	VIDO ARTUKOVICH & SON, INC./VIDMAR, INC. A JV	47,409.03	IRWD Check	Reconciled
421458	16-Sep-21	VULCAN MATERIALS COMPANY	1,518.72	IRWD Check	Reconciled
421459	16-Sep-21	VUONG, TRISHA	23.45	IRWD Check	Negotiable
421460	16-Sep-21	WAGENER LAW, A PROFESSIONAL CORPORATION	35,246.00	IRWD Check	Reconciled
421461	16-Sep-21	WAKATABI, KOTARO	51.37	IRWD Check	Reconciled
421462	16-Sep-21	WANG, HAO	2,496.50	IRWD Check	Reconciled
421463	16-Sep-21	WASTE MANAGEMENT COLLECTIONS AND RECYCLING, INC.	3,820.79	IRWD Check	Reconciled
421464	16-Sep-21	WATER TREATMENT CHEMICALS INC	1,772.80	IRWD Check	Reconciled
421465	16-Sep-21	WATERSMART SOFTWARE INC	15,174.99	IRWD Check	Negotiable
421466	16-Sep-21	WAXIE'S ENTERPRISES, INC	1,250.49	IRWD Check	Reconciled
421467	16-Sep-21	WEAST, ABIGAIL	21.81	IRWD Check	Reconciled
421468	16-Sep-21	WEST YOST & ASSOCIATES, INC.	175,471.25	IRWD Check	Reconciled
421469	16-Sep-21	WIENHOFF & ASSOCIATES, INC	320	IRWD Check	Reconciled
421470	16-Sep-21	SOUTHERN CALIFORNIA GAS COMPANY	152,871.60	IRWD Check	Reconciled
421471	23-Sep-21	Asman, David Jr.	64.64	IRWD Check	Negotiable
421472	23-Sep-21	Cascelli, Craig M (Craig)	288	IRWD Check	Negotiable
421473	23-Sep-21	Prewoznik, Frank	91.84	IRWD Check	Negotiable
421474	23-Sep-21	Vasquez, Jonathan	275.53	IRWD Check	Reconciled
421475	23-Sep-21	ABSOLUTE STANDARDS, INC.	1,468.50	IRWD Check	Negotiable
421476	23-Sep-21	ADAM'S FALCONRY SERVICE, LLC	1,300.00	IRWD Check	Reconciled
421477	23-Sep-21	AGILENT TECHNOLOGIES, INC.	19,200.00	IRWD Check	Reconciled
421478	23-Sep-21	AIRGAS, INC.	2,716.27	IRWD Check	Reconciled
421479	23-Sep-21	AIRKINETICS, INC	37,365.00	IRWD Check	Negotiable
421480	23-Sep-21	ALAN SMITH POOL PLASTERING, INC	964.33	IRWD Check	Negotiable
421481	23-Sep-21	ALL STAR GLASS	320.05	IRWD Check	Reconciled
421482	23-Sep-21	ALPHA TRAFFIC SERVICES, INC.	1,595.00	IRWD Check	Reconciled
421483	23-Sep-21	AMAYA SOLUTIONS INC.	5,725.84	IRWD Check	Reconciled
421484	23-Sep-21	AMAZON CAPITAL SERVICES, INC.	623.78	IRWD Check	Reconciled
421485	23-Sep-21	ANTHEM BLUE CROSS	283.41	IRWD Check	Reconciled
421486	23-Sep-21	AT&T	10,533.73	IRWD Check	Reconciled
421487	23-Sep-21	AT&T	175.14	IRWD Check	Reconciled
421488	23-Sep-21	ATHENS SERVICES	8,540.29	IRWD Check	Reconciled
421489	23-Sep-21	AUTOZONE PARTS, INC.	619.09	IRWD Check	Negotiable
421490	23-Sep-21	B8 MYFORD INDUSTRIAL OWNER LLC	105.64	IRWD Check	Negotiable
421491	23-Sep-21	BATTERIES PLUS AND BATTERIES PLUS BULBS	545.24	IRWD Check	Reconciled
421492	23-Sep-21	BIGWIG MONSTER, LLC	46,920.00	IRWD Check	Negotiable
421493	23-Sep-21	BOOT WORLD, INC.	189.07	IRWD Check	Reconciled
421494	23-Sep-21	BOYD, JULIAN	32.24	IRWD Check	Negotiable
421495	23-Sep-21	BRENNTAG PACIFIC INC	10,009.93	IRWD Check	Reconciled
421496	23-Sep-21	BROWN AND CALDWELL	536.35	IRWD Check	Reconciled
421497	23-Sep-21	BRUCE HADLEY NEWELL	1,250.00	IRWD Check	Reconciled
421498	23-Sep-21	C WELLS PIPELINE MATERIALS INC	7,106.98	IRWD Check	Reconciled
421499	23-Sep-21	CALIFORNIA BARRICADE RENTAL, INC.	1,202.50	IRWD Check	Reconciled
421500	23-Sep-21	CANNON CORPORATION	6,208.61	IRWD Check	Reconciled
421501	23-Sep-21	CAROLLO ENGINEERS, INC	30,392.11	IRWD Check	Reconciled
421502	23-Sep-21	CDW GOVERNMENT LLC	7,907.00	IRWD Check	Reconciled
421503	23-Sep-21	CHEM SERVICE INC.	663.9	IRWD Check	Reconciled
421504	23-Sep-21	CHIEN, PHYLLIS	98.11	IRWD Check	Reconciled
421505	23-Sep-21	CITY OF IRVINE	12,905.53	IRWD Check	Negotiable
421506	23-Sep-21	CITY OF IRVINE	169.04	IRWD Check	Negotiable
421507	23-Sep-21	CLA-VAL COMPANY	5,511.26	IRWD Check	Reconciled
421508	23-Sep-21	COASTAL OCCUPATIONAL MEDICAL GROUP, INC.	585	IRWD Check	Negotiable
421509	23-Sep-21	CONSERV CONSTRUCTION INC.	955	IRWD Check	Negotiable
421510	23-Sep-21	CONSTELLATION NEWENERGY, INC.	9,401.90	IRWD Check	Negotiable
421511	23-Sep-21	CROWN CASTLE INTERNATIONAL CORP.	810.35	IRWD Check	Reconciled
421512	23-Sep-21	CULLIGAN OF SANTA ANA	22,000.00	IRWD Check	Reconciled
421513	23-Sep-21	DATA CLEAN CORPORATION	559	IRWD Check	Reconciled
421514	23-Sep-21	DEERFIELD HOMEOWNERS ASSOCIATION	761.75	IRWD Check	Negotiable
421515	23-Sep-21	DELL MARKETING LP	17,650.75	IRWD Check	Reconciled
421516	23-Sep-21	DG INVESTMENT INTERMEDIATE HOLDINGS 2, INC.	11,623.03	IRWD Check	Reconciled
421517	23-Sep-21	DIRECTV INC	146.99	IRWD Check	Reconciled

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421518	23-Sep-21	DIRKAND INC	2,475.00	IRWD Check	Negotiable
421519	23-Sep-21	DISTRICT ONE WEST VERGE BA 156	1,040.09	IRWD Check	Negotiable
421520	23-Sep-21	DIVITA BUILDERS, INC.	1,658.92	IRWD Check	Reconciled
421521	23-Sep-21	DRAKE TRAFFIC CONTROL SERVICES INC	8,570.00	IRWD Check	Reconciled
421522	23-Sep-21	DRIVELINES INC	381.63	IRWD Check	Negotiable
421523	23-Sep-21	EAGLE PRINT DYNAMICS	225.35	IRWD Check	Reconciled
421524	23-Sep-21	EQUALTOX, LLC	6,125.00	IRWD Check	Reconciled
421525	23-Sep-21	EXCLUSIVE ENERGY & ELECTRIC	7,960.00	IRWD Check	Negotiable
421526	23-Sep-21	FEDEX	191.02	IRWD Check	Reconciled
421527	23-Sep-21	FERGUSON ENTERPRISES, LLC	8,468.47	IRWD Check	Reconciled
421528	23-Sep-21	FIONA HUTTON & ASSOCIATES, INC.	1,293.75	IRWD Check	Negotiable
421529	23-Sep-21	FISHER SCIENTIFIC COMPANY LLC	7,394.59	IRWD Check	Reconciled
421530	23-Sep-21	FRANCHISE TAX BOARD	850	IRWD Check	Negotiable
421531	23-Sep-21	FRONTIER CALIFORNIA INC.	513.63	IRWD Check	Reconciled
421532	23-Sep-21	GALPIN MOTORS INC	48,160.94	IRWD Check	Reconciled
421533	23-Sep-21	GARY BALE REDI-MIX CONCRETE, INC.	3,432.57	IRWD Check	Reconciled
421534	23-Sep-21	GEI CONSULTANTS INC	3,120.00	IRWD Check	Reconciled
421535	23-Sep-21	GM SAGER CONSTRUCTION CO,INC.	29,850.00	IRWD Check	Negotiable
421536	23-Sep-21	GRAINGER	8,878.15	IRWD Check	Reconciled
421537	23-Sep-21	GROVES AT ORCHARD HILLS	698.06	IRWD Check	Negotiable
421538	23-Sep-21	HAAKER EQUIPMENT COMPANY	1,675.76	IRWD Check	Reconciled
421539	23-Sep-21	HACH COMPANY	3,161.06	IRWD Check	Reconciled
421540	23-Sep-21	HAMILTON, KURT	2,512.01	IRWD Check	Reconciled
421541	23-Sep-21	HDR ENGINEERING INC	14,555.00	IRWD Check	Reconciled
421542	23-Sep-21	HELPMATES STAFFING SERVICES LLC	8,754.00	IRWD Check	Reconciled
421543	23-Sep-21	HERC RENTALS INC.	671.06	IRWD Check	Reconciled
421544	23-Sep-21	HI-LINE INC	525.33	IRWD Check	Negotiable
421545	23-Sep-21	HILL BROTHERS CHEMICAL COMPANY	6,599.72	IRWD Check	Negotiable
421546	23-Sep-21	HOME DEPOT USA INC	832.04	IRWD Check	Reconciled
421547	23-Sep-21	HONG, WON KI	137.38	IRWD Check	Negotiable
421548	23-Sep-21	IMPERIAL SPRINKLER SUPPLY, INC.	70.27	IRWD Check	Reconciled
421549	23-Sep-21	INDUSTRIAL METAL SUPPLY CO	186.19	IRWD Check	Reconciled
421550	23-Sep-21	INFOSYS LIMITED	26,880.00	IRWD Check	Reconciled
421551	23-Sep-21	INTERNATIONAL BROTHERHOOD OF ELECTRICAL WORKERS LOCAL 47	3,183.56	IRWD Check	Negotiable
421552	23-Sep-21	IRVIN, MICHAEL	40.78	IRWD Check	Negotiable
421553	23-Sep-21	IRVINE PIPE & SUPPLY INC	3,926.28	IRWD Check	Reconciled
421554	23-Sep-21	IRWD-PETTY CASH CUSTODIAN	898.59	IRWD Check	Reconciled
421555	23-Sep-21	J M ELECTRICAL SERVICES	4,000.00	IRWD Check	Negotiable
421556	23-Sep-21	JIANG, FEN	15.45	IRWD Check	Negotiable
421557	23-Sep-21	KAESER COMPRESSORS, INC.	689.6	IRWD Check	Reconciled
421558	23-Sep-21	KOPPL PIPELINE SERVICES, INC.	26,972.00	IRWD Check	Negotiable
421559	23-Sep-21	LA HABRA FENCE COMPANY INC	5,128.00	IRWD Check	Negotiable
421560	23-Sep-21	LABWORKS, LLC	24,180.00	IRWD Check	Negotiable
421561	23-Sep-21	LANDCARE HOLDINGS, INC.	30,980.06	IRWD Check	Reconciled
421562	23-Sep-21	LEE & RO, INC.	20,612.00	IRWD Check	Reconciled
421563	23-Sep-21	LENNAR HOMES OF CALIFORNIA, INC.	200.43	IRWD Check	Reconciled
421564	23-Sep-21	LILLESTRAND LEADERSHIP CONSULTING, INC.	6,218.13	IRWD Check	Negotiable
421565	23-Sep-21	LLOYD, SETH	41.76	IRWD Check	Reconciled
421566	23-Sep-21	LOS ANGELES TIMES	449.74	IRWD Check	Reconciled
421567	23-Sep-21	LUBRICATION ENGINEERS, INC.	3,304.16	IRWD Check	Reconciled
421568	23-Sep-21	MATHESON TRI GAS, INC	2,814.13	IRWD Check	Negotiable
421569	23-Sep-21	MBF CONSULTING, INC.	11,620.00	IRWD Check	Reconciled
421570	23-Sep-21	MBK ENGINEERS	6,222.00	IRWD Check	Reconciled
421571	23-Sep-21	MC FADDEN-DALE INDUSTRIAL	868.43	IRWD Check	Reconciled
421572	23-Sep-21	MC MASTER CARR SUPPLY CO	1,303.74	IRWD Check	Reconciled
421573	23-Sep-21	MCBAIN SYSTEMS LP	565	IRWD Check	Reconciled
421574	23-Sep-21	MERITAGE HOMES OF CALIFORNIA, INC.	1,367.91	IRWD Check	Negotiable
421575	23-Sep-21	MICROSOFT CORPORATION	534.28	IRWD Check	Reconciled
421576	23-Sep-21	MIREMADI, ALI	728.5	IRWD Check	Negotiable
421577	23-Sep-21	MSC INDUSTRIAL SUPPLY CO	710.33	IRWD Check	Reconciled
421578	23-Sep-21	NATIONAL BUSINESS FURNITURE, LLC	3,930.34	IRWD Check	Reconciled
421579	23-Sep-21	NEW PIG CORPORATION	2,560.89	IRWD Check	Reconciled
421580	23-Sep-21	NORTHWOOD PLACE APTS	178.28	IRWD Check	Reconciled

**IRVINE RANCH WATER DISTRICT
AP DISBURSEMENTS AND VOIDS FOR SEP 2021**

CHECK OR ELECTRONIC #	PAYMENT DATE	SUPPLIERS	PAYMENT AMOUNT	PAYMENT METHOD	STATUS
421581	23-Sep-21	O'REILLY AUTO ENTERPRISES, LLC	1,725.90	IRWD Check	Reconciled
421582	23-Sep-21	OLIN CORPORATION	16,643.34	IRWD Check	Reconciled
421583	23-Sep-21	ONESOURCE DISTRIBUTORS LLC	50,928.57	IRWD Check	Reconciled
421584	23-Sep-21	ORANGE COUNTY AUTO PARTS CO	1,242.74	IRWD Check	Reconciled
421585	23-Sep-21	ORANGE COUNTY MOSQUITO AND VECTOR CONTROL DISTRICT	159.24	IRWD Check	Negotiable
421586	23-Sep-21	ORANGE COUNTY TREASURER	250	IRWD Check	Reconciled
421587	23-Sep-21	PACIFIC AUTO WASH PARTNERS	36.98	IRWD Check	Negotiable
421588	23-Sep-21	PACIFIC HYDROTECH CORPORATION	382,999.82	IRWD Check	Negotiable
421589	23-Sep-21	PACIFIC HYDROTECH CORPORATION	20,157.88	IRWD Check	Negotiable
421590	23-Sep-21	PACIFIC MECHANICAL SUPPLY	749.67	IRWD Check	Reconciled
421591	23-Sep-21	PAYNE & FEARS LLP	181.5	IRWD Check	Reconciled
421592	23-Sep-21	PELLETIER & ASSOCIATES, INC.	315	IRWD Check	Negotiable
421593	23-Sep-21	PERKINELMER HEALTH SCIENCES INC	472.38	IRWD Check	Reconciled
421594	23-Sep-21	PERS LONG TERM CARE	447.62	IRWD Check	Reconciled
421595	23-Sep-21	PRAXAIR DISTRIBUTION INC	2,505.95	IRWD Check	Reconciled
421596	23-Sep-21	PRIME CONTROLS COMPANY INC	1,555.05	IRWD Check	Reconciled
421597	23-Sep-21	RAM AIR ENGINEERING INC	345	IRWD Check	Negotiable
421598	23-Sep-21	REAL WATER CONSULTANTS INC.	14,457.00	IRWD Check	Reconciled
421599	23-Sep-21	REFRIGERATION SUPPLIES DISTRIBUTOR	287.77	IRWD Check	Reconciled
421600	23-Sep-21	RENTOKIL NORTH AMERICA, INC	1,300.00	IRWD Check	Negotiable
421601	23-Sep-21	RESTEK CORPORATION	89.09	IRWD Check	Reconciled
421602	23-Sep-21	RINCON TRUCK CENTER INC.	706.4	IRWD Check	Reconciled
421603	23-Sep-21	ROBERSON- WAITE ELECTRIC	1,786.33	IRWD Check	Negotiable
421604	23-Sep-21	RTM ENGINEERING CONSULTANTS, LLC	1,710.00	IRWD Check	Reconciled
421605	23-Sep-21	RUEN DRILLING, INC.	1,745.00	IRWD Check	Negotiable
421606	23-Sep-21	S & J SUPPLY CO INC	9,219.09	IRWD Check	Reconciled
421607	23-Sep-21	SAN CARLO APARTMENTS	44.18	IRWD Check	Reconciled
421608	23-Sep-21	SANTA MARGARITA FORD	1,628.05	IRWD Check	Reconciled
421609	23-Sep-21	SECURITAS SECURITY SERVICES USA, INC.	50,686.88	IRWD Check	Reconciled
421610	23-Sep-21	SHAMROCK SUPPLY CO INC	573.77	IRWD Check	Reconciled
421611	23-Sep-21	SIMPSON, GARY	72.87	IRWD Check	Reconciled
421612	23-Sep-21	SITMATIC	2,087.32	IRWD Check	Reconciled
421613	23-Sep-21	SOUTHERN CALIFORNIA EDISON COMPANY	43.14	IRWD Check	Reconciled
421614	23-Sep-21	SOUTHERN CALIFORNIA EDISON COMPANY	197,615.32	IRWD Check	Reconciled
421615	23-Sep-21	SOUTHERN CALIFORNIA GAS COMPANY	4,908.25	IRWD Check	Negotiable
421616	23-Sep-21	SPARKLETTS	167.09	IRWD Check	Negotiable
421617	23-Sep-21	STOCKTON, JULIE	81.42	IRWD Check	Negotiable
421618	23-Sep-21	TALLEY INC	193.78	IRWD Check	Reconciled
421619	23-Sep-21	TEVORA BUSINESS SOLUTIONS, INC.	20,318.05	IRWD Check	Negotiable
421620	23-Sep-21	THE HELLAN STRAINER COMPANY	2,839.41	IRWD Check	Reconciled
421621	23-Sep-21	THOMPSON & PHIPPS INC	2,706.31	IRWD Check	Reconciled
421622	23-Sep-21	TOTAL RESOURCE MANAGEMENT, INC	2,932.50	IRWD Check	Negotiable
421623	23-Sep-21	TRAFFIC CONTROL ENGINEERING, INC	9,000.00	IRWD Check	Negotiable
421624	23-Sep-21	TRAFFIC MANAGEMENT, INC	1,114.00	IRWD Check	Reconciled
421625	23-Sep-21	TUNG, MARIAN	15	IRWD Check	Negotiable
421626	23-Sep-21	UNITED PARCEL SERVICE INC	399.66	IRWD Check	Reconciled
421627	23-Sep-21	WARMINGTON HOMES	18.13	IRWD Check	Negotiable
421628	23-Sep-21	WAXIE'S ENTERPRISES, INC	833.73	IRWD Check	Reconciled
421629	23-Sep-21	WEST YOST & ASSOCIATES, INC.	17,938.25	IRWD Check	Negotiable
421630	23-Sep-21	WILMINGTON INSTRUMENT COMPANY INC	206.21	IRWD Check	Reconciled
421631	23-Sep-21	WIMBERLY, CHASE	588.56	IRWD Check	Negotiable
421632	23-Sep-21	WIN-911 SOFTWARE	660	IRWD Check	Reconciled
421633	23-Sep-21	WONG, PATRICK C	21.78	IRWD Check	Reconciled
421634	23-Sep-21	WOODARD & CURRAN INC	10,282.40	IRWD Check	Reconciled
421635	28-Sep-21	US BANK NAT'L ASSOCIATION NORTH DAKOTA	41,123.38	IRWD Check	Negotiable
421636	30-Sep-21	Haney, Lisa	53.88	IRWD Check	Negotiable
421637	30-Sep-21	Hoffman, Michael S (Mike)	101	IRWD Check	Negotiable
421638	30-Sep-21	O'Neill, Owen H	298	IRWD Check	Negotiable
421639	30-Sep-21	Pardee, Debra S	202.5	IRWD Check	Negotiable
421640	30-Sep-21	Reed, Megan A	1,046.36	IRWD Check	Negotiable
421641	30-Sep-21	Sciabica, Joseph	192	IRWD Check	Negotiable
421642	30-Sep-21	3SE	1,497.50	IRWD Check	Negotiable
421643	30-Sep-21	8X8 INC	9,750.00	IRWD Check	Negotiable

**IRVINE RANCH WATER DISTRICT
AP DISBURSEMENTS AND VOIDS FOR SEP 2021**

CHECK OR ELECTRONIC #	PAYMENT DATE	SUPPLIERS	PAYMENT AMOUNT	PAYMENT METHOD	STATUS
421644	30-Sep-21	A&Y ASPHALT CONTRACTORS, INC.	2,900.00	IRWD Check	Negotiable
421645	30-Sep-21	ACCURATE MEASUREMENT SYSTEMS INC	2,789.57	IRWD Check	Negotiable
421646	30-Sep-21	ADVANCED MICRO INSTRUMENTS, INC.	361	IRWD Check	Negotiable
421647	30-Sep-21	AECOM TECHNICAL SERVICES, INC.	290,917.36	IRWD Check	Negotiable
421648	30-Sep-21	AFLAC	1,940.08	IRWD Check	Negotiable
421649	30-Sep-21	AIRGAS, INC.	1,501.06	IRWD Check	Negotiable
421650	30-Sep-21	ALLIANT INSURANCE SERVICES, INC	14,966.16	IRWD Check	Negotiable
421651	30-Sep-21	ALPHA TRAFFIC SERVICES, INC.	18,745.00	IRWD Check	Negotiable
421652	30-Sep-21	ALSTON & BIRD LLP	48,115.05	IRWD Check	Negotiable
421653	30-Sep-21	AMAZON CAPITAL SERVICES, INC.	743.13	IRWD Check	Negotiable
421654	30-Sep-21	AMWINS GROUP BENEFITS INC.	3,689.32	IRWD Check	Negotiable
421655	30-Sep-21	ANTHONY N. LARSEN	450	IRWD Check	Negotiable
421656	30-Sep-21	APPLIED ENGINEERING CONCEPTS	6,280.00	IRWD Check	Negotiable
421657	30-Sep-21	AT&T	201.71	IRWD Check	Negotiable
421658	30-Sep-21	AT&T	476.66	IRWD Check	Negotiable
421659	30-Sep-21	AT&T	59.59	IRWD Check	Negotiable
421660	30-Sep-21	AUTOMOX INC.	1,137.50	IRWD Check	Negotiable
421661	30-Sep-21	AUTOZONE PARTS, INC.	818.37	IRWD Check	Negotiable
421662	30-Sep-21	BANCROFT CONSTRUCTION SERVICES LLC	1,761.32	IRWD Check	Negotiable
421663	30-Sep-21	BAVCO BACKFLOW APPARATUS & VALVE COMPANY	1,126.33	IRWD Check	Negotiable
421664	30-Sep-21	BIOTAGE LLC	698	IRWD Check	Negotiable
421665	30-Sep-21	BROWN AND CALDWELL	4,063.42	IRWD Check	Negotiable
421666	30-Sep-21	C WELLS PIPELINE MATERIALS INC	4,560.21	IRWD Check	Negotiable
421667	30-Sep-21	CALIFORNIA BARRICADE RENTAL, INC.	9,515.46	IRWD Check	Negotiable
421668	30-Sep-21	CALIFORNIA COUNCIL FOR ENVIRONMENTAL AND ECONOMIC BALANCE	39,000.00	IRWD Check	Negotiable
421669	30-Sep-21	CAPDEVIELLE INC	4,854.18	IRWD Check	Negotiable
421670	30-Sep-21	CDW GOVERNMENT LLC	4,057.69	IRWD Check	Negotiable
421671	30-Sep-21	CENTURY PAVING, INC.	30,215.00	IRWD Check	Negotiable
421672	30-Sep-21	CITY OF IRVINE	193,494.37	IRWD Check	Negotiable
421673	30-Sep-21	CITY OF NEWPORT BEACH	2,038.57	IRWD Check	Negotiable
421674	30-Sep-21	CLA-VAL COMPANY	2,669.24	IRWD Check	Negotiable
421675	30-Sep-21	CLIFFORD MORIYAMA	4,000.00	IRWD Check	Negotiable
421676	30-Sep-21	COASTAL OCCUPATIONAL MEDICAL GROUP, INC.	780	IRWD Check	Negotiable
421677	30-Sep-21	CONSOLIDATED ELECTRICAL DISTRIBUTORS, INC	135.77	IRWD Check	Negotiable
421678	30-Sep-21	CONSTELLATION NEWENERGY, INC.	36,605.82	IRWD Check	Negotiable
421679	30-Sep-21	CONTROLLED KEY SYSTEMS INC	106.75	IRWD Check	Negotiable
421680	30-Sep-21	COUNTY OF ORANGE	5,000.00	IRWD Check	Negotiable
421681	30-Sep-21	D & G SIGNS	517.2	IRWD Check	Negotiable
421682	30-Sep-21	D & H WATER SYSTEMS INC.	810.15	IRWD Check	Negotiable
421683	30-Sep-21	DAWSON, SANDRA	1,831.16	IRWD Check	Negotiable
421684	30-Sep-21	DCS MANAGEMENT LLC	91.32	IRWD Check	Negotiable
421685	30-Sep-21	DE VAUL PAINT COMPANY	850.76	IRWD Check	Negotiable
421686	30-Sep-21	DENALI WATER SOLUTIONS LLC	8,453.54	IRWD Check	Negotiable
421687	30-Sep-21	DIGITAL MAP PRODUCTS, L.P.	4,546.21	IRWD Check	Negotiable
421688	30-Sep-21	DIRECTV INC	146.99	IRWD Check	Negotiable
421689	30-Sep-21	DOUGLAS ENVIRONMENTAL GROUP INC	1,425.00	IRWD Check	Negotiable
421690	30-Sep-21	DPR CONSTRUCTION	198.77	IRWD Check	Negotiable
421691	30-Sep-21	DRAKE TRAFFIC CONTROL SERVICES INC	47,902.50	IRWD Check	Negotiable
421692	30-Sep-21	DRIVELINES INC	395	IRWD Check	Negotiable
421693	30-Sep-21	DUDEK	752.04	IRWD Check	Negotiable
421694	30-Sep-21	DUKE'S ROOT CONTROL INC	3,016.44	IRWD Check	Negotiable
421695	30-Sep-21	EAGLE PRINT DYNAMICS	7,576.00	IRWD Check	Negotiable
421696	30-Sep-21	EAST ORANGE COUNTY WATER DISTRICT	3,195.56	IRWD Check	Negotiable
421697	30-Sep-21	EHS INTERNATIONAL, INC	760	IRWD Check	Negotiable
421698	30-Sep-21	ENVIRONMENTAL RESOURCE ASSOCIATES	4,250.50	IRWD Check	Negotiable
421699	30-Sep-21	ENVIRONMENTAL SCIENCE ASSOCIATES	4,885.55	IRWD Check	Negotiable
421700	30-Sep-21	EUROFINS CALSCIENCE, LLC	3,202.50	IRWD Check	Negotiable
421701	30-Sep-21	EUROFINS EATON ANALYTICAL, INC.	300	IRWD Check	Negotiable
421702	30-Sep-21	EVANS, DARRELL	65.06	IRWD Check	Negotiable
421703	30-Sep-21	FARRELL & ASSOCIATES	103.43	IRWD Check	Negotiable
421704	30-Sep-21	FARWICK, DULCIE	16.23	IRWD Check	Negotiable
421705	30-Sep-21	FEDEX	253.39	IRWD Check	Negotiable
421706	30-Sep-21	FERGUSON ENTERPRISES, LLC	292.28	IRWD Check	Negotiable

**IRVINE RANCH WATER DISTRICT
AP DISBURSEMENTS AND VOIDS FOR SEP 2021**

CHECK OR ELECTRONIC #	PAYMENT DATE	SUPPLIERS	PAYMENT AMOUNT	PAYMENT METHOD	STATUS
421707	30-Sep-21	FIRST CHOICE SERVICES	2,163.28	IRWD Check	Negotiable
421708	30-Sep-21	FISHER SCIENTIFIC COMPANY LLC	1,190.29	IRWD Check	Negotiable
421709	30-Sep-21	FLW, INC.	2,248.95	IRWD Check	Negotiable
421710	30-Sep-21	FRASE, STUART	30.9	IRWD Check	Negotiable
421711	30-Sep-21	FRONTIER CALIFORNIA INC.	400.05	IRWD Check	Negotiable
421712	30-Sep-21	GARY BALE REDI-MIX CONCRETE, INC.	1,009.56	IRWD Check	Negotiable
421713	30-Sep-21	GJ AUTOMOTIVE EQUIPMENT CO INC	2,143.50	IRWD Check	Negotiable
421714	30-Sep-21	GOFORTH & MARTI	1,968.33	IRWD Check	Negotiable
421715	30-Sep-21	GRAINGER	4,829.64	IRWD Check	Negotiable
421716	30-Sep-21	GSE CONSTRUCTION CO., INC	31,014.94	IRWD Check	Negotiable
421717	30-Sep-21	HAAKER EQUIPMENT COMPANY	1,523.59	IRWD Check	Negotiable
421718	30-Sep-21	HACH COMPANY	10,368.12	IRWD Check	Negotiable
421719	30-Sep-21	HANSON BRIDGETT LLP	63,902.33	IRWD Check	Negotiable
421720	30-Sep-21	HARPER & ASSOCIATES ENGINEERING INC	8,045.00	IRWD Check	Negotiable
421721	30-Sep-21	HATHAWAY DINWIDDIE CONSTRUCTION CO	930.92	IRWD Check	Negotiable
421722	30-Sep-21	HDR ENGINEERING INC	104,737.02	IRWD Check	Negotiable
421723	30-Sep-21	HI-LINE INC	29.05	IRWD Check	Negotiable
421724	30-Sep-21	HILL BROTHERS CHEMICAL COMPANY	13,352.25	IRWD Check	Negotiable
421725	30-Sep-21	HOME DEPOT USA INC	436.02	IRWD Check	Negotiable
421726	30-Sep-21	HOMISCO, INC. AND SUBSIDIARY	1,087.63	IRWD Check	Negotiable
421727	30-Sep-21	IMPERIAL SPRINKLER SUPPLY, INC.	747.14	IRWD Check	Negotiable
421728	30-Sep-21	INNOVATIVE MACHINE TOOL REPAIR LLC	845.33	IRWD Check	Negotiable
421729	30-Sep-21	INTRACORP SOUTHERN CALIFORNIA LLC	292.14	IRWD Check	Negotiable
421730	30-Sep-21	IRVINE PACIFIC	356.35	IRWD Check	Negotiable
421731	30-Sep-21	IRVINE PIPE & SUPPLY INC	2,826.02	IRWD Check	Negotiable
421732	30-Sep-21	JAMBOREE SMOG	58	IRWD Check	Negotiable
421733	30-Sep-21	JASPER ENGINE EXCHANGE, INC.	2,932.96	IRWD Check	Negotiable
421734	30-Sep-21	JCI JONES CHEMICALS INC	12,703.25	IRWD Check	Negotiable
421735	30-Sep-21	JUST ENERGY SOLUTIONS INC.	3,915.67	IRWD Check	Negotiable
421736	30-Sep-21	KAESER COMPRESSORS, INC.	1,335.40	IRWD Check	Negotiable
421737	30-Sep-21	LANDCARE HOLDINGS, INC.	30,538.00	IRWD Check	Negotiable
421738	30-Sep-21	LANDSEA HOLDINGS CORPORATION	1,984.58	IRWD Check	Negotiable
421739	30-Sep-21	LENNAR HOMES OF CALIFORNIA, INC.	1,501.69	IRWD Check	Negotiable
421740	30-Sep-21	LGC GEOTECHNICAL, INC.	7,355.00	IRWD Check	Negotiable
421741	30-Sep-21	LIEBERT CASSIDY WHITMORE	1,416.00	IRWD Check	Negotiable
421742	30-Sep-21	LILLESTRAND LEADERSHIP CONSULTING, INC.	7,111.88	IRWD Check	Negotiable
421743	30-Sep-21	LINDSAY POLIC CONSULTING, INC.	5,450.00	IRWD Check	Negotiable
421744	30-Sep-21	LING, MI	82.66	IRWD Check	Negotiable
421745	30-Sep-21	LINKEDIN CORPORATION	15,425.00	IRWD Check	Negotiable
421746	30-Sep-21	MATRANGA, DANIEL	75.58	IRWD Check	Negotiable
421747	30-Sep-21	MBC AQUATIC SCIENCES, INC.	1,400.00	IRWD Check	Negotiable
421748	30-Sep-21	MC FADDEN-DALE INDUSTRIAL	982.96	IRWD Check	Negotiable
421749	30-Sep-21	MERRIMAC PETROLEUM, INC.	25,108.59	IRWD Check	Negotiable
421750	30-Sep-21	METTLER-TOLEDO INC	2,356.62	IRWD Check	Negotiable
421751	30-Sep-21	MICHAEL BAKER INTERNATIONAL, INC.	720	IRWD Check	Negotiable
421752	30-Sep-21	MICRO FOCUS SOFTWARE INC.	31,416.80	IRWD Check	Negotiable
421753	30-Sep-21	MILES CHEMICAL COMPANY, INC.	6,152.88	IRWD Check	Negotiable
421754	30-Sep-21	MRO ELECTRIC & SUPPLY CO.	4,386.00	IRWD Check	Negotiable
421755	30-Sep-21	MUNICIPAL MAINTENANCE EQUIPMENT INC	1,439.65	IRWD Check	Negotiable
421756	30-Sep-21	MUNICIPAL UNDERGROUND SERVICES INC	3,550.00	IRWD Check	Negotiable
421757	30-Sep-21	MUNICIPAL WATER DISTRICT OF ORANGE COUNTY	360	IRWD Check	Negotiable
421758	30-Sep-21	NATIONAL SPECIALITY ALLOYS LLC	1,824.21	IRWD Check	Negotiable
421759	30-Sep-21	NATURALWELL, LLC	1,897.50	IRWD Check	Negotiable
421760	30-Sep-21	NEW DIMENSION GENERAL CONSTRUCTION	14,561.45	IRWD Check	Negotiable
421761	30-Sep-21	NEWPORT BEACH CHAMBER OF COMMERCE	500	IRWD Check	Negotiable
421762	30-Sep-21	O'REILLY AUTO ENTERPRISES, LLC	844.7	IRWD Check	Negotiable
421763	30-Sep-21	OCTA	900	IRWD Check	Negotiable
421764	30-Sep-21	OLIN CORPORATION	33,386.69	IRWD Check	Negotiable
421765	30-Sep-21	OLSON REMCHO LLP	150	IRWD Check	Negotiable
421766	30-Sep-21	ONESOURCE DISTRIBUTORS LLC	5,664.33	IRWD Check	Negotiable
421767	30-Sep-21	ORANGE COUNTY AUTO PARTS CO	176.42	IRWD Check	Negotiable
421768	30-Sep-21	ORANGE COUNTY FIRE PROTECTION	1,370.00	IRWD Check	Negotiable
421769	30-Sep-21	ORANGE COUNTY SANITATION DISTRICT	509.32	IRWD Check	Negotiable

**IRVINE RANCH WATER DISTRICT
AP DISBURSEMENTS AND VOIDS FOR SEP 2021**

CHECK OR ELECTRONIC #	PAYMENT DATE	SUPPLIERS	PAYMENT AMOUNT	PAYMENT METHOD	STATUS
421770	30-Sep-21	PACIFIC HYDROTECH CORPORATION	1,616.10	IRWD Check	Negotiable
421771	30-Sep-21	PACIFIC STAR CHEMICAL, LLC	3,663.78	IRWD Check	Negotiable
421772	30-Sep-21	PACRIM ENGINEERING INC.	1,800.00	IRWD Check	Negotiable
421773	30-Sep-21	PARKHOUSE TIRE INC	795.18	IRWD Check	Negotiable
421774	30-Sep-21	PAULUS ENGINEERING INC	36,110.16	IRWD Check	Negotiable
421775	30-Sep-21	PAYMENTUS GROUP INC.	68,575.74	IRWD Check	Negotiable
421776	30-Sep-21	PINNACLE CUSTOM HOMES, INC.	1,453.75	IRWD Check	Negotiable
421777	30-Sep-21	PMC ENGINEERING LLC.	1,562.70	IRWD Check	Negotiable
421778	30-Sep-21	POLYDYNE INC	62,319.37	IRWD Check	Negotiable
421779	30-Sep-21	PPANERA, SCOTT	56.04	IRWD Check	Negotiable
421780	30-Sep-21	PRAXAIR DISTRIBUTION INC	1,718.95	IRWD Check	Negotiable
421781	30-Sep-21	PSOMAS	5,017.50	IRWD Check	Negotiable
421782	30-Sep-21	PULTE GROUP	335.01	IRWD Check	Negotiable
421783	30-Sep-21	PYRO-COMM SYSTEMS INC	651.36	IRWD Check	Negotiable
421784	30-Sep-21	QUADIENT FINANCE USA, INC.	2,000.00	IRWD Check	Negotiable
421785	30-Sep-21	R&B AUTOMATION, INC.	20,793.91	IRWD Check	Negotiable
421786	30-Sep-21	RAM AIR ENGINEERING INC	14,234.04	IRWD Check	Negotiable
421787	30-Sep-21	RED WING SHOE STORE	184.24	IRWD Check	Negotiable
421788	30-Sep-21	REFRIGERATION SUPPLIES DISTRIBUTOR	5,344.40	IRWD Check	Negotiable
421789	30-Sep-21	REGENTS OF THE UNIVERSITY OF CALIFORNIA	800	IRWD Check	Negotiable
421790	30-Sep-21	RESTEK CORPORATION	2,840.72	IRWD Check	Negotiable
421791	30-Sep-21	RINCON TRUCK CENTER INC.	210.71	IRWD Check	Negotiable
421792	30-Sep-21	RLG ENTERPRISES, INC	459.93	IRWD Check	Negotiable
421793	30-Sep-21	ROCKFIELD SHELL	529.11	IRWD Check	Negotiable
421794	30-Sep-21	SANTA MARGARITA FORD	1,059.73	IRWD Check	Negotiable
421795	30-Sep-21	SHAMROCK SUPPLY CO INC	3,386.92	IRWD Check	Negotiable
421796	30-Sep-21	SHOTTS, KEVIN	68.05	IRWD Check	Negotiable
421797	30-Sep-21	SOUTH BAY FOUNDRY, INC	3,683.93	IRWD Check	Negotiable
421798	30-Sep-21	SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT	5,219.40	IRWD Check	Negotiable
421799	30-Sep-21	SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT	1,463.04	IRWD Check	Negotiable
421800	30-Sep-21	SOUTH COAST WATER DISTRICT	937.17	IRWD Check	Negotiable
421801	30-Sep-21	SOUTHERN CALIFORNIA EDISON	85.86	IRWD Check	Negotiable
421802	30-Sep-21	SOUTHERN CALIFORNIA EDISON COMPANY	11,853.98	IRWD Check	Negotiable
421803	30-Sep-21	SOUTHERN CALIFORNIA EDISON COMPANY	403,194.05	IRWD Check	Negotiable
421804	30-Sep-21	SOUTHERN CALIFORNIA GAS COMPANY	11.75	IRWD Check	Voided
421805	30-Sep-21	SOUTHERN CALIFORNIA SECURITY CENTERS, INC.	688.16	IRWD Check	Negotiable
421806	30-Sep-21	SOUTHWEST VALVE & EQUIPMENT INC	11,942.62	IRWD Check	Negotiable
421807	30-Sep-21	STANTEC CONSULTING SERVICES INC.	19,089.89	IRWD Check	Negotiable
421808	30-Sep-21	TAIT ENVIRONMENTAL SERVICES, INC.	1,095.00	IRWD Check	Negotiable
421809	30-Sep-21	TAYLOR MORRISON OF CALIFORNIA, LLC	188.84	IRWD Check	Negotiable
421810	30-Sep-21	TETRA TECH, INC	4,385.00	IRWD Check	Negotiable
421811	30-Sep-21	THE CONVERSE PROFESSIONAL GROUP	1,135.00	IRWD Check	Negotiable
421812	30-Sep-21	THOMPSON & PHIPPS INC	4,946.04	IRWD Check	Negotiable
421813	30-Sep-21	TK ELEVATOR CORPORATION	211.44	IRWD Check	Negotiable
421814	30-Sep-21	TOP TEN REAL ESTATE INC	44.19	IRWD Check	Negotiable
421815	30-Sep-21	TOTAL RESOURCE MANAGEMENT, INC	3,940.00	IRWD Check	Negotiable
421816	30-Sep-21	TRAFFIC MANAGEMENT, INC	3,535.00	IRWD Check	Negotiable
421817	30-Sep-21	UNITED SITE SERVICES OF CALIFORNIA INC	689.7	IRWD Check	Negotiable
421818	30-Sep-21	UNIVAR SOLUTIONS USA INC.	7,539.20	IRWD Check	Negotiable
421819	30-Sep-21	VERIZON WIRELESS SERVICES LLC	13,528.57	IRWD Check	Negotiable
421820	30-Sep-21	VULCAN MATERIALS COMPANY	1,521.50	IRWD Check	Negotiable
421821	30-Sep-21	VWR INTERNATIONAL, LLC	840.88	IRWD Check	Negotiable
421822	30-Sep-21	WARD, WILLIAM P JR.	1,351.80	IRWD Check	Negotiable
421823	30-Sep-21	WASTE MANAGEMENT COLLECTIONS AND RECYCLING, INC.	342.56	IRWD Check	Negotiable
421824	30-Sep-21	WATER MANAGEMENT GROUP	240	IRWD Check	Negotiable
421825	30-Sep-21	WATER TREATMENT CHEMICALS INC	13,503.36	IRWD Check	Negotiable
421826	30-Sep-21	WATERLINE TECHNOLOGIES INC	2,720.00	IRWD Check	Negotiable
421827	30-Sep-21	WAXIE'S ENTERPRISES, INC	1,138.56	IRWD Check	Negotiable
421828	30-Sep-21	WECK LABORATORIES INC	15,873.00	IRWD Check	Negotiable
421829	30-Sep-21	WEST COAST SAND & GRAVEL INC.	624.65	IRWD Check	Negotiable
421830	30-Sep-21	WEST YOST & ASSOCIATES, INC.	16,353.00	IRWD Check	Negotiable
421831	30-Sep-21	WILMINGTON INSTRUMENT COMPANY INC	1,204.18	IRWD Check	Negotiable
421832	30-Sep-21	WORKFORCE SAFETY LLC	4,500.00	IRWD Check	Negotiable

**IRVINE RANCH WATER DISTRICT
AP DISBURSEMENTS AND VOIDS FOR SEP 2021**

CHECK OR ELECTRONIC #	PAYMENT DATE	SUPPLIERS	PAYMENT AMOUNT	PAYMENT METHOD	STATUS
421833	30-Sep-21	YORKE ENGINEERING, LLC	889.25	IRWD Check	Negotiable
421834	30-Sep-21	ZHOU, BAOMIN	8.83	IRWD Check	Negotiable
421835	30-Sep-21	SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT	5,371.08	IRWD Check	Negotiable
421836	30-Sep-21	CONSTELLATION NEWENERGY, INC.	115,744.41	IRWD Check	Negotiable
421837	30-Sep-21	COX COMMUNICATIONS, INC.	3,554.94	IRWD Check	Negotiable
421838	30-Sep-21	SOUTHERN CALIFORNIA GAS COMPANY	2,220.74	IRWD Check	Negotiable
SUB-TOTAL CHECK DISBURSEMENTS			13,184,915.54		
14524	1-Sep-21	YORK RISK SERVICES GROUP, INC.	34.69	IRWD Wire	Negotiable
14525	2-Sep-21	CHARD SNYDER & ASSOCIATES, INC.	1,517.30	IRWD Wire	Negotiable
14526	2-Sep-21	CALPERS	3,140.59	IRWD Wire	Negotiable
14527	2-Sep-21	CALPERS	557,518.96	IRWD Wire	Negotiable
14528	7-Sep-21	CHARD SNYDER & ASSOCIATES, INC.	26,336.60	IRWD Wire	Negotiable
14529	7-Sep-21	CHARD SNYDER & ASSOCIATES, INC.	3,896.08	IRWD Wire	Negotiable
14530	8-Sep-21	FRANCHISE TAX BOARD	76,131.63	IRWD Wire	Negotiable
14531	8-Sep-21	GREAT-WEST LIFE & ANNUITY INSURANCE COMPANY	182,614.29	IRWD Wire	Negotiable
14532	8-Sep-21	CALIFORNIA DEPARTMENT OF CHILD SUPPORT SERVICES	2,227.47	IRWD Wire	Negotiable
14533	8-Sep-21	EMPLOYMENT DEVELOPMENT DEPARTMENT	17,997.21	IRWD Wire	Negotiable
14534	8-Sep-21	INTERNAL REVENUE SERVICE	242,560.59	IRWD Wire	Negotiable
14535	13-Sep-21	BANK OF NEW YORK MELLON TRUST COMPANY NA	3,061.64	IRWD Wire	Negotiable
14536	13-Sep-21	U.S. BANK NATIONAL ASSOCIATION	460.17	IRWD Wire	Negotiable
14537	13-Sep-21	BANK OF AMERICA	445.78	IRWD Wire	Negotiable
14538	13-Sep-21	SUMITOMO MITSUI BANKING CORPORATION	730.41	IRWD Wire	Negotiable
14539	13-Sep-21	U.S. BANK NATIONAL ASSOCIATION	217.33	IRWD Wire	Negotiable
14540	13-Sep-21	CALPERS	1,416.16	IRWD Wire	Negotiable
14541	13-Sep-21	CALPERS	256,428.42	IRWD Wire	Negotiable
14542	14-Sep-21	YORK RISK SERVICES GROUP, INC.	14,787.57	IRWD Wire	Negotiable
14543	14-Sep-21	WELLS FARGO BANK, N.A.	6,350.71	IRWD Wire	Negotiable
14544	14-Sep-21	CHARD SNYDER & ASSOCIATES, INC.	5,494.47	IRWD Wire	Negotiable
14545	14-Sep-21	CHARD SNYDER & ASSOCIATES, INC.	2,858.54	IRWD Wire	Negotiable
14546	15-Sep-21	CALPERS	0.02	IRWD Wire	Negotiable
14547	16-Sep-21	CITIGROUP GLOBAL MARKETS INC.	838,115.33	IRWD Wire	Negotiable
14548	16-Sep-21	MERRILL LYNCH CAPITAL SERVICES, INC	838,115.33	IRWD Wire	Negotiable
14549	20-Sep-21	CHARD SNYDER & ASSOCIATES, INC.	2,857.24	IRWD Wire	Negotiable
14550	20-Sep-21	CHARD SNYDER & ASSOCIATES, INC.	2,545.05	IRWD Wire	Negotiable
14551	21-Sep-21	YORK RISK SERVICES GROUP, INC.	9,889.66	IRWD Wire	Negotiable
14552	21-Sep-21	MUNICIPAL WATER DISTRICT OF ORANGE COUNTY	2,638,346.22	IRWD Wire	Negotiable
14553	22-Sep-21	CAI, LI	67.35	IRWD Wire	Negotiable
14554	22-Sep-21	EMPLOYMENT DEVELOPMENT DEPARTMENT	17,736.20	IRWD Wire	Negotiable
14555	22-Sep-21	FRANCHISE TAX BOARD	77,040.22	IRWD Wire	Negotiable
14556	22-Sep-21	INTERNAL REVENUE SERVICE	245,095.88	IRWD Wire	Negotiable
14557	22-Sep-21	CALIFORNIA DEPARTMENT OF CHILD SUPPORT SERVICES	2,227.47	IRWD Wire	Negotiable
14558	22-Sep-21	GREAT-WEST LIFE & ANNUITY INSURANCE COMPANY	178,535.64	IRWD Wire	Negotiable
14559	27-Sep-21	CHARD SNYDER & ASSOCIATES, INC.	2,942.81	IRWD Wire	Negotiable
14560	28-Sep-21	ORANGE COUNTY WATER DISTRICT	4,832,395.08	IRWD Wire	Negotiable
14561	27-Sep-21	CALPERS	255,656.82	IRWD Wire	Negotiable
14562	28-Sep-21	YORK RISK SERVICES GROUP, INC.	7,734.72	IRWD Wire	Negotiable
14563	30-Sep-21	BANK OF AMERICA MERRILL LYNCH	92,666.73	IRWD Wire	Negotiable
14564	30-Sep-21	BANK OF NEW YORK MELLON TRUST COMPANY NA	5,532.79	IRWD Wire	Negotiable
14565	30-Sep-21	BANK OF NEW YORK MELLON TRUST COMPANY NA	5,197.01	IRWD Wire	Negotiable
14566	30-Sep-21	BANK OF NEW YORK MELLON TRUST COMPANY NA	1,036.01	IRWD Wire	Negotiable
SUB-TOTAL ELECTRONIC DISBURSEMENTS			11,459,960.19		
SUB-TOTAL AP CHECK AND ELECTRONIC DISBURSEMENTS			24,644,875.73		
SUB-TOTAL CHECK AND ELECTRONIC ISSUED AND VOIDED IN SEP 2021					
421064	2-Sep-21	MCHENRY, NICOLE	82.98	IRWD Check	Voided
421804	30-Sep-21	SOUTHERN CALIFORNIA GAS COMPANY	11.75	IRWD Check	Voided
SUB-TOTAL CHECK AND ELECTRONIC ISSUED AND VOIDED IN SEP 2021			94.73		
TOTAL AP DISBURSEMENTS AND VOIDS FOR SEP 2021			24,644,781.00		

Note: This page is intentionally left blank.

Exhibit "E"

MONTHLY SUMMARY OF PAYROLL ACH PAYMENTS

**September
2021**

	AMOUNT	VENDOR	PURPOSE
9/10/2021	1,107,008.84	BANK OF AMERICA	ACH Payments for Payroll
9/24/2021	1,123,537.21	BANK OF AMERICA	ACH Payments for Payroll
	<u><u>\$2,230,546.05</u></u>		

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Exhibit "F"

IRWD Gov Code 53065.5 Disclosure Report

Payment or Reimbursements for Individual charges of \$100 or more per transaction for services or product received.
01-SEP-21 to 30-SEP-21

NAME	CHECK NO.	CHECK DATE	AMOUNT	ITEM DESCRIPTION	EXPENSE JUSTIFICATION
Bill, Cody	421149	9-Sep-21	204.00	Membership Renewal	CWEA Membership
Cascelli, Craig	421472	23-Sep-21	192.00	Membership Renewal	CWEA Membership
Gronlund, Brandon	421151	9-Sep-21	125.00	Certification Renewal	SWRCB Wastewater Operator Grade I
Haney, Lisa	421147	2-Sep-21	309.98	Lodging	CASA 2021 Annual Conference, San Diego, CA - August 11-13, 2021
Hoffman, Mike	421637	30-Sep-21	101.00	Certification Renewal	CWEA Collections Grade III
Ledesma, Alex	420952	2-Sep-21	110.00	Certification Renewal	SWRCB Water Treatment Operator Grade II
Ledesma, Alex	420952	2-Sep-21	164.53	Certification Renewal	CEU Course Water Treatment Plant Operator
Marcacci, Mark	421153	9-Sep-21	180.00	Certification Renewal	California Board for Professional Engineers - Civil Engineer
Mwe, Nang	421154	9-Sep-21	180.00	Certification Renewal	California Board for Professional Engineers - Civil Engineer
Oldewage, Lars	420953	2-Sep-21	267.00	Membership Renewal	WEF membership
O'Neill, Owen	421638	30-Sep-21	106.00	Certification Renewal	CWEA Electrical/Instrumentation Grade IV
O'Neill, Owen	421638	30-Sep-21	192.00	Membership Renewal	CWEA Membership
Pardee, Debra	421639	30-Sep-21	202.50	Other(Misc)	AWWA 2021 Water and Wastewater Rate Survey - Book - Benchmarking and misc. info.
Paulson, David	420954	2-Sep-21	105.00	Certification Renewal	SWRCB Water Distribution Grade V
Sciabica, Joseph	421641	30-Sep-21	192.00	Membership Renewal	CWEA Membership
Sosa, Ives	421156	9-Sep-21	200.00	Other(Misc)	Safety shoe allowance
Strunk, Robert	421146	2-Sep-21	110.00	Certification Renewal	SWRCB Wastewater Operator Grade V
Vasquez, Jonathan	421474	23-Sep-21	110.00	Certification Renewal	SWRCB Water Treatment Grade II
Vasquez, Jonathan	421474	23-Sep-21	165.53	Certification Renewal	CEU Course Water Treatment Plant Operator
Total Amount:			\$3,216.54		

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October 25, 2021
Prepared by: D. Pardee / C. Smithson
Submitted by: C. Clary
Approved by: Paul A. Cook



CONSENT CALENDAR

IRWD STRATEGIC MEASURES

SUMMARY:

Provided as Exhibit “A” are the IRWD Strategic Measures and informational items for the Board’s review. These measures are intended to reflect the critical performance measures that gauge the District’s key business objectives.

BACKGROUND:

The proposed strategic measures document summarizes several operating performance, financial, customer and other key measures important to the ongoing operation of the District. These measures were selected and designed to provide a “snapshot” view of the measures that would be of interest to the Board.

FISCAL IMPACTS:

Not applicable.

ENVIRONMENTAL COMPLIANCE:

Not applicable.

RECOMMENDATION:

RECEIVE AND FILE.

LIST OF EXHIBITS:

Exhibit “A” – Q1 2022 Strategic Measures

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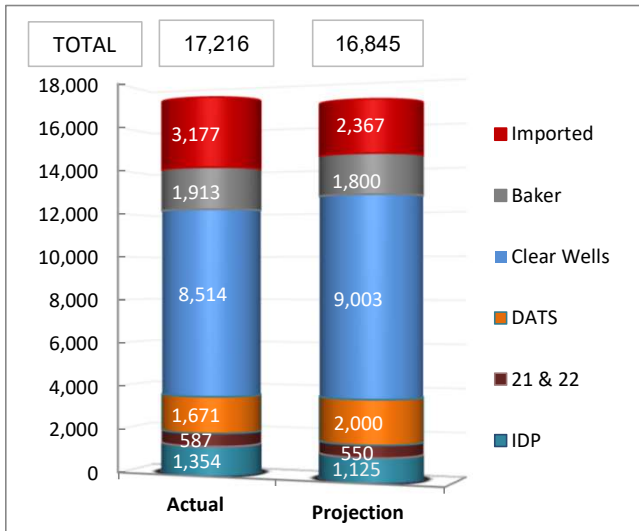
Exhibit "A"

IRVINE RANCH WATER DISTRICT

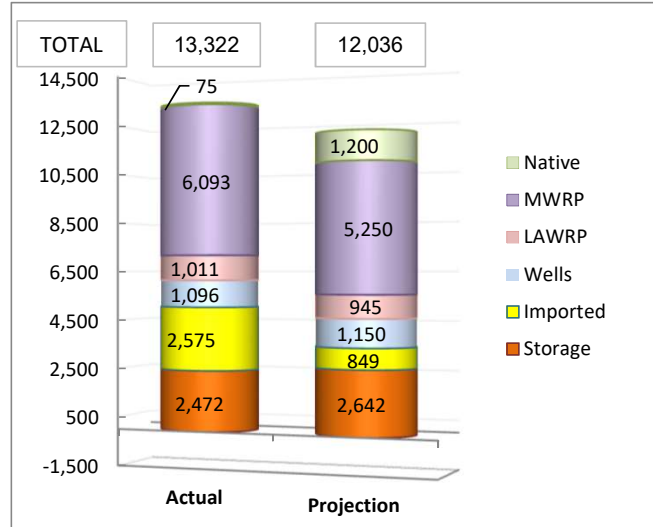
Operational Performance Measures

Data as of September 30, 2021

Potable Water Production FYTD
(AF)



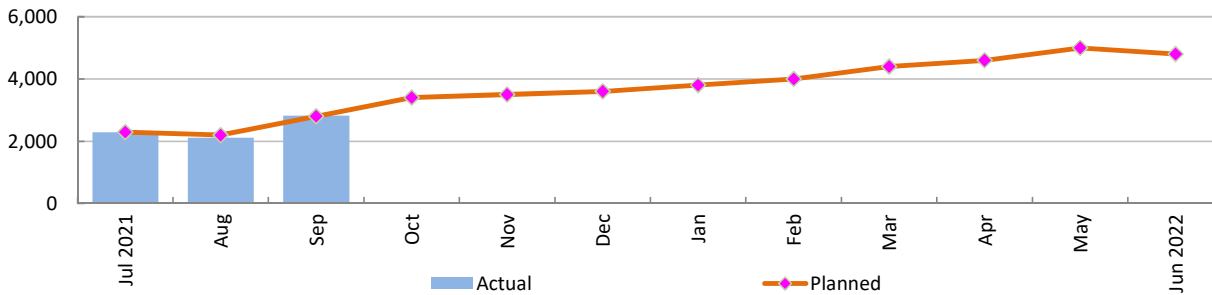
Non-Potable Water Production FYTD
(AF)



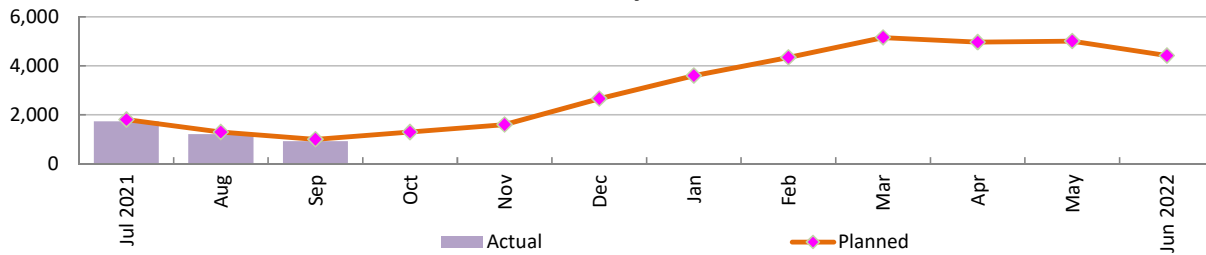
Non-Potable Reservoir Storage

(AF)

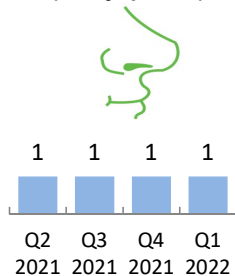
Irvine Lake



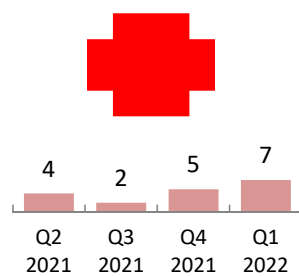
Recycled



Odor Complaints (FY by quarter)



OSHA Recordables Incidents



Regulatory Compliance Incidents

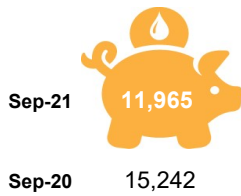
Category	Q2 2021	Q3 2021	Q4 2021	Q1 2022
AQMD	3	1	3	9
Plants	0	0	1	0
Sewer Spills	1	3	1	0

IRVINE RANCH WATER DISTRICT

Other Statistical Information

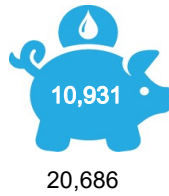
Data as of September 30, 2021

State Project (AF)

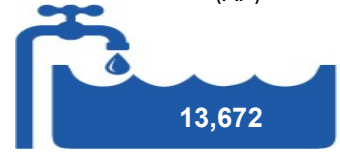


Banked Water

Non-State Project (AF)



Net YTD Water In/(Out) (AF)



*Calendar Year including extraordinary supply received.

Certificates of Occupancies FYTD

Apartment Condominium Single Family



	Apartment	Condominium	Single Family
FY 2021-22	285	335	115
FY 2020-21	0	330	59

Total Potable Water

FYTD

Q1



	AF	GPCD
FY 2021-22	17,216	80
Three Yr Avg	16,666	77
Change	3.3%	4%

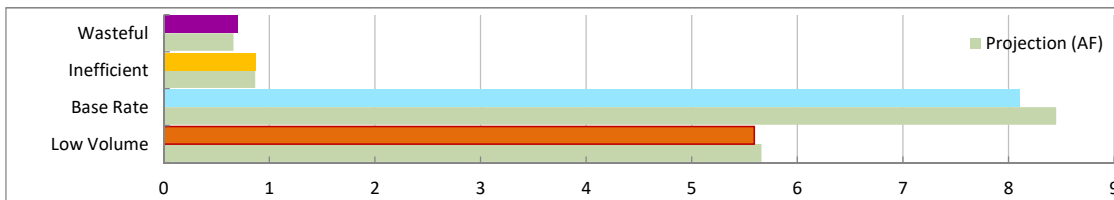
Acre-Feet Per Acre Irrigation



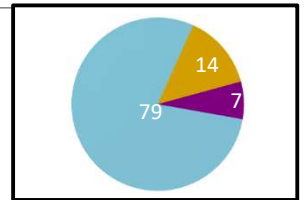
	Actual	Water Budget
FY 2021-22	1.07	1.29
Three Yr Avg	1.03	1.30

Potable Sales by Tier FYTD

(in thousands)

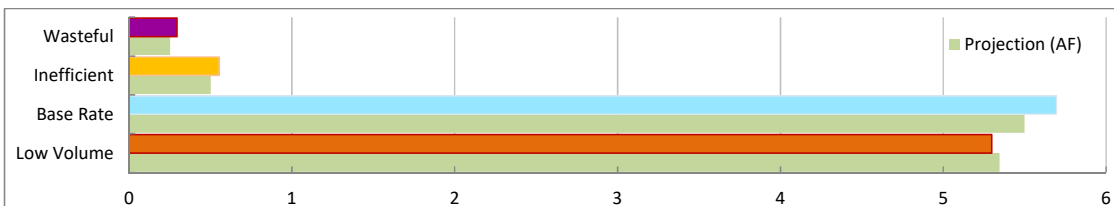


% of Customers by Tier

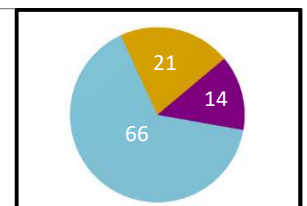


Non-Potable Sales by Tier FYTD

(in thousands)

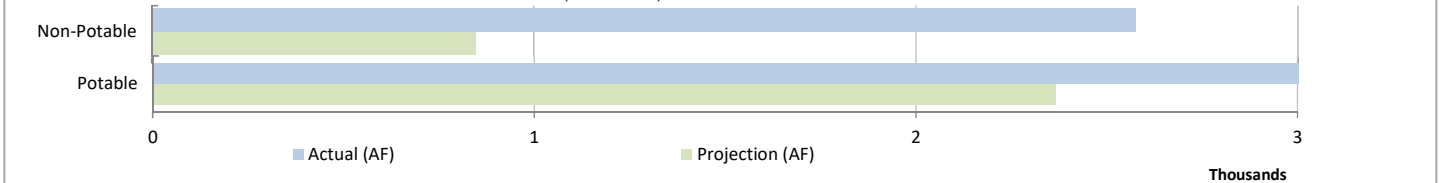


% of Customers by Tier



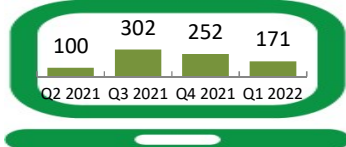
Imported Water Purchases FYTD

(in thousands)

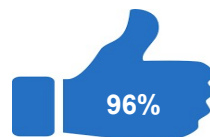


Website Hits

(in thousands)



Customer Satisfaction Index**



** 12 month rolling average

October 25, 2021
Prepared by: J. Davis
Submitted by: R. Jacobson / C. Clary
Approved by: Paul A. Cook *P.A.C.*

CONSENT CALENDAR

LETTER OF CREDIT EXTENSIONS FOR THE SERIES 1993 AND 2009A BONDS

SUMMARY:

IRWD currently has \$24.8 million of Consolidated Series 1993 Bonds and \$52.5 million of Consolidated Series 2009A Bonds supported by U.S. Bank N.A. letters of credit (LOCs) set to expire on December 15, 2021. U.S. Bank provided a proposal to extend both LOCs for a 1.5-year or 3.5-year term. Based on the proposal received and feedback from IRWD's municipal advisor, Public Financial Management (PFM), staff recommends the Board authorize staff to extend the U.S. Bank LOCs for 3.5 years at a rate of 0.30% per year and adopt a resolution, subject to nonsubstantive changes, authorizing certain actions in connection with the extension of Letters of Credit for Consolidated Series 1993 and Consolidated Series 2009A bonds.

BACKGROUND:

IRWD currently has a total of \$77.3 million (\$24.8 million of 1993 Bonds and \$52.5 million of 2009A Bonds) supported by U.S. Bank LOCs, scheduled to expire on December 15, 2021. Current pricing for the LOCs is 0.33% per year. U.S. Bank provided a proposal to extend the LOCs for a 1.5-year or 3.5-year term at an annual rate of 0.25% and 0.30%, respectively.

Staff reviewed current LOC market rates with PFM to ensure the fee proposal was competitive with LOC pricing from other banks of similar credit quality. Staff recommends the Board authorize the extension of the LOCs for a 3.5-year term at an annual cost of 0.30%, a 0.03% reduction from the current LOC fees. The Letter of Credit Pricing is provided as Exhibit "A". Provided as Exhibit "B" is a resolution approving the extensions of the Letters of Credit for the 1993 and 2009A Bonds.

FISCAL IMPACTS:

Extending the U.S. Bank Letters of Credit for the 1993 Bonds and 2009A Bonds for a 3.5-year term at 0.30% will result in an estimated total cost of \$741,462. The LOC fee reduction from 0.33% to 0.30% provides a savings of approximately \$115,600. Expenses related to the extension for legal services and other miscellaneous costs are estimated at \$19,000.

ENVIRONMENTAL COMPLIANCE:

This item is not a project as defined in the California Environmental Quality Act Code of Regulations, Title 14, Chapter 3, Section 15378.

COMMITTEE STATUS:

This item was reviewed by the Finance and Personnel Committee on October 14, 2021.

RECOMMENDATION:

THAT THE BOARD AUTHORIZE STAFF TO EXTEND THE U.S. BANK LETTERS OF CREDIT FOR IRWD'S 1993 BONDS AND THE 2009A BONDS TO MAY 2025 AT AN ANNUAL COST OF 0.30% AND ADOPT THE FOLLOWING RESOLUTION BY TITLE SUBJECT TO NONSUBSTANTIVE CHANGES.

RESOLUTION NO. 2021-23

RESOLUTION OF THE BOARD OF DIRECTORS OF
THE IRVINE RANCH WATER DISTRICT
AUTHORIZING CERTAIN ACTIONS IN CONNECTION
WITH THE EXTENSION OF LETTERS OF CREDIT FOR
CONSOLIDATED SERIES 1993 AND CONSOLIDATED SERIES 2009A BONDS

LIST OF EXHIBITS:

Exhibit "A" – Letter of Credit Pricing

Exhibit "B" – Resolution Authorizing Certain Actions in Connection with LOC Extensions

EXHIBIT "A"

IRIVNE RANCH WATER DISTRICT
US BANK LETTER OF CREDIT PRICING
September 2, 2021

Series 1993 Bonds

Fiscal Year	Prinicpal	Stated ⁽¹⁾	Current		Proposed		Savings
			LC Fee	Annual Cost	LC Fee	Annual Cost	
FY 21-22 ⁽²⁾	24,800,000	25,134,290	0.330%	82,943	0.30%	37,701	45,242
FY 22-23	23,000,000	23,310,027	0.330%	76,923	0.30%	69,930	6,993
FY 23-24	21,000,000	21,283,068	0.330%	70,234	0.30%	63,849	6,385
FY 24-25	19,100,000	19,357,458	0.330%	63,880	0.30%	58,072	5,807
Total				293,980		229,553	64,427

(1) Stated amount represents the average par amount of bonds outstanding for the 1993 Bonds, plus 41 days of interest at the maximum rate of 12%

(2) Represents a 6-month period

Series 2009A Bonds

Fiscal Year	Prinicpal	Stated ⁽¹⁾	Current		Proposed		Savings
			LC Fee	Cost	LC Fee	Cost	
FY 21-22 ⁽²⁾	52,500,000	53,086,849	0.330%	87,593	0.30%	79,630	7,963
FY 22-23	50,000,000	50,558,904	0.330%	166,844	0.30%	151,677	15,168
FY 23-24	47,500,000	48,030,959	0.330%	158,502	0.30%	144,093	14,409
FY 24-25	45,000,000	45,503,014	0.330%	150,160	0.30%	136,509	13,651
Total				563,100		511,909	51,191

(1) Stated amount represents the average par amount of bonds outstanding for the 2009A Bonds, plus 34 days of interest at the maximum rate of 12%

(2) Represents a 6-month period

Estimated Expenses: 19,000

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RESOLUTION NO. 2021-

RESOLUTION OF THE BOARD OF DIRECTORS OF
THE IRVINE RANCH WATER DISTRICT
AUTHORIZING CERTAIN ACTIONS IN CONNECTION
WITH EXTENSION OF LETTERS OF CREDIT
(CONSOLIDATED SERIES 1993 AND CONSOLIDATED SERIES 2009A)

The Irvine Ranch Water District (“**IRWD**”) has issued the Bonds of IRWD, Consolidated Series 1993 (the “**Series 1993 Bonds**”) and Consolidated Series 2009A (the “**Series 2009A Bonds**”).

The irrevocable letters of credit of U.S. Bank National Association (“**US Bank**”) have been issued with respect to the Series 1993 Bonds (the “**1993 Bonds Letter of Credit**”) and 2009A Bonds (the “**2009A Bonds Letter of Credit**,” and collectively with the 1993 Bonds Letter of Credit, the “**Letters of Credit**”).

The 1993 Bonds Letter of Credit and the 2009A Bonds Letter of Credit are scheduled to expire on December 15, 2021.

Consistent with IRWD’s Debt Management Policy, the Board of Directors (the “**Board**”) must approve all debt issuance or refunding proposals made by IRWD involving a pledge or other extension of IRWD’s credit through the sale of securities, execution of loans or leases, or making guarantees, or otherwise involving directly or indirectly the lending or pledging of IRWD’s credit.

After evaluating proposed terms and conditions for extending the Letters of Credit, the Board believes it is in the interest of IRWD to authorize the extension of the Letters of Credit as provided herein.

The 1993 Bonds Letter of Credit was issued pursuant to the Reimbursement Agreement dated as of May 7, 2015 and has previously been extended pursuant to the First Amendment to Reimbursement Agreement dated October 1, 2018 (collectively, the “**1993 Bonds Reimbursement Agreement**”), and the 2009A Bonds Letter of Credit was issued and has previously been extended pursuant to the Amended and Restated Reimbursement Agreement, dated as of April 1, 2011, as amended by the First Amendment to Amended and Restated Reimbursement Agreement, dated as of July 15, 2013, the Second Amendment to Amended and Restated Reimbursement Agreement, dated as of June 22, 2016, and subsequently amended by the Third Amendment to Amended and Restated Reimbursement Agreement, dated as of October 1, 2018, each by and between the District and US Bank (collectively, the “**2009A Bonds Reimbursement Agreement**”).

The Board of Directors of IRWD therefore resolves as follows:

Section 1. The Treasurer is hereby authorized and directed to cause the extension of the Letters of Credit, so as to expire on or about May 2025. The form of a second amendment to the 1993 Bonds Reimbursement Agreement (inclusive of the form of a second amended and restated fee letter), and the fourth amendment to the 2009A Bonds Reimbursement Agreement (inclusive

of the form of a second amended and restated fee letter) are hereby approved in substantially the forms presented to the Board with this resolution, and the President and Secretary are authorized and directed to execute such amendment and the President is authorized to execute such fee letter, each in the form so presented with such changes therein as are approved by, and on the date for delivery established by, the Treasurer with the concurrence of the President, which approval will be conclusively evidenced by execution and delivery thereof.

Section 2. The foregoing authorization to cause the extension of the Letters of Credit shall include the approval of the terms of any amendments to agreement and instrument to be delivered by and to the respective remarketing agent. The President and Secretary of IRWD are authorized and directed to execute any amendment so approved.

Section 3. The foregoing authorization to cause the extension of the Letters of Credit shall further include any and all of the following: preparation and/or approval, execution and delivery of any notices, instruments, disclosure or other documents to be delivered or distributed in conjunction with the authorized actions, and any other actions to implement such extension of the Letters of Credit.

Section 4. The President, Secretary and each other officer of IRWD is hereby authorized and directed to execute and deliver any and all documents and instruments and to do and cause to be done any and all acts and things necessary or proper for carrying out the transactions contemplated by this resolution.

ADOPTED, SIGNED AND APPROVED this 25th day of October 2021.

President
IRVINE RANCH WATER DISTRICT and
of the Board of Directors thereof

Secretary
IRVINE RANCH WATER DISTRICT and
of the Board of Directors thereof

APPROVED AS TO FORM:
Hanson Bridgett LLP

By: _____
District Counsel

SECOND AMENDMENT TO REIMBURSEMENT AGREEMENT

This **SECOND AMENDMENT TO REIMBURSEMENT AGREEMENT** (this "*Amendment*") is dated November 1, 2021 (the "*Amendment Date*"), between **IRVINE RANCH WATER DISTRICT**, a California water district ("*IRWD*"), and **U.S. BANK NATIONAL ASSOCIATION** (the "*Bank*"). All capitalized terms herein and not defined herein shall have the meanings set forth in the hereinafter defined Agreement.

WITNESSETH

WHEREAS, IRWD and the Bank have previously entered into that certain Reimbursement Agreement dated as of May 7, 2015 (as amended, restated, supplemented or otherwise modified from time to time, the "*Agreement*"), relating to the \$38,300,000 Bonds of Irvine Ranch Water District, Consolidated Series 1993;

WHEREAS, pursuant to Section 8.1 of the Agreement, the Agreement may be amended by a written amendment thereto executed by IRWD and the Bank; and

WHEREAS, IRWD has requested that certain amendments be made to the Agreement, and the Bank has agreed to make such amendments to the Agreement subject to the terms and conditions set forth herein.

NOW, THEREFORE, in consideration of the premises, the parties hereto hereby agree as follows:

SECTION 1. AMENDMENTS.

Upon the satisfaction of the conditions precedent set forth in Section 2 hereof, the Agreement is hereby amended as follows:

1.01. The following definitions in Section 1.1 of the Agreement are hereby amended and restated in their entireties to read as follows:

"Fee Letter" shall mean the Second Amended and Restated Fee Letter dated November 1, 2021 from the Bank to IRWD regarding fees and expenses in respect of the Financing Documents, as amended, restated, supplemented or otherwise modified from time to time.

SECTION 2. CONDITIONS PRECEDENT.

This Amendment shall be effective as of the Amendment Date subject to the satisfaction of or waiver by IRWD of all of the following conditions precedent:

2.01. Delivery by IRWD to the Bank of an executed counterpart of this Amendment and the Second Amended and Restated Fee Letter dated November 1, 2021, between the Bank and IRWD.

2.02. Receipt by the Bank of the Resolution of IRWD authorizing the extension of the Letter of Credit, the execution of this Amendment and the other matters contemplated hereby and thereby.

2.03. Receipt by the Bank of an incumbency certificate of IRWD certifying the names and signatures of the people authorized to execute and deliver, on behalf of IRWD, this Amendment and the other matters contemplated hereby, in form and substance satisfactory to the Bank.

2.04. Payment to the Bank on or before the Amendment Date of the reasonable legal fees and expenses of counsel to the Bank.

2.05. All other legal matters pertaining to the execution and delivery of this Amendment shall be reasonably satisfactory to the Bank and its counsel.

SECTION 3. AMENDMENT OF THE LETTER OF CREDIT.

At the Amendment Date, the Bank shall execute and deliver to the Trustee an amendment to the Letter of Credit extending the Stated Expiration Date to May 1, 2025.

SECTION 4. REPRESENTATIONS AND WARRANTIES OF IRWD.

4.01. IRWD hereby represents and warrants that the following statements are true and correct as of the Amendment Date:

(a) the representations and warranties of IRWD contained in Article IV of the Agreement and in each of the other Financing Documents are true and correct on and as of the Amendment Date as though made on and as of such date;

(b) no Default or Event of Default has occurred and is continuing or would result from the execution of this Amendment; and

(c) no petition by or against IRWD has at any time been filed under the United States Bankruptcy Code or under any similar law.

4.02. In addition to the representations given in Article IV of the Agreement, IRWD hereby represents and warrants as follows:

(a) the execution, delivery and performance by IRWD of this Amendment and the Agreement, as amended hereby, are within its powers, have been duly authorized by all necessary action and do not contravene any law, rule or regulation, any judgment, order or decree or any contractual restriction binding on or affecting IRWD;

(b) no authorization, approval or other action by, and no notice to or filing with, any governmental authority or regulatory body is required for the due execution, delivery and performance by IRWD of this Amendment or the Agreement, as amended hereby; and

(c) this Amendment and the Agreement, as amended hereby, constitute legal, valid and binding obligations of IRWD enforceable against IRWD in accordance with their respective terms, except that (i) the enforcement thereof may be limited by bankruptcy, reorganization, insolvency, liquidation, moratorium and other laws relating to or affecting the enforcement of creditors' rights and remedies generally, as the same may be applied in the event of the bankruptcy, reorganization, insolvency, liquidation or similar situation of IRWD, and (ii) no representation or warranty is expressed as to the availability of equitable remedies.

SECTION 5. MISCELLANEOUS.

5.01. Except as specifically amended herein, the Agreement shall continue in full force and effect in accordance with its terms. Reference to this Agreement need not be made in any note, document, agreement, letter, certificate, the Agreement or any communication issued or made subsequent to or with respect to the Agreement, it being hereby agreed that any reference to the Agreement shall be sufficient to refer to, and shall mean and be a reference to, the Agreement, as hereby amended. In case any one or more of the provisions contained herein should be invalid, illegal or unenforceable in any respect, the validity, legality and enforceability of the remaining provisions contained herein shall not in any way be affected or impaired hereby. The rights and obligations of the parties hereunder shall be deemed to be a contract made under the laws of the State of New York and for all purposes shall be construed in accordance with the laws of said State, without regard to principles of conflicts of law.

5.02. This Amendment may be simultaneously executed in several counterparts, each of which shall be an original and all of which shall constitute but one and the same instrument.

[Remainder of page intentionally left blank.]

IN WITNESS WHEREOF, the parties hereto have caused this Amendment to be duly executed and delivered as of the Amendment Date.

IRVINE RANCH WATER DISTRICT

By: _____
Name: Douglas J. Reinhart
Title: President

By: _____
Name: Leslie Bonkowski
Title: Secretary

U.S. BANK NATIONAL ASSOCIATION

By: _____
Name: Ashley L. Martin
Title: Senior Vice President

November 1, 2021

Irvine Ranch Water District
Consolidated Series 1993
Second Amended and Restated Fee Letter

Irvine Ranch Water District
15600 Sand Canyon Avenue
Irvine, CA 92718
Attention: Treasurer

Ladies and Gentlemen:

Reference is made to (i) the Reimbursement Agreement dated as of May 7, 2015 (as the same may be amended, modified or supplemented from time to time, the “*Agreement*”) between Irvine Ranch Water District (“*you*” or the “*District*”) and U.S. Bank National Association (“*US Bank*” or the “*Bank*”), relating to the Bonds of Irvine Ranch Water District, Consolidated Series 1993 and (ii) the Amended and Restated Fee Letter dated as of October 1, 2018 (the “*Existing Fee Letter*”) between US Bank and the District regarding certain fees and expenses. This Second Amended and Restated Fee Letter (this “*Fee Letter*”) amends and restates the Existing Fee Letter in its entirety as of the date hereof. Any capitalized term below that is defined in the Agreement shall have the same meaning when used herein. This Fee Letter is the Fee Letter described in the Agreement.

In order to induce US Bank to extend the Stated Expiration Date of the Letter of Credit to May 1, 2025, the District agrees to make the following payments at the following times:

(1) The District hereby agrees to pay to the Bank on January 3, 2022, for the period commencing on October 1, 2021 to and including January 2, 2022, and in arrears on the first Business Day of each April, July, October and January until the Termination Date and on the Termination Date, a non-refundable letter of credit fee (the “*Letter of Credit Fee*”) on the daily average undrawn Stated Amount of the Letter of Credit in effect from time to time from the date of this Fee Letter to and including the Termination Date, at the applicable Letter of Credit Fee Rate. As used herein, “*Letter of Credit Fee Rate*” means the fee rate per annum set forth in the grid below opposite Level 1; *provided, however*, if any Rating Agency downgrades the District’s Rating to a level less than Level 1, the applicable “*Letter of Credit Fee Rate*” shall be the rate per annum set forth in the applicable grid below opposite the level that corresponds to the lowest level (it being understood that level 1 is the highest level) during each related period:

(i) for the period commencing on October 1, 2021, to but not including November 1, 2021, the Letter of Credit Fee Rate for such period shall be determined in accordance with the pricing matrix set forth below:

LEVEL	MOODY'S RATING	S&P RATING	FITCH RATING	LETTER OF CREDIT FEE RATE
Level 1	Aa1 or above	AA+ or above	AA+ or above	0.33%
Level 2	Aa2	AA	AA	0.48%
Level 3	Aa3	AA-	AA-	0.63%
Level 4	A1	A+	A+	0.83%
Level 5	A2	A	A	1.03%

(ii) for the period commencing on November 1, 2021, and at all times thereafter, the Letter of Credit Fee Rate shall be determined in accordance with the pricing matrix set forth below:

LEVEL	MOODY'S RATING	S&P RATING	FITCH RATING	LETTER OF CREDIT FEE RATE
Level 1	Aa1 or above	AA+ or above	AA+ or above	0.30%
Level 2	Aa2	AA	AA	0.45%
Level 3	Aa3	AA-	AA-	0.60%
Level 4	A1	A+	A+	0.80%
Level 5	A2	A	A	1.00%
Level 6	A3	A-	A-	1.25%

Notwithstanding the foregoing, the Letter of Credit Fee Rate shall be increased by 1.00% per annum from the Letter of Credit Fee Rate in effect immediately prior thereto, (a) in the event that (i) any Rating is withdrawn, suspended or otherwise unavailable from any Rating Agency (other than as a result of the District's determination for reasons other than credit-related reasons or an imminent withdrawal, suspension or downgrade to reduce the number of Rating Agencies assigning Ratings from three to two) or (ii) only one Rating Agency is providing a Rating, and/or (b) upon the occurrence and during the continuance of an Event of Default other than an Event of Default of the type described in clauses (i) and (ii) of Section 7.1(n) of the Agreement.

Any change in the Letter of Credit Fee Rate resulting from a change in the Rating shall be and become effective as of and on the date of the announcement of the change in such Rating. References to the Ratings above are references to the rating categories of the Rating Agencies as presently determined by the respective Rating Agencies and in the event of adoption of any new or changed rating system by any Rating Agency, the Ratings from the applicable Rating Agency shall be deemed to refer to the rating category under the new rating system which most closely approximates the applicable rating category as currently in effect.

The Letter of Credit Fee for any period prior to the date of this Fee Letter shall be calculated in accordance with the terms of the Existing Fee Letter.

(2) In the event the Letter of Credit is terminated prior to the first anniversary of the date of this Fee Letter, a termination fee (the "*Termination Fee*") payable on the date of termination equal to the Letter of Credit Fee that would have been payable to the Bank pursuant to preceding paragraph (1) but for the termination of the Letter of Credit for the period from and including the date on which the Letter of Credit is terminated to and including the first anniversary of the date of this Fee Letter assuming (A) a Letter of Credit Fee Rate equal to the Letter of Credit Fee Rate in effect immediately prior to the termination of the Letter of Credit; and (B) a Stated Amount equal to the Stated Amount in effect on the date of this Fee Letter; *provided, however*, that the Termination Fee shall not be payable if (1) the Bank's unsecured short-term credit rating at the time of termination is below "P-1" by Moody's, below "A-1" by S&P or below "F1" by Fitch or (2) the Bank submits a request for payment pursuant to Section 2.2(f) of the Agreement.

(3) A draw fee of \$250 for each drawing under the Letter of Credit, payable on each Business Day on which the Bank honors the amount of any such drawing or, if the District so elects, payable quarterly in arrears along with the Letter of Credit Fee.

(4) The Bank's customary courier fees and wire transfer fees payable promptly following the District's receipt of an invoice therefor.

(5) Upon each transfer of the Letter of Credit in accordance with its terms, a transfer commission equal to \$2,500.

(6) (A) At the time any non-material amendment, waiver, supplement or restatement of the Agreement is requested or (B) in connection with any Bank consent required for any non-material amendment, waiver, supplement or restatement of any Financing Document (other than the Agreement) at the time such consent is sought, a fee of \$2,500 plus reasonable attorneys' fees and expenses, which fee shall be earned and payable whether or not any such amendment, waiver, supplement or restatement is executed or consent granted. Fees for material amendments, waivers, supplements, restatements, supplements and consents shall be negotiated at the time sought.

All amounts paid pursuant to this Fee Letter shall be non-refundable. Computations of the Letter of Credit Fee and the Termination Fee shall be made on the basis of a 360 day year and actual days elapsed. All amounts paid pursuant to this Fee Letter shall be paid in the manner and to the account set forth in the Agreement.

This Fee Letter may not be amended or waived except by an instrument in writing signed by the Bank and you.

The provisions of Sections 8.9 and 8.10 of the Agreement shall be incorporated by this reference into this Fee Letter as if such provisions were set forth in their entirety except that references to other agreements or "this Agreement" shall mean this Fee Letter and references to "hereunder" or "hereof" shall mean under this Fee Letter or of this Fee Letter.

This Fee Letter amends and restates in its entirety the Existing Fee Letter. Reference to this specific Fee Letter need not be made in any agreement, document, instrument, letter,

certificate, the Existing Fee Letter itself, or any communication issued or made pursuant to or with respect to the Existing Fee Letter, any reference to the Existing Fee Letter being sufficient to refer to the Existing Fee Letter as amended and restated hereby, and more specifically, any and all references to the Fee Letter as amended and restated hereby, and more specifically, any and all references to the Fee Letter in the Agreement shall mean this Fee Letter.

This Fee Letter may be executed in any number of counterparts, each of which shall be an original, and all of which, when taken together, shall constitute one agreement. Delivery of an executed signature page of this Fee Letter by electronic transmission shall be effective as delivery of a manually executed counterpart hereof.

This Fee Letter is delivered to you on the understanding that neither the Fee Letter nor any of its terms shall be disclosed, directly or indirectly, to any other person except (a) to your officers, directors, employees, accountants, attorneys, agents and advisors who are directly involved in the consideration of this matter on a confidential and need-to-know basis and for whom you shall be responsible for any breach by any of them of this confidentiality undertaking or (b) under compulsion of law (whether by interrogatory, subpoena, civil investigative demand or otherwise) or by order of any court or governmental or regulatory body, *provided* that, to the extent permitted, you shall give us reasonable prior notice of such disclosure.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK.]

Please confirm that the foregoing is our mutual understanding by signing and returning to the Bank an executed counterpart of this Fee Letter. This Fee Letter shall become effective as of the date first above referenced upon our receipt of an executed counterpart of this Fee Letter from you.

Very truly yours,

U.S. BANK NATIONAL ASSOCIATION

By: _____

Name: Ashley L. Martin

Title: Senior Vice President

Accepted and agreed to
as of the date first
written above by:

IRVINE RANCH WATER DISTRICT

By: _____
Name: Douglas J. Reinhart
Title: President

By: _____
Name: Leslie Bonkowski
Title: Secretary

**FOURTH AMENDMENT TO
AMENDED AND RESTATED REIMBURSEMENT AGREEMENT**

This **FOURTH AMENDMENT TO AMENDED AND RESTATED REIMBURSEMENT AGREEMENT** (this “*Amendment*”) is dated November 1, 2021 (the “*Amendment Date*”), between **IRVINE RANCH WATER DISTRICT**, a California water district (“*IRWD*”), and **U.S. BANK NATIONAL ASSOCIATION** (the “*Bank*”). All capitalized terms herein and not defined herein shall have the meanings set forth in the hereinafter defined Agreement.

WITNESSETH

WHEREAS, IRWD and the Bank have previously entered into that certain Amended and Restated Reimbursement Agreement dated as of April 1, 2011 (as amended, restated, supplemented or otherwise modified from time to time, the “*Agreement*”), relating to the \$75,000,000 Bonds of Irvine Ranch Water District, Consolidated Series 2009A;

WHEREAS, pursuant to Section 8.1 of the Agreement, the Agreement may be amended by a written amendment thereto executed by IRWD and the Bank; and

WHEREAS, IRWD has requested that certain amendments be made to the Agreement, and the Bank has agreed to make such amendments to the Agreement subject to the terms and conditions set forth herein.

NOW, THEREFORE, in consideration of the premises, the parties hereto hereby agree as follows:

SECTION 1. AMENDMENTS.

Upon the satisfaction of the conditions precedent set forth in Section 2 hereof, the Agreement is hereby amended as follows:

1.01. The following definition in Section 1.1 of the Agreement is hereby amended and restated in its entirety to read as follows:

“Fee Letter” shall mean the Second Amended and Restated Fee Letter dated November 1, 2021, from the Bank to IRWD regarding fees and expenses in respect of the Financing Documents, as amended, restated, supplemented or otherwise modified from time to time.

SECTION 2. CONDITIONS PRECEDENT.

This Amendment shall be effective as of the Amendment Date subject to the satisfaction of or waiver by IRWD of all of the following conditions precedent:

2.01. Delivery by IRWD to the Bank of an executed counterpart of this Amendment and the Second Amended and Restated Fee Letter dated November 1, 2021, between the Bank and IRWD.

2.02. Receipt by the Bank of the Resolution of IRWD authorizing the extension of the Letter of Credit, the execution of this Amendment and the other matters contemplated hereby and thereby.

2.03. Receipt by the Bank of an incumbency certificate of IRWD certifying the names and signatures of the people authorized to execute and deliver, on behalf of IRWD, this Amendment and the other matters contemplated hereby, in form and substance satisfactory to the Bank.

2.04. Payment to the Bank on or before the Amendment Date of the reasonable legal fees and expenses of counsel to the Bank.

2.05. All other legal matters pertaining to the execution and delivery of this Amendment shall be reasonably satisfactory to the Bank and its counsel.

SECTION 3. AMENDMENT OF THE LETTER OF CREDIT.

At the Amendment Date, the Bank shall execute and deliver to the Trustee an amendment to the Letter of Credit extending the Stated Expiration Date to May 1, 2025.

SECTION 4. REPRESENTATIONS AND WARRANTIES OF IRWD.

4.01. IRWD hereby represents and warrants that the following statements are true and correct as of the Amendment Date:

(a) the representations and warranties of IRWD contained in Article IV of the Agreement and in each of the other Financing Documents are true and correct on and as of the Amendment Date as though made on and as of such date;

(b) no Default or Event of Default has occurred and is continuing or would result from the execution of this Amendment; and

(c) no petition by or against IRWD has at any time been filed under the United States Bankruptcy Code or under any similar law.

4.02. In addition to the representations given in Article IV of the Agreement, IRWD hereby represents and warrants as follows:

(a) the execution, delivery and performance by IRWD of this Amendment and the Agreement, as amended hereby, are within its powers, have been duly authorized by all necessary action and do not contravene any law, rule or regulation, any judgment, order or decree or any contractual restriction binding on or affecting IRWD;

(b) no authorization, approval or other action by, and no notice to or filing with, any governmental authority or regulatory body is required for the due execution, delivery and performance by IRWD of this Amendment or the Agreement, as amended hereby; and

(c) this Amendment and the Agreement, as amended hereby, constitute legal, valid and binding obligations of IRWD enforceable against IRWD in accordance with their respective terms, except that (i) the enforcement thereof may be limited by bankruptcy, reorganization, insolvency, liquidation, moratorium and other laws relating to or affecting the enforcement of creditors' rights and remedies generally, as the same may be applied in the event of the bankruptcy, reorganization, insolvency, liquidation or similar situation of IRWD, and (ii) no representation or warranty is expressed as to the availability of equitable remedies.

SECTION 5. MISCELLANEOUS.

5.01. Except as specifically amended herein, the Agreement shall continue in full force and effect in accordance with its terms. Reference to this Agreement need not be made in any note, document, agreement, letter, certificate, the Agreement or any communication issued or made subsequent to or with respect to the Agreement, it being hereby agreed that any reference to the Agreement shall be sufficient to refer to, and shall mean and be a reference to, the Agreement, as hereby amended. In case any one or more of the provisions contained herein should be invalid, illegal or unenforceable in any respect, the validity, legality and enforceability of the remaining provisions contained herein shall not in any way be affected or impaired hereby. The rights and obligations of the parties hereunder shall be deemed to be a contract made under the laws of the State of New York and for all purposes shall be construed in accordance with the laws of said State, without regard to principles of conflicts of law.

5.02. This Amendment may be simultaneously executed in several counterparts, each of which shall be an original and all of which shall constitute but one and the same instrument.

[Remainder of page intentionally left blank.]

IN WITNESS WHEREOF, the parties hereto have caused this Amendment to be duly executed and delivered as of the Amendment Date.

IRVINE RANCH WATER DISTRICT

By: _____
Name: Douglas J. Reinhart
Title: President

By: _____
Name: Leslie Bonkowski
Title: Secretary

U.S. BANK NATIONAL ASSOCIATION

By: _____
Name: Ashley L. Martin
Title: Senior Vice President

November 1, 2021

Irvine Ranch Water District
2009A GO Bonds
Second Amended and Restated Fee Letter

Irvine Ranch Water District
15600 Sand Canyon Avenue
Irvine, CA 92718
Attention: Treasurer

Ladies and Gentlemen:

Reference is made to (i) the Amended and Restated Reimbursement Agreement dated as of April 1, 2011 (as the same may be amended, modified or supplemented from time to time, the “*Agreement*”) between Irvine Ranch Water District (“*you*” or the “*District*”) and U.S. Bank National Association (“*US Bank*” or the “*Bank*”), relating to the Bonds of Irvine Ranch Water District, Consolidated Series 2009A and (ii) the Amended and Restated Fee Letter dated as of October 1, 2018 (the “*Existing Fee Letter*”) between US Bank and the District regarding certain fees and expenses. This Second Amended and Restated Fee Letter (this “*Fee Letter*”) amends and restates the Existing Fee Letter in its entirety as of the date hereof. Any capitalized term below that is defined in the Agreement shall have the same meaning when used herein. This Fee Letter is the Fee Letter described in the Agreement.

In order to induce US Bank to extend the Stated Expiration Date of the Letter of Credit to May 1, 2025, the District agrees to make the following payments at the following times:

(1) The District hereby agrees to pay to the Bank on January 3, 2022, for the period commencing on October 1, 2021 to and including January 2, 2022, and in arrears on the first Business Day of each April, July, October and January until the Termination Date and on the Termination Date, a non-refundable letter of credit fee (the “*Letter of Credit Fee*”) on the daily average undrawn Stated Amount of the Letter of Credit in effect from time to time from the date of this Fee Letter to and including the Termination Date, at the applicable Letter of Credit Fee Rate. As used herein, “*Letter of Credit Fee Rate*” means the fee rate per annum set forth in the grid below opposite Level 1; *provided, however*, if any Rating Agency downgrades the District’s Rating to a level less than Level 1, the applicable “*Letter of Credit Fee Rate*” shall be the rate per annum set forth in the applicable grid below opposite the level that corresponds to the lowest level (it being understood that level 1 is the highest level) during each related period:

(i) for the period commencing on October 1, 2021, to but not including November 1, 2021, the Letter of Credit Fee Rate for such period shall be determined in accordance with the pricing matrix set forth below:

LEVEL	MOODY'S RATING	S&P RATING	FITCH RATING	LETTER OF CREDIT FEE RATE
Level 1	Aa1 or above	AA+ or above	AA+ or above	0.33%
Level 2	Aa2	AA	AA	0.48%
Level 3	Aa3	AA-	AA-	0.63%
Level 4	A1	A+	A+	0.83%
Level 5	A2	A	A	1.03%

(ii) for the period commencing on November 1, 2021, and at all times thereafter, the Letter of Credit Fee Rate shall be determined in accordance with the pricing matrix set forth below:

LEVEL	MOODY'S RATING	S&P RATING	FITCH RATING	LETTER OF CREDIT FEE RATE
Level 1	Aa1 or above	AA+ or above	AA+ or above	0.30%
Level 2	Aa2	AA	AA	0.45%
Level 3	Aa3	AA-	AA-	0.60%
Level 4	A1	A+	A+	0.80%
Level 5	A2	A	A	1.00%
Level 6	A3	A-	A-	1.25%

Notwithstanding the foregoing, the Letter of Credit Fee Rate shall be increased by 1.00% per annum from the Letter of Credit Fee Rate in effect immediately prior thereto, (a) in the event that (i) any Rating is withdrawn, suspended or otherwise unavailable from any Rating Agency (other than as a result of the District's determination for reasons other than credit-related reasons or an imminent withdrawal, suspension or downgrade to reduce the number of Rating Agencies assigning Ratings from three to two) or (ii) only one Rating Agency is providing a Rating, and/or (b) upon the occurrence and during the continuance of an Event of Default other than an Event of Default of the type described in clauses (i) and (ii) of Section 7.1(n) of the Agreement.

Any change in the Letter of Credit Fee Rate resulting from a change in the Rating shall be and become effective as of and on the date of the announcement of the change in such Rating. References to the Ratings above are references to the rating categories of the Rating Agencies as presently determined by the respective Rating Agencies and in the event of adoption of any new or changed rating system by any Rating Agency, the Ratings from the applicable Rating Agency shall be deemed to refer to the rating category under the new rating system which most closely approximates the applicable rating category as currently in effect.

The Letter of Credit Fee for any period prior to the date of this Fee Letter shall be calculated in accordance with the terms of the Existing Fee Letter.

(2) In the event the Letter of Credit is terminated prior to the first anniversary of the date of this Fee Letter, a termination fee (the "*Termination Fee*") payable on the date of termination equal to the Letter of Credit Fee that would have been payable to the Bank pursuant to preceding paragraph (1) but for the termination of the Letter of Credit for the period from and including the date on which the Letter of Credit is terminated to and including the first anniversary of the date of this Fee Letter assuming (A) a Letter of Credit Fee Rate equal to the Letter of Credit Fee Rate in effect immediately prior to the termination of the Letter of Credit; and (B) a Stated Amount equal to the Stated Amount in effect on the date of this Fee Letter; *provided, however*, that the Termination Fee shall not be payable if (1) the Bank's unsecured short-term credit rating at the time of termination is below "P-1" by Moody's, below "A-1" by S&P or below "F1" by Fitch or (2) the Bank submits a request for payment pursuant to Section 2.2(f) of the Agreement.

(3) A draw fee of \$250 for each drawing under the Letter of Credit, payable on each Business Day on which the Bank honors the amount of any such drawing or, if the District so elects, payable quarterly in arrears along with the Letter of Credit Fee.

(4) The Bank's customary courier fees and wire transfer fees payable promptly following the District's receipt of an invoice therefor.

(5) Upon each transfer of the Letter of Credit in accordance with its terms, a transfer commission equal to \$2,500.

(6) (A) At the time any non-material amendment, waiver, supplement or restatement of the Agreement is requested or (B) in connection with any Bank consent required for any non-material amendment, waiver, supplement or restatement of any Financing Document (other than the Agreement) at the time such consent is sought, a fee of \$2,500 plus reasonable attorneys' fees and expenses, which fee shall be earned and payable whether or not any such amendment, waiver, supplement or restatement is executed or consent granted. Fees for material amendments, waivers, supplements, restatements, supplements and consents shall be negotiated at the time sought.

All amounts paid pursuant to this Fee Letter shall be non-refundable. Computations of the Letter of Credit Fee and the Termination Fee shall be made on the basis of a 360 day year and actual days elapsed. All amounts paid pursuant to this Fee Letter shall be paid in the manner and to the account set forth in the Agreement.

This Fee Letter may not be amended or waived except by an instrument in writing signed by the Bank and you.

The provisions of Sections 8.9 and 8.10 of the Agreement shall be incorporated by this reference into this Fee Letter as if such provisions were set forth in their entirety except that references to other agreements or "this Agreement" shall mean this Fee Letter and references to "hereunder" or "hereof" shall mean under this Fee Letter or of this Fee Letter.

This Fee Letter amends and restates in its entirety the Existing Fee Letter. Reference to this specific Fee Letter need not be made in any agreement, document, instrument, letter,

certificate, the Existing Fee Letter itself, or any communication issued or made pursuant to or with respect to the Existing Fee Letter, any reference to the Existing Fee Letter being sufficient to refer to the Existing Fee Letter as amended and restated hereby, and more specifically, any and all references to the Fee Letter as amended and restated hereby, and more specifically, any and all references to the Fee Letter in the Agreement shall mean this Fee Letter.

This Fee Letter may be executed in any number of counterparts, each of which shall be an original, and all of which, when taken together, shall constitute one agreement. Delivery of an executed signature page of this Fee Letter by electronic transmission shall be effective as delivery of a manually executed counterpart hereof.

This Fee Letter is delivered to you on the understanding that neither the Fee Letter nor any of its terms shall be disclosed, directly or indirectly, to any other person except (a) to your officers, directors, employees, accountants, attorneys, agents and advisors who are directly involved in the consideration of this matter on a confidential and need-to-know basis and for whom you shall be responsible for any breach by any of them of this confidentiality undertaking or (b) under compulsion of law (whether by interrogatory, subpoena, civil investigative demand or otherwise) or by order of any court or governmental or regulatory body, *provided* that, to the extent permitted, you shall give us reasonable prior notice of such disclosure.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK.]

Please confirm that the foregoing is our mutual understanding by signing and returning to the Bank an executed counterpart of this Fee Letter. This Fee Letter shall become effective as of the date first above referenced upon our receipt of an executed counterpart of this Fee Letter from you.

Very truly yours,

U.S. BANK NATIONAL ASSOCIATION

By: _____

Name: Ashley L. Martin


Title: Senior Vice President

Accepted and agreed to
as of the date first
written above by:

IRVINE RANCH WATER DISTRICT

By: _____
Name: Douglas J. Reinhart
Title: President

By: _____
Name: Leslie Bonkowski
Title: Secretary

October 25, 2021
Prepared by: L. Haney
Submitted by: J. Colston / K. Burton
Approved by: Paul A. Cook 

ACTION CALENDAR

FATS, OILS, AND GREASE PROGRAM CONSULTANT SELECTION

SUMMARY:

IRWD has utilized contracted services to administer its Fats, Oils, and Grease (FOG) program. The contract with the District's current consultant performing these services, EEC Environmental, is set to expire on October 31, 2021. Staff has evaluated options and recommends a new agreement with EEC as the most beneficial to the District's needs. Staff recommends the Board authorize the General Manager to execute a Professional Services Agreement with EEC for FOG program management services in the amount of \$596,100 for the three-year period of November 1, 2021 to October 31, 2024.

BACKGROUND:

IRWD initiated a FOG program in 2004 for the purpose of better controlling the release of FOG into the sewer collection and treatment systems. At that time, EEC Environmental was retained to develop a FOG Characterization Study. The scope of work for this study included inspection of food service establishments (FSEs), development of "enhanced maintenance area" maps, FOG source characterizations, and design of a database management system for the FOG program.

The District's FOG program has expanded over the past 17 years, and it currently has over 1,600 FSEs under permit. EEC's program responsibilities have expanded to include all field aspects of the program, records management, administrative and technical support to District staff. It has successfully implemented the contracted portion of the program since inception, working cooperatively with District staff and FSE owners / operators.

Services provided by EEC comply with the District's FOG Control Program Manual and Grease Control Rules and Regulations, which is part of the District's Sewer System Management Plan and are consistent with the State Water Resources Control Board's Statewide General Waste Discharge Requirements for Sanitary Sewer Systems, Order Number 2006-0003.

Consultant Selection:

Staff considered the use of a request for proposal to contract this work for the next three years, but ultimately decided to recommend proceeding with EEC based on its unique qualifications and experience implementing FOG control programs in Orange County and for IRWD. EEC is extremely well qualified to provide continuity of service, expertise in working with District staff to maintain the IRWD FOG permit database, implementation of the new permit fees for cost recovery, extensive experience implementing the IRWD FOG program, and detailed knowledge of IRWD's program rules and regulations. A copy of EEC's proposal is provided as Exhibit "A".

Staff recommends executing an agreement with EEC for a three-year period.

FISCAL IMPACTS:

FOG program funds in the amount of \$120,000 and \$200,000 are included in the approved FY 2021-22 and 2022-23 operating budgets, respectively. An IRWD FOG Program cost recovery fee schedule was approved as part of the IRWD Schedule of Rates and Charges and the cost recovery fee collection began in January 2021. Based on current figures, the total program cost after cost recovery for fiscal year 2021-22 is projected to be \$52,059. Staff will implement an updated permit fee in January of 2022 that will lower the net estimated program cost to \$15,896 for each subsequent fiscal year.

ENVIRONMENTAL COMPLIANCE:

Not applicable.

COMMITTEE STATUS:

This item was reviewed by the Engineering and Operations Committee on October 18, 2021.

RECOMMENDATION:

THAT THE BOARD AUTHORIZE THE GENERAL MANAGER TO EXECUTE A PROFESSIONAL SERVICES AGREEMENT WITH EEC ENVIRONMENTAL IN THE AMOUNT OF \$596,100 FOR THE PERIOD OF NOVEMBER 1, 2021 TO OCTOBER 31, 2024.

LIST OF EXHIBITS:

Exhibit "A" – Proposal from EEC Environmental



EXHIBIT "A"



PROPOSAL TO PROVIDE FATS, OILS, AND GREASE PROGRAM SERVICES



Irvine Ranch
WATER DISTRICT

IRVINE RANCH WATER DISTRICT, IRVINE, CALIFORNIA

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Attachments

- Attachment A Fee Schedule
- Attachment B Insurance Certificate (current)

Section 1.0 – Firm Experience

1.1 Introduction

EEC Environmental (EEC) is pleased to submit this proposal to provide continued fats, oils, and grease (FOG) program management services to the Irvine Ranch Water District (District). EEC helped establish the District's current program and has provided FOG management support services to the District for more than a decade. Based on its extensive experience and success in the development, implementation, and management of FOG programs throughout the country, EEC is poised and prepared to assist the District with the tasks and services associated with maintaining the District's successful FOG control program. These services include, but are not limited to, providing oversight and administrative support of the District's comprehensive FOG program, which shall include food service establishment (FSE) inspections, supporting the enforcement of the District's FOG control rules and regulations, public education and outreach, geographic information systems (GIS) support, and training. EEC's existing familiarity of the District's FOG program and FSE community will ensure a seamless transition into this new phase of FOG program implementation.

1.1.1 Company Details

Number of Employees:	44
Years in Business:	26
Corporate headquarters:	One City Boulevard West, Suite 1800 Orange, California 92868
Phone Number:	(714) 667-2300
Fax Number:	(714) 667-2310
Website:	www.eecenvironmental.com
Certifications/Licenses:	Class A General Engineering Contractor License Hazardous Substances Removal Certification Small Business Enterprise (California Department of General Services) Small Business as prescribed by the Federal Acquisition Regulations
Tax Identification Number:	33-0665828
Primary Project Contact:	Mr. Jim Kolk Principal Engineer / Program Manager Phone: (714) 667-2300 Fax: (714) 667-2310 E-Mail: jkolk@eecenvironmental.com
Secondary Project Contact:	Mr. Joseph Jenkins Regulatory Specialist/Project Manager Phone: (714) 667-2300 Fax: (714) 667-2310 E-Mail: jjenkins@eecenvironmental.com

1.1.2 Background

EEC is a national environmental consulting firm that specializes in wastewater, storm water, regulatory compliance, and assessment and remediation of soil and groundwater. EEC was founded in 1995 to fulfill a need for technical excellence and professional service in environmental consulting. EEC comprises a team of experts in engineering, environmental compliance, environmental science technology and data management systems, chemistry, toxicology, hydrogeology, geology, and climate.

KEY SERVICES

Engineering

- ✓ FOG Program Management
- ✓ FOG Program Inspections
- ✓ NPDES Program Management
- ✓ NPDES Program Inspections
- ✓ SSMP Audits and Support Services
- ✓ CIP Support
- ✓ Wastewater Treatment & Water Reuse Design
- ✓ Soil & Groundwater Remediation Design
- ✓ Pumping System, Water/Wastewater Pipeline, Storage, and Treatment Facility Design
- ✓ Computer-Aided Drafting and Design
- ✓ Sewer System Elevated Maintenance Location Investigations
- ✓ SSO Response and Fog Inspection Training
- ✓ Odor Investigations

Construction

- ✓ Soil & Groundwater Remediation Systems
- ✓ Wastewater / Stormwater Treatment Systems
- ✓ Removal/Installation of Aboveground/Underground Storage Tanks
- ✓ General Construction
- ✓ Mechanical/Electrical Installation

Technology Services

- ✓ Database Management
- ✓ Geographic Information Systems
- ✓ Computerized Maintenance Management Systems
- ✓ Modeling
- ✓ Asset Management
- ✓ Cloud Services and Support

Environmental

- ✓ Phase I & II ESAs
- ✓ Brownfield Assessments
- ✓ Groundwater Monitoring Well Installations
- ✓ Groundwater Monitoring and Sampling
- ✓ Vapor Intrusion Investigations
- ✓ Indoor Air Sampling
- ✓ Lead/Asbestos/Formaldehyde Assessment and Abatement
- ✓ Waste Management
- ✓ Preliminary Endangerment Assessments
- ✓ Removal Action Work Plans
- ✓ Regulatory Compliance
- ✓ Remediation Design and Construction
- ✓ Remediation System Operation and Maintenance

EEC comprises four main divisions: environmental, engineering, technology, and construction. The **engineering division** provides FOG control services; wastewater treatment and reuse design; National Pollutant Discharge Elimination System (NPDES) / storm water management; soil and groundwater remediation design; chemical delivery system design; and operation and maintenance of wastewater treatment systems. The division also designs and implements plans for remediation of soil and groundwater, mitigation of lead and asbestos, treatment and reuse of wastewater, and management of stormwater.

The **environmental division** routinely performs Phase I/II Environmental Site Assessments (ESAs), soil and groundwater investigations, air monitoring, and asbestos and lead testing. The division also prepares and implements site assessment work plans, preliminary endangerment assessments, remedial action plans, and closure reports for regulatory acceptance and approval. Finally, the division undertakes coordination and negotiation with regulatory agencies on behalf of clients throughout a project's duration.

The **construction division** supports projects originating from the engineering and environmental departments, but also undertakes projects independently. This division removes underground and aboveground storage tanks; installs, operates, and maintains remediation systems; designs and builds electrical panels/control systems, and performs general construction services, including operation of heavy equipment.

EEC's **technology services division** offers services for efficient collection, storage, QA/QC, graphical display, and analysis of large data inventories. This department uses computer-aided drafting and design (AutoCAD), GIS, and database technologies to support and manage projects across the firm's divisions. The department identifies the right technologies for the client's most critical needs and ensures that the chosen technologies will stay relevant and effective long after project completion.

Some of EEC's specialized projects have entailed customized database and geographic information projects for municipal agencies; engineering services at one of the largest Superfund sites in the United States (Stringfellow); environmental oversight at the largest privately funded development site in the United States (Playa Vista development); comprehensive Phase I and Phase II site assessments for national Fortune 500 companies for multiple sites throughout the United States in support of large property acquisitions; Phase I ESAs for a leading financial institution in the United States; ocean-water and river-water sampling investigations documenting the impact of contaminated groundwater to these surface water bodies; design of a \$4.5-million wastewater treatment system design/build project in China; and an environmental impact assessment of a 17-million-gallon free-product plume beneath New York City.

In addition, EEC employs an in-house editor to ensure the consistency, accuracy, and readability of the firm's documents. Finally, the administrative team supports the entire firm with project-related activities, such as accounting and invoicing.

1.2 Related Experience

EEC has extensive experience in providing FOG control program services and has expertise with a broad range of complementary services that have gained EEC an excellent reputation and working relationship with federal, state, and local agencies. EEC has provided extensive FOG program services to more than 30 cities and sewer districts throughout the nation, including the following:

City of Orange	Costa Mesa Sanitary District	Irvine Ranch Water District
City of El Segundo	County of Orange	Orange County Sanitation District
City of Anaheim	City of Santa Ana	Garden Grove Sanitary District
City of Fullerton	City of Stanton	San Francisco Public Utility Commission
City of La Habra	Seattle Public Utilities	Midway City Sanitary District
Johnson County, KS	Clark County, NV	Boston Water and Sewer Commission

Furthermore, EEC has developed a detailed understanding of the District's FOG control program database and comprehensive FSE inspection program. Through experience gained from previous work for the District and the EEC team's unique knowledge of the District's FOG control program, EEC will continue to provide a flexible and cost-effective approach to meeting the District's project goals and needs. Following is a selection of project descriptions representative of EEC's local FOG inspection experience.

1.2.1 Irvine Ranch Water District: FOG Program Management and Inspection Services

EEC conducted a FOG characterization study that included more than 800 initial food service establishment (FSE) inspections within the District's service area. Since 2003, EEC has continued to support the District's FOG program efforts, including program management support and FSE inspection services. Grease interceptors are routinely inspected to evaluate their operational status, structural

condition, and maintenance condition. FOG program information and education is also provided to FSEs throughout the District’s service area. To enhance analysis of the FOG Program data collected, EEC developed a geodatabase, where FSE and interceptor data can be further analyzed with sanitary sewer overflow (SSO) and other historical sewer system issues. This type of analysis was instrumental in developing the District’s FOG program and provides the basis for prioritizing FSE permitting and inspections as well as optimizing the utilization of District resources.

The project scope included the following elements:

- FOG program development and management support
- Permitting inspections
- FSE kitchen best management practices (BMP)
- Grease removal equipment (GRE) inspections
- Compliance inspections
- District’s customer support services
- Hydrogen sulfide (H₂S) odor testing and monitoring
- New FSE plan submittal program development and management support

1.2.2 City of Santa Ana: FOG Program Management and Inspection Services

EEC developed, implemented, and continues to support management of the City’s FOG program and on-site FSE inspections. EEC compiled and maintained an exhaustive list of FSEs within the City’s boundaries and inspected each FSE to inventory cooking equipment, fixtures, floor sinks and drains, and GRE, as well as evaluate compliance with FOG program regulations. EEC developed a FOG program database that stores the kitchen equipment inventory and created inspection frequencies based, in part, on an FSE’s potential to release FOG into the sewer system. EEC used the City’s GIS to determine an FSE’s potential to impact sewer line elevated maintenance locations (EMLs). EEC has been inspecting FSEs in Santa Ana for the past decade. Project highlights include the following:

- FOG program development and management support
- Permitting inspections
- BMP inspections
- GRE inspections
- FSE noncompliance notifications
- Compliance inspection and follow-up efforts
- SSO response and support
- City staff training and transition services
- Mobile FOG inspection deployment



An Inspector Uses a Mobile Device to Gather FSE Data During Inspections

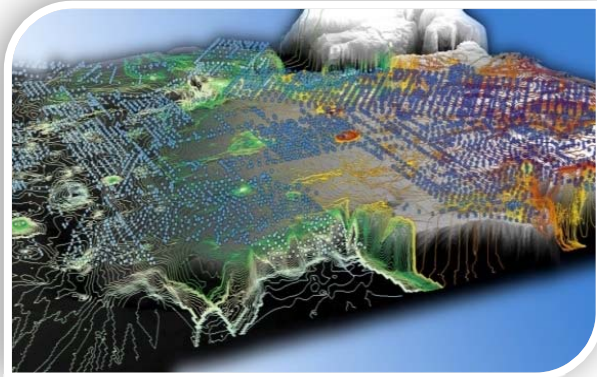
“EEC’s expertise and responsiveness was instrumental in helping our city meet new stringent sewer regulations.”

*Ray Burk, Former Principal Civil Engineer
City of Santa Ana*

1.2.3 Costa Mesa Sanitary District: FOG Program Management and Inspection Services

EEC currently provides many of the same services the District is requesting—FOG program management and inspections, GIS support and data management support—to the Costa Mesa Sanitary District (CMSD).

- FOG program development and management
- FSE FOG inspections and follow-up
- FSE database creation and management
- Enforcement development and management support
- Infiltration and inflow analysis support
- GIS development and management
- CCTV source identification inspections
- City staff training services
- Hotspot analysis
- Hydraulic modeling

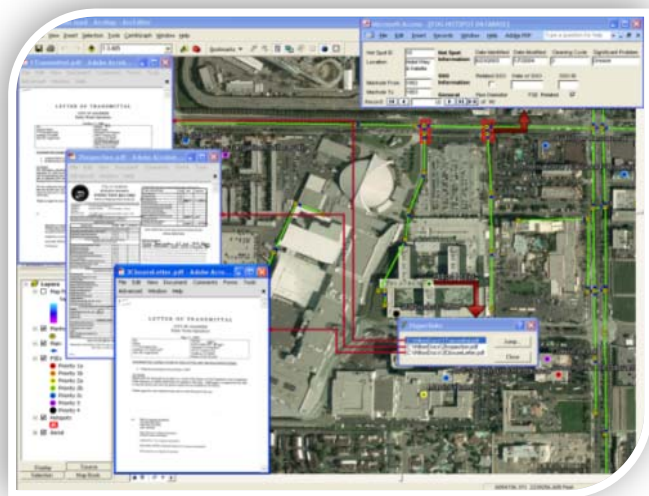


GIS is Used to Analyze Manhole Elevations

1.2.4 City of Anaheim: FOG Program Management and Inspection Services

EEC has provided FOG program development and implementation services for the City of Anaheim since 2008. Services have included FSE inspections, development of the City's FOG program manual, new FSE plan review and FSE determination support, and guidance on analysis of FSE contributions to sewer line hotspots and SSOs. EEC provided support services in response to private and public SSO events, including follow-up inspections, corrective action tracking, and GIS development to aid in analysis of FSE and SSO relationships. EEC has supported review of FSE variance and waiver requests, including site inspections, to verify site limitations or identify alternatives to preclude the need for a variance. The project scope included the following elements:

- Compliance/enforcement inspections
- New FSE permitting inspections
- New FSE plan review
- SSO response support
- NPDES inspections
- BMP inspections
- GRE inspections
- GIS development
- City FOG inspector training



GIS Enables Efficient Response to SSOs

1.2.5 Orange County Sanitation District: FOG Program Inspection Services

In 2003 EEC assisted the Orange County Sanitation District (OCSD) with the development and implementation of its FOG Program. Currently EEC provides OCSD with inspection services similar to the District's inspection needs. The project scope includes the following elements:

- Health and safety plan development
- BMP Inspections
- BMP/GRE Inspections
- FSE outreach and education
- Inspection routing
- Inspection quality assurance/quality control (QA/QC)
- Inspection management



An Inspector Reviews the Site Safety Plan Before Commencing Inspections

“EEC brings unique technical expertise to our projects and provides practical solution for our agency, our satellite agencies, and our industries.”

*Mahin Talebi, Source Control Manager
Orange County Sanitation District*

Section 2.0 – Personnel Experience

2.1 Proposed Project Team

EEC has assembled a team of highly qualified personnel to assist the District in achieving the goals of the FOG Control Program and completing the requested scope of work. All key personnel have the necessary availability, credentials, licenses, and relevant experience required to successfully complete the proposed scope of work on schedule and within budget in accordance with the District's requirements. The proposed project team is detailed in the diagram below. Additionally, a summary of EEC key personnel, regulatory experience, registrations, and credentials is included in Table 2-1, *Summary of Key Staff Qualifications*.



Table 2-1, Summary of Key Staff Qualifications

Key Personnel/ Role	Years' Exp.	Credentials/Registrations/Licenses
Jim Kolk Project Manager	22	B.S. Industrial Engineering PACP/NASCCO Certification, CWEA SSO Reporting Certified, Co-Author and Researcher for the Orange County FOG Control Study – Phase II, Performed/Managed over 15,000 FOG inspections
John Shaffer Principal-in-Charge	27	General Engineering Contractor Co-Author and lead researcher for the Orange County FOG Control Study – Phase I and Phase II, WEF/EPA FOG Control Workshop contributor & speaker, IAPMO FOG Task Group member CWEA FOG inspector trainer
Joseph Jenkins Sr. Compliance Inspector/ FOG Inspection Supervisor	8	B.A. Business Administration OSHA 40-Hour HAZPWOPER Certification, Pipeline Assessment And Certification Program FSE inspections management and training EEC inspectors and QA/QC inspection procedures Lead researcher for emerging grease control technology
Alex Conner Data Management / GIS	3	B.A., Geography Environmental analysis, ESRI ArcEditor and spatial analyst, GIS Graphical User Interface design, Access database integration, file Geodatabase, AutoCAD
Baltazar Maldonado FOG Inspector	5	Compliance inspector Conducted over 4,500 inspections SSO investigation and response development

2.2 Project Management

Jim Kolk has served as the primary project manager for the District’s FOG Control Program projects for the past 13 years and will continue to serve in this role (for a minimum of 1 year). Mr. Kolk will provide overall management and leadership that will include maintaining an effective team, ensuring availability of technical staff, maintaining quality of work, resolving project issues, and attending to administrative items such as contract and insurance requirements. While many tasks can and should be handled directly by technical staff, all project communication will be routed through Mr. Kolk to ensure continuity of project tasks and control of project resources. In the event that Mr. Kolk is unavailable, Mr. Joseph Jenkins will serve as the secondary project manager.

A QA/QC process will continue to be implemented throughout the project and will include periodic reviews during planning and execution phases. The project manager will ensure that all the required elements are effectively incorporated into the project and the principal-in-charge will ensure that the project manager is routinely performing this verification.

All reports and presentations will be reviewed by the project manager and, where appropriate, the principal-in-charge for content and format. In addition, draft and final reports as well as presentations are edited by an in-house technical editor. For technical tasks, including intermediate calculations and determinations of key parameters, verification by technically qualified team members with no prior involvement in the particular task is conducted for accuracy and completeness.

Section 3.0 – Scope

3.1 FOG Program Management Support

EEC currently manages and supports FOG control programs for five Southern California agencies, including the District, utilizing comprehensive databases and GIS tools to collect, organize, analyze, and manage FOG data. Having been closely involved in the development and implementation of key FOG program tools and processes, EEC's technical and field staff is thoroughly knowledgeable with the field data acquisition systems and work flows currently employed by the District.

EEC will provide the following as-needed services under this task:

- Collect, organize, and manage the District's FOG Control Program data
- Review FSE inspection results for QA/QC
- Develop reports to summarize inspection results and compliance efforts
- Establish inspection schedules, and coordinate compliance and enforcement tasks with District staff
- Provide as-needed new FSE plan review/plan check support and District staff training
- Conduct regular meetings/calls with District staff to evaluate the FOG Control Program status, provide recommendations, and prioritize project efforts (minimum of bi-weekly)
- Provide monthly reports summarizing activities conducted and recommendations to IRWD FOG
- Provide follow-up documentation assistance and expertise to IRWD FOG
- Manage the FOG geodatabase and GIS files such as map documents
- Monitor the Orange County Health Care Agency's (OCHCA's) inventory of restaurants and append any updates, changes, or additions to the District's FSE inventory
- Obtain data and information to keep the FSE inventory up to date
- As needed, develop and coordinate evaluation of new and emerging grease control technologies, including GRE and chemical/biological additives
- Provide the District with experienced and knowledgeable professional staff
- Provide the district with inspectors equipped with proper identification including contractor badges

Additionally, based on our recognized FOG expertise, EEC is afforded the opportunity to work with agencies across the country, exposing the team to a variety of innovative ideas and concepts that can be shared with the District. EEC also works with some of the District's neighboring agencies and can share field intelligence regarding sewer investigations and FSE issues that might impact the District's programs.

3.2 FSE Inspections and Enforcement

EEC inspectors are fully trained on FOG inspection procedures and the District's specific FOG regulations. To ensure the efficiency, quality and consistency of our inspections, EEC will routinely perform QA/QC of FOG inspectors as well as the inspection data. EEC will closely monitor inspection progress to ensure the FOG control program tasks are on track to meet inspection and follow-up targets. EEC will also work with the IRWD FOG to evaluate implementation of FOG risk-based inspection prioritization processes to further optimize the District's inspection resources.

EEC will provide the following services under this task:

- Conduct on-site physical inspections of FSEs as determined by IRWD FOG (during the District's regular business hours)
- Provide recommendations for enforcement actions and support coordination and execution of these actions
- Provide outreach and educational materials to FSEs
- Provide the District with educational and BMP information
- Promote the importance of kitchen BMPs to the FSE community
- Require inspectors to clearly identify themselves both verbally and with proper identification badges as contract inspectors of the District
- Require inspectors to identify their vehicles as contract vehicles of the District (if requested)
- Coordinate and establish work schedules

Specific FSE inspection categories include the following:

1. Permitting Inspections. EEC will conduct initial permitting inspections for new, change-of-ownership, and remodeled FSEs. Through initial inspections, also referred to as FSE characterization, EEC will identify the type of food, cooking equipment, kitchen practices, and grease removal equipment utilized at each new FSE. Each FSE will be provided with educational materials and detailed verbal guidance to help the FSE understand the District's Program and minimize their risk for FOG discharge into the District's collection system.



An FSE's Cooking Equipment Inventory Undergoes FOG Inspection

2. Grease Removal Equipment Inspections. EEC will conduct GRE inspections for FSEs with a grease interceptor or grease trap to ensure each device is in good operational and maintenance condition and confirm that appropriate maintenance practices are implemented. The inspections are comprehensive and thorough to support potential enforcement efforts in the future.

Specifically, EEC inspectors will conduct the following:

- Measure the layer of floating FOG and settable solids
- Determine conformance with compliance criteria
- Inspect the mechanical condition of the GRE
- Review the maintenance logs and record the last pump-out date
- Evaluate GRE pumping record-keeping
- Document and capture photographic evidence of all violations

3. Best Management Practice Inspections. Having conducted over 20,000 kitchen BMP inspections, EEC



A Kitchen BMP Violation is Identified During Inspection

understands the importance of educating FSEs on proper BMPs. EEC will conduct BMP inspections to evaluate compliance with all required kitchen BMPs, including employee education and training practices. These inspections also provide an opportunity to provide new program educational materials.

Specifically, EEC inspectors will assess the following:

- Removal of food grinder
- Drain screens installed/maintained
- Kitchen signage (BMP poster) posted
- Scraping practices
- Food waste disposal practices
- Emergency spill response materials
- Utilization of drainage additives
- Segregation and proper storage of waste cooking oil
- Grease collection log maintained
- Employee training log maintained
- Lateral cleaning and spill log maintained

4. Compliance Inspections. ECC will conduct follow-up inspections for non-compliance issues as required by the IRWD FOG. This may include issuance of notices of violation (NOV) to FSEs that are found to be in non-compliance of the FOG control regulations.

EEC will assist the District in managing enforcement actions for violations of the District’s Rules and Regulations. For any FSE or critical source facility identified with deficiencies, EEC will meet with FSE managers/owners or property owners to discuss violations and enforcement and to help develop an appropriate corrective action plan to achieve and maintain compliance. Based on the results of follow-up inspections and issued notices of non-compliance, EEC will review, provide recommendations, and assist the District with elevated enforcement actions required as a result of violations of the District’s FOG Rules and Regulations.

EEC understands the District’s FSE inventory database and key FSE details necessary to determine each FSE’s potential to discharge FOG into the sewer system (e.g., cooking equipment). Inspection results collected in the field are recorded in the geodatabase and used to determine and monitor each FSE’s compliance status and history.



A Probe is Used to Measure the FOG Accumulation in a Grease Interceptor

3.3 Safety

EEC inspectors are extensively trained in inspection safety and have an impeccable safety track record. EEC inspectors also receive training in SSO response procedures and are readily familiar with the SSO emergency response procedures implemented by the District.

With over 30,000 facility and grease interceptor inspections conducted to date, EEC understands the potential hazards associated with conducting facility inspections. EEC inspectors adhere to safety protocols and safety equipment including, but not limited to, the following:

- Anti-slip steel toed boots
- Latex gloves
- Safety glasses
- Long pants
- Traffic safety vests
- Traffic cones
- Hand sanitizer

If requested, EEC can develop a Site Safety Plan specific to this project. The Site Safety Plan would outline the steps to be taken during each inspection to not only protect inspectors/public from harm, but also satisfy the District's specific requirements (if any). Such a Site Safety Plan would be kept in each inspection vehicle and provided to the District upon request.

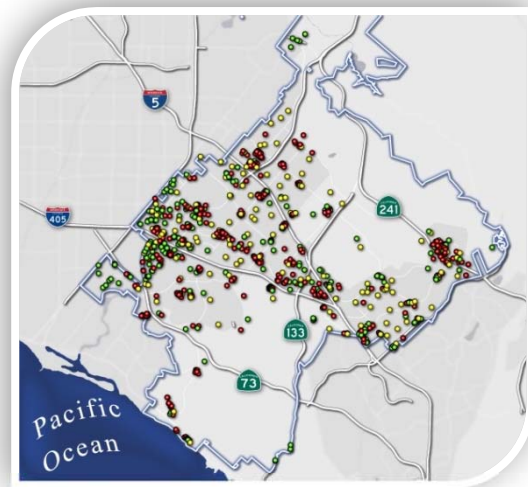
3.4 Mapping Services

EEC fully understands the District's use of GIS and other systems to manage FOG program data and inspection tasks. EEC understands that the District may occasionally need mapping and GIS support services to continue use of these systems.

Since 2004, EEC has provided GIS support services, including determining the most effective way to manage FOG control programs. EEC created and implemented Esri's ArcGIS and MS Access system to manage inspections of more than 2,500 FSEs and more than 1,500 GREs.

EEC will provide the following services under this task:

- Manage and maintain FSE/GRE geodatabase
- Review FOG inspection results
- Generate reports and inspection statistics
- Maintain SPID and FSEID cross reference tables
- Maintain map documents for Esri software
- Conduct geospatial analysis to determine FSE inspection priorities
- Provide GIS support as requested by the District
- Identify and address problems or errors in databases



FSEs Located in IRWD's Service Area

EEC has also developed customized tools to query and review copious amounts of FSE data for analysis and reporting. For example, an inspector or manager can find an SSO or other known sewer system issues in the GIS and readily identify the associated FSEs. Hyperlink tools in the GIS are provided to quickly query the FSE database to return pertinent information related to an FSE's inspection history, site pictures, and inspection reports.

3.5 Waste Discharge Requirement and Sewer Management Plan Support

EEC staff has comprehensive experience in conducting a wide range of program audits, including sewer system management plan (SSMP) audits. This broad experience has provided EEC with a unique insight to both a regulator's view on conducting audits and a regulated entity's view on being audited. Since the issuance of Order No. R8-2002-0014 by the California Regional Water Quality Control Board in 2002, and subsequent issuance of the current Statewide General Waste Discharge Requirements (SSS WDR) for Sanitary Sewer Systems (Order No. 2006-0003-DWQ) in 2006, EEC applied its insight to developing and implementing practical and defensible programs designed to reduce SSOs. EEC can provide continued support to the District with WDR and SSMP development and implementation as requested.



An SSO is Simulated During SSO Response Training

EEC continues to serve local governments in developing, implementing, and monitoring sensible sewer system management programs tailored to address specific local conditions and ensure compliance with applicable WDRs. EEC has extensive expertise in key SSO mitigation strategies, including FOG control programs, overflow emergency response plans (ERP), and SSMP performance assessment and audits. EEC continues to assist cities and independent special districts, including the Cities of Santa Ana, La Habra, Buena Park, El Segundo, and Anaheim, as well as CMSD, with development, implementation, and/or audit of their key SSMP strategies.

As needed, EEC can support the District with the on-going efforts toward SSMP assessment and enhancement to ensure continued compliance with the SSS WDR. EEC's service capabilities range from cursory review/discussion of specific SSMP elements to a comprehensive audit and update of the entire SSMP program.

3.6 Training and Miscellaneous Support

EEC developed and conducted California's only Grease Interceptor Inspector Training Workshop for the California Water Environment Association (formerly conducted for CalFOG). To date, EEC has conducted seven workshops and trained more than 400 inspectors. EEC most recently provided specialized training for City Redondo Beach and South San Luis Obispo Sanitation District inspectors as well as City of Santa Ana Code Enforcement staff.

As needed, EEC can provide the District with FOG Program and inspection training services tailored to suit the District's current program needs as well as supporting the District's long-term program goals.

3.7 Summary of Deliverables

Based on the scope of services, the following deliverables are anticipated for this project:

- Up-to-date insurance certificate(s) addressing all District requirements including Worker's Compensation, General Liability, and Auto Liability (current District's insurance certificate (Attachment B))
- FOG program protocols assessment reports and recommendations (as needed)
- Monthly inspection status reports summarizing inspections conducted, compliance status, and recommendations for follow-up and enforcement actions
- Quarterly program review/status meetings with District staff
- FOG outreach and educational materials procurement support and distribution (as needed)
- Updates of FSE inspection database with new FSE data from a variety of sources (as needed)
- FOG program initiative recommendations (as needed)
- Evaluation/assessment reports for emerging GRE devices and additives (as needed)
- Mapping document updates and recommendation reports (as needed)
- Work flow development recommendations (as needed)
- Memoranda/reports on emerging WDR/SSMP requirements (as needed)
- SSMP internal audit report and recommendations (as needed)
- Classroom and field training on a wide range of FOG/WDR/SSMP/GIS/CMMS topics (as needed)
- Monthly Invoices including number of hours by labor category and hourly rates (as included in the fee proposal)

3.8 Projected Costs

Based on EEC's experience with similar scopes of work and familiarity with the systems and operations at the District, Year 1, 2 and 3 estimated costs for the proposed services is **\$198,700** (assumed project duration of November/2021 through October/2024). These fees are inclusive of the projected food service establishment (FSE) inspections, as well as the level of as-needed support services anticipated for these periods. A breakdown of projected labor costs per task for this scope is provided in the tables below.

Table 3-1a, Year 1 Projected Costs (11/2021 - 10/2022)

Labor Task	Projected Hours	Hourly Rate	Projected Year 1 Cost
Administrative Services <ul style="list-style-type: none"> • IRWD customer call support and coordination • FSE inspection planning and coordination 	100	\$165	\$16,500
FOG Program – Analytical Services <ul style="list-style-type: none"> • Program development and management support • Enforcement recommendations and support • Special project coordination and planning support • Program status updates/meetings 	100	\$195	\$19,500
FOG Program – Plan Check Review <ul style="list-style-type: none"> • New FSE plan review support • Plan processing and comment letter support 	120	\$165	\$19,800
Field Inspections <ul style="list-style-type: none"> • New FSE Initial Inspections • Best Management Practice (BMP) inspections • Grease Removal Equipment (GRE) inspections • Inspection data processing 	840	\$110	\$92,400
Compliance Inspections <ul style="list-style-type: none"> • Non-compliance follow-up inspections • Non-compliance coordination and data processing 	240	\$125	\$30,000
GIS/Information Technology <ul style="list-style-type: none"> • Mapping support • Data/database management support • Status report support 	100	\$140	\$14,000
Emergency Response – Business hours <ul style="list-style-type: none"> • Private/Public SSO follow-up 	20	\$125	\$2,500
Emergency Response – Non-business hours <ul style="list-style-type: none"> • Private/Public SSO follow-up 	20	\$200	\$4,000
Projected Total (11/1/2021 through 10/31/2022)			\$198,700

Table 3-1b, Year 2 Projected Costs (11/2022 - 10/2023)

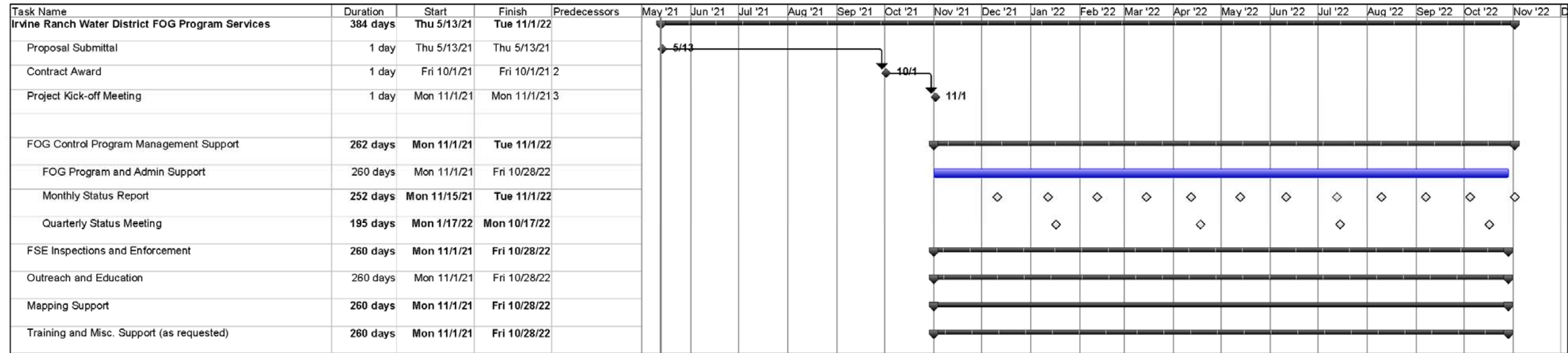
Labor Task	Projected Hours	Hourly Rate	Projected Year 1 Cost
Administrative Services <ul style="list-style-type: none"> IRWD customer call support and coordination FSE inspection planning and coordination 	100	\$165	\$16,500
FOG Program – Analytical Services <ul style="list-style-type: none"> Program development and management support Enforcement recommendations and support Special project coordination and planning support Program status updates/meetings 	100	\$195	\$19,500
FOG Program – Plan Check Review <ul style="list-style-type: none"> New FSE plan review support Plan processing and comment letter support 	120	\$165	\$19,800
Field Inspections <ul style="list-style-type: none"> New FSE Initial Inspections Best Management Practice (BMP) inspections Grease Removal Equipment (GRE) inspections Inspection data processing 	840	\$110	\$92,400
Compliance Inspections <ul style="list-style-type: none"> Non-compliance follow-up inspections Non-compliance coordination and data processing 	240	\$125	\$30,000
GIS/Information Technology <ul style="list-style-type: none"> Mapping support Data/database management support Status report support 	100	\$140	\$14,000
Emergency Response – Business hours <ul style="list-style-type: none"> Private/Public SSO follow-up 	20	\$125	\$2,500
Emergency Response – Non-business hours <ul style="list-style-type: none"> Private/Public SSO follow-up 	20	\$200	\$4,000
Projected Total (11/1/2022 through 10/31/2023)			\$198,700

Table 3-1c, Year 3 Projected Costs (11/2023 - 10/2024)

Labor Task	Projected Hours	Hourly Rate	Projected Year 1 Cost
Administrative Services <ul style="list-style-type: none"> IRWD customer call support and coordination FSE inspection planning and coordination 	100	\$165	\$16,500
FOG Program – Analytical Services <ul style="list-style-type: none"> Program development and management support Enforcement recommendations and support Special project coordination and planning support Program status updates/meetings 	100	\$195	\$19,500
FOG Program – Plan Check Review <ul style="list-style-type: none"> New FSE plan review support Plan processing and comment letter support 	120	\$165	\$19,800
Field Inspections <ul style="list-style-type: none"> New FSE Initial Inspections Best Management Practice (BMP) inspections Grease Removal Equipment (GRE) inspections Inspection data processing 	840	\$110	\$92,400
Compliance Inspections <ul style="list-style-type: none"> Non-compliance follow-up inspections Non-compliance coordination and data processing 	240	\$125	\$30,000
GIS/Information Technology <ul style="list-style-type: none"> Mapping support Data/database management support Status report support 	100	\$140	\$14,000
Emergency Response – Business hours <ul style="list-style-type: none"> Private/Public SSO follow-up 	20	\$125	\$2,500
Emergency Response – Non-business hours <ul style="list-style-type: none"> Private/Public SSO follow-up 	20	\$200	\$4,000
Projected Total (11/1/2023 through 10/31/2024)			\$198,700

3.9 Project Schedule

Following is a general schedule of Year 1 tasks and milestones based on the scope of work. During the project kick-off meeting, the schedule will be reviewed with the District's staff and revised as necessary. Additionally, the schedule will be routinely updated as needed as new tasks are identified and assigned to EEC.



Project: Project Schedule - 2022 Date: Thu 5/13/21	Task		Project Summary		Inactive Milestone		Manual Summary Rollup		Progress	
	Split		External Tasks		Inactive Summary		Manual Summary		Deadline	
	Milestone		External Milestone		Manual Task		Start-only			
	Summary		Inactive Task		Duration-only		Finish-only			

Page 1

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October 25, 2021
Prepared by: A. Stayton
Submitted by: R. Mykitta / W. Chambers
Approved by: Paul A. Cook *PAC*

ACTION CALENDAR

LOCAL HAZARD MITIGATION PLAN ADOPTION

SUMMARY:

The Local Hazard Mitigation Plan (LHMP) provides a framework for IRWD to reduce vulnerabilities of water and sewer infrastructure to the impacts of human-induced and natural events such as earthquakes, flooding, and spills. The plan fulfills a requirement of IRWD's Urban Water Management Plan (UWMP) and can be used to satisfy eligibility requirements for federal funding for hazard mitigation and capital projects. At the Board meeting, staff will provide a presentation on the LHMP. Staff recommends the Board approve and adopt the IRWD Local Hazard Mitigation Plan, subject to non-substantive changes.

BACKGROUND:

IRWD staff, with assistance from consultant Michael Baker International, began the LHMP project in October 2020. The LHMP was developed through a process-oriented approach as required by the Federal Emergency Management Agency's (FEMA) standards and best practices. IRWD community partners – including the Orange County Sheriff's Department, Orange County Fire Authority, neighboring cities, and the Water Emergency Response Organization of Orange County (WEROC) – provided key stakeholder input on hazard profiles, vulnerability assessment and mitigation strategies. Community comments, collected via survey, remote meetings and draft document review, are incorporated into the LHMP. Additionally, the LHMP identifies how the plan will be monitored, evaluated, and updated within a five-year cycle. The plan is provided as Exhibit "A". Staff's presentation to the Board on the LHMP is provided as Exhibit "B".

The LHMP is approved by both the California Governor's Office of Emergency Services (CalOES) and FEMA, and re-certification is required every five years. The LHMP is considered a living document and will be updated as hazard mitigation projects are removed or completed, and as new projects are identified. The plan aligns with IRWD's UWMP and supports Building Resilient Infrastructure and Communities (BRIC) grant proposals. The plan will be reviewed by IRWD staff annually in accordance with FEMA requirements.

FISCAL IMPACTS:

Funds for this project are available in the Fiscal Year 2021-22 budget. Additional funding for required updates and recertification will be requested during the budgeting process.

ENVIRONMENTAL COMPLIANCE:

This project is not subject to the California Environmental Quality Act (CEQA).

Action Calendar: Local Hazard Mitigation Plan Adoption

October 25, 2021

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COMMITTEE STATUS:

This item was reviewed by the Engineering and Operations Committee on October 18, 2021.

RECOMMENDATION:

THAT THE BOARD APPROVE AND ADOPT THE IRWD LOCAL HAZARD MITIGATION PLAN SUBJECT TO NON-SUBSTANTIVE CHANGES.

LIST OF EXHIBITS:

Exhibit "A" – IRWD Local Hazard Mitigation Plan

Exhibit "B" – IRWD Local Hazard Mitigation Plan Draft Presentation

EXHIBIT "A"

IRWD DRAFT LOCAL HAZARD MITIGATION PLAN

AUGUST 2021

[IRWD Draft Local Hazard Mitigation Plan August 2021.pdf](#)

EXHIBIT "A"



Irvine Ranch
WATER DISTRICT

IRVINE RANCH WATER DISTRICT

DRAFT LOCAL HAZARD MITIGATION PLAN

AUGUST 2021

Michael Baker
INTERNATIONAL

IRVINE RANCH WATER DISTRICT LOCAL HAZARD MITIGATION PLAN



Lead Agency:

IRVINE RANCH WATER DISTRICT

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Prepared by:

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(949) 855-3683

DE NOVO PLANNING GROUP

Contact: Ms. Starla Barker, AICP
(949) 396-8193

August 2021

JN 181343

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SECTION 1: INTRODUCTION AND PURPOSE

Natural disasters can cause significant damage to communities, businesses, public infrastructure, and the environment. The impacts specific to water and wastewater utilities and the individuals they serve can be immense, and infrastructure damage, like other damage caused by natural or manmade disasters, can impact public health and safety, the ability to respond to disaster, and can result in regional economic impacts. Because of this fact, it is important that water and wastewater utilities, which maintain public infrastructure and provide essential public services, enhance their ability to withstand and rebound from disasters. While no utility can protect itself against all potential impacts of natural hazards, utilities can reduce potential impacts by taking action to become more resilient.

Irvine Ranch Water District (IRWD) has worked for decades to improve local reliability and resiliency. These efforts have been founded in innovative planning, capital improvement projects, and enhancing emergency management practices. IRWD has also collaborated with other local and regional water agencies, service area cities and the County of Orange to enhance reliability and resiliency of both water and wastewater treatment through mutually beneficial projects.

In an effort to formalize existing efforts related to natural hazards and hazard mitigation planning, along with establishing a clear understanding of potential hazards and a coordinated plan to address these risks, IRWD developed this Local Hazard Mitigation Plan (LHMP). The LHMP is a blueprint for IRWD to reduce threats posed by natural hazards that may impact its infrastructure or operations. The LHMP will also enable IRWD to focus planning for and proactively mitigating natural hazards. This will allow IRWD to return to “normal” as soon as possible, with fewer impacts to people, facilities, and infrastructure, following a natural or man-made disaster.

1.1 PLAN PURPOSE

This LHMP identifies natural and human-induced hazards that threaten IRWD infrastructure and operations, and provides resources, information, and strategies to reduce these threats, resulting in overall risk reduction. The purpose of the LHMP is to provide IRWD with clear direction for hazard mitigation action planning.

This plan focuses on the mitigation component of the cycle shown in [Figure 1.1, *Disaster Response Cycle*](#). Hazard mitigation plays an important role in reducing the impacts of disasters by identifying effective and feasible actions to reduce the risks posed by potential hazards before the incident occurs. IRWD has developed this plan in order to be consistent with current standards and regulations, ensuring that the understanding of hazards facing the community reflects best available information and present-day conditions.

The LHMP does not supersede any internal or current IRWD plans or strategies; nor does the LHMP supersede any plans or strategies of IRWD customer cities. Rather, the LHMP enhances the ability to identify, inform, and mitigate hazard risks that are unique to the service area. Information in this plan will be used to help guide and coordinate mitigation



Exhibit 1-1 Disaster Response Cycle

activities and serve as a tool for IRWD decision-makers to specifically direct mitigation activities and resources.

1.2 MITIGATION GOALS

The following goals for reducing disaster risk have been identified for the IRWD LHMP:

- **Reduce the Potential for Damage:** To reduce damage to IRWD critical assets from natural and man-made hazards.
- **Create a Decision Tool for Management:** To provide information so IRWD may act to address vulnerabilities.
- **Promote Compliance with State and Federal Program Requirements:** To ensure IRWD can take full advantage of State and federal grant programs, policies, and regulations.

1.3 PLAN AUTHORITY

FEDERAL

The federal Robert T. Stafford Disaster Relief and Emergency Act (Stafford Act), as amended by the Disaster Mitigation Act of 2000 (DMA 2000) and supported by various regulations, directs hazard mitigation planning activities such as this plan. Water districts and purveyors are not required to prepare a LHMP, but the Stafford Act requires State, local, and tribal governmental entities that wish to be eligible for federal hazard mitigation grant funds to submit a hazard mitigation plan that outlines the processes for identifying the natural and man-made hazards, risks, and vulnerabilities of each jurisdiction (United States Code [USC] Title 42, Section 5156[a]). The Federal Emergency Management Agency (FEMA) has promulgated Code of Federal Regulations (CFR) Title 44, Part 201 to carry out the hazard mitigation planning requirements in the Stafford Act. These regulations direct the planning process, plan content, and FEMA approval of hazard mitigation plans.

This LHMP complies with the Stafford Act and DMA 2000, along with the appropriate sections of Title 44 of the CFR, including Parts 201, 206, and 322.

STATE

California Government Code Section 8685.9 (Assembly Bill [AB] 2140) limits the State of California's share of disaster relief funds paid out to local governments to 75 percent of the funds not paid for by federal disaster relief efforts, unless the jurisdiction has adopted a valid hazard mitigation plan consistent with DMA 2000. This LHMP is consistent with current standards and regulations, as outlined by the Governor's Office of Emergency Services (Cal OES) and FEMA. It uses the best available information and its mitigation actions reflect best practices and community values. This LHMP meets the requirements of current State and federal guidelines and ensures IRWD is eligible for all appropriate benefits under State and federal law and practices.

1.4 PLAN ADOPTION

Following FEMA approval, the IRWD Board of Directors will formally adopt the LHMP as its own Hazard Mitigation Plan. A copy of the resolution will be provided in [Appendix A](#).

1.5 PLAN ORGANIZATION

The LHMP is organized into seven sections to reflect the logical progression of activities undertaken to develop the plan and includes all relevant documentation required to meet the necessary criteria for FEMA approval. Each section is briefly described below:

Section 1.0, Introduction and Purpose: Introduction describes the background, purpose, and mitigation goals of the plan, as well as the authority established for its development.

Section 2.0, Planning Process: Planning Process describes the LHMP planning process, as well as the meetings and outreach activities undertaken to engage partner agencies, stakeholders, and the public.

Section 3.0, Jurisdictional Profile: Jurisdictional Profile provides the history and geography of IRWD, along with a list of critical facilities and facilities of concern.

Section 4.0, Hazard Assessment: Hazards Assessment identifies and profiles the natural and human-induced hazards that affect the IRWD service area. The assessment includes the history, risk of future occurrence, and any effects of climate change on the frequency and intensity of identified hazards, where applicable. The selection of hazards and their prioritization is also discussed. This section also identifies the vulnerability and risk to the community and critical facilities associated with each hazard.

Section 5.0, Mitigation Strategy: Mitigation Strategy identifies the specific hazard mitigation actions to reduce potential risks to IRWD'S critical facilities and associated impacts to the residents and businesses it serves, in order to improve resiliency, and assesses capabilities to implement and achieve the mitigation actions.

Section 6.0, Plan Maintenance: Plan Maintenance discusses implementation of the plan, including the process to monitor, evaluate, update, and maintain the LHMP, and identifies opportunities for continued public involvement.

Section 7.0, References: References identifies the various resources utilized throughout development of the LHMP.

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SECTION 2: PLANNING PROCESS

Hazard mitigation planning in the United States is guided by statutory regulations described in the Disaster Mitigation Act of 2000 (DMA 2000) and implemented through Title 44 Code of Federal Regulations (CFR) Parts 201 and 206. FEMA’s hazard mitigation plan guidelines outline a four-step planning process for the development and approval of hazard mitigation plans. Table 2-1, DMA 2000 CFR Crosswalk, lists the specific CFR excerpts that contain the requirements for approval, and identifies the applicable section of this LHMP.

**Table 2-1
DMA 2000 CFR Crosswalk**

DMA 2000 (44 CFR 201.6)	2021 LHMP Section
(1) Organize Resources	Section 2
201.6(c)(1)	Organize to prepare the plan
201.6(b)(1)	Involve the public
201.6(b)(2) and (3)	Coordination with other agencies
(2) Assess Risks	Section 4
201.6(c)(2)(i)	Assess the hazard
201.6(c)(2)(ii) and (iii)	Assess the problem
3) Develop the Mitigation Plan	Section 5
201.6(c)(3)(i)	Set goals (Section 1)
201.6(c)(3)(ii)	Review possible activities (actions)
201.6(c)(3)(iii)	Draft an action plan
(4) Plan Maintenance	Section 6
201.6(c)(5)	Adopt the plan
201.6(c)(4)	Implement, evaluate, and revise

This section describes each stage of the planning process used to develop this LHMP. The LHMP planning process provides a framework to document the plan’s development and follows the Federal Emergency Management Agency (FEMA)-recommended steps. The LHMP follows a prescribed series of planning steps which includes organizing resources; assessing risk; developing the mitigation plan; drafting, reviewing, and revising the plan; and adopting and submitting the plan for approval. Each step is described in this section.

2.1 ORGANIZING RESOURCES

One of the first steps in the planning process involved organization of resources, including identifying the LHMP Project Management Team, convening the LHMP Planning Team, and reviewing background material and documents.

2.1.1 LHMP PROJECT MANAGEMENT TEAM

The LHMP Project Management Team was responsible for day-to-day coordination of the LHMP work program, including forming and assembling the LHMP Planning Team; scheduling meetings; preparing, reviewing, and disseminating meeting materials; coordinating, scheduling, and participating in community engagement activities and meetings; and coordinating document review. The LHMP Project Management Team included staff from the IRWD Safety Department, who also participated on the LHMP Planning Team.

The LHMP Project Management Team worked with the LHMP Consultant Project Management Team throughout the development of the LHMP. The LHMP Consultant Project Management Team, consisting of hazard mitigation/planning professionals, provided guidance and support to

IRWD through facilitation of the planning process, data collection, community engagement, and meeting materials and document development.

2.1.2 LHMP PLANNING TEAM

In addition to IRWD staff, an invitation via email was sent to the following local and neighboring agencies advising them of IRWD's efforts to prepare a LHMP and requesting their involvement in preparation of the plan, including an invitation to attend LHMP Planning Team meetings:

- California State Water Resources Control Board;
- City of Costa Mesa (Office of Emergency Management);
- City of Irvine (Office of Emergency Management);
- City of Newport Beach (Police Department);
- City of Orange (Fire Department);
- City of Santa Ana (Emergency Management);
- City of Tustin (Tustin Police Department);
- Municipal Water District of Orange County (Water Emergency Response Organization of Orange County);
- Orange County Fire Authority; and,
- Orange County Sherriff Department.

The LHMP Planning Team consisted of IRWD staff, representing a diverse cross-section of departments and responsibilities. Members of the LHMP Planning Team represented the following IRWD departments:

- Automation;
- Collection Systems;
- Construction Services;
- Contracts & Risk Management and Safety;
- Electrical Services – Maintenance Operations;
- Engineering – Operations Support;
- Engineering – Planning
- Facilities Services & Fleet Services – Maintenance Operations;
- Field Services;
- Information Systems;
- Mechanical Services – Maintenance Operations;
- Michelson Water Recycling Plant Operations/Biosolids;
- Natural Treatment System Operations;
- Public Affairs;
- Regulatory Compliance;
- Safety Department;
- Water Operations Department;
- Water Quality; and
- Water Resources.

The Planning Team worked together to ensure the success of the planning process and is responsible for the LHMP implementation and future maintenance. The LHMP Planning Team's key responsibilities included:

- Participation in LHMP Planning Team meetings;
- Collection of valuable local information and other requested data;
- Decision on plan process and content;
- Development and prioritization of mitigation actions for the LHMP;
- Review and comment on plan drafts; and
- Coordination in the public engagement process.

Table 2-2, *LHMP Planning Team*, identifies the LHMP Project Management Team and LHMP Planning Team members along with their roles in the LHMP development.

**Table 2-2
LHMP Planning Team**

Name	Title/Role	Organization	LHMP Planning Team Role
IRWD Project Management Team			
Alix Stayton	Safety Specialist/LHMP Project Manager and Primary Point of Contact	Irvine Ranch Water District	LHMP Project Manager – Organization of LHMP Planning Team and meetings; participation in LHMP Planning Team meetings; facilitator of focused department meetings; development and participation in community outreach, hazard identification, capabilities assessment, mitigation actions and prioritization; and plan coordination and review. Served as primary point of contact for IRWD and the Consultant Project Management Team, LHMP Planning Team and the public.
Emilyn Zuniga	Safety Manager/LHMP Management Team	Irvine Ranch Water District	LHMP Project Management Team and LHMP Planning Team – Oversight and input on development and organization of LHMP Planning Team and meetings, participation in LHMP Planning Team meetings, hazard identification, capabilities assessment, mitigation actions and prioritization, and plan review.
LHMP Planning Team			
Allen Shinbashi	Manager of Risk & Contracts, Contracts & Risk Management	Irvine Ranch Water District	Hazard Identification, Capabilities Assessment, Mitigation Actions, Focus Group Discussions, Plan Review.
Amy Stonich	Assistant Director of Community Development	City of Lake Forest	Hazard Identification and Plan Review.
Andy Lauridsen	Fire Captain/Emergency Services Coordinator	Orange City Firefighters	Mitigation Actions and Plan Review.
Ashley Melchor	Management Assistant	City of Lake Forest	Mitigation Actions and Plan Review.
Baryic Hunter	Division Chief	Operations District 4, Orange County Fire Authority	Capabilities Assessment and Plan Review.
Cheryl Clary	Executive Director, Finance and Administration	Irvine Ranch Water District	Mitigation Actions and Plan Review.
Colt Martin	Mechanical Services Manager, Mechanical Services – Maintenance Operations	Irvine Ranch Water District	Hazard Identification, Capabilities Assessment, Mitigation Actions and Prioritization, Focus Group Discussions, and Plan Review.
Dave Crowe	Construction Manager, Construction Services	Irvine Ranch Water District	Hazard Identification, Capabilities Assessment, Mitigation Actions and Prioritization, Focus Group Discussion, and Plan Review.

**Table 2-2 (continued)
LHMP Planning Team**

Name	Title/Role	Organization	LHMP Planning Team Role
Deniene Rivenburg	Public Affairs Specialist, Public Affairs	Irvine Ranch Water District	Hazard Identification and Plan Review.
Derek Moreno	Asset Systems Analyst	Irvine Ranch Water District	Mitigation Actions, Focus Group Discussion, and Plan Review.
Dorien McElroy	Collections Systems Manager, Collection Systems	Irvine Ranch Water District	Hazard Identification, Capabilities Assessment, Mitigation Actions and Prioritization, Focus Group Discussion, and Plan Review.
Dustin Grinstead	Administrative Captain for Chief Sherwood	Orange County Fire Authority – Division 2	Hazard Identification and Plan Review.
Eric Akiyoshi	Engineering Manager, Planning	Irvine Ranch Water District	Hazard Identification, Capabilities Assessment, Mitigation Actions and Plan Review, Focus Group Discussion.
Gaspar Garza	Operations Manager, MWRP Operations/Biosolids	Irvine Ranch Water District	Hazard Identification, Capabilities Assessment, Mitigation Actions and Prioritization, Focus Group Discussion, and Plan Review.
Ian Swift	Natural Resources Manager, Natural Treatment System Operations	Irvine Ranch Water District	Hazard Identification, Mitigation Actions, Focus Group Discussion, and Plan Review.
Jacob Moeder	Senior Engineer, Capital Projects	Irvine Ranch Water District	Mitigation Actions and Prioritization, Focus Group Discussion, and Plan Review.
James Colston	Director, Water Quality and Regulatory Compliance	Irvine Ranch Water District	Hazard Identification, Capabilities Assessment, Mitigation Actions, Focus Group Discussion, and Plan Review.
Jason Dempsey	Emergency Services Administrator, Police Department	City of Costa Mesa	Hazard Identification, Capabilities Assessment, Mitigation Actions and Prioritization, and Plan Review.
Joe Lam	Automation Manager, Automation	Irvine Ranch Water District	Hazard Identification, Capabilities Assessment, Mitigation Actions and Prioritization, Focus Group Discussion, and Plan Review.
John Dayer	Facilities/Fleet Manager, Facilities Services & Fleet Services – Maintenance Operations	Irvine Ranch Water District	Hazard Identification, Capabilities Assessment, Mitigation Actions and Prioritization, Focus Group Discussion, and Plan Review.
John Fabris	Public Affairs Manager, Public Affairs	Irvine Ranch Water District	Capabilities Assessment, Mitigation Actions and Prioritization, Focus Group Discussion, and Plan Review.
Jose Zepeda	Director, Recycling Operations	Irvine Ranch Water District	Capabilities Assessment, Mitigation Actions and Plan Review.
Ken Pfister	Operations Manager, Water Operations	Irvine Ranch Water District	Hazard identification, Capabilities Assessment, Mitigation Actions and Prioritization, Focus Group Discussion, and Plan Review.
Kevin Burton	Executive Director, Technical Services	Irvine Ranch Water District	Mitigation Actions and Prioritization, and Plan Review.
Lars Oldewage	Water Quality Manager, Water Quality	Irvine Ranch Water District	Mitigation Actions, Focus Group Discussion, and Plan Review.
Lisa Haney	Regulatory Compliance Manager, Regulatory Compliance	Irvine Ranch Water District	Hazard Identification, Capabilities Assessment, Mitigation Actions and Prioritization, Focus Group Discussion, and Plan Review.
Malcolm Cortez	Engineering Manager, Engineering – Operations Support	Irvine Ranch Water District	Hazard Identification, Mitigation Actions and Prioritization, Focus Group Discussion, and Plan Review.

**Table 2-2 (continued)
LHMP Planning Team**

Name	Title/Role	Organization	LHMP Planning Team Role
Marina Lindsay	Water Resources Planner, Planning	Irvine Ranch Water District	Capabilities Assessment, Mitigation Actions and Prioritization, Focus Group Discussion and Plan Review.
Matthew Barba	Firefighter Paramedic, Station 6	Orange City Firefighters	Mitigation Actions and Plan Review.
Natalie Palacio	Water Resources Specialist	Irvine Ranch Water District	Mitigation Actions, Focus Group Discussion, and Plan Review.
Oliver Pacifico	Water – South Coast Section	State Water Resources Control Board	Hazard Identification, Capabilities Assessment, Mitigation Actions and Prioritization, and Plan Review.
Owen O'Neill	Electrical & Instrumentation Manager, Electrical Services – Maintenance Operations	Irvine Ranch Water District	Hazard Identification, Capabilities Assessment, Mitigation Actions and Prioritization, Focus Group Discussion, and Plan Review.
Randy Williams	Network and Cybersecurity Manager, Information Systems	Irvine Ranch Water District	Hazard Identification, Mitigation Actions, Focus Group Discussion, and Plan Review.
Richard (Rick) Mykitta	Director of Maintenance	Irvine Ranch Water District	Hazard Identification, Capabilities Assessment, Mitigation Actions, Focus Group Discussion and Plan Review.
Robert (Bobby) Simmons	Emergency Management Administrator	Office of Emergency Management, City of Irvine	Hazard Identification and Plan Review.
Sarah Fetterling	Sergeant	Tustin Police Department	Capabilities Assessment and Plan Review.
Scott Toland	Senior Engineer	Irvine Ranch Water District	Mitigation Actions and Prioritization, Focus Group Discussion, and Plan Review.
Sharlyn de la Paz	Senior Management Analyst	City of Lake Forest	Hazard Identification and Plan Review.
Stephen Foster	Emergency Management Coordinator	City of Tustin	Mitigation Actions and Prioritization, and Plan Review.
Steve Rhyner	Emergency Operations Coordinator	Emergency Management, City of Santa Ana	Hazard Identification and Plan Review.
Todd Colvin	Water Maintenance Supervisor, Field Services	Irvine Ranch Water District	Mitigation Actions, Focus Group Discussion, and Plan Review.
Thomas Malone	Director for Information Services	Irvine Ranch Water District	Hazard Identification, Capabilities Assessment, Mitigation Actions and Prioritization, and Plan Review.
Vicki Osborn	Director of Emergency Management	Metropolitan Water District of Orange County	Hazard Identification, Capabilities Assessment, and Plan Review.
Wendy Chambers	Executive Director of Operations	Irvine Ranch Water District	Capabilities Assessment, Mitigation Actions and Prioritization, and Plan Review.

The LHMP Planning Team held four meetings, as summarized in [Table 2-3, LHMP Planning Team Meeting Summary](#). Meetings were held virtually via Microsoft Teams, to accommodate the COVID-19 related “safer at home” mandates in place during the first half of 2021. Meeting materials, including PowerPoint presentations, roll-call sheets, agendas, notes, and other relevant handouts, are provided in [Appendix B, LHMP Planning Team Meetings](#).

**Table 2-3
LHMP Planning Team Meeting Summary**

Date	Meeting	Discussion Items
January 27, 2021	Planning Committee Meeting #1	<ul style="list-style-type: none"> • Project goals, objectives, and expectations • Purpose and requirements of the LHMP • Hazard identification and prioritization • Critical facilities introduction
February 24, 2021	Planning Committee Meeting #2	<ul style="list-style-type: none"> • Summary of hazards/hazard profiles • Risk assessment methodology • Critical facilities discussion • Capabilities assessment and identification • Public involvement update
March 31, 2021	Planning Committee Meeting #3	<ul style="list-style-type: none"> • Risk assessment and vulnerability overview • Critical facilities discussion and update • Mitigation strategy discussion • Public involvement update
May 5, 2021	Planning Committee Meeting #4	<ul style="list-style-type: none"> • Hazard mitigation goals • Risk assessment and vulnerability overview/updates • Public involvement, survey summary • Mitigation strategy discussion

The LHMP Project Management Team hosted additional focused discussions throughout the LHMP development process with specific LHMP Planning Team members. The intent of the focus discussions was to allow for more detailed questions and information sharing specific to the LHMP Planning Team members' areas of expertise and job responsibilities. Topics of discussion included: critical facilities identification, LHMP goals articulation, mitigation action development (including priority and timeline assignment), and capabilities identification. These focused discussions allowed for more complete information to be presented during the LHMP Planning Team meetings, and meaningful discussion to occur.

2.1.3 PUBLIC OUTREACH

A public outreach and engagement strategy were developed to maximize public involvement in the LHMP planning process. The LHMP public outreach strategy included a dedicated webpage, community survey, and public review draft distribution, as described below; refer to [Appendix B](#).

WEBPAGE

A dedicated webpage was developed on IRWD's website for the LHMP and development process. The webpage provided information on the LHMP and how the public can be involved in the planning process. A link to complete the community survey was posted to encourage participation. The website was updated throughout the planning process and provided notifications and access to LHMP materials. The draft LHMP was also made available for review through this webpage.

COMMUNITY SURVEY

A community survey was developed to obtain input from IRWD customers about various hazards and hazard mitigation topics. In addition to basic demographic information (e.g., zip code and age), the survey asked participants to identify specific safety concerns, including identifying what hazards they felt were most likely to impact their neighborhood or property. Participants were also asked what actions they had taken to be more resistant to hazards, and preferences for the IRWD communication methods. Information gained from the survey was presented to the LHMP

Planning Team during Meeting #4 and was used to identify potential mitigation actions and assist in ranking the mitigation action prioritization and timeline.

The survey was open between February 2 to March 31, 2021 and was made available on the LHMP webpage, as mentioned above. A blog post regarding the survey was posted on IRWD's "Liquid News" segment on February 2, 2021. Additionally, the survey link was included with two cycles of IRWD's "Pipelines" newsletter, included within IRWD's monthly billing. The survey was also posted on IRWD social media pages (Facebook and Instagram). Members of the LHMP Planning Team also distributed the survey link to their colleagues and constituents. Ultimately, the survey received 1,750 responses. Over 800 survey participants provided their contact information and requested to be notified when the public review draft LHMP was made available.

PUBLIC REVIEW DRAFT LHMP

A public review draft LHMP was made available on the LHMP webpage for the public to review and comment for a two-week (14-day) period beginning July 27, 2021 and ending August 10, 2021. The opportunity to comment was provided through an embedded link on the LHMP webpage and a direct email address. Additionally, the public review draft LHMP link was emailed directly to approximately 600 survey respondents who requested to be notified. A total of six comments were received, and are documented as part of the planning process in [Appendix B](#).

BOARD OF DIRECTORS

The draft LHMP was considered by the IRWD Board of Directors, as part of their regularly scheduled public meeting on **November XX, 2021**. The presentation included an overview of the LHMP and the plan development process. **Following the presentation, the Board of Directors adopted the LHMP.**

2.1.4 REVIEW AND INCORPORATE EXISTING INFORMATION

The LHMP Planning Team referenced a variety of plans, studies, data, and technical reports available from local, State, and federal sources to prepare the LHMP. Primary resources reviewed and incorporated as part of the LHMP planning process are listed in [Table 2-4](#), [Primary Plan Resources](#). A complete list of resources is included in [Section 7.0](#), [References](#).

Table 2-4
Primary Plan Resources

Plans, Studies, Reports and Other Technical Data/Information	Planning Process/Area of Document Inclusion
California Department of Forestry and Fire Protection (CAL FIRE)	Hazard Profiles; Vulnerability Assessment; Mitigation Strategy
Cal-Adapt	Hazard Profiles; Vulnerability Assessment; Mitigation Strategy
California Department of Water Resources	Hazard Profiles
California Geological Survey	Hazard Profiles; Vulnerability Assessment
FEMA Local Hazard Mitigation Plan Guidance	Multiple Plan Sections
FEMA Map Service Center	Hazard Profiles; Vulnerability Assessment
IRWD Dam Emergency Action Plans (Rattlesnake, San Joaquin, Sand Canyon, Santiago Creek, Syphon) and Approved Inundation Maps	Hazard Profiles, Vulnerability Assessment, Mitigation Strategy (for information about High Hazard Potential Dams)
IRWD Emergency Operations Plan	Multiple Plan Sections
IRWD Sewage Treatment Master Plan	Mitigation Strategy
IRWD Urban Water Management Plan	Hazard Profiles; Vulnerability Assessment
IRWD Water Shortage Contingency Plan Update	Hazard Profiles; Vulnerability Assessment; Mitigation Strategy
IRWD Water Supply Reliability Evaluation	Mitigation Strategy
IRWD Water System Risk and Resilience Assessment	Multiple Plan Sections
National Oceanic and Atmospheric Administration	Hazard Profiles

**Table 2-4 (continued)
Primary Plan Resources**

Plans, Studies, Reports and Other Technical Data/Information	Planning Process/Area of Document Inclusion
National Weather Service	Hazard Profiles
Orange County and Orange County Fire Authority Local Hazard Mitigation Plan	Hazard Profiles
Orange County General Plan	Hazard Profiles
Orange County Regional Water and Wastewater MJHMP	Hazard Profiles; Vulnerability Assessment
Southern California Earthquake Data Center	Hazard Profiles
State of California Multi-Hazard Mitigation Plan	Hazard Profiles
U.S. Drought Monitor	Hazard Profiles; Vulnerability Assessment
U.S. Geological Survey	Hazard Profiles; Vulnerability Assessment

2.2 ASSESS RISKS

In accordance with FEMA requirements, the LHMP Planning Team identified and prioritized the natural hazards affecting IRWD and assessed the service area's associated vulnerability from those hazards. Results from this phase of the LHMP planning process aided subsequent identification of appropriate mitigation actions to reduce risk from these hazards; refer to [Section 5.0, *Mitigation Strategy*](#).

2.2.1 IDENTIFY/PROFILE HAZARDS

Based on a review of past historical hazards, as well as a review of existing plans, reports, and other technical studies, data, and information, the LHMP Planning Team determined which specific hazards could affect IRWD infrastructure and operations. Content for each hazard profile is provided in [Section 4.0, *Hazards Assessment*](#).

2.2.2 ASSESS VULNERABILITIES

Hazard profiling exposed the unique characteristics of individual hazards and begins the process of determining which areas within the IRWD service area are vulnerable to specific hazard events. The vulnerability assessment included input from the LHMP Planning Team and a GIS overlaying method for mapped hazard risk assessments. Using these methodologies, IRWD infrastructure impacted by hazards were identified and potential loss estimates were determined, where available. The vulnerability assessments for each hazard is provided in [Section 4.0](#).

2.3 DEVELOP MITIGATION PLAN

2.3.1 IDENTIFY GOALS

Internally, IRWD reviewed mitigation goals from hazard mitigation plans of customer cities and local/regional water and wastewater purveyors. An internal focus group developed three mitigation goals to include in the LHMP. The mitigation goals were then presented to the Planning Team for discussion, comment, and incorporation into the LHMP. The Mitigation Goals are included in [Section 1.0, *Introduction*](#).

2.3.2 DEVELOP CAPABILITIES ASSESSMENT

A capabilities assessment is a comprehensive review of all the various mitigation capabilities and tools currently available to IRWD for mitigation action implementation, prescribed in the LHMP. The LHMP Project Management and Planning Team identified the planning and regulatory;

administrative and technical; financial; and education and outreach capabilities to implement mitigation actions, as detailed in [Section 5.0](#).

2.3.3 IDENTIFY MITIGATION ACTIONS

As part of the LHMP planning process, the LHMP Planning Team worked to identify and develop mitigation actions, after which mitigation actions were prioritized as “high”, “medium” or “low”. The process began with the LHMP Planning Team identifying issues or concerns associated with the profiled hazards and vulnerabilities, then identifying potential ways in which the issue or concern could be addressed. During this process, the capabilities assessment was also referenced to better understand if the capability already existed and needed to be expanded, or if the capability was not currently available. A detailed discussion of the identification and prioritization of mitigation actions is provided in [Section 5.0](#).

2.3.4 PLAN ADOPTION AND SUBMITTAL

This plan will be submitted to Cal OES and FEMA for review. Upon receiving “approvable pending adoption” notification from FEMA, this plan will be presented to IRWD Board of Directors for their consideration and approval. If approved, a copy of the resolution will be provided in [Appendix A, IRWD Adoption Resolution](#).

2.3.5 PLAN MAINTENANCE

Plan maintenance procedures, found in [Section 6.0](#), include the measures IRWD will take to ensure the LHMP’s continuous long-term implementation. The procedures also include the manner in which the LHMP will be regularly monitored, reported upon, evaluated, and updated to remain a current and meaningful planning document.

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SECTION 3: JURISDICTIONAL PROFILE

IRWD is an independent special district serving multiple jurisdictions in central Orange County, California; refer to Exhibit 3-1, *Regional Location*. IRWD provides potable drinking water, wastewater collection and treatment, recycled water, and urban runoff treatment to customers in the service area. IRWD also participates in water banking activities to create emergency supplies and protect against drought conditions or other water shortages. IRWD provides water and wastewater services to approximately 425,208 residential customers and serves a district daytime population of over 600,000 people.¹

IRWD's water supply portfolio includes groundwater (clear and treated), imported water, recycled water, and local surface water; a breakdown of water distribution by type is outlined in Table 3-1, *IRWD Water Portfolio*.

Table 3-1
IRWD Water Portfolio

Water by Source/Type	Acre-Feet per Year
Groundwater	27,382
Recycled Water	24,913
Treated Groundwater	19,523
Imported Water	17,398
Local Surface Water	5,165
TOTAL WATER	94,381
Irvine Ranch Water District, <i>Irvine Ranch Water District: An Overview</i> , https://www.irwd.com/images/pdf/about-us/factsheet.pdf , published February 2020, accessed May 1, 2021.	

IRWD is governed by a five-member publicly elected Board of Directors, responsible for IRWD's policies and decision making. Day-to-day operations are supervised by the General Manager and IRWD staff.

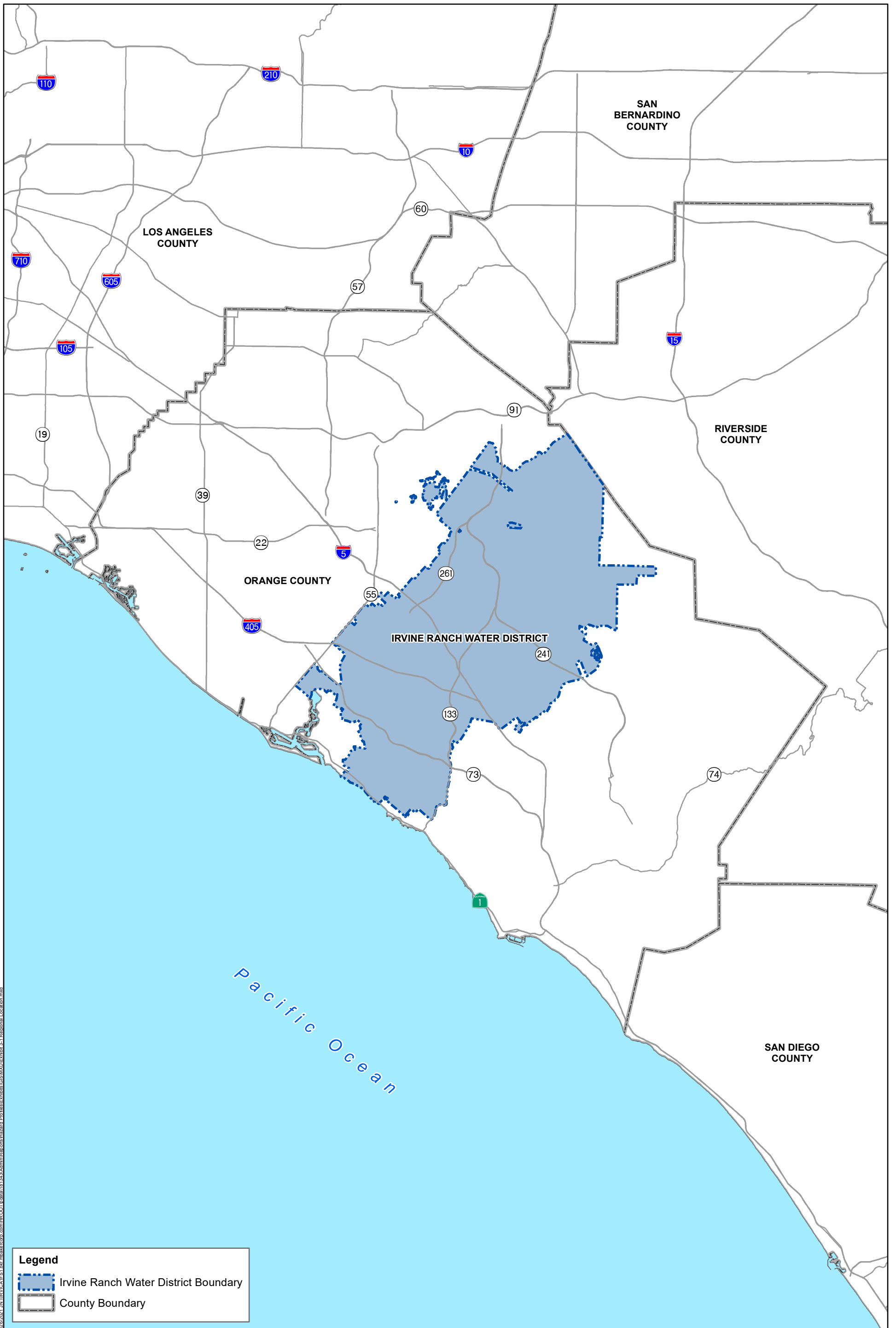
3.1 PHYSICAL SETTING

IRWD provides both water and wastewater services in six cities and several unincorporated communities within central Orange County, California; refer to Exhibit 3-2, *Irvine Ranch Water District Service Area*. The service area encompasses approximately 181 square miles (about 20 percent of Orange County) extending from the Pacific Coast to the Santa Ana Mountain foothills. IRWD customer cities include Irvine, portions of Costa Mesa, Lake Forest, Newport Beach, Orange, Tustin, and unincorporated areas of Orange County.

3.2 HISTORY

IRWD has provided potable water and wastewater services to residents in Orange County since 1961. Shortly after IRWD was established, the Board of Directors implemented a vision to integrate water recycling into the design of the community. In 1967, IRWD began providing recycled water for irrigation, industrial, and other non-potable uses within the service area. This vision in the early years of IRWD's history has resulted in more than 25 percent of the service area water demands being met with recycled water. For the past 60 years, IRWD has expanded potable water and wastewater services in an urbanizing service area.

¹ Irvine Ranch Water District. *About Us*. <https://www.irwd.com/about-us>. Accessed March 11, 2020.



4/26/2021 JUN 10 10:41:51 bvr.mtakacorp.com\ROOT\p\data\181343\Admin\Reports\Hazard_Profile\Exhibit\GIS\MXD\Exhibit 3-1 Regional Location.mxd



0 12,500 25,000
 Feet

Irvine Ranch Water District Local Hazard Mitigation Plan Regional Location

Data Source: IRWD, 2021, State of California, 2007

In 1979, IRWD began developing local water supplies to reduce dependence on imported water – primarily expanding groundwater and surface water supplies within the IRWD service area. In 1990, over 66 percent of IRWD’s water portfolio depended on imported water. In 2020, imported water accounted for 18 percent of the portfolio due to the expansion of groundwater, surface water, and recycled water.²

In 1997, IRWD began treating urban runoff by reconstructing wetlands at the San Joaquin Marsh and Wildlife Sanctuary in Irvine. Runoff from the nearby San Diego Creek is diverted into a series of manmade water quality treatment ponds and wetlands, where natural ecosystems remove sediment, nutrients, pathogens and other contaminants from dry weather runoff. This gives plants and soils the time to naturally remove nitrates and other pollutants before the water enters the Upper Newport Back Bay and eventually the Pacific Ocean.³

Over the last 20 years, IRWD has consolidated with five local water districts through mutual agreement. The benefits of consolidation, in which smaller water districts in Orange County become incorporated into IRWD, include lower rates and charges for customers, improved customer service, increased operational efficiencies, lower administrative costs, enhanced reliability, and equitable treatment of all areas within the consolidated district. Table 3-2, Consolidated Districts in IRWD History, shows each water district or company that IRWD has consolidated with, as well as the cities/communities to which each district previously provided services.

**Table 3-2
Consolidated Districts in IRWD History**

Water District/Company	Serviced Cities/Communities	Consolidation Date
Orange Park Acres Mutual Water Company	East of the City of Orange	June 1, 2008
Santiago County Water District	East of the City of Orange and the City of Tustin	July 6, 2006
Los Alisos Water District	The City of Laguna Hills, Laguna Woods, the City of Lake Forest, west of the City of Mission Viejo, north of the Aliso Viejo	January 1, 2001
Carpenter Irrigation District	N/A	December 31, 1998
Santa Ana Heights Mutual Water Company	N/A	1997

Source: Irvine Ranch Water District, *Consolidations*, <https://www.irwd.com/about-us/consolidations>, accessed March 11, 2021.

3.3 CRITICAL FACILITIES AND FACILITIES OF CONCERN

The LHMP Planning Team identified 83 critical facilities and facilities of concern for incorporation in the hazard vulnerability/risk analysis; refer to Table 3-3, Irvine Ranch Water Districts Critical Facilities and Facilities of Concern. All listed critical facilities and facilities of concern are owned, operated, and maintained by IRWD with the exception of Critical Facility #5, Met Source Water (maintained by the Municipal Water District of Orange County). The critical facilities label is assigned to facilities that are vital and significant to providing potable water and wastewater services to IRWD customers. The failure of a critical facility would result in significant issues in maintaining service to customers and may result in a disruption of service. Some critical facilities are the sole source of water at their location, do not have a backup option, or provide service to areas with known hazards or risk. Facilities of concern are important in providing potable water and wastewater services to IRWD customers but are not critical to providing these services. A

² Irvine Ranch Water District. *Irvine Ranch Water District: An Overview*. <https://www.irwd.com/images/pdf/about-us/factsheet.pdf>. February 2020

³ Irvine Ranch Water District. *Services, Urban Runoff*. <https://www.irwd.com/services/urban-runoff#:~:text=IRWD%20began%20treating%20urban%20runoff,for%20seven%20to%2010%20days>, accessed March 11, 2021.

facility of concern failure would create slowdowns or challenges, but ultimately IRWD would be able to maintain service to customers in the short-term.

IRWD critical facilities are identified on Exhibit 3-3, Irvine Ranch Water District - Critical Facilities and Facilities of Concern. For graphical and clarity purposes, Critical Facility #3, Distribution System and Critical Facility, and Critical Facility #63, Sewer Collection System, are shown on their own exhibits; refer to Exhibit 3-4, Irvine Ranch Water District – Distribution System and Exhibit 3-5, Irvine Ranch Water District – Sewer Collection System. It is also noted that two assets, Critical Facility #58, Enterprise Information System, and Critical Facility #59, Supervisory Control and Data Acquisition (SCADA) System, are technology assets, and thus are not mapped on Exhibits 3-4 and 3-5 (and on the following exhibits in Section 4.0).

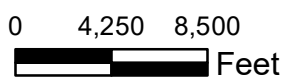
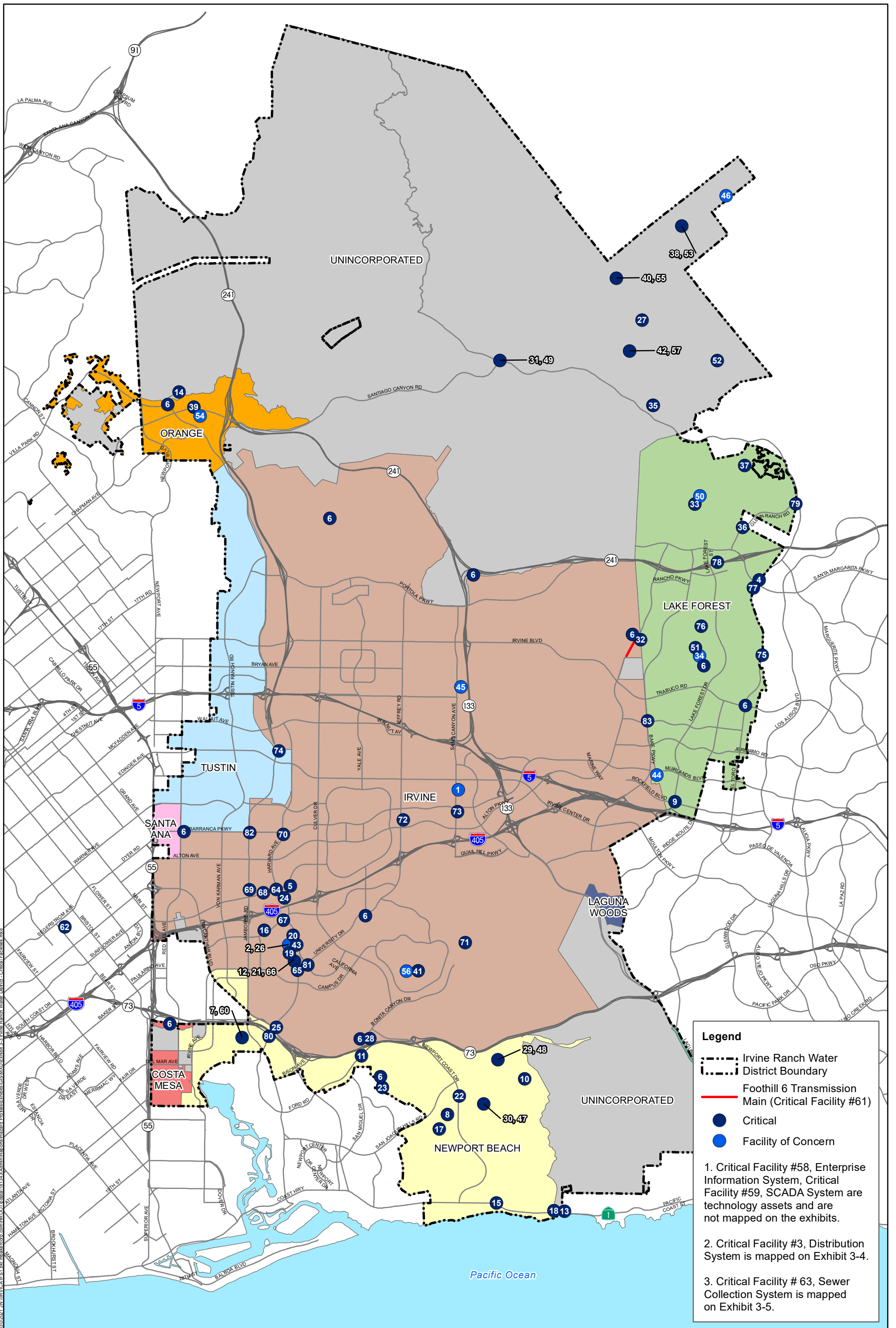
Where available, the LMHP Project Management Team and LHMP Planning Team identified a facility’s potential loss value, comprised of replacement and contents values for each facility. If a critical facility or facility of concern is destroyed in a hazard event, the replacement and contents values indicate the cost to replace the entire facility and any contents within the facility. Typically, the cost to repair a damaged facility would be less than the replacement value. While the replacement and contents values are used throughout this plan to estimate potential losses, it is noted that the actual cost to recover from a hazard event will depend on the type and magnitude of the event.

**Table 3-3
Irvine Ranch Water Districts Critical Facilities and Facilities of Concern**

ID	Name	Facility Type	Critical Facility	Facility of Concern
1	Headquarters Building	Administrative Offices		X
2	Michelson Biosolids	Biosolids Treatment		X
3	Distribution System	Distribution System	X	
4	El Toro Diversion Structure	Diversion Structure	X	
5	San Mateo Diversion	Diversion Structure	X	
6	Met Source Water	Intake	X	
7	Bayview	Lift Station	X	
8	Buck Gully	Lift Station	X	
9	Canada	Lift Station	X	
10	Coastal Ridge	Lift Station	X	
11	Coyote Canyon	Lift Station	X	
12	Duck Club	Lift Station	X	
13	El Morro School	Lift Station	X	
14	Irvine Park	Lift Station	X	
15	Los Trancos Low Flow	Lift Station	X	
16	Michelson	Lift Station	X	
17	Montecito	Lift Station	X	
18	Muddy Canyon Low Flow	Lift Station	X	
19	MWRP MPS-3	Lift Station	X	
20	MWRP Auto Shop	Lift Station	X	
21	MWRP Caretaker Housing	Lift Station	X	
22	Newport Coast	Lift Station	X	
23	San Joaquin Housing	Lift Station	X	
24	HATS Lift Station	Lift Station	X	
25	University	Multi-Purpose: Lift Station, Telemetry Site, Pump Station	X	
26	Michelson Operations Center	Operations Staff Offices		X
27	Benner Reservoir	Pump Station	X	
28	Coastal OC 63-Zn.4 Pump Station	Pump Station	X	
29	Coastal Zn 6-7 Pump Station	Pump Station	X	

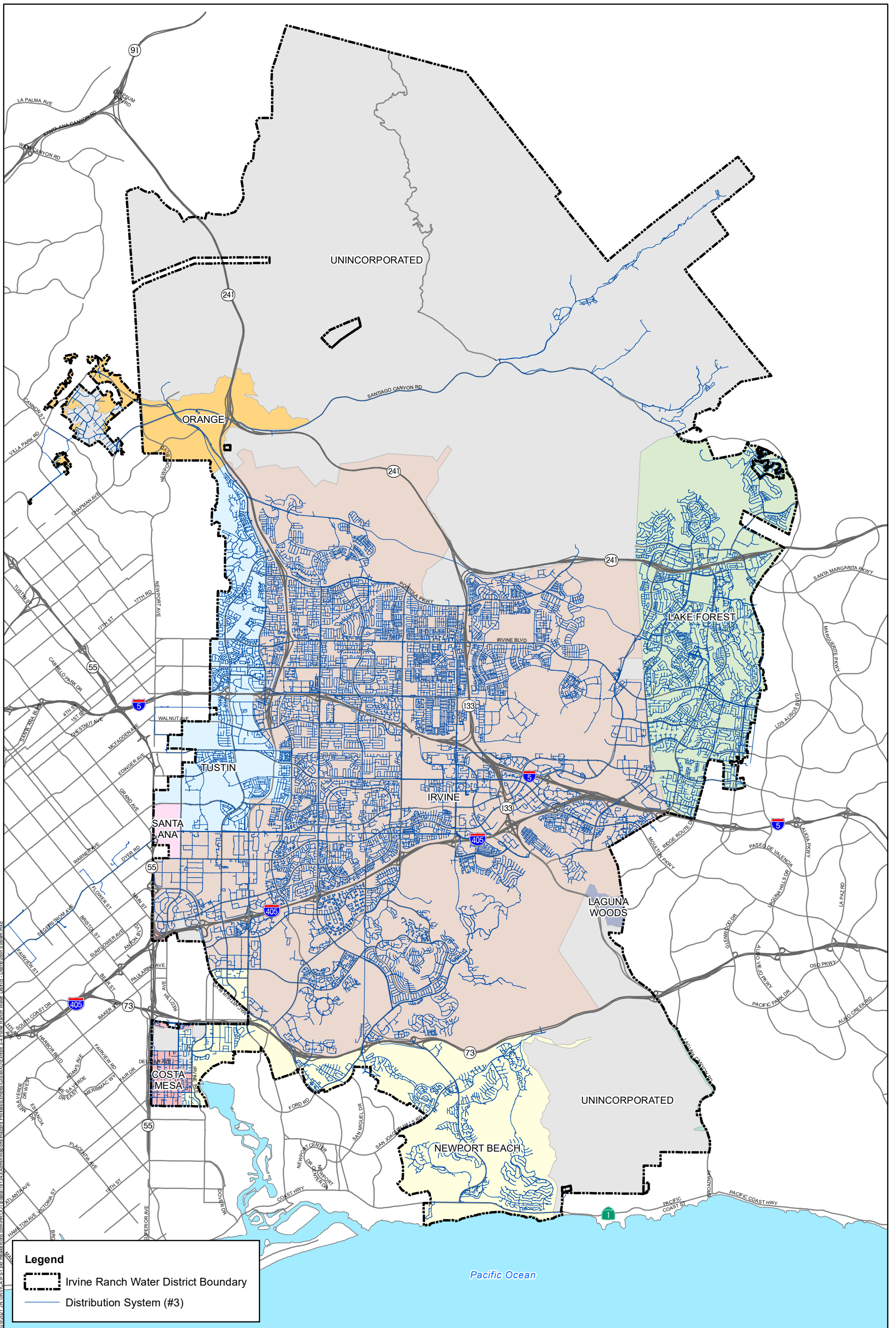
**Table 3-3 (continued)
Irvine Ranch Water Districts Critical Facilities and Facilities of Concern**

ID	Name	Facility Type	Critical Facility	Facility of Concern
30	Coastal Zn. 4-6 Pump Station	Pump Station	X	
31	Fleming Pump Station	Pump Station	X	
32	Foothill Zn 4-6 Pump Station	Pump Station	X	
33	Foothill Zn 6-6A Pump Station	Pump Station	X	
34	Lake Forest 4-5 West	Pump Station		X
35	Manning Pump Station	Pump Station	X	
36	Portola Hills Zn 6-8	Pump Station	X	
37	Portola Hills Zn 8-9 Pump Station	Pump Station	X	
38	Read Pump Station	Pump Station	X	
39	Santiago Hills Zn 5-6	Pump Station	X	
40	Shaw Pump Station	Pump Station	X	
41	Turtle Rock Zn 3-4 Pump Station	Pump Station	X	
42	Williams Canyon Pump Station (Benner)	Pump Station	X	
43	Michelson MWRP	Recycled Water	X	
44	Los Alisos Water Recycling Plant (LAWRP)	Recycling Plant		X
45	Central Irvine Zn 1 Reservoir	Reservoir		X
46	Chapman Reservoir	Reservoir		X
47	Coastal Zn 4 Reservoir	Reservoir	X	
48	Coastal Zn 6 Reservoir	Reservoir	X	
49	Fleming Reservoir	Reservoir	X	
50	Foothill Zn 6 Reservoir	Reservoir		X
51	Lake Forest Zn 4 Tank 1 & Tank 2	Reservoir	X	
52	Modjeska Reservoir	Reservoir	X	
53	Read Reservoir	Reservoir	X	
54	Santiago Canyon Zn 5	Reservoir		X
55	Shaw Reservoir	Reservoir	X	
56	Turtle Rock Zn 3	Reservoir		X
57	Williams Canyon Reservoir	Reservoir	X	
58	Enterprise Information System	Technology	X	
59	SCADA System	Technology	X	
60	Bayview Telemetry	Telemetry Site	X	
61	Foothill 6 Transmission Line	Transmission Main	X	
62	Deep Aquifer Treatment System (DATS)	Treatment System	X	
63	Collection System	Wastewater Collection System	X	
64	Harvard Area Trunk Diversion Structure (HATS)	Diversion Structure	X	
65	S1	Siphon	X	
66	S2	Siphon	X	
67	S3	Siphon	X	
68	S4	Siphon	X	
69	S5	Siphon	X	
70	S6	Siphon	X	
71	S7	Siphon	X	
72	S8	Siphon	X	
73	S9	Siphon	X	
74	S10	Siphon	X	
75	S11	Siphon	X	
76	S12	Siphon	X	
77	S13	Siphon	X	
78	S14	Siphon	X	
79	S15	Siphon	X	
80	S16	Siphon	X	
81	S18	Siphon	X	
82	S19	Siphon	X	
83	S17	Siphon	X	



Irvine Ranch Water District Local Hazard Mitigation Plan

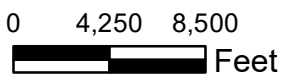
Irvine Ranch Water District - Critical Facilities



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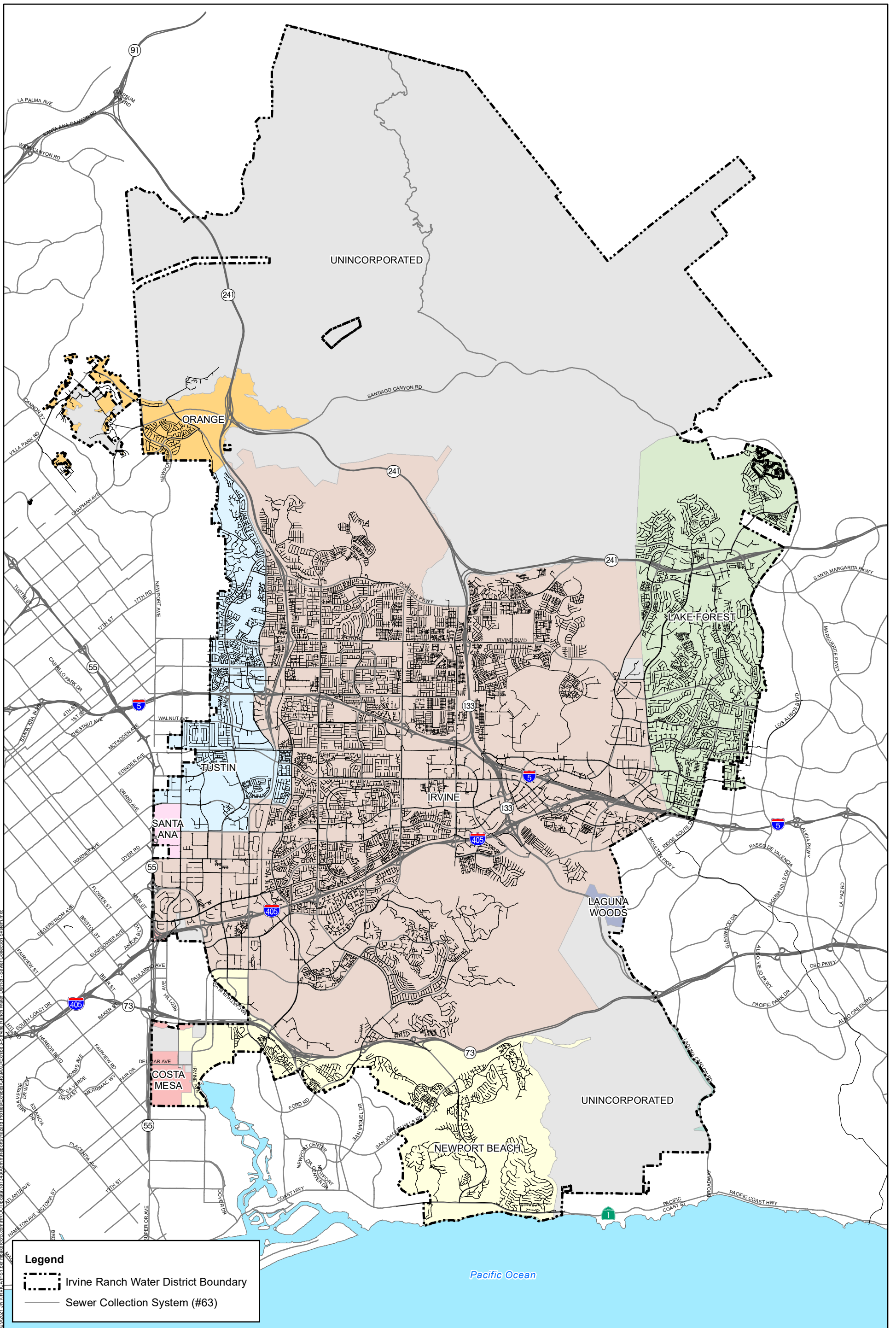
Legend

- Irvine Ranch Water District Boundary
- Distribution System (#3)





Irvine Ranch Water District Local Hazard Mitigation Plan


Irvine Ranch Water District - Distribution System



Legend

-  Irvine Ranch Water District Boundary
-  Sewer Collection System (#63)



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 Feet

Irvine Ranch Water District Local Hazard Mitigation Plan

Irvine Ranch Water District - Sewer Collection System

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SECTION 4: HAZARD ASSESSMENT

4.1 HAZARD IDENTIFICATION AND PRIORITIZATION

4.1.1 HAZARD IDENTIFICATION

The first step in developing the risk assessment is identifying the hazards. Federal Emergency Management Agency (FEMA) guidance identifies several hazards that may affect communities. The list of hazards is comprehensive, but not meant to be exhaustive or limit a community from identifying other hazards within their plans. Additionally, a community may not be susceptible to all hazards identified for consideration. In reviewing the FEMA list of hazards, the Planning Team discussed the potential for each hazard to affect the community. The team discussed previous occurrences within the IRWD service area, considerations of the local geography, and the Planning Team’s professional experience and knowledge. Table 4-1, IRWD Hazard Identification, summarizes the Planning Team’s discussion and determination of hazards for inclusion in the LHMP.

**Table 4-1
IRWD Hazard Identification**

Hazards	Include in LHMP?	Discussion of Hazard's Inclusion or Exclusion
Avalanche	No	Not applicable to IRWD as snowfall does not regularly occur within the jurisdiction, and there is no historical record of avalanche in the area.
Climate Change	Yes	Climate change is closely correlated with several hazards profiled in the LHMP and may exacerbate hazards that affect IRWD. Therefore, climate change is discussed within each hazard profile.
Coastal Erosion	No	Coastal erosion was evaluated by the Planning Team as an identified hazard, due to the small coastal section of IRWD’s jurisdiction. A draft of the hazard was prepared, in coordination with sea level rise and tsunamis. Upon further research, it was confirmed that projected coastal erosion within IRWD’s jurisdiction is considered minor and no critical infrastructure was identified as vulnerable. Additionally, IRWD has not experienced impacts due to coastal erosion. Thus, the Planning Team elected to remove coastal erosion from the LHMP and no mitigation actions are included.
Coastal Storm	Yes	Coastal storms are evaluated together with the severe storm hazard profile, below.
Dam Failure	Yes	IRWD owns and maintains several dams and reservoirs located upstream of highly populated areas within the jurisdiction. Critical infrastructure is located within mapped inundation zones.
Disease/Pest Management	No	Not applicable; disease and pest management is not a hazard that impacts the operation of water/wastewater facilities and infrastructure.
Drought	Yes	The IRWD water portfolio includes groundwater and imported surface water supply, both of which are susceptible to drought. IRWD has experienced several historical droughts, including the most recent State-declared drought emergency from 2014 through 2017.
Earthquake Fault Rupture	Yes	Mapped fault lines are known within the IRWD service area. Fault rupture is included under the Seismic Hazards profile.
Expansive Soils	Yes	Portions of the IRWD service area include known expansive soils. This hazard is profiled under Geological Hazards.
Extreme Heat	No	Extreme heat is not a hazard that typically affects the IRWD service area, which is characterized by mild temperatures; nor would extreme heat traditionally affect the operations of water/wastewater services.
Flood	Yes	Significant portions of the IRWD service area are located within FEMA mapped floodplains and have experienced historic flooding. Localized flooding can also occur during severe rainstorms.

Table 4-1 (continued)
IRWD Hazard Identification

Hazards	Include in LHMP?	Discussion of Hazard's Inclusion or Exclusion
Geological Hazards	Yes	IRWD is located in an area with known and mapped geological hazards. This topic includes expansive soils and land subsidence.
Hailstorm	No	Not applicable; significant hailstorms rarely occur within the IRWD service area.
Hazardous Materials	Yes	Hazardous materials (including intentional or accidental releases) could compromise IRWD water supplies and infrastructure. This topical area is included under the Human-Induced Hazards profile.
Human-Caused Hazards	Yes	The Planning Team identified the following human-induced hazards within the IRWD jurisdiction: hazardous materials release (including an IRWD release or an external release) and terrorism/sabotage (including cyberattacks). Heightened security concerns have resulted in increased measures to protect infrastructure systems.
Hurricane	No	Hurricanes do not occur within the IRWD jurisdiction.
Land Subsidence	Yes	Portions of the IRWD service area include mapped land subsidence. This hazard is profiled under Geological Hazards.
Landslide/Mudflow	Yes	The IRWD service area includes mapped landslide hazard zones. Additionally, portions of the service area have experienced mudflow incidents.
Lightning	No	Significant lightning events do not typically occur within the IRWD service area.
Liquefaction	Yes	The IRWD service area is located within mapped liquefaction hazard zones. Liquefaction is included under the Seismic Hazards profile.
Sea Level Rise	No	Sea level rise was evaluated by the Planning Team as an identified hazard due to the small coastal section of IRWD's jurisdiction. A draft of the hazard was prepared, in coordination with coastal erosion and tsunamis. Upon further research, it was confirmed that projected sea level rise mapping within IRWD's jurisdiction is considered minor and no critical infrastructure was identified as vulnerable. Additionally, IRWD has never experienced impacts from sea level rise historically and all other flooding incidents/information are covered in the Flood profile. Thus, the Planning Team elected to remove sea level rise from the LHMP and no mitigation actions are included.
Seismic Hazards	Yes	The IRWD service area is located within a seismically active region in southern California, and is susceptible to ground shaking, fault rupture, and liquefaction. For organizational purposes, these three hazards are profiled together under seismic hazards.
Severe Winter Storm	Yes	The climate within southern California does not result in severe winter storms such as ice storms, blizzards or significant snowfall. However, the IRWD service area does experience heavy rain events that could impact operations. For purposes of the LHMP, heavy rain events are profiled under Severe Weather.
Tornado	No	Tornados do not regularly occur within the IRWD service area.
Tsunami	No	Tsunami was evaluated by the Planning Team as an identified hazard, due to the small coastal section of IRWD's jurisdiction. A draft of the hazard was prepared, in coordination with sea level rise and coastal erosion. Upon further research, it was confirmed that projected tsunami inundation mapping within IRWD's jurisdiction is considered minor and no critical infrastructure was identified as vulnerable. Additionally, IRWD has never experienced impacts from a tsunami historically and Orange County infrequently experiences tsunami occurrences. Thus, the Planning Team elected to remove tsunami from the LHMP and no mitigation actions are included.
Volcano	No	The IRWD service area is not located within the vicinity of a known active volcano.
Wildfire	Yes	Large portions of the IRWD service area are located within mapped high fire hazard zones, and wildfire season regularly occurs within the IRWD service area resulting in impacts to IRWD operations.

**Table 4-1 (continued)
IRWD Hazard Identification**

Hazards	Include in LHMP?	Discussion of Hazard's Inclusion or Exclusion
Wind	No	Regular wind does not occur within the IRWD service area.
Windstorm	Yes	Santa Ana winds commonly occur in the IRWD service area between September and May. Windstorms can impact power transmission lines and create power outages. Windstorms are evaluated under the Severe Weather profile, and power outages are outlined as a secondary impact.

4.1.2 HAZARD PRIORITIZATION

Following FEMA's guidance for preparation of Local Hazard Mitigation Plans, the Planning Team used a Microsoft Excel-based tool to prioritize the identified hazards assigning each hazard a ranking of 1 to 4, where one is the lowest score and four is the highest, for the following criteria:

- Probability (likelihood of occurrence);
- Location (size of potentially affected area);
- Maximum Probable Extent (intensity of damage); and
- Secondary Impacts (severity of secondary impacts to community).

The rankings were assigned based on group discussion, knowledge of past occurrences, and familiarity with IRWD's vulnerabilities. The four criteria were assigned a weighted value (recommended by FEMA and confirmed by the Planning Team) based on the importance of the criterion; refer to [Table 4-2, Hazard Ranking Methodology](#). The hazard rankings were multiplied by weighted factors to obtain a score for each criterion. A higher weight was given to the criterion considered more important or significant. For example, the probability of the hazard's occurrence received a higher weight than the potential secondary impacts. The scores for location, maximum probable extent (anticipated damage), and secondary impacts for each hazard were added together to determine the total impact score for each hazard. The total impact score was then multiplied by the overall probability score to determine the final score for each hazard. The final scores were used to determine the prioritization of each hazard based on the following FEMA recommended scale:

- Low Threat: 0 to 12;
- Medium Threat: 12.1 to 42; and
- High Threat: 42.1 and above.

[Table 4-3, Hazard Rankings](#), identifies the criterion scores, final scores, and the hazard planning consideration (threat level) for each hazard based on discussions with the Planning Team and the prioritization process described above.

**Table 4-2
Hazard Ranking Methodology**

Probability (2.0): Based on the estimated likelihood of occurrence from historical data.	
Probability (2.0): Estimated likelihood of occurrence from historical data.	Score
Unlikely – less than 1% probability in next 100 years or has a recurrence interval of greater than every 100 years	1
Somewhat Likely – between 1% and 10% probability in next year or has a recurrence interval of 11 to 100 years	2
Likely – between 10% and 100% probability in next year or has a recurrence interval of 10 years or less	3
Highly Likely – near 100% probability in next year or happens every year	4

**Table 4-2 (continued)
Hazard Ranking Methodology**

Probability (2.0): Based on the estimated likelihood of occurrence from historical data.	
Location (0.8): Size of geographical area of community affected by the hazard.	
Affected Area	Score
Isolated	1
Small	2
Medium	3
Large	4
Maximum Probable Extent (0.7): Anticipated damage to a typical facility/structure in the community.	
Impact	Score
Negligible – less than 10% damage	1
Limited – between 10% and 25% damage	2
Critical – between 25% and 50% damage	3
Catastrophic – more than 50% damage	4
Secondary Impacts (0.5): Estimated secondary impacts to the community at large.	
Impact	Score
Negligible – no loss of function, downtime, and/or evacuations	1
Limited – minimal loss of function, downtime, and/or evacuations	2
Moderate – some loss of function, downtime, and/or evacuations	3
High – major loss of function, downtime, and/or evacuations	4

**Table 4-3
Hazard Rankings**

Hazard Type	Probability	Location	Maximum Probable Extent	Secondary Impact	Total Score	Hazard Planning Consideration (Threat Level) ¹
Climate Change ²	N/A	N/A	N/A	N/A	N/A	N/A
Coastal Erosion ³	1	1	1	2	5.00	Low
Coastal Storm/Severe Winter Storm	3	2	2	2	24.00	Medium
Dam/Reservoir Failure	1	1	1	4	7.00	Low
Drought	4	4	1	1	35.20	Medium
Fault Rupture/Seismic Hazards/Groundshaking	4	2	2	3	36.00	Medium
Flood	2	1	3	4	19.60	Medium
Geological Hazards (Expansive Soils, Subsidence)	1	1	1	1	4.00	Low
Hazardous Materials Spill	2	2	2	3	18.00	Medium
Terrorism	1	3	3	3	12.00	Low
Sabotage/Vandalism	1	1	1	2	5.00	Low
Landslide/Mudflow	3	2	3	3	31.20	Medium
Liquefaction	1	2	3	3	10.40	Low
Sea Level Rise ³	1	1	1	1	4.00	Low
Tsunami ³	1	1	1	1	4.00	Low
Wildfire	4	3	2	2	38.40	Medium
Windstorm	4	4	1	1	35.20	Medium
Power Outage ⁴	4	2	1	2	26.40	Medium

1. Refer to Table 4-2 for the hazard ranking methodology. The total score is based on an equation that provides a weighted value to each category by its importance.

2. The Planning Team did not rank climate change, due to the interconnected nature with the other identified hazards. Climate change is profiled with each identified hazard in Section 4.2, below.

3. As outlined in Table 4-1, coastal erosion, sea level rise, and tsunami were listed as a potential hazard that could impact IRWD, and thus were included in the hazard ranking process. After further research, it was found these hazards have not historically impacted IRWD and hazard maps did not intersect with IRWD infrastructure. Thus, coastal erosion, sea level rise, and tsunami were not included in the LHMP and no mitigation actions are identified.

4. Power outage is included as a secondary impact, under the Severe Weather profile in Section 4.2.

Many hazards identified by the Planning Team are recognized to be interconnected or interrelated. Where appropriate, hazard profiles below may include references to other hazard profiles. Additionally, as part of the hazard identification and prioritization process, the Planning Team determined that some hazards could be combined for clarity purposes within a larger hazard category. Some hazards were expanded or renamed to reflect conditions for the IRWD service area more accurately. Thus, the Geologic Hazards profile includes both Expansive Soils and Land Subsidence Hazards. Human-Caused Hazards includes Hazardous Materials and Terrorism/Sabotage (Cyberattacks). Seismic Hazards includes Fault Rupture, Ground Shaking and Liquefaction. Severe Weather includes Coastal/Winter Storm, Windstorm (Santa Ana Winds), and Power Outage as a secondary impact.

It is noted that Power Outage is not a direct hazard, but a secondary impact from other natural disasters (primarily windstorm, but potentially wildfire as well). The Planning Team and survey participants are extremely concerned about the ramifications of Power Outages and the effects on IRWD infrastructure and operations; thus, Power Outage is discussed under Severe Weather.

Climate change is not a stand-alone hazard but has the potential to exacerbate other natural hazards in the IRWD service area. The Planning Team decided climate change would be included under each applicable hazard profile, with a discussion about how the hazard would intersect or become more significant with the impacts of climate change.

The following hazards are discussed within the LHMP:

- Dam/Reservoir Failure;
- Drought Hazards;
- Flood Hazards;
- Geologic Hazards (Expansive Soils, Land Subsidence);
- Human-Caused Hazards (Hazardous Materials, Terrorism/Sabotage [Cyberattacks]);
- Landslide and Mudflow;
- Seismic Hazards (Fault Rupture, Ground Shaking, Liquefaction);
- Severe Weather (Coastal/Winter Storm, Windstorm [Santa Ana Winds], Power Outage [Secondary Impact]); and
- Wildfire.

4.2 HAZARD IDENTIFICATION AND PRIORITIZATION

This section contains profiles for the hazards identified as having the potential to occur in the IRWD service area. Each hazard includes a description of the hazard, location of where the hazard may occur, severity of the hazard, history of the hazard, the probability of the hazard's future occurrence, and the intersection with climate change (if applicable).

4.2.1 DAM/RESERVOIR FAILURE

Description

A dam is an artificial barrier preventing the flow of water or a barrier built across a watercourse for impounding water. Dam failure is the uncontrolled release of impounded water from behind a dam. Flooding, earthquakes, blockages, landslides, lack of maintenance, improper operation, poor construction, vandalism, and terrorism can all cause dam infrastructure to fail. Dam failure causes downstream flooding of varying velocities that in extreme cases can result in loss of life

and property. Damage caused by dam failure varies greatly depending on the rate and amount of water released by failure.

Reservoirs are defined as an artificial lake, pond, impoundment, or tank, used to store water (both potable and non-potable). Reservoirs can be created on the surface by constructing dams to store water. Additionally, tank reservoirs can be constructed to store water above ground, on the surface, or below ground. Reservoir failure is the uncontrolled release of impounded water from a reservoir. Flooding (associated with heavy rain events), earthquakes, blockages, landslides, lack of maintenance, improper operation, poor construction, vandalism, and terrorism activities can all cause a reservoir to fail. Seismic activity may also cause inundation by the action of a differential movement of a reservoir and the water within, causing shearing or buckling of the reservoir infrastructure.

Dam or reservoir failures are most likely to happen for the following reasons:¹

- Overtopping, caused by water spilling over the top of the dam/reservoir, usually a precursor of failure because of inadequate spillway design, debris blockage of spillways, or settlement of the crest;
- Foundation defects, including settlement or slope stability;
- Cracking caused by natural settling of a dam or seismic movements;
- Inadequate maintenance and upkeep; and/or
- Piping, when seepage through a dam is not properly filtered, soil particles continue to progress and form sinkholes in the dam/reservoir.

Because dam and reservoir failure can have severe consequences, FEMA and Cal OES require all dam owners to develop an Emergency Action Plan (EAP) for warning, evacuation, and post-flood actions. In the event of a major dam failure, mutual aid from all levels of government would be required for an extended period. Recovery efforts would include the removal of debris, clearing roadways, demolishing unsafe structures, assistance in reestablishing public services, and providing continued care for the affected population.

IRWD dams are regulated by the Department of Water Resources, Division of Safety of Dams (DSOD). DSOD ensures dam safety by:²

- Reviewing and approving dam enlargements, repairs, alterations, and removals, and ensuring that the dam appurtenant structures are designed to meet minimum requirements;
- Performing independent analyses to understand dam and appurtenant structures performance (including structural, hydrologic, hydraulic, and geotechnical evaluations);
- Overseeing construction to ensure work is performed in accordance with approved plans/specifications;
- Inspecting each dam on an annual basis to ensure safety and performance standards; and,
- Periodically reviewing the stability of dams/major appurtenances, as well as new findings regarding earthquake hazards and hydrologic estimates in California.

¹ Association of State Dam Safety Officials, *Dam Failures and Incidents*, <https://damsafety.org/dam-failures>, accessed May 11, 2021.

² California Department of Water Resources, *Division of Safety of Dams*, <https://water.ca.gov/Programs/All-Programs/Division-of-Safety-of-Dams>, accessed March 16, 2021.

DSOD is responsible for assigning each jurisdictional dam a downstream hazard classification. This classification is based only on potential downstream impacts to life and property, should the dam fail when operating with a full reservoir. This hazard status is not related to the condition of the dam or the likelihood of the dam to fail in either the short or long-term future. Additionally, dams in southern California usually do not operate at full capacity at all times of the year, as most do not receive significant flows from rivers or streams. Thus, hazard risks and classifications are a worst-case scenario assessment. The DSOD definitions for downstream hazards are borrowed from the Federal Guidelines for Inundation Mapping of Flood Risks Associated with Dam Incidents and Failures, and are outlined in Table 4-4, *DSOD Downstream Hazard Potential Classification Levels*.

**Table 4-4
DSOD Downstream Hazard Potential Classification Levels**

Downstream Hazard Potential Classification	Potential Downstream Impacts to Life and Property
Low	No probable loss of human life and low economic and environmental losses. Losses are expected to be principally limited to the owner's property.
Significant	No probable loss of human life but can cause economic loss, environmental damage, impacts to critical facilities, or other significant impacts.
High	Expected to cause loss of at least one human life.
Extremely High	Expected to cause considerable loss of human life or would result in an inundation area with a population of 1,000 or more.
Source: California Department of Water Resources, Division of Safety of Dams, <i>Definitions of Downstream Hazard and Condition Assessment</i> , https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/All-Programs/Division-of-Safety-of-Dams/Files/Publications/Definitions-of-Downstream-Hazard-and-Condition-Assessment.pdf , accessed March 16, 2021.	

Due to the highly urbanized nature of the IRWD service area, dam infrastructure (five dams at the time of this writing) is classified as “extremely high.” As noted above, this is not reflective of the likelihood for the specific infrastructure to fail; this classification is due to the highly populated areas downstream of IRWD dams. As discussed previously, DSOD inspects dams once annually and provides a condition assessment. This condition assessment is a more accurate tool to evaluate infrastructure risk. DSOD uses the National Inventory of Dams (NID) condition rating definitions, with additional criteria, as a guideline in assigning condition assessments. This rating system is outlined in Table 4-5, *DSOD Condition Assessment Rating Levels*.

**Table 4-5
DSOD Condition Assessment Rating Levels**

Rating	National Inventory of Dams Definitions	California DSOD Additional Criteria
Satisfactory	No existing or potential dam safety deficiencies are recognized. Acceptable performance is expected under all loading conditions (static, hydrologic, seismic) in accordance with the applicable regulatory criteria or tolerable risk guidelines.	None.
Fair	No existing dam safety deficiencies are recognized for normal loading conditions. Rare or extreme hydrologic and/or seismic events may result in a dam safety deficiency. Risk may be in the range to take further action.	<ul style="list-style-type: none"> • Dam has a long-standing deficiency that is not being addressed in a timely manner. • Dam is not certified and its safety is under evaluation. • Dam is restricted and operation of the reservoir at the lower level does not mitigate the deficiency.
Poor	A dam safety deficiency is recognized for loading conditions that may realistically occur. Remedial action is necessary. A poor rating may also be used when uncertainties exist as to critical analysis parameters that identify a potential dam safety deficiency. Further investigations and studies are necessary.	Dam has multiple deficiencies or a significant deficiency that requires extensive remedial work.
Unsatisfactory	A dam safety deficiency is recognized that requires immediate or emergency remedial action for problem resolution.	None.

**Table 4-5 (continued)
DSOD Condition Assessment Rating Levels**

Rating	National Inventory of Dams Definitions	California DSOD Additional Criteria
Not Rated	The dam has not been inspected, is not under State jurisdiction, or has been inspected but, for whatever reason, has not been rated.	None.
Source: California Department of Water Resources, Division of Safety of Dams, <i>Definitions of Downstream Hazard and Condition Assessment</i> , https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/All-Programs/Division-of-Safety-of-Dams/Files/Publications/Definitions-of-Downstream-Hazard-and-Condition-Assessment.pdf , accessed March 16, 2021.		

Location/Extent

As a water purveyor, IRWD owns and maintains several critical dams and reservoirs within the service area for potable and recycled water storage. IRWD dams are listed below in Table 4-6, IRWD Dams, and reservoirs are listed in Table 4-7, IRWD Reservoirs.

**Table 4-6
IRWD Dams**

Dam Name	Hazard Classification	Type	Size	DSOD Rating
Rattlesnake Canyon	Extremely High	Recycled Water	1,480 acre-feet	Satisfactory
Syphon Canyon	Extremely High	Recycled Water	535 acre-feet	Satisfactory
San Joaquin	Extremely High	Recycled Water	3,036 acre-feet	Satisfactory
Santiago Creek	Extremely High	Potable/Non-Potable Water Storage	25,000 acre-feet	Poor*
Sand Canyon	Extremely High	Recycled Water	768 acre-feet	Satisfactory
*At the time of this LHMP writing, Santiago Creek Dam is listed with a “Poor” rating due to the spillway structure. To maintain safety, IRWD is minimizing use of the spillway by implementing an Interim Lake Level Operations Plan approved by the DSOD, while preparing for infrastructure improvements in the near future.				
Source: Irvine Ranch Water District, <i>DSOD Safety Rating for IRWD Dams</i> , https://www.irwd.com/images/pdf/construction/DSOD_safety_rating_for_dams_chart_031721_temp.pdf , accessed May 11, 2021.				

**Table 4-7
IRWD Reservoirs**

Reservoir Name	Address	Area Served
Benner Reservoir	28741 Williams Canyon Road	Williams Canyon
Central Irvine Zone 1 Reservoir	13826 Sand Canyon Avenue, Irvine 92620	Zone 1
Chapman Reservoir	14909 Mill Road	Chapman Zone
Coastal Zone 2 Reservoir	22433 Newport Coast Drive, Newport Beach, 92657	Zone 2
Coastal Zone 4 Reservoir	21474 Vista Ridge Road, Newport Beach, 92657	Zone 4
Coastal Zone 6 Reservoir	20783 Vista Ridge Road, Newport Beach, 92657	Zone 6
East Irvine Zone 3 #1	13497 Alton Parkway, Irvine 92618	Zone 3
East Irvine Zone 3 #2	13497 Alton Parkway, Irvine 92618	Zone 3
East Irvine Zone 4	21515 Magazine Road, Irvine, 92618/12848 1/2 Alton	Zone 4
Fleming Reservoir	7431 Silverado Canyon Road	Lower Silverado Canyon
Foothill Zone 6 Reservoir	2 Touraine Place, Foothill Ranch 92610	Zone 6
Foothill Zone 6A Reservoir	71 Tessara Avenue, Foothill Ranch 92610	Zone 6A
Lake Forest Zone Tank 1 and Tank 2	21082 Wisteria, Lake Forest 92630	Zone 4
Modjeska Reservoir	29265 Modjeska Canyon Road	Modjeska Canyon
Orchard Zone 5 Reservoir	10703 Culver Drive, Irvine 92602	Orchard Hills
Portola Hills Zone 8 Reservoir	18967 Saddleback Ranch Road, Lake Forest 92679	Zone 8
Portola Hills Zone 9 Reservoir	18181 Santiago Canyon, Trabuco 92679	Zone 9
Portola Springs Zone 6 Reservoir – Rattle Snake Canyon Dam Reservoir	8631 Portola Parkway, Irvine	Zone 6
Quail Hill Zone 3 Reservoir	17500 1/2 Pine Needles, Irvine 92603	Zone 3
Quail Hill Zone 4 Reservoir	108 1/2 Luminous, Irvine	Zone 4
Read Reservoir	30500 Silverado Canyon Road,	Upper/Middle Silverado Canyon
Santiago Canyon Zone 5	1802 East Santiago Canyon Road, Orange 92862	Zone 5

Table 4-7 (continued)
IRWD Reservoirs

Reservoir Name	Address	Area Served
Shaw Reservoir	28914 Olive Drive,	Middle Silverado Canyon
Turtle Rock Zone 3	13.5 Minaret, Irvine	N/A
Williams Canyon Reservoir	27600 Williams Canyon Road	Williams Canyon
Source: Irvine Ranch Water District, <i>Water System Risk and Resilience Assessment: A Comprehensive Analysis Consistent with America's Water Infrastructure Act of 2018</i> , March 30, 2020.		

The geographic extent from dam or reservoir failure is dependent on the type of infrastructure and amount of water stored at the time of the hazard incident. Inundation maps were prepared for the listed dams as part of the recent EAP effort through DSOD and Cal OES. Inundation maps show flooding that could result from a hypothetical failure of a dam or its critical components, such as spillways and other outlets. The failure scenario evaluated assumes instantaneous failure of the entire dam. As mentioned previously, inundation maps are based on worst-case scenarios and are not based on any specific information about the condition of the dam.

Dam and reservoir inundation vulnerability exhibits and tables are included in Appendix C, Dam/Reservoir Failure Vulnerability Assessment. Generally speaking, inundation from a failure of Santiago Creek Dam would be the most severe out of the five “extremely high” hazard dams owned and operated by IRWD. Failure of the facilities would vary, and could result in substantial inundation of the communities surrounding and/or downstream.

Additionally, IRWD infrastructure and the service area is at risk from dam infrastructure outside of IRWD control. Prado Dam is a flood control dam on the Santa Ana River, located north of State Route (SR) 91 and east of the SR-71, within Riverside County. This dam was constructed in 1941 by the U.S. Army Corps of Engineers, with a gross storage capacity of 217,000 acre-feet. The dam and reservoir are managed by the U.S. Army Corps of Engineers and OCWD.³ Due to the age of Prado Dam, infrastructure failure is a concern. Inundation from Prado Dam failure has the potential to impact downstream IRWD infrastructure.

Previous Occurrences

IRWD has never experienced a major dam failure resulting in significant flooding or inundation; further, no such major dam failures resulting in significant flooding or inundation has occurred in Orange County history. IRWD has experienced spillway infrastructure erosion at the Santiago Dam during a major storm in February 1969. During this peak event, large storms caused high flows at both Santiago Dam and the neighboring Villa Park Dam, filling both reservoirs to capacity. A gauge downstream measured a historical peak flow of 6,600 cubic feet per second (cfs) recorded on February 25, 1969.⁴ After the 1969 winter floods, the Army Corps of Engineers authorized the Santa Ana River Mainstream project and constructed both the Prado Dam and Bond Street groundwater replenishment project to increase flood storage; thus, it is unlikely that Santiago Dam or Villa Park Dam will fill to capacity during future storm events.⁵ Refer to Section 4.2.3 for further discussion regarding historical flood hazards. A minor landslide occurred near the perimeter of the Santiago Creek Dam, and IRWD in coordination with DSOD implemented maximum storage restrictions as a safety response measure.

³ U.S. Army Corps of Engineers, *Prado Dam*, <https://www.spl.usace.army.mil/Missions/Asset-Management/Prado-Dam/>, accessed March 16, 2021.

⁴ Irvine Ranch Water District & Serrano Water District, *Emergency Action Plan for Santiago Creek Dam*, https://www.irwd.com/images/pdf/construction/dam-emergency-action-plans/eap_santiago_creek_2021-02-12_post.pdf, accessed July 15, 2021.

⁵ City of Villa Park, *Villa Park Dam*, <https://villapark.co/villa-park-dam/>, accessed July 15, 2021.

Maintenance and other safety measures have been implemented due to conditions at both Rattlesnake Dam and Sand Canyon Dam. Rattlesnake Dam has storage restrictions to keep the water surface level six feet below the designed maximum storage elevation. IRWD may wish to further restrict the water storage or construct physical improvements to the dam in the future. In the past the Sand Canyon Dam spillway has required maintenance to mitigate past risks. The spillway eroded in specific areas, and slurry materials was placed to maintain structural integrity. Capacity at Sand Canyon Dam has diminished since the dam was constructed in 1942, due to sedimentation.⁶

Historically, the most significant dam failures in California have occurred outside of the IRWD service area. The closest dam failures to IRWD's service area resulting in significant inundation occurred in the City of Los Angeles (St. Francis Dam Disaster of 1928 and Baldwin Hills Dam Disaster of 1963). Both incidents are considered major civil engineering disasters and resulted in significant loss of life and property in the City of Los Angeles.

The City of Westminster (north of the IRWD service area within Orange County) experienced a reservoir (tank) failure in September 1998. A five-million-gallon municipal water storage tank ruptured because of corrosion and construction defects. No loss of life occurred, but the inundation destroyed most of the storage facility, along with flooding over 30 private residences. Through a Public Works Mutual Aid agreement, Orange County Public Works Department assisted the City of Westminster in clean-up and repair activities. A new reservoir facility came online in March 2003.⁷

Probability of Future Occurrences

As there has only been one water storage structure failure that resulted in significant flooding/inundation in over one hundred years of Orange County history, the probability for future events within IRWD jurisdiction is anticipated to remain low. IRWD maintains all dams and reservoirs in accordance with state and federal regulations, along with a district specific Dam Safety Program, available for review on the IRWD website. The IRWD dam safety program is driven by Risk Informed Decision Making (RIDM), which includes: consequence assessment, data summary report, potential failure modes, and the dam safety program framework.

IRWD continually monitors, inspects, and operates dams and reservoirs with safety in mind. In addition to state-mandated inspections, IRWD's dam safety team conducts an extra semiannual inspection of San Joaquin, Rattlesnake, Sand Canyon and Syphon reservoirs and quarterly inspections of Santiago Creek Reservoir. IRWD visually inspects all five dams daily. Caretakers live onsite at San Joaquin, Rattlesnake, Sand Canyon and Santiago Dams. Regular maintenance and infrastructure upgrades are crucial to the IRWD dam safety program to ensure the probability of future occurrences remain low.

Despite best planning efforts however, dam/reservoir failure resulting in flooding within the community could occur due to severe seismic activity. While the probability of future occurrences remains low, an incident has the potential to be highly destructive due to the urbanized nature of the IRWD inundation area.

Since the Baldwin Hills Dam failure in 1963, the State of California implemented stringent dam standards, regulations, and inspection schedules. In the past 50 years, there have been few

⁶ Irvine Ranch Water District, *Emergency Action Plan for San Canyon Dam*, https://www.irwd.com/images/pdf/construction/dam-emergency-action-plans/eap_sand_canyon_2019-10-25_post.pdf, accessed July 15, 2021.

⁷ Municipal Water District of Orange County, *Orange County Regional Water and Wastewater Hazard Mitigation Plan*, adopted August 2019.

incidents in California as a result of these regulations. The Oroville Dam Crisis in 2017 is the most recent major dam incident, where erosion at the Oroville Dam spillway and emergency spillway threatened the structural integrity of the main weir and gate. Emergency repairs ultimately prevented dam failure. The crisis served as a reminder of the ongoing risk prevented by dams and triggered additional inundation mapping and emergency preparedness planning requirements for California dams.

Climate Change

Dam/reservoir failure is not directly correlated with climate change, and the effects of climate change do not increase or decrease the likelihood of dam/reservoir infrastructure failure. Dam and reservoir failure could be caused by seismic activity; similarly, the likelihood of seismic activity does not increase or decrease due to the effects of climate change. However, severe storm events and flooding incidents could put increased strain on dam and reservoir infrastructure. Repetitive severe storm events could increase the “wear and tear” and require additional maintenance and infrastructure improvements to protect the dam integrity. Severe storm events could also oversaturate soils and compromise dam/reservoir infrastructure integrity. However, the threat of dam/reservoir failure is only indirectly impacted or associated with climate change.

4.2.2 DROUGHT HAZARDS

Description

Drought is defined as an extremely dry climatic period where the available water falls below a statistical average for a region. Drought is also defined by factors other than rainfall, including vegetation conditions, agricultural productivity, soil moisture, water levels in reservoirs, and stream flow. Droughts or water shortages are a gradual phenomenon, occurring over multiyear periods and increasing with the length of dry conditions. When precipitation is less than normal for a period of time, the flow of streams and rivers declines, water levels in lakes and reservoirs fall, and the depth to water in wells increases. If dry weather persists and water supply problems develop, the dry period can become a drought. Drought cycles are common in southern California and are influenced by cyclical El Niño and La Niña events.

The term “drought” can have different meanings depending on how a water deficiency affects day to day activities. Drought is a complex natural hazard, which is reflected in the following four definitions commonly used to describe it:

- Agricultural – Agricultural drought is defined principally in terms of naturally occurring soil moisture deficiencies relative to water demands of plant life, usually arid crops.
- Hydrological – Hydrological drought is related to the effects of precipitation shortfalls on stream flows and reservoir, lake, and groundwater levels.
- Meteorological – Meteorological drought is defined solely on the degree of dryness, expressed as a departure of actual precipitation from an expected average or normal amount based on monthly, seasonal, or annual time scales.
- Regulatory – Regulatory drought can occur when the availability of water is reduced due to imposition of regulatory restrictions on the diversion and export of water out of a watershed to another area. A significant percentage of water in southern California is imported from other regions (Colorado River and Northern California) via aqueducts. Correspondingly, drought in California can be made worse by water availability conditions in the regions at which the water originates.

Although climate is a primary contributor to hydrological drought, other factors such as changes in land use (i.e., deforestation), land degradation, and the construction of dams can affect the hydrological characteristics of a region. Because regions are geographically interconnected by natural systems, the impact of meteorological drought may extend well beyond the borders of the precipitation-deficient area. Changes in land use upstream may alter hydrologic characteristics such as infiltration and runoff rates, resulting in more variable stream flow and a higher incidence of hydrologic drought downstream. Land use change is one way human actions can alter the frequency of water shortage even when no change in precipitation has been observed.⁸

Droughts can cause public health and safety impacts, as well as economic and environmental impacts. Public health and safety impacts of drought are primarily associated with catastrophic wildfire risks and drinking water shortage risks for small water systems in rural areas and private residential wells. Examples of other impacts include costs to homeowners due to loss of residential landscaping, degradation of urban environments due to loss of landscaping, agricultural land fallowing and associated job loss, degradation of fishery habitat, and tree mortality with damage to forest ecosystems. Drought conditions can also result in damage to older infrastructure that is located within dry soils with potential to leak or break. Dead or dying vegetation poses a risk to falling and damaging structures and infrastructure systems.

In Orange County, drought conditions typically result in implementation of large-scale conservation efforts. Drought conditions often increase reliance on groundwater supplies, and extended periods of drought can deplete these reserves. As a result of the drought history in southern California, IRWD has aggressively diversified its water source portfolio to reduce reliance on imported water and has implemented innovative water recycling technology and water banking systems.

Drought conditions have also resulted in drier brush and an increase in the size and severity of wildfires. Water and wastewater infrastructure systems located within areas susceptible to wildfires are at a greater risk of being impacted. Damage or failure to water and wastewater infrastructure systems can significantly reduce or even interrupt service to customers. For more on wildfire hazards, refer to [Section 4.2.9, *Wildfire*](#).

Location/Extent

Droughts are generally widespread events that affect the entire IRWD service area, and the larger southern California region. The geographic extent of drought conditions usually extend to every resident and business owner receiving water from IRWD. IRWD relies on local groundwater, native water, imported water from other regions (e.g., northern California and Colorado River) via aqueducts, and recycled water. As a result, droughts can decrease the amount of groundwater available as well as be caused or made worse by conditions in the regions in which the water originates. Regional groundwater management in Orange County aims to regulate groundwater usage and prevent overreliance on groundwater resources during drought years.

Drought severity depends on numerous factors, including duration, intensity, and geographic extent, as well as regional water supply demands by humans and vegetation. The severity of drought can be aggravated by other climatic factors, such as prolonged high winds and low relative humidity. The magnitude of drought is usually measured in time and the severity of the hydrologic deficit.

⁸ National Drought Mitigation Center, *Drought Basics*, <https://drought.unl.edu/Education/DroughtBasics.aspx>, accessed February 8, 2021.

The U.S. Drought Monitor is a map released weekly that indicates the portions of the United States that are experiencing drought and the severity of the drought based on five classifications: abnormally dry (D0), showing areas that may be going into or are coming out of drought, and four levels of drought: moderate (D1), severe (D2), extreme (D3), and exceptional (D4); refer to [Table 4-8, *Drought Severity Classification*](#).

Table 4-8
Drought Severity Classification

Category	Description	Possible Impacts
D0	Abnormally Dry	Going into drought: short-term dryness slowing planting, growth of crops or pastures. Coming out of drought: some lingering water deficits; pastures or crops not fully recovered.
D1	Moderate Drought	Some damage to crops, pastures; streams, reservoirs, or wells low, some water shortages developing or imminent; voluntary water-use restrictions requested.
D2	Severe Drought	Crop or pasture losses likely; water shortages common; water restrictions imposed.
D3	Extreme Drought	Major crop/pasture losses; widespread water shortages or restrictions.
D4	Exceptional Drought	Exceptional and widespread crop/pasture losses; shortages of water in reservoirs, streams, and wells creating water emergencies.
Source: U.S. Drought Monitor, <i>Drought Classification</i> , https://droughtmonitor.unl.edu/About/AbouttheData/DroughtClassification.aspx , accessed February 8, 2021.		

The Drought Monitor is not a forecast but looks backward; providing a weekly assessment of drought conditions based on how much precipitation did or did not fall. Because drought is a slow-moving hazard, it may take more than one good rainfall to end a drought, especially if an area has been in drought for a long time.

[Exhibit 4-1, *Drought Monitor Map*](#), depicts the drought monitor map, which identifies areas of drought and labels them by intensity as shown in [Table 4-8](#). As of May 24, 2021, central Orange County is classified as “Severe Drought” by the U.S. Drought Monitor.

Previous Occurrences

Although defining drought can be challenging across a large geography, California has experienced numerous severe droughts over the past century. FEMA declared one drought emergency for California in January 1977, and other drought emergency declarations have been declared by the State. According to the 2018 State Hazard Mitigation Plan, from 1972 to 2016, there were fifteen drought State Emergency Proclamations in California.⁹

The most severe drought on record began in 2012 and continued through 2017. On January 17, 2014, the Governor of California declared a State drought emergency, and on April 1, 2014, the Governor announced the first-ever mandatory 25-percent Statewide water use reduction and a series of actions to help save water, increase enforcement to prevent wasteful water use, streamline the State’s drought response, and invest in new technologies that would make California more drought resilient. At the time of the announcement, the volume of Sierra Nevada snowpack was approximately 14 percent of normal. Despite multiple storms in February 2014, drought conditions persisted. By the end of May 2014, all of California was in a condition of “extreme” or “exceptional” drought. At the same time, the volume of the Sierra Nevada snowpack had decreased to less than 10 percent of normal and water stored in Lake Oroville, the major reservoir for the State Water Project, was at 58 percent of normal.¹⁰ On April 7, 2017, the

⁹ California Governor’s Office of Emergency Services, *2018 California State Hazard Mitigation Plan*, https://www.caloes.ca.gov/HazardMitigationSite/Documents/003-2018%20SHMP_FINAL_ACK-TOC.pdf, published September 2018, accessed February 8, 2021.

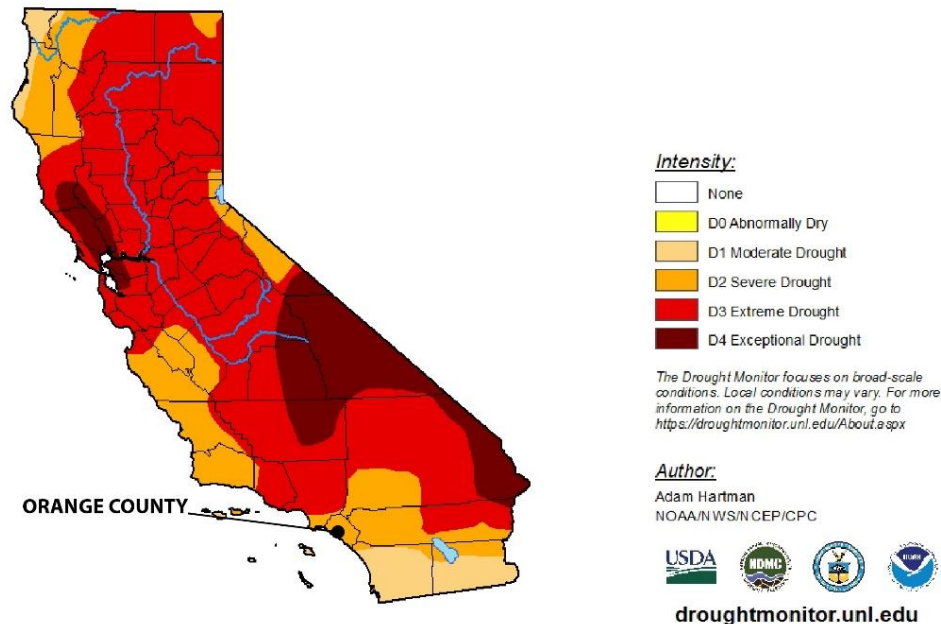
¹⁰ California Department of Water Resources, *California’s Most Significant Droughts: Comparing Historical and Recent Conditions*, February 2015.

Governor issued an executive order ending the drought emergency in Southern California, including Orange County.

**Exhibit 4-1
Drought Monitor Map**

**U.S. Drought Monitor
California**

May 18, 2021
(Released Thursday, May 20, 2021)
Valid 8 a.m. EDT



Source: United States Drought Monitor, California, <https://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?CA>, accessed May 24, 2021.

IRWD did not experience water reliability issues during the 2012-2017 drought. IRWD implemented the State-wide water conservation efforts, meeting the required 25-percent reduction. Several of these water conservation programs have remained in place after the emergency drought restrictions lifted in 2017.

Currently, Orange County (including the IRWD service area) is located within a “severe drought” area as identified by the U.S. Drought Monitor. Drought conditions rapidly intensified throughout California in first half of 2021, as a result of the dry winter and warm/dry spring. Most of the State has received less than a half-inch of rain since April 1, 2021.¹¹ On May 10, 2021, Governor Gavin Newsom declared a State of Emergency for several northern and central California Counties in the Klamath River, Sacramento – San Joaquin Delta and Tulare Lake Watersheds.¹² Thus far, no emergency declarations have included Orange County and IRWD has not experienced any immediate drought impacts.

¹¹ The Washington Post, *California facing drought crisis as water shortages mount and fire danger escalates*, dated May 21, 2021, accessed May 24, 2021.

¹² Executive Department State of California, *Proclamation of a State of Emergency*, dated May 10, 2021.

IRWD utilizes diverse water sources, recycled water, water banking, and water use efficiency programs to ensure water reliably to the IRWD service area during drought conditions. [Table 4-9, *Historical Droughts*](#), shows the historical droughts that have occurred in California from 1827 through the present.

**Table 4-9
Historical Droughts**

Date	Area Affected	Notes
1827 – 1916	Statewide	Multiyear: 1827–29, 1843–44, 1856–57, 1863–64 (particularly extreme), 1887–88, 1897–1900, 1912–13.
1917 – 1921	Statewide except central Sierra Nevada and north coast	Simultaneous in affected areas, 1919–20. Most extreme in north.
1922 – 1926	Statewide except central Sierra Nevada	Simultaneous in effect for entire State only during 1924, which was particularly severe.
1928 – 1937	Statewide	Simultaneously in effect for entire State, 1929–34. Longest in State's history.
1943 – 1951	Statewide	Simultaneously in effect for entire State, 1947–49. Most extreme in south.
1959 – 1962	Statewide	Most extreme in Sierra Nevada and central coast.
1976 – 1977	Statewide, except for southwestern deserts	Two significantly dry years in State's history. Most severe in northern two-thirds of State.
1987 – 1992	Statewide	Moderate, continuing through 1989. Most extreme in northern Sierra Nevada.
2000 – 2002	Statewide	Most severe in southern California.
2007 – 2009	Statewide	Twelfth driest 3-year period on record at the time. Most severe in western San Joaquin Valley.
2012 – 2017	Statewide	Most severe California drought on record.
Sources: Paulson, R. W., E. B. Chase, R. S. Roberts, and D. W. Moody, <i>Compilers, National Water Summary 1988-89: Hydrologic Events and Floods and Droughts: U.S. Geological Survey Water-Supply Paper.</i> California Department of Water Resources, <i>California's Most Significant Droughts: Comparing Historical and Recent Conditions</i> , February 2015.		

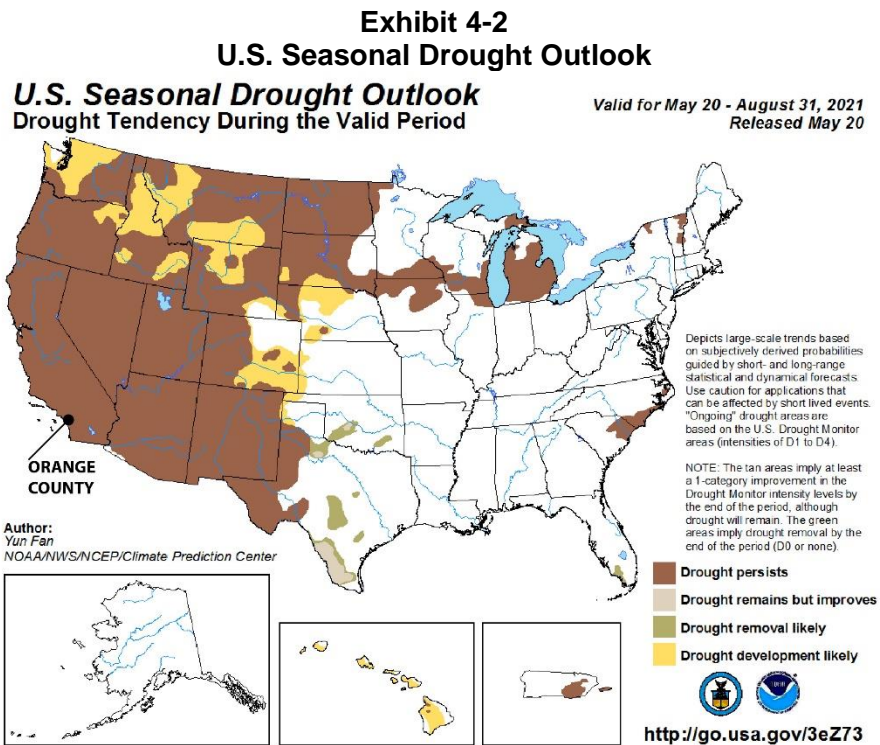
Probability of Future Occurrences

Based on previous occurrences and trends in California, the likelihood that the IRWD service area will experience drought conditions in the future is considered high. The U.S. Seasonal Drought Outlook depicts large-scale trends based on U.S. Drought Monitor areas (intensities of D1 to D4), as shown in [Exhibit 4-2, *U.S. Seasonal Drought Outlook*](#). The southern California region, including the IRWD service area, is currently indicating that drought development is likely to persist. Based on available data, drought is considered to have a high probability for reoccurrence within the IRWD service area. Additionally, Orange County has been in severe or extreme drought for a total of 343 months, or 31 percent of the time since 1920 and 54 percent of the time since 1960.

Climate Change

Climate change is a phenomenon that could exacerbate drought hazards. In Governor Brown's 2014 drought emergency declaration, he noted that droughts could occur more regularly in the future. According to the 2018 State Hazard Mitigation Plan, climate scientists studying California found that drought conditions are likely to become more frequent and persistent over the twenty-first century due to changing weather patterns, such as more frequent and extended periods of high temperature conditions. The experiences faced by water supply agencies during the most recent drought (2012-2017) underscore the need to examine water storage, distribution, management, conservation, and use policies more closely. Decreasing snowmelt, reduced precipitation, and higher temperatures are all expected effects of changing weather patterns. Furthermore, the California Adaptation Planning Guide states that the pressure climate change

places on ground water reliance during times of drought is not sustainable.¹³ When coupled with increasing populations and increasing demand for water in southern portions of California, these conditions may result in future water shortages for the IRWD service area.



Source: National Weather Service Climate Prediction Center, U.S. Seasonal Drought Outlook, https://www.cpc.ncep.noaa.gov/products/expert_assessment/sdo_summary.php, accessed May 24, 2021.

4.2.3 FLOOD HAZARDS

Description

Flooding occurs when a waterway (either a natural or artificial drainage channel) receives more water than it is capable of conveying. Depending on how long these conditions last and the amount of runoff the waterway receives in proportion to its capacity, the rising water level may eventually overtop the waterway's banks or any other boundaries to the drainage area, resulting in flooding.

Floods often occur during heavy precipitation events, when the amount of rainwater exceeds the capacity of storm drains or flood control channels. Floods can also happen when infrastructures such as levees, dams, or culverts fail, or when a section of drainage infrastructure fails, and water cannot be drained from an area quickly enough. These failures can be linked to precipitation events or can be a consequence of other emergency situations (i.e., flood infrastructure compromised due to an earthquake).

¹³ California Governor's Office of Emergency Services, *California Adaptation Plan*, <https://www.caloes.ca.gov/HazardMitigationSite/Documents/CA-Adaptation-Planning-Guide-FINAL-June-2020-Accessible.pdf>, published June 2020, accessed February 8, 2021.

FEMA defines flood or flooding as a general and temporary condition of partial or complete inundation of normally dry land areas from:

- The overflow of inland or tidal waters;
- The unusual and rapid accumulation or runoff of surface waters from any source; or,
- Mudslides (i.e., mudflows) which are proximately caused by flooding and are akin to a river of liquid and flowing mud on the surfaces of normally dry land areas, as when earth is carried by a current of water and deposited along the path of the current.

Floods can be caused by a number of factors, including:

- Weather and climate patterns (e.g., El Niño, La Niña, Pineapple Express, Atmospheric River, etc.)
 - El Niño and La Niña are complex weather patterns resulting from variations in ocean temperatures in the equatorial Pacific. Warmer or colder than average ocean temperatures in one part of the world can influence weather around the globe. El Niño and La Niña episodes typically last 9 to 12 months, but some prolonged events may last for years.¹⁴
 - Pineapple Express is a name given to an atmospheric river on the West Coast. It is a channel in the atmosphere that moves vast amounts of moisture and can result in massive rain showers.
- Hydrologic features such as reservoirs, ponds, lakes, river, etc., can have a large impact on the amount of flooding.
- The absorption capacity of the ground depends on the composition of soil and bedrock of the area. Less absorbent soil conditions in addition to lack of proper storm infrastructure can result in flooding.
- Type and density of vegetation is related to moisture absorption affecting the flow of water.
- Patterns of land use/urbanization relates to the pervious and impervious nature of the ground.
- Expected level, age, and condition of flood management infrastructure can impact flooding conditions.
- Large-scale wildfires dramatically alter the terrain and ground conditions. Vegetation absorbs rainfall, reducing runoff. However, wildfires leave the ground charred, barren, and unable to properly absorb water, creating conditions ripe for flash flooding and mudflow. Flood risk remains significantly higher until vegetation is restored – up to five years after a wildfire.¹⁵

In some cases, the force of flood can be enough to carry away large objects and damage structures, causing considerable damage to buildings and infrastructure. Floods can also saturate and weaken the soil, potentially making structures or infrastructure more susceptible to damage or collapse. Flooding can also affect water quality, as large volumes of water can transport contaminants into water bodies and overload storm/wastewater systems. Additionally, large increases in water volume can cause water body erosion and loss of aquatic habitat. Flooding can also cause economic loss to people and government due to the destruction of property and infrastructure.

¹⁴ National Oceanic and Atmospheric Administration, *What are El Niño and La Niña?*
<https://oceanservice.noaa.gov/facts/ninonina.html>, February 15, 2021.

¹⁵ Federal Emergency Management Agency, *Flood Risk Increases After Fires Are Out – Buy Flood Insurance Now*,
<https://www.fema.gov/fact-sheet/4562/flood-risk-increases-after-fires-are-out-buy-flood-insurance-now>, February 15, 2021.

Location/Extent

Orange County's terrain is naturally susceptible to flooding. Many rivers, creeks, and streams flow through natural floodplains within the IRWD service area on their way to the ocean. IRWD jurisdiction is primarily located within the Santa Ana River Watershed, Newport Bay Watershed, and Newport Coastal Watershed, and to a lesser extent the Aliso Watershed and San Juan Creek Watershed.¹⁶ Storm drain collection facilities within the IRWD service area are the responsibility of the local cities and county. The Orange County Flood Control District (OCFCD) is the agency responsible for regional flood control. The major drainage feature within the IRWD service area is the San Diego Creek, that drains to the Newport Bay before reaching the Pacific Ocean. Other drainages include Silverado Creek and the Williams Creek, along with minor drainages distributed throughout the IRWD service areas.

Food zones in IRWD's jurisdiction are determined by Flood Insurance Rate Maps (FIRMS), produced by FEMA in partnership with various communities. A FIRM is the official flood map that shows hazard areas. These may include high-hazard (Special Flood Hazard Areas [SFHA]), moderate- to low-hazard areas, and undetermined areas. A SFHA map shows the 100-year floodplain, divided into Zone A and AE. A FIRM also includes 500-year flood plains and higher, classified as moderate and minimal risk areas. A 100- and 500-year flood is an event that has a 1 in 100 (1 percent) and 1 in 500 (0.2 percent) chance, respectively of occurring in any given year. This data is incorporated into FIRMs to support the National Flood Insurance Program (NFIP) and provide the basis for community floodplain management regulations and flood insurance requirements.

Exhibit 4-3, Flood Hazard Zone – Critical Facilities, Exhibit 4-4, Flood Hazard Zone – Distribution System, and Exhibit 4-5, Flood Hazard Zone – Sewer Collection System, show the locations of flood zones in the IRWD service area. Significant 100-year flood zones are located within the City of Irvine primarily associated with San Diego Creek and ultimately draining into the upper Newport Back Bay.

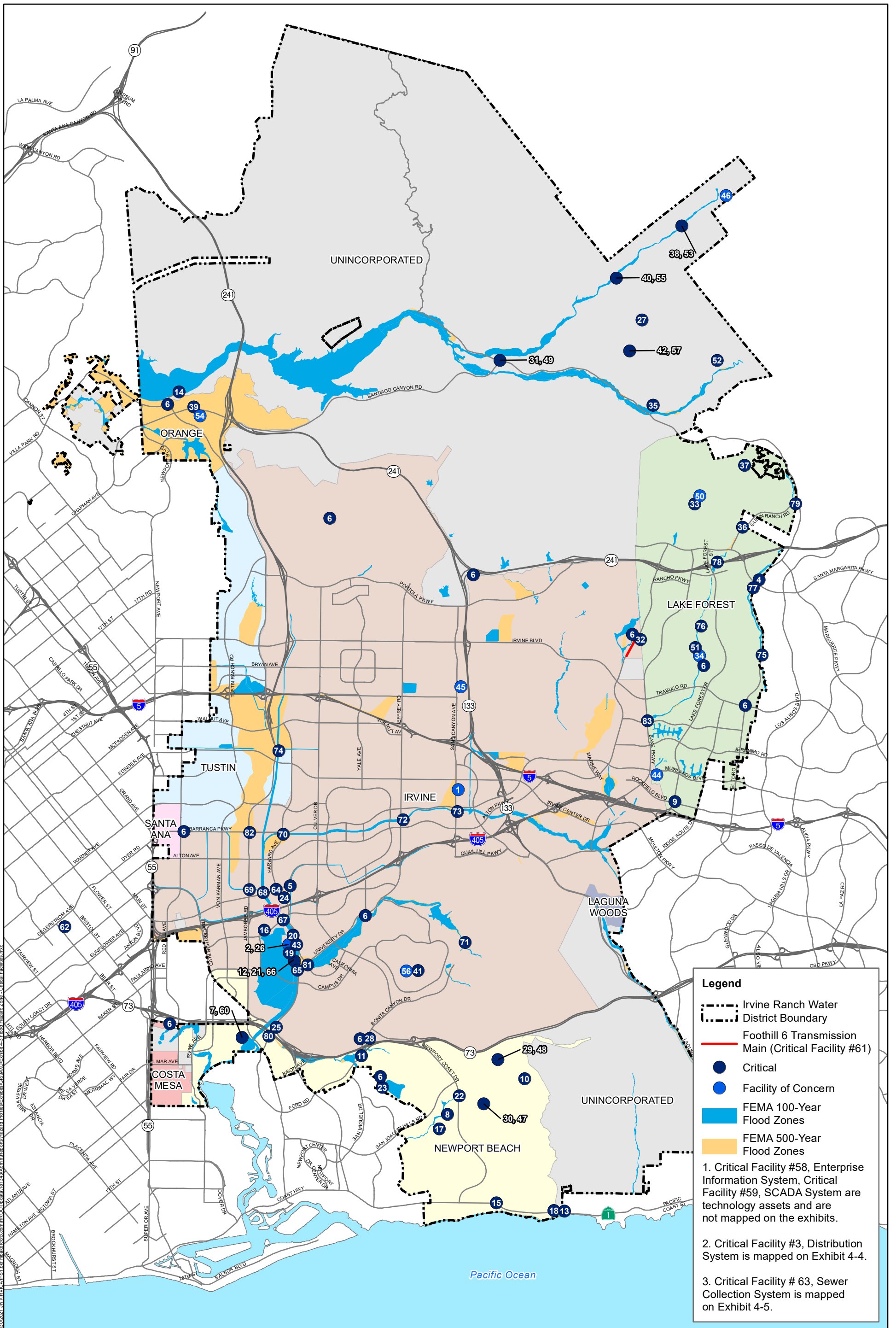
In 2014, IRWD prepared a Letter of Map Revision (LOMR) with FEMA to update the Flood Insurance Rate Map (FIRM) 0287J, as new flood control improvements were constructed to protect the Michelson Water Reclamation Plant. The LOMR reflects the Michelson Water Reclamation Plant as located outside of the 100-year flood zone. Other significant 100-year flood zones are located along Silverado Creek and Irvine Lake in unincorporated Orange County. While less extensive, 500-year flood zones are located within the City of Orange and Tustin. Isolated 100-year and 500-year flood zones can be found distributed throughout the IRWD service area. Refer to Table 4-10, Acreage by Flood Zones, for the amount of IRWD's service area located within 100-year or 500-year flood zone.

Table 4-10
Acreage by Flood Zones

Zone	Risk	Area (Acres)
100-year flood zone	1% annual flood risk	4,055.32
500-year flood zone	0.2% annual flood risk	2,197.33

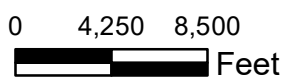
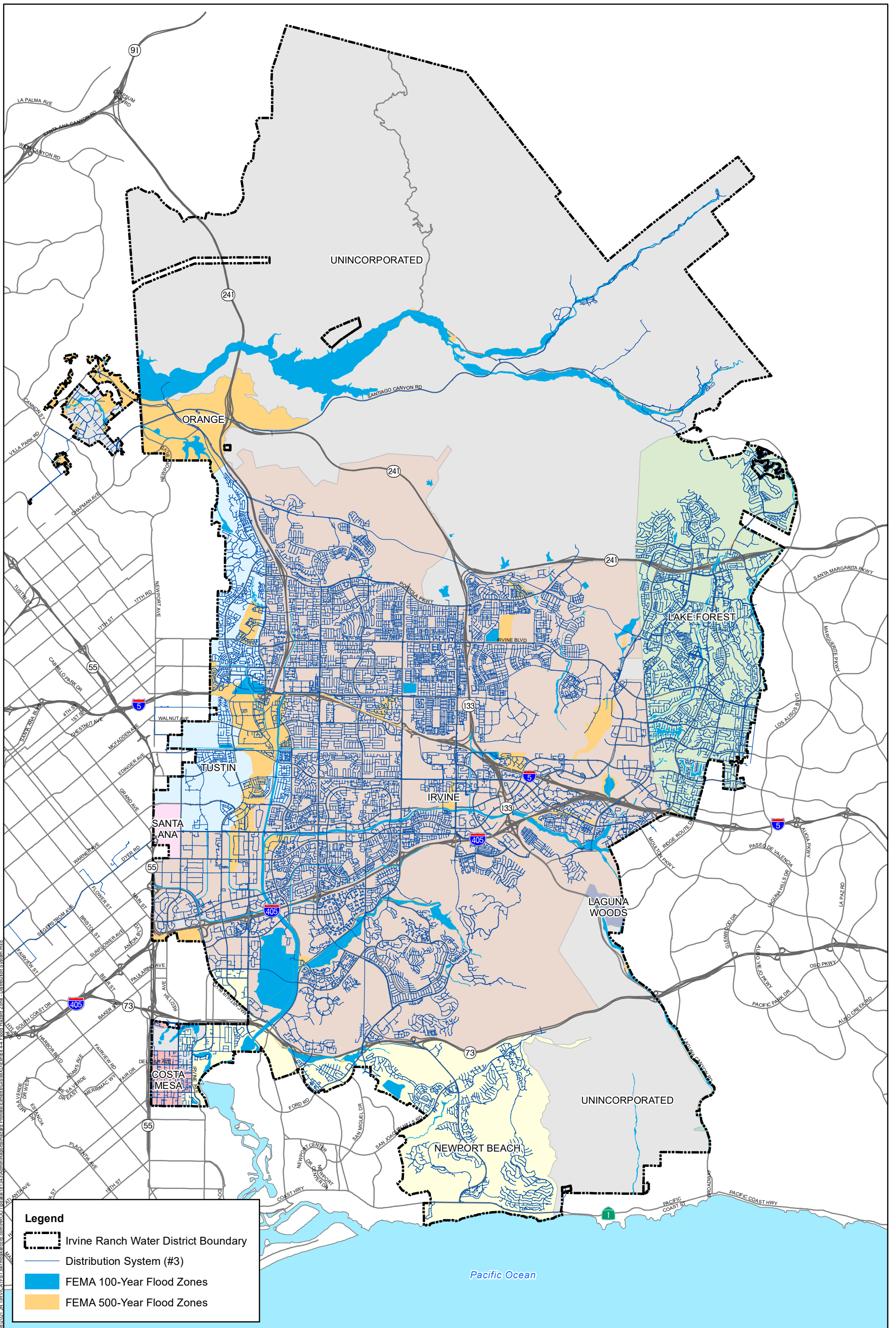
Source: Michael Baker International GIS, FEMA.

¹⁶ Orange County Open Data ARCGIS, *Orange County – Our Watersheds*, <https://data-ocpw.opendata.arcgis.com/datasets/orange-county-our-watersheds?geometry=-118.009%2C33.555%2C-117.142%2C33.755>, accessed February 15, 2021.



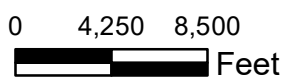
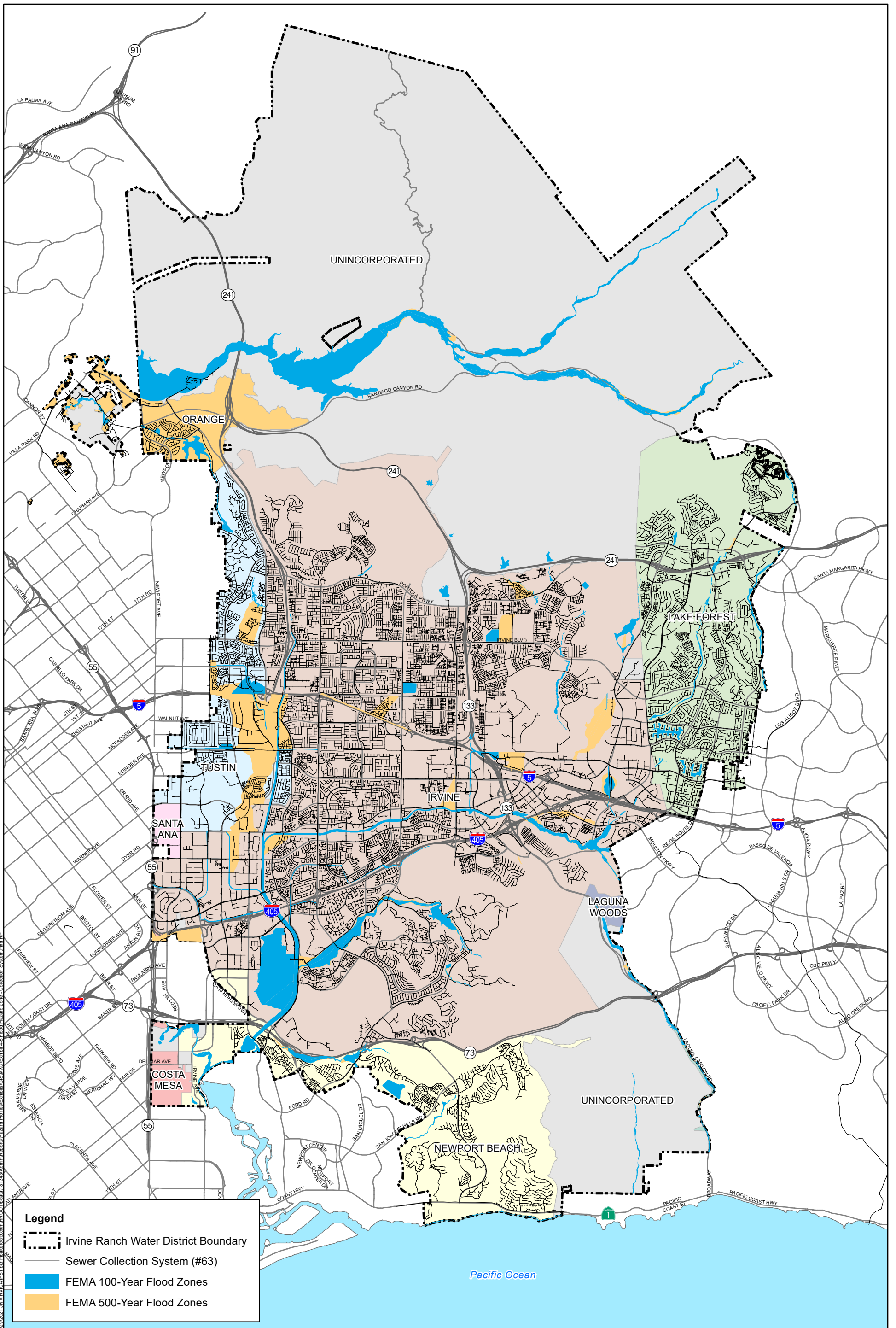
0 4,250 8,500
Feet

Irvine Ranch Water District Local Hazard Mitigation Plan Flood Hazard Zone - Critical Facilities



Irvine Ranch Water District Local Hazard Mitigation Plan

Flood Hazard Zone - Distribution System



Irvine Ranch Water District Local Hazard Mitigation Plan

Flood Hazard Zone - Sewer Collection System

Localized flooding can occur outside of mapped flood hazard zones during heavy rain events associated with extensive runoff. Localized flooding typically occurs when significant amounts of rain fall over a short time period and/or, as a result of overloaded or blocked stormwater drainage systems that cause sheet flow into streets and low-lying areas.

The extent or magnitude of flooding is measured by percentage and annual chance floods. The flooding areas are classified as 1 in 100 (one percent) or high risk, and 1 in 500 (0.2 percent) or moderate risk of flooding. Areas having a chance of less than 0.2 percent are classified as low risk areas. Floods are measured by stream gauges that are installed in bodies of water near populated areas. They are installed and operated by the United States Geological Survey (USGS) and monitor water levels constantly.

Previous Occurrences

The two most significant floods in Orange County history include the Flood of 1938 and 1969. During February and March 1938, a tropical storm centered around Los Angeles, Orange, and Riverside Counties, caused catastrophic flooding in several watersheds including the Santa Ana River and San Diego Creek (within the IRWD service area). From February 27 to March 4, 1938, an average of 22.5 inches of rainfall overtopped stream banks and caused mass flooding across the southern California region. A total of 87 people were killed during this disaster, 45 of those deaths occurred in Orange County (primarily in Atwood/Placentia). At this time, IRWD was not yet founded and the majority of the service area was unincorporated Orange County and sparsely populated.¹⁷

In January and February 1969, two major storms caused mass flooding across Orange County. On February 5, 1969, Orange County was declared a national disaster area. Santiago Dam and Villa Park Dam both reached capacity, with maximum peak outflows. Although the safety of the dams was never threatened, maximum peak outflows caused serious downstream erosion including structural damage to the Santiago Dam spillway. Approximately 2,000 Orange and Santa Ana residents were evacuated from homes bordering Santiago Creek. Specific areas of the IRWD service area were more affected than others. The flood triggered a mudslide in Silverado Canyon, killing five and injuring seventeen.¹⁸

Additionally, NOAA's Storm Event Database summarizes flood events of regional significance, specifically affecting the IRWD service area. While these incidents are not as significant as the floods in 1938 and 1969, they are included for informational purposes below: These incidents include:¹⁹

- In February 1998, a deep low pressure trough moved through southern California with moderate to heavy rain flooding. The most serious flooding occurred in the cities of Irvine and Newport Beach, and a local State of Emergency was declared in Irvine. Numerous swift-water and standing-water rescues were made as flooding surrounded residential areas and cars. A large sink hole formed and forced the closure of Santiago Canyon Road for several days.

¹⁷ US Geological Survey, *Floods of March 1938 in Southern California*, <https://pubs.usgs.gov/wsp/0844/report.pdf>, accessed February 15, 2021.

¹⁸ City of Irvine, Local Hazard Mitigation Plan Public Review Draft, prepared June 2020.

¹⁹ National Oceanic and Atmospheric Administration, *Storm Events Database – Event Types Flood, Orange County, California*, https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=%28Z%29+Flood&beginDate_mm=10&beginDate_dd=01&beginDate_yyyy=1950&endDate_mm=10&endDate_dd=31&endDate_yyyy=2020&county=ORANGE%3A59&hailfilter=0.00&tornfilter=0&windfilter=000&sort=DT&submitButton=Search&statefips=6%2CCALIFORNIA, accessed February 15, 2021.

- In September 2015, a broad upper level Pacific trough moved through the west coast, resulting in locally heavy rainfall. A debris flow occurred within the Silverado Canyon area.

In addition, localized flooding occurs in repeating locations within the IRWD jurisdiction, primarily within the coastal and canyon areas. In 2011, the Silverado and Williams Canyon area within the IRWD jurisdiction experienced localized flooding and minimal mudflow. A pipeline adjacent to Williams Canyon Creek surfaced during this incident. IRWD is currently working to permit repairs to protect the pipeline from further damage.

Probability of Future Occurrences

Based on the frequency of severe weather events and the capacity of existing facilities, there is a medium probability of a flood occurring within the IRWD service area. For areas located within the 100-year flood zone, this medium probability results in a one percent chance in a given year that this area will be inundated by flood waters. For moderate flood hazard areas located within the 500-year flood zone, the probability decreases to 0.2 percent chance in a given year that the area will be inundated by flood water. Minimal flood hazard areas are located outside the 0.2 percent annual chance for a flood zone. Exhibits 4-3 through 4-5 denote the 100- and 500-year flood zones within the IRWD service area. Flooding is most likely to occur within these delineated areas. As previously discussed, historical flooding in the canyons and coastal areas of the IRWD service area indicate the likelihood of future occurrences.

Climate Change

Climate change is likely to have a direct effect on flooding within IRWD's jurisdiction. According to research conducted by University of California, Los Angeles, California will experience extremely wet and extremely dry seasons by the end of the century. It is predicted that "over the next 40 years, the State will be 300 to 400 percent more likely to have a prolonged storm sequence as severe as the one that caused the legendary California flood more than 150 years ago."²⁰ Since this flooding incident, significant flood control measures have been implemented and Orange County has grown from an agrarian community to a major urban metropolitan area. While there has been regional flood control infrastructure implemented since the 1930s, such a flood could still have significant impacts. While the annual rainfall averages remain constant, the wet season may be narrower, leading to downpours in short periods of time that overwhelm infrastructure and lead to increased floods.

4.2.4 GEOLOGIC HAZARDS

Description

Expansive Soils

Expansive soils are those that have the ability to expand or contract, changing in volume based on their moisture content. They are typically composed of a form of expansive clay mineral that readily absorbs water and swells, leading to an increase in volume when wet, and shrinkage when dry.²¹ Expansive soils pose a particular risk within the southwestern United States, where large clay deposits are subject to alternating periods of rainfall and drought. As expansive soils expand and contract with changes in moisture, the shrink-swell process can cause fatigue and cracking

²⁰ UCLA Newsroom, *Study forecasts a severe climate future for California*, <https://newsroom.ucla.edu/releases/california-extreme-climate-future-ucla-study>, accessed February 15, 2021.

²¹ Jones, Lee. Encyclopedia of Engineering Geology, *Expansive Soils*, https://doi.org/10.1007/978-3-319-12127-7_118-1, accessed May 11, 2021.

for infrastructure or foundations placed directly on or within expansive soils. Expansive soils can cause stress on water/wastewater facilities, particularly infrastructure located underground.

Expansive soils underlying compact topsoil can lead to unstable slope conditions, eventually resulting in landslides. As expansive soil expands and contracts, compact topsoil creeps downhill. Facilities built on slopes with underlying expansive soils are vulnerable to movement or damage from topsoil creep or landslides. Refer to Section 4.2.6, *Landslide and Mudflow*, for further details about landslide hazards.

Land Subsidence

The USGS defines land subsidence as a gradual settling or sudden sinking of the Earth's surface due to removal or displacement of earth materials.²² The primary causes include aquifer-system compaction associated with groundwater withdrawals, drainage of organic soils, underground mining, and natural compaction or collapse, such as with sinkholes or thawing permafrost. More than 17,000 square miles of the U.S. have been directly affected by subsidence, with 80 percent of known land subsidence in the U.S. occurring as a consequence of groundwater use.

In southern California, the primary cause of land subsidence is groundwater extraction in areas where aquifer recharge is exceeded by the amount of water extracted, a phenomenon known as "over-drafting." Depletion of aquifers creates a lower water table, allowing for permanent land subsidence and a reduction in the total storage capacity of the aquifer system. Damage to infrastructure, reduction in water quality, and potential intrusion from seawater in coastal areas have been documented as a result of land subsidence. Conditions typical to southern California, including an arid climate, high population density, and frequent drought conditions all exacerbate over-drafting incidents.

Location/Extent

Expansive Soils

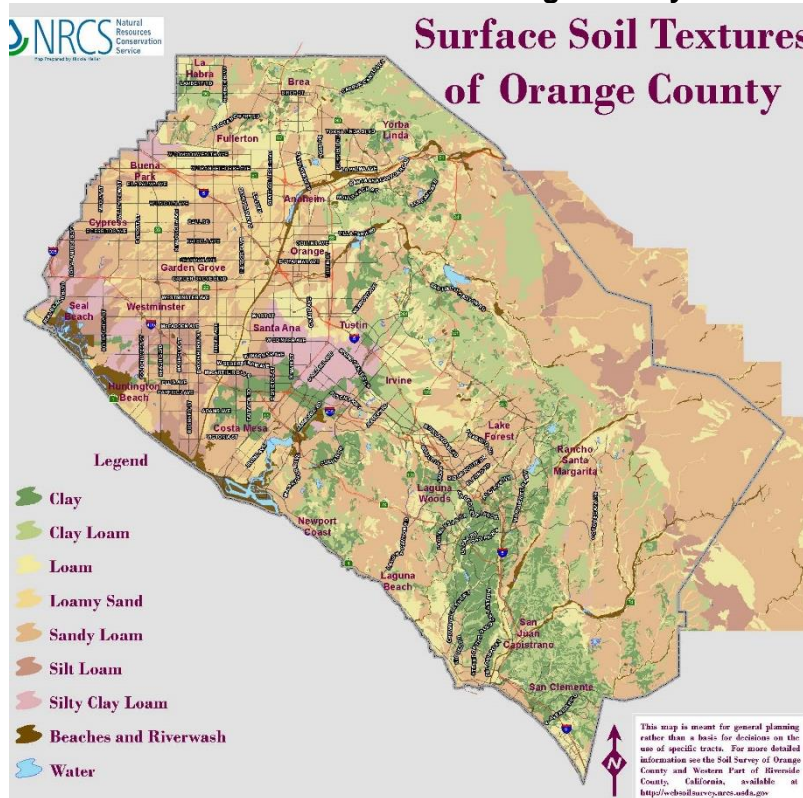
Based on Natural Resources Conservation Service (NRCS) mapping, soils that could be defined as expansive underly significant portions of Orange County, including part of the IRWD jurisdiction. Consensus among experts suggests that due to the diversity of soil conditions throughout the County, no structures are completely safe from the effects of expansive soils, including cracking, sinking, or slipping.²³

Exhibit 4-6, *Surface Soil Textures of Orange County*, depicts the NRCS mapped soil surface textures prepared for the Metropolitan Water Department of Orange County (MWD OC), showing clay, clay loam, and silty clay loam occurring through much of the IRWD service area. IRWD facilities within areas of underlying clay soils or on slopes, or within areas subject to flooding or landslides may be especially vulnerable to the effects of expansive soils, due to the increased soil movement common under these conditions. Facilities in areas of high fire risk may also be vulnerable, due to increased soil exposure following a fire.

²² U. S. Geologic Survey, *Land Subsidence*, https://www.usgs.gov/mission-areas/water-resources/science/land-subsidence?qt-science_center_objects=0#qt-science_center_objects, accessed May 11, 2021.

²³ County of Orange, *General Plan: Safety Element*, <https://www.ocgov.com/civicax/filebank/blobload.aspx?blobid=40234>, prepared 2005, accessed May 11, 2021.

Exhibit 4-6
Surface Soil Textures of Orange County



Source: Municipal Water District of Orange County, *Orange County Surface Soils Textures Map*, <https://www.mwdoc.com/save-water/resources/technical-resources/soils/>, accessed January 27, 2021.

The severity of impacts from expansive soils can vary from cosmetic to functional and structural damage. Cosmetic damage refers to damage affecting only the physical appearance, such as cracking in plaster or drywall. Functional damages refer to situations where the use of the structure was impacted or otherwise diminished. Structural damage includes situations where an entire foundation or structure requires replacement. The magnitude of an expansive soil hazard depends on the kind of IRWD infrastructure affected – impacts on a critical water or wastewater facility could have significant ramifications in water delivery or the timely treatment of wastewater. Functional or structural dam or reservoir damage because of expansive soils could also occur; refer to Section 4.2.1, *Dam/Reservoir Failure* for further details.

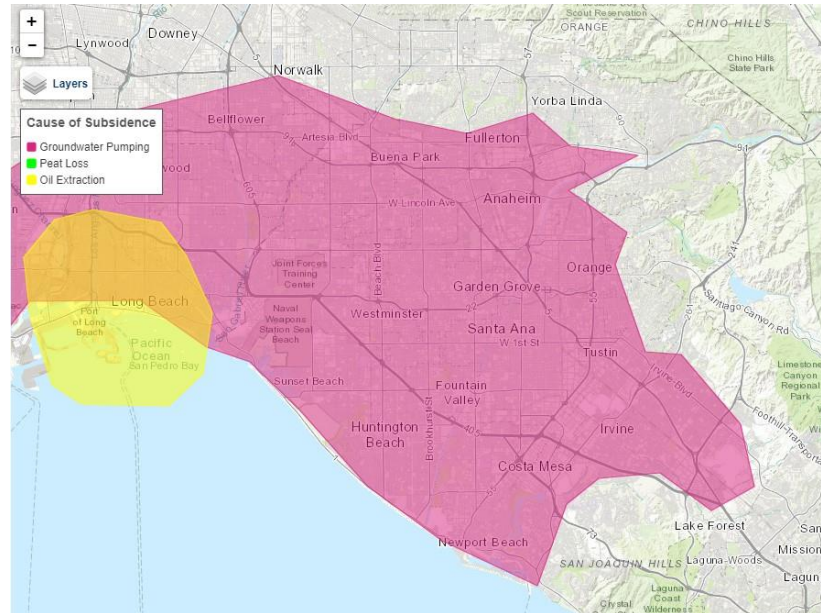
Land Subsidence

Land subsidence affects much of the west coast, including areas of Orange County. The major area in Orange County affected by land subsidence extends between Newport Beach and Huntington Beach on the coast and approximately five miles inland. Referred to as the Talbert Gap, this area formed millennia ago from alluvial deposition processes of the Santa Ana River, and has been subject to saltwater intrusion as a consequence.²⁴ According to the USGS online map viewer, the area of land subsidence in Orange County resulted from groundwater pumping. USGS mapping, depicted in Exhibit 4-7, *USGS Areas of Land Subsidence in California*, shows

²⁴ Liles, Thomas & Sovich, *Saltwater Intrusion in Orange County, California: Planning for the Future*, <https://olemiss.edu/sciencenet/saltnet/swica1/liles-thomas-sovich-exabs.pdf>, accessed February 9, 2021.

an area of subsidence extending southeast from the general vicinity of Orange, Tustin, and Irvine to Lake forest, overlapping with portions of the IRWD service area.

Exhibit 4-7
USGS Areas of Land Subsidence in California



Source: U. S. Geologic Survey, *Areas of Land Subsidence in California*, https://ca.water.usgs.gov/land_subsidence/california-subsidence-areas.html accessed February 9, 2021

Because land subsidence is a slow-moving and on-going hazard, it is difficult to estimate the severity of long-term impacts.

Previous Occurrences

Expansive Soils

Although expansive soils are known to exist within Orange County, there are no reported occurrences of expansive soils causing substantial damage within the IRWD service area. Expansive soils would likely be identified at a local level on a site-by-site basis. There are no known occurrences of IRWD infrastructure being impacted by expansive soils.

Land Subsidence

Land subsidence has been documented historically in Orange County in the IRWD service area and is attributed to groundwater pumping and overdraft conditions beginning in the early 20th century. By the 1950s, continued development in Orange County strained local groundwater resources. The local water table dipped below sea level, resulting in subsidence and seawater intrusion, primarily between the cities of Newport Beach and Huntington Beach.²⁵ The Orange County Water District (OCWD) was established to manage regional groundwater aquifers within the County and identified major subsidence and saltwater intrusion at the Talbert Gap. Part of the affected area lies within the IRWD service area. While land subsidence is a recognized phenomenon to occur within Orange County and the IRWD service area, there are no known occurrences of IRWD infrastructure being impacted by land subsidence. Recognizing the impacts

²⁵ Ibid.

of groundwater basin over-drafting, IRWD works closely with OCWD to strategically manage groundwater resources as part of a complete water portfolio.

Probability of Future Occurrences

Expansive Soils

Based upon NRCS soil mapping, expansive soils will continue to occur within the IRWD service area. The climatic processes that exacerbate expansive soils, including alternating periods of rainfall and drought, will also continue.²⁶ Potential impacts associated with expansive soils are typically addressed during site design and development review when constructing new infrastructure.

Land Subsidence

As drought and population pressures continue to burden regional aquifers, the possibility for overdraft exists in the future. To mitigate these issues, OCWD updated the County-wide Groundwater Management Plan in 2015 to set forth basin management goals and objectives, and outline management practices. This plan meets the Sustainable Groundwater Management Act requirement and will be updated every five years per State requirements. IRWD coordinates with OCWD regarding groundwater resources and follows the regional regulations and guidelines regarding extractions. While areas in Orange County have previously experienced overdraft, the regional management and leadership from OCWD on groundwater resources will ensure the likelihood of overdraft in the future is low. As overdraft conditions are mitigated, land subsidence associated with these activities will remain unlikely.

Climate Change

Expansive Soils

According to the 2018 State Hazard Mitigation Plan, climate scientists studying California find that drought conditions are likely to become more frequent and persistent over the twenty-first century due to changing weather patterns such as more frequent and extended periods of high temperature conditions.²⁷ With high temperatures likely to produce extended drought conditions, periods of intense rain are also likely to occur. According to research conducted by the University of California, Los Angeles, California will experience extremely wet and extremely dry seasons by the end of the century.²⁸ As alternating patterns of wet and dry become more pronounced, the shrink-swell process behind the destructive force of expansive soils will likely intensify, leading to a greater potential for structural damage.²⁹ Drought and increasingly powerful storm events driven by climate change are also likely to increase the rates of fires and floods, leading to exposed soils and greater potential for landslides triggered by expansive soils processes.

Land Subsidence

While drought driven by climate change is likely to continue and place an increased burden on local aquifers, regional leadership and groundwater sustainability plans reduce the likelihood of future overdraft conditions. Reductions in overdraft conditions reduce the likelihood of land

²⁶ National Weather Service - Climate Prediction Center, *U.S. Seasonal Drought Outlook*, https://www.cpc.ncep.noaa.gov/products/expert_assessment/sdo_summary.php, accessed February 8, 2021.

²⁷ California Governor's Office of Emergency Services, *2018 California State Hazard Mitigation Plan*, https://www.caloes.ca.gov/HazardMitigationSite/Documents/003-2018%20SHMP_FINAL_ACK-TOC.pdf, published September 2018, accessed February 8, 2021.

²⁸ University of California Los Angeles Newsroom, *Study forecasts a severe climate future for California*, <https://newsroom.ucla.edu/releases/california-extreme-climate-future-ucla-study>, accessed May 11, 2021.

²⁹ Mitchell, PW., *Climate Change Effects on Expansive Soil Movements*, <https://www.cfms-sols.org/sites/default/files/Actes/1159-1162.pdf>, accessed February 9, 2021.

subsidence occurrences. Additionally, IRWD has taken critical steps to diversify the water portfolio and reduce dependence on groundwater resources. Neighboring jurisdictions reliant on Orange County aquifers have done the same. Thus, while drought is expected to continually occur in the southern California region, land subsidence is not likely to occur in the IRWD service area.

4.2.5 HUMAN CAUSED HAZARDS

Description

Hazardous Materials

A hazardous material means that, because of its quantity, concentration, or physical or chemical composition, poses a significant present or potential hazard to human health and safety or to the environment if released. The term “release” means spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment, unless permitted or authorized by a regulatory agency.³⁰ Hazardous materials can be in the form of explosives, flammable and combustible substances, poisons, and radioactive materials. Hazardous materials accidents can occur during production, storage, transportation, use, or disposal.³¹

The impacts of a hazardous materials release can vary, depending on the type and amount of material released. Hazardous materials exposure can include the following effects: skin/eye irritation; difficulty breathing; headaches; nausea; behavior abnormalities; cancer; genetic mutations; physiological malfunctions (i.e., reproductive impairment, kidney failure); physical deformations; or birth defects.³²

Terrorism/Sabotage

Domestic terrorism is defined by the Federal Bureau of Investigation (FBI) as perpetrated by individuals and/or groups inspired by or associated with a primarily U.S. based movement that espouses extremist ideologies of a political, religious, social, racial, or environmental nature. International terrorism is perpetrated by individuals and/or groups inspired by or associated with designated foreign terrorist organizations or nations (i.e., State sponsored).³³ The U.S. Federal Code states that terrorism must be intended to 1) intimidate or coerce a civilian population; 2) influence the policy of a government by intimidation or coercion; or, 3) affect the conduct of a government by mass destruction, assassination, or kidnapping.³⁴ Following serious international and domestic terrorism incidents since the early 2000s, this type of hazard has become a growing concern.

Terrorism can be utilized by a variety of agents and delivery systems. IRWD water supplies and infrastructure are considered potential terrorist targets, particularly dams and reservoirs. For example, a terrorist attack that utilizes explosives could damage a dam and trigger significant inundation with little warning. Other types of weapons that could be utilized are chemical or biological weapons to contaminate drinking water supply.

³⁰ Health and Safety Code Division 20, Chapter 6.95, *Hazardous Materials Release Response Plans and Inventory*, Article 1.

³¹ Department of Homeland Security, *Hazardous Materials Incidents*, <https://www.ready.gov/hazardous-materials-incident>, accessed February 16, 2021.

³² U.S. Environmental Protection Agency, *Health and Ecological Hazards Caused by Hazardous Substances*, <https://www.epa.gov/emergency-response/health-and-ecological-hazards-caused-hazardous-substances>, February 16, 2021.

³³ Federal Bureau of Investigation, *Terrorism*, <https://www.fbi.gov/investigate/terrorism>, accessed February 16, 2021.

³⁴ U.S. Federal Code Title 18, Chapter 113B, Section 2331.

Other types of terrorism could include cyberterrorism. All of Orange County's water utilities utilize Supervisory Control and Data Acquisition system (SCADA), which operate over telecommunication lines and/or radio systems. This leaves IRWD and other water agencies potentially vulnerable to hacking or other malicious attacks.

Location/Extent

Hazardous Materials

Hazardous materials are generated, transported, used, and stored by facilities owned and operated by IRWD for the purposes of potable water and wastewater treatment activities. Localized hazardous materials spills pose low magnitude risks to IRWD water supplies and systems, as minor spills would likely be quickly identified and addressed. However, there is the potential for a major hazardous materials spill to severely impact water supplies through groundwater intrusion or direct contamination of the water source.

The magnitude and severity of the hazard would be highly dependent on the type of spill, location, and the extent to which hazardous materials enter the water system. Hazardous materials can be flammable, radioactive, infectious, corrosive, toxic/poisonous, or otherwise reactive. For example, a radioactive material spill would have a much further-reaching extent when compared to a paint spill. Climate conditions can also affect the severity of hazardous materials spills. Heavy rains or winds could spread hazardous materials over a larger geographical area and create challenging cleanup conditions.

Additionally, hazardous materials are generated, transported, used, and stored by facilities within the IRWD jurisdiction by other entities. Uses known to handle hazardous materials within the IRWD service area include gas stations, dry cleaners, medical facilities, and commercial/retail business. Most hazardous materials operations by other entities within the IRWD service area are small-scale and pose minimal risk to IRWD infrastructure.

Terrorism/Sabotage

Terrorism and sabotage are difficult to predict the specific location and severity of impacts. Both IRWD water and wastewater infrastructure are vulnerable to terrorism or sabotage attacks but would have varying magnitudes or severity of impacts. The most severe impacts would occur if a full dam or reservoir was attacked, resulting in the inundation of property and infrastructure downstream (refer to [Section 4.2.1](#) for further discussion regarding Dam/Reservoir Failure). Attacks on water or wastewater treatment facilities could threaten water distribution or timely wastewater treatment activities for an unknown period of time, potentially affecting a range of IRWD customers.

Unlike physical terrorism attacks, cyberterrorism is not location based. Hacking could occur from great distances away from the IRWD service area, but impacts could be severe and widely distributed throughout the jurisdiction.

Previous Occurrences

Hazardous Materials

Previous occurrences of hazardous materials spills in the IRWD service area included sewage, saline water/brine, petroleum, and chemicals. The majority of past incidents were minor in scope and did not impact drinking water to IRWD customers. IRWD reports hazardous materials spills immediately after detection and initiates cleanup activities with the appropriate regulatory and law

enforcement agencies. IRWD has not experienced major spills that have interrupted service to customers, by either internal accidents or accidents from external entities that affected IRWD.

Terrorism/Sabotage

IRWD has not experienced any high-profile terrorism or sabotage attacks on infrastructure or critical facilities. Generally speaking, Orange County has not experienced significant attacks or threats from domestic or international terrorist organizations. Several organizations in Orange County are dedicated to the advisory notification, investigation, and analysis of terrorist events/activities, including: Orange County Joint Terrorism Task Force, Orange County Private Sector Terrorism Response Group, and Orange County Intelligence Assessment Center (OCIAC).³⁵ IRWD is also a member of the Water Emergency Response Organization of Orange County (WEROC), which provides direct and consistent access to emergency training and advisement by the OCIAC.

Probability of Future Occurrences

Hazardous Materials

As the IRWD service area continues to become more urbanized, hazardous materials use and transport will likely continue into the future. IRWD implements applicable policies and regulations regarding the use and storage of hazardous materials; additionally, partner cities within the jurisdiction also implement hazardous materials regulations from the County, State and federal government. IRWD regularly reviews hazardous chemical technology improvement and assesses the potential for adopting less-hazardous chemicals as they become available. Both the federal government and the State require hazardous materials handling to be reported with the local Certified Unified Program Agency (CUPA). Because of the preventative action taken by IRWD and customer cities, the probability and likelihood for future contamination is considered medium.

Terrorism/Sabotage

Because of the dynamic nature of a terrorist threat and the open nature of California society and public spaces, all jurisdictions are vulnerable to a terrorist attack. The probability of a physical terrorist attack on IRWD infrastructure is low; however, a small probability does exist for future occurrence. The prevalent use of technology and the Internet increases the likelihood for cyberterrorism incidents against IRWD, however, IRWD has taken and continues to take steps to lessen this risk.

Climate Change

Hazardous Materials

Accidental hazardous materials releases are caused by human error, unrelated with climate change. However, hazardous materials releases can result from infrastructure failure during a natural hazard event, such as a wildfire or severe winter storm. Climate change could cause an increase in these types of natural hazards in the IRWD service area. Hazardous materials releases during wildfire or severe weather events could spread contamination to large geographic areas and amplify long-term impacts to human and ecological health.

Terrorism/Sabotage

As terrorism and sabotage events are human caused, these types of hazards are not directly tied to climate change impacts. However, the interaction of natural hazards and global climate change

³⁵ Municipal Water District of Orange County, *Orange County Regional Water and Wastewater Hazard Mitigation Plan*, adopted August 2019.

could increase the frequency and severity of events. Significant and prolonged climate change impacts can cause conflicts regarding natural resources and livelihood insecurity, as well as food insecurity or water scarcity. Terrorist organizations could operate more easily in fragile and conflict-affected environments.³⁶

4.2.6 LANDSLIDE AND MUDFLOW

Description

Landslide

Landslide is a generalized term for a falling mass of soil or rocks. When a hillside or other slope becomes unstable, downslope movement of rock and soil occurs under the direct influence of gravity. Landslides can include events such as rock falls, topples, slides, spreads and flows. Landslides are often sudden, although some occur very slowly over a long period of time. Loose and fractured materials are more likely to slide than compact materials or solid rock, and steep slopes are at greater risk than gentle rises. Areas that have been recently burned by wildfires are more susceptible to sliding because the fire destroys the plant cover that helps stabilize slopes.

Landslides are usually induced by either earthquakes or moisture. The shaking of an earthquake can decrease slope stability, or in a more severe instance, can fracture the earth material enough that it slides. Moisture-induced landslides can occur when the ground soaks up enough water that it becomes loose and unstable. This is often the result of intense or long-lasting rainfall but can also result from a pipeline burst or overwatering landscapes. In some cases, hillside erosion from rainfall can cause instability and result in landslides. If the slide is wet enough to become mud, the event is known as a mudslide or a mudflow (refer to the mudflow discussion below).

Regardless of the cause or specific form, a landslide can damage or destroy structures built on the sliding material or in its path. Underground infrastructure, such as pipelines or telecommunication lines, may be severed during a landslide. This could lead to infrastructure-induced flooding if water pipes or sewage lines are broken. In addition to property damage, landslides can crush or bury people, creating a risk of serious injury or death.

Natural processes can cause landslides or re-activate historical landslide sites. The removal or undercutting of shoreline-supporting material along bodies of water by currents and waves produces countless small slides each year. Seismic tremors can trigger landslides on slopes historically known to have landslide movement. Earthquakes can also cause additional failure (lateral spreading) that can occur on gentle slopes above steep streams and riverbanks.

Mudflow

A mudflow is a river of rock, earth and other debris, including vegetation that is saturated with water. While landslides can occur without the presence of soil (such as a rock landslide), mudflows consist of material that contains at least 50 percent sand, silt and clay-sized particles. The high percentage of water gives the mudflow a rapid rate of movement down a slope, posing extremely dangerous conditions to people and property. Mudflows normally occur when a landslide moves down slope as a semi-fluid mass scouring or partially scouring soils from the slope along the path. Flows often triggered by earthquakes or heavy rainfall, can occur on gentle slopes, and can move rapidly for large distances.

³⁶ Climate Diplomacy Organization, *Insurgency, Terrorism and Organized Crime in a Warming Climate*, <https://www.climate-diplomacy.org/publications/insurgency-terrorism-and-organised-crime-warming-climate>, accessed February 16, 2021.

Wildland fires on hills covered with chaparral are often a precursor to mudflows or debris flows in burned out canyons. The extreme heat of a wildfire can create impervious soil conditions by creating a waxy-like layer just below the ground surface. Because the water cannot be absorbed into the soil, it rapidly accumulates on slopes, often gathering loose particles of soil into a sheet of mud and debris. Debris flows can often originate miles away from unsuspecting persons, and approach them at a high rate of speed with little warning.

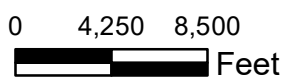
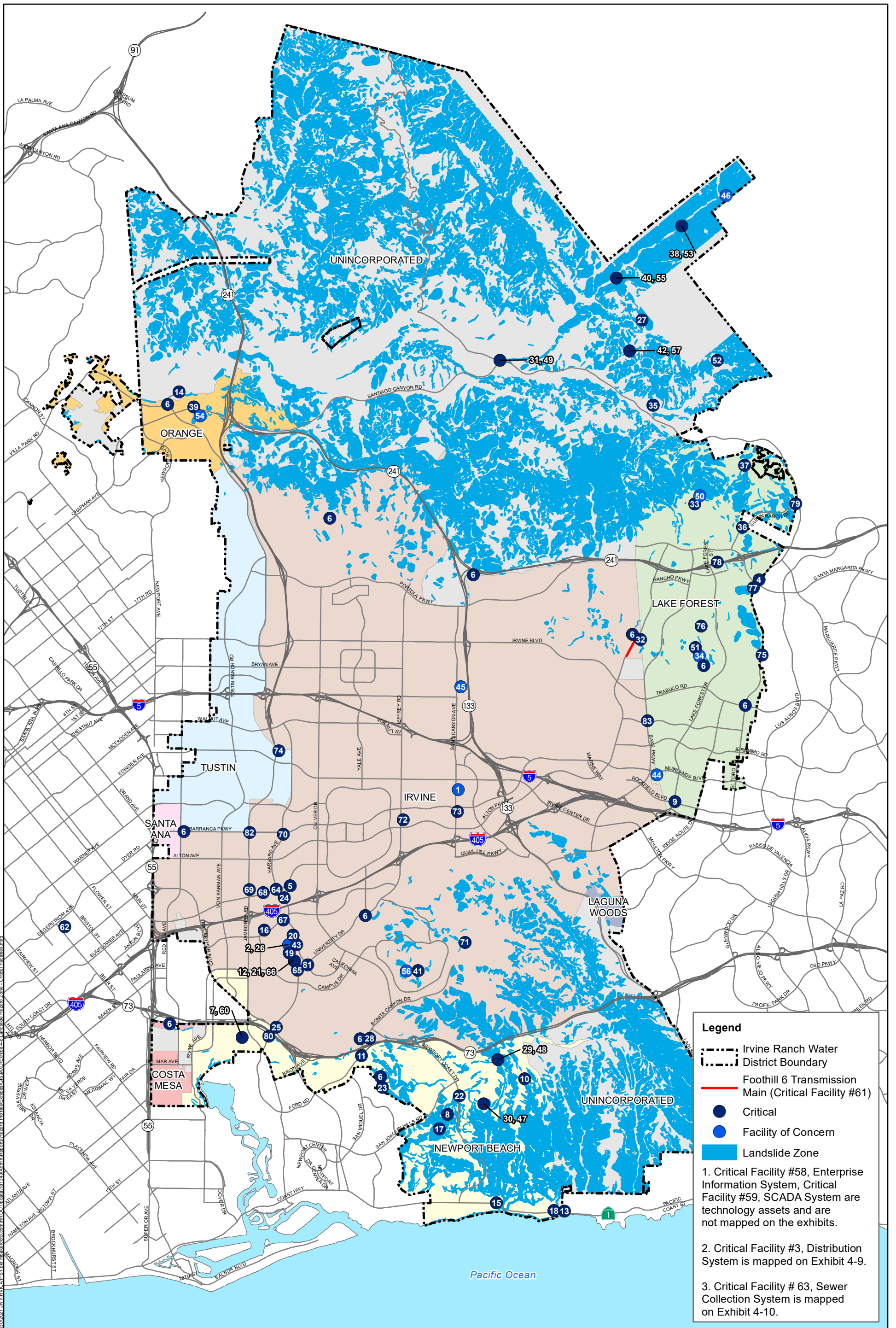
Location/Extent

Exhibit 4-8, *Landslide Hazard Zone – Critical Facilities*, Exhibit 4-9, *Landslide Hazard Zone – Distribution System*, and Exhibit 4-10, *Landslide Hazard Zone – Sewer Collection System*, identifies landslide hazard areas within the IRWD service area based on the terrain, geologic, geotechnical, and seismological data. These areas are susceptible to earthquake-induced hazards and do not depict areas that could be at risk for moisture-induced landslides. According to the County of Orange and Orange County Fire Authority Hazard Mitigation Plan, locations at risk from landslides or debris flows (mudflows) include areas with the following conditions: ³⁷

- On or close to steep hills;
- Steep road-cuts or excavations;
- Existing landslides or places of known historic landslides (such sites often have tilted powerlines, trees tilted in various directions, cracks in the ground, and irregular-surfaced ground);
- Steep areas where surface runoff is channeled, such as below culverts, V-shaped valley, canyon bottoms, and steep stream channels;
- Fan-shaped areas of sediment and boulder accumulation at the outlets of canyons; and/or
- Canyon areas below hillside mountains that have recently (within one to six years) been subjected to wildfire.

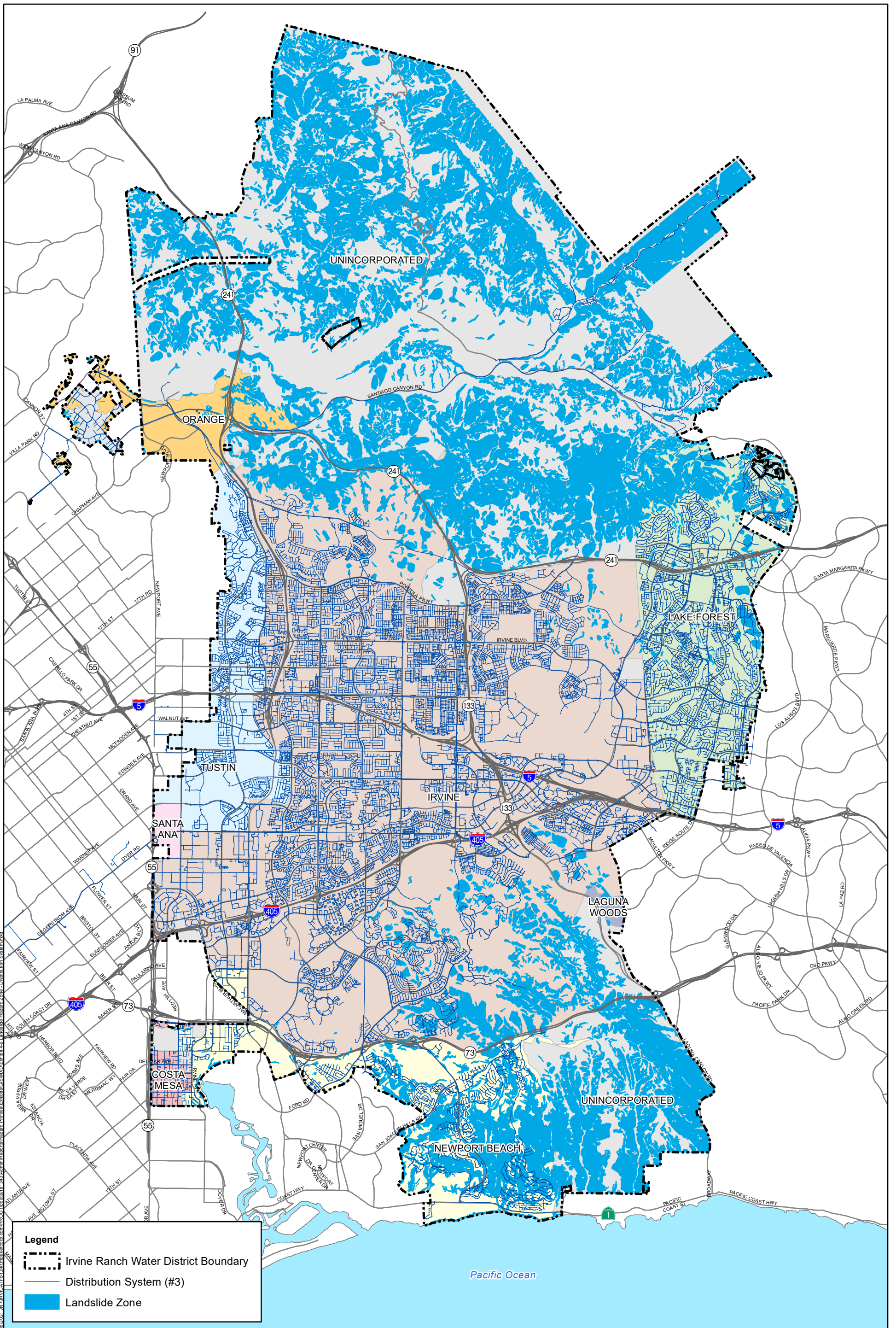
Landslide hazard zones are distributed throughout the IRWD service area, particularly in the steep and hilly unincorporated Orange County areas in the northern and southern portion of the service area. Landslides are less likely to occur within the topographically flat areas in central Irvine, Tustin, and Lake Forest, correlating with the most urbanized portions of the service area. Areas of steep slopes and the creeks that convey surface runoff from the community serve as locations at risk for landslides and mudflows within IRWD's service areas. The location of IRWD's infrastructure within and adjacent to high wildfire hazard areas also makes it more susceptible to experiencing impacts from landslides and mudflows associated with heavy rain events following a wildfire event. Specifically, infrastructure located in the City of Newport Beach, City of Lake Forest, and unincorporated communities would be highly susceptible to potential wildfires; refer to Section 4.2.9 regarding wildfire hazard zones.

³⁷ County of Orange and Orange County Fire Authority, *Local Hazard Mitigation Plan*, adopted November 2015.



Irvine Ranch Water District Local Hazard Mitigation Plan

Landslide Hazard Zone - Critical Facilities

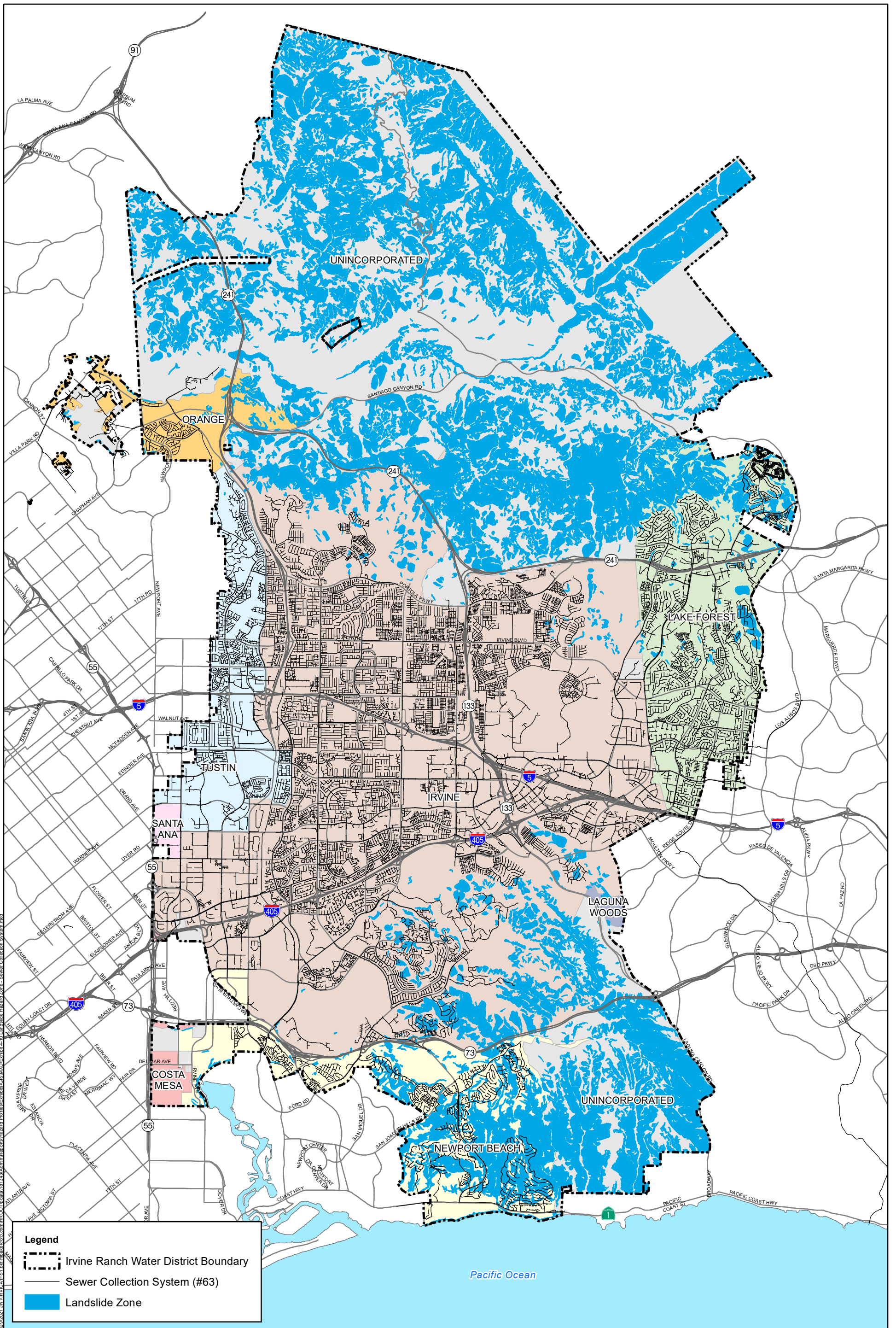


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Irvine Ranch Water District Local Hazard Mitigation Plan Landslide Hazard Zone - Distribution System



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Irvine Ranch Water District Local Hazard Mitigation Plan

Landslide Hazard Zone - Sewer Collection System

Landslides and mudflows have different predictability and velocity levels depending upon the nature and location of the event. Slow landslides may damage structures and infrastructure and are difficult to stabilize due to their large size. However, slow landslides allow people to evacuate before there is the danger of loss of life. Landslides and mudflows with high velocity can destroy structures or other lifeline utilities and can cause significant loss of life or injury. The severity of a landslide is often measured by the amount of material that slides (e.g., in cubic feet). Mudflows tend to be more fluid and because they flow down a stream or creek, they can extend beyond the community in which they originated. Mudflows can occur suddenly without time for adequate warning and reach 100 miles per hour. Monitoring of weather conditions and understanding historic fire conditions within the area can help to identify conditions in which mudflows are likely.

Previous Occurrences

The IRWD service area has not experienced a major landslide. In 2011, the Silverado and Williams Canyon area within the IRWD jurisdiction experienced localized flooding and minimal mudflow. A pipeline adjacent to Williams Canyon Creek surfaced during this incident. IRWD is currently working to permit repairs to protect the pipeline from further damage.

Moderate mudflows regularly occur in the canyons area of IRWD's jurisdiction, primarily during heavy rains after a significant wildfire. A more recent mud and debris flow occurred in Silverado Canyon during January and March 2021 within the IRWD service area, in locations surrounding the Bond Fire, which burned over 6,000 acres in December 2020.³⁸ IRWD infrastructure remained unharmed during these mudflows, but substantial cleanup efforts were required to remove debris and reestablish access to facilities.

Regionally, the southern California area has experienced major landslide incidents. Landslides were triggered by both the 1971 San Fernando Earthquake and the 1994 Northridge Earthquake in Los Angeles County. Historically, Orange County has experienced several moisture-induced landslides, including the 1978 and 2005 Blue Bird Canyon Landslides (Laguna Beach), 2005 Southcoast Water District (SCWD) Landslide (Laguna Niguel), and 2018 Cannon Cliff Landslide (Dana Point).³⁹

Regionally, major mudflows have been triggered by the recent increase in wildfires in southern California. Most recently in January 2018, Santa Barbara County experienced heavy rains directly onto the Thomas Fire burn area in the steep hills of the Montecito community. A major mudflow of up to 15 feet in height was triggered, destroying 100 homes, damaging over 300 homes, and killing 23 people. A natural gas pipeline burst, and a small brush fire broke out. Over 20,000 people lost power. Mud and debris flooded Highway 101 and the freeway was closed in both the north and south direction for almost two weeks.⁴⁰

Probability of Future Occurrences

Landslides and mudflows are considered to have a medium probability of occurring within IRWD's jurisdiction. There are several areas located throughout the IRWD service area that have a higher probability of landslides, particularly the hilly and less urbanized areas of unincorporated Orange County in the northern and southern portions of the service area. With the recent and reoccurring

³⁸ Los Angeles Times, *Winter Storms Trigger Mudslide in Southern California, Clogs Roadways*, <https://www.latimes.com/california/story/2021-01-29/winters-storm-triggers-mudslide-in-southern-california-clogs-roadways>, accessed February 16, 2021.

³⁹ Municipal Water District of Orange County, *Orange County Regional Water and Wastewater Hazard Mitigation Plan*, adopted August 2019.

⁴⁰ The San Luis Obispo Tribune, *A year ago, debris flows brought unfathomable destruction to Montecito*, <https://www.sanluisobispo.com/news/local/article224213780.html>, accessed February 16, 2021.

wildfires, burn areas are highly susceptible to landslides or mudflows during heavy rains. Additionally, landslides can be caused by earthquake activity, which was determined to have a high probability of occurring in the IRWD service area.

Climate Change

There is no known link between climate change and seismic activity, and therefore climate change is not expected to directly affect earthquake-induced landslides. In southern California, climate change is anticipated to create more severe drought patterns and increase the frequency of intense storms. Drought conditions cause soil to dry out over time, reducing the ability for soils to absorb precipitation when storms occur. Decreased absorption can result in increased amounts of runoff with the potential for landslide and/or mudflow conditions. More significant or frequent storm events can also result in increased precipitation to be absorbed by the soil of slopes within IRWD's jurisdiction, causing hillside destabilization and increasing the frequency of landslide events or mudflows.

Additionally, climate change is expected to increase the length and severity of the wildfire season. Orange County is increasingly susceptible to a longer wildfire season, triggered by abnormally strong Santa Ana winds, dry conditions, and extreme heat. When wildfires burn slopes, the devegetation and destabilization of soil can also result in landslides or mudflows during winter rains. As climate change extends the wildfire season, mudflows and landslides are likely to increase in frequency as well.

4.2.7 SEISMIC HAZARDS

Description

The USGS defines an earthquake as a sudden slip on a fault and the resulting ground shaking and radiated seismic energy caused by the slip (or any other sudden stress changes in the earth).⁴¹ Earthquakes occur without warning, and result in effects such as fault rupture, ground shaking, and liquefaction, described below.

Fault Rupture

Fault rupture or surface faulting is the differential movement of two sides of a fracture, where the ground breaks apart. The length, width, and displacement of the ground characterize surface faults, which occur based on the type of underlying fault. Faults occur at boundaries between large sections of the earth's surface, called tectonic plates. Most of California sits on the North American plate, but coastal areas (including IRWD's jurisdiction) are on the Pacific Plate. The San Andreas Fault is the main boundary between the North American and Pacific Plates, but other fault lines can be found up to 200 miles away. The presence of the San Andreas Fault and other regional faults is the reason for California's frequent seismic shaking and other tectonic activity.

Ground Shaking

Ground shaking or ground motion is the seismic shaking of the earth's surface during an earthquake. When a fault ruptures or slips, seismic waves radiate and cause the ground to vibrate. The severity of the vibration increases with the amount of energy released and decreases with distance from the causative fault or epicenter. Soft soils can further amplify ground motion.⁴² Seismic ground shaking can be strong enough to result in widespread devastation or be virtually

⁴¹ U.S. Geological Survey, *Earthquake Glossary – Earthquake*, <https://earthquake.usgs.gov/learn/glossary/?term=earthquake>, accessed February 15, 2021.

⁴² U.S. Geological Survey, *Earthquake Glossary – Ground Motion*, <https://earthquake.usgs.gov/learn/glossary/?term=ground%20motion>, accessed February 15, 2021.

undetectable by the average person. The intensity of seismic shaking is a result of the release by the fault rupture (how much of the accumulated stress was released), the length of the rupture (the longer the slip along the fault line, the greater the shaking), and the depth at which the rupture occurs (ruptures that occur closer to the surface often cause stronger shaking). Usually, areas closest to the rupture (epicenter) experience the greatest shaking, although differences in geology and soil can have an impact.

Seismic shaking can damage or destroy buildings and structures and may cause partial or total collapse. Ground movement can damage or destroy infrastructure beneath the ground, such as utility lines and pipes. This in turn, can cause hazardous materials releases, water main breaks, and other dangerous situations resulting from infrastructure failure. Falling debris and structures can also create a risk of personal injury or death.

Liquefaction

Liquefaction is a phenomenon that occurs when ground shaking causes saturated soils (primarily clay-free deposits such as sand or silt) to lose strength and act like a viscous fluid. Certain soils are more susceptible to liquefaction, particularly younger and looser sediment with a higher water table. According to FEMA, liquefaction causes three types of ground failure, as described below:⁴³

- Lateral spreads involve the lateral movement of large soil blocks as a result of liquefaction of an underlying layer. They generally develop on gentle slopes, most commonly between 0.3 and 3 degrees. Horizontal movements commonly are as much as 10 to 15 feet. However, where slopes are particularly favorable, and duration of ground shaking is long, lateral movement may be as much as 100 to 150 feet. Lateral spread usually breaks up internally, forming numerous fissures and scarps.
- Flow failures consist of liquefied soil or blocks of intact material riding on a layer of liquefied soil and are the most catastrophic type of ground failure caused by liquefaction. They commonly move several feet but can travel up to dozens of miles under certain conditions. Flow failures usually form in loose saturated sands or silts on slopes greater than three degrees.
- Loss of bearing strength occurs when the soil supporting buildings or other structures liquefies. When large deformations occur, structures settle and tip. The general subsurface geometry required for liquefaction-caused bearing failures is a layer of saturated, cohesionless soil that extends from near the ground surface to a depth equal to about the width of the building.

Location/Extent

Fault Rupture

The IRWD service area is located within the southern California region, known to be seismically active. Two faults have been mapped by USGS within the IRWD jurisdiction, as described below:

- San Joaquin Hills Thrust fault: This fault is a recently discovered southwest-dipping blind thrust fault originating near the southern end of the Newport-Inglewood Fault close to

⁴³ Federal Emergency Management Agency, *Multi-Hazard Identification and Risk Assessment - Subpart D: Seismic Hazards*, published January 1, 1997.

Huntington Beach, at the western margins of the San Joaquin Hills. Rupture of the entire area of this blind thrust fault could generate an earthquake as large as magnitude 7.3. In addition, a minimum average reoccurrence interval of about 1,650 and 3,100 years has been estimated for moderate-sized earthquakes on this fault.⁴⁴

- Pelican Hill fault: This fault was mapped in the San Joaquin Hills, and appears to be confined to older bedrock units, with no impact on the younger, Holocene terrace/alluvial deposits. Thus, this fault zone is not considered active. According to the City of Newport Beach Local Hazard Mitigation Plan, no further geological studies are considered warranted at this time for this particular fault.⁴⁵

In addition to the fault zones mapped above, several active faults of regional significance could pose a threat to the IRWD service area. The closest active faults of significance to the IRWD jurisdiction are discussed below:

- Elsinore Fault Zone/Whittier Fault/Chino Fault: Located in the northeast portion of Orange County, the Elsinore Fault Zone follows a general line easterly of the Santa Ana Mountains into Mexico. This is one of the largest fault zones in southern California, but in historical times one of the seismically quietest zones. The main trace of the Elsinore Fault is about 180 km, excluding the connections to Whittier, Chino and Laguna Salada faults. The last major earthquake on this fault line occurred on May 1910 (M 6.0) with no surface rupture found. The interval between major ruptures is estimated at 250 years, with probable magnitudes between 6.5 to 7.5. At the northern end of the Elsinore Fault Zone, the fault splits into two significant segments: the 25-mile-long Whittier Fault (probable magnitude between 6.0 and 7.2) and the 25-mile-long Chino Fault (probable magnitude between 6.0 and 7.0). Also included in the northern portion of the fault zone are the Glen Ivy North and Glen Ivy South faults.⁴⁶
- Newport-Inglewood-Rose Canyon Fault Zone: The Newport-Inglewood segment extends from the Santa Monica Mountains in a southeast direction to the western part of Orange County (Newport Beach/Costa Mesa), then continues approximately four miles offshore into the San Diego Bay (Rose Fault Zone). The last major earthquake on this fault line occurred on March 10, 1933 (M 6.4) with no surface rupture found. This incident resulted in 120 deaths and over \$50 million in property damage. The interval between major ruptures is unknown, with probable magnitudes between 6.0 – 7.4. The main trace of this fault zone is estimated to be 105 kilometers, but portions of the fault zone are difficult to map because the surface trace is discontinuous in the Los Angeles Basin. Due to the urbanized nature of communities along this fault line, the Newport-Inglewood-Rose Canyon Fault Zone is considered one of southern California's top seismic dangers.⁴⁷
- San Andreas Fault Zone: One of the most well-known faults in California, the San Andreas Fault is the main boundary between the Pacific and North American tectonic plates. Over

⁴⁴ Municipal Water District of Orange County, *Orange County Regional Water and Wastewater Hazard Mitigation Plan*, adopted August 2019.

⁴⁵ City of Newport Beach, *Local Hazard Mitigation Plan*, updated 2016.

⁴⁶ Southern California Earthquake Data Center, *Elsinore Fault Zone*, <https://scedc.caltech.edu/earthquake/elsinore.html>, accessed February 15, 2021.

⁴⁷ Southern California Earthquake Data Center, *Newport-Inglewood Fault Zone*, <https://scedc.caltech.edu/earthquake/newport.html>, accessed February 15, 2021.

1,200 kilometers of this fault line has been mapped from Cape Mendocino in northern California to the Salton Sea in southern California. The San Andreas Fault is located approximately 35 miles northeast of Orange County. While several major earthquakes in California history have been attributed to the San Andreas Fault (namely, the 1906 San Francisco earthquake), the southern Mojave segment is more fractured and geographically complex. The last major fault rupture in the southern portion occurred in January 1857, and the interval between major ruptures is an average of about 140 years. Probable magnitudes for earthquakes range from 6.8 to 8.0.⁴⁸

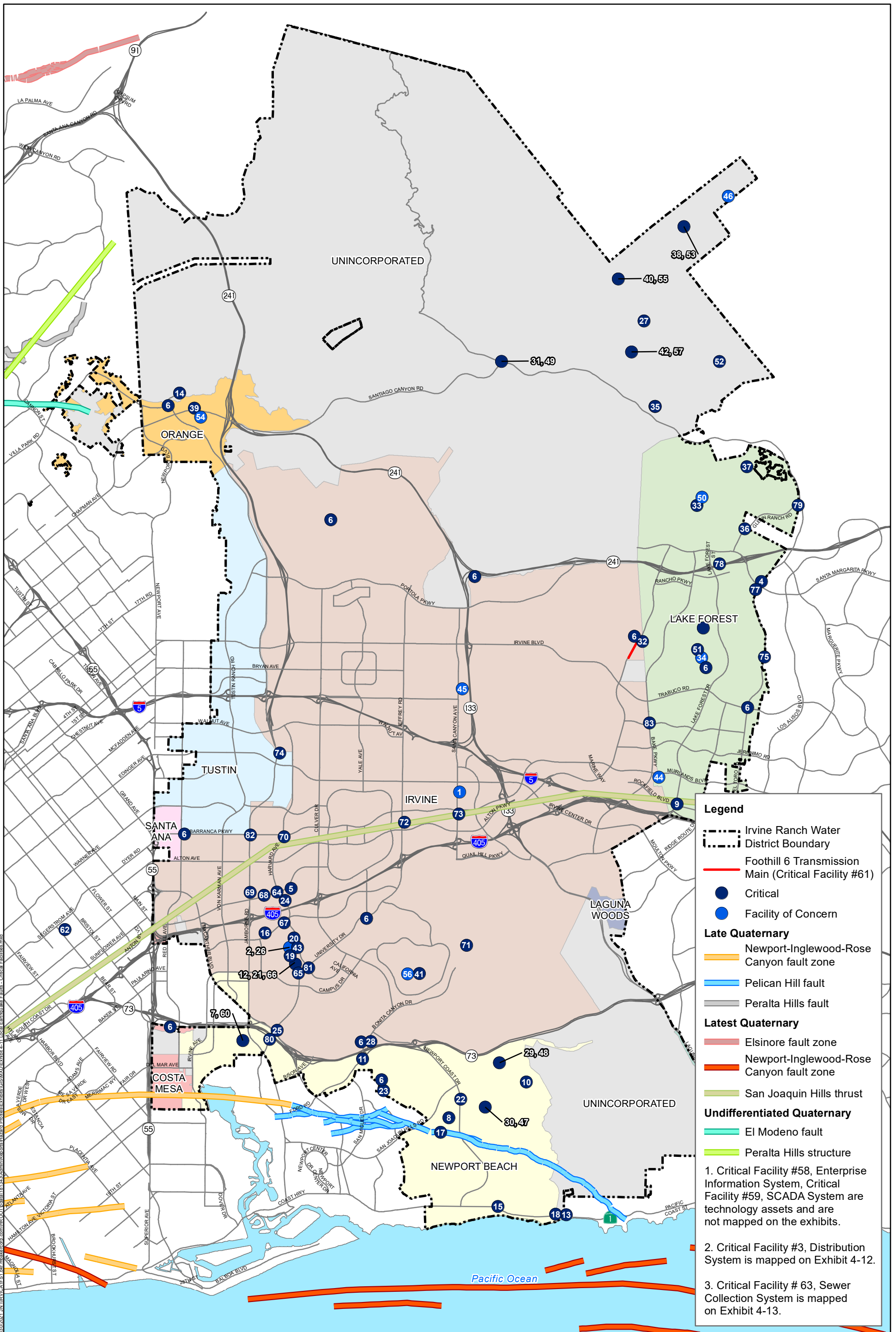
- San Jacinto Fault Zone: The San Jacinto Fault Zone is a right-lateral strike-slip fault, located approximately 30 miles northeast of Orange County (passing through the Cities of Hemet and San Bernardino). This fault is 210 kilometers in length, including the Coyote Creek fault line as part of the San Jacinto Fault Zone. The most recent surface rupture occurred in April 1968, on the Coyote Creek fault segment. The estimated interval between surface ruptures is between 100 and 300 years, per segment. Probable magnitudes would be between 6.5 to 7.5. Other active segments of the San Jacinto Fault Zone include the Casa Loma fault, Clark fault, Glen Helen fault and Lytle Creek fault. Inactive faults include Hot Springs and Buck Ridge Faults, with the last rupture estimated in the Late Quaternary period at the extreme northern end of the fault zone.⁴⁹

Exhibit 4-11, *Fault Zones – Critical Facilities*, Exhibit 4-12, *Fault Zones – Distribution System*, and Exhibit 4-13, *Fault Zones – Sewer Collection System*, show the intersection of IRWD critical facilities against mapped fault zones in the jurisdiction.

Fault ruptures that occur outside of the IRWD jurisdiction could have a significant impact on drinking water supplies. As a portion of IRWD's water portfolio relies on imported water from the State Water Project, failure of regional or state-wide infrastructure as a result of fault ruptures could disrupt water supplies for undetermined lengths of time.

⁴⁸ Southern California Earthquake Data Center, *San Andreas Fault Zone*, <https://scedc.caltech.edu/earthquake/sanandreas.html>, accessed February 15, 2021.

⁴⁹ Southern California Earthquake Data Center, *San Jacinto Fault Zone*, <https://scedc.caltech.edu/earthquake/sanjacinto.html>, accessed February 15, 2021.



Legend

- Irvine Ranch Water District Boundary
- Foothill 6 Transmission Main (Critical Facility #61)
- Critical
- Facility of Concern

Late Quaternary

- Newport-Inglewood-Rose Canyon fault zone
- Pelican Hill fault
- Peralta Hills fault

Latest Quaternary

- Elsinore fault zone
- Newport-Inglewood-Rose Canyon fault zone
- San Joaquin Hills thrust

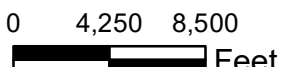
Undifferentiated Quaternary

- El Modeno fault
- Peralta Hills structure

1. Critical Facility #58, Enterprise Information System, Critical Facility #59, SCADA System are technology assets and are not mapped on the exhibits.

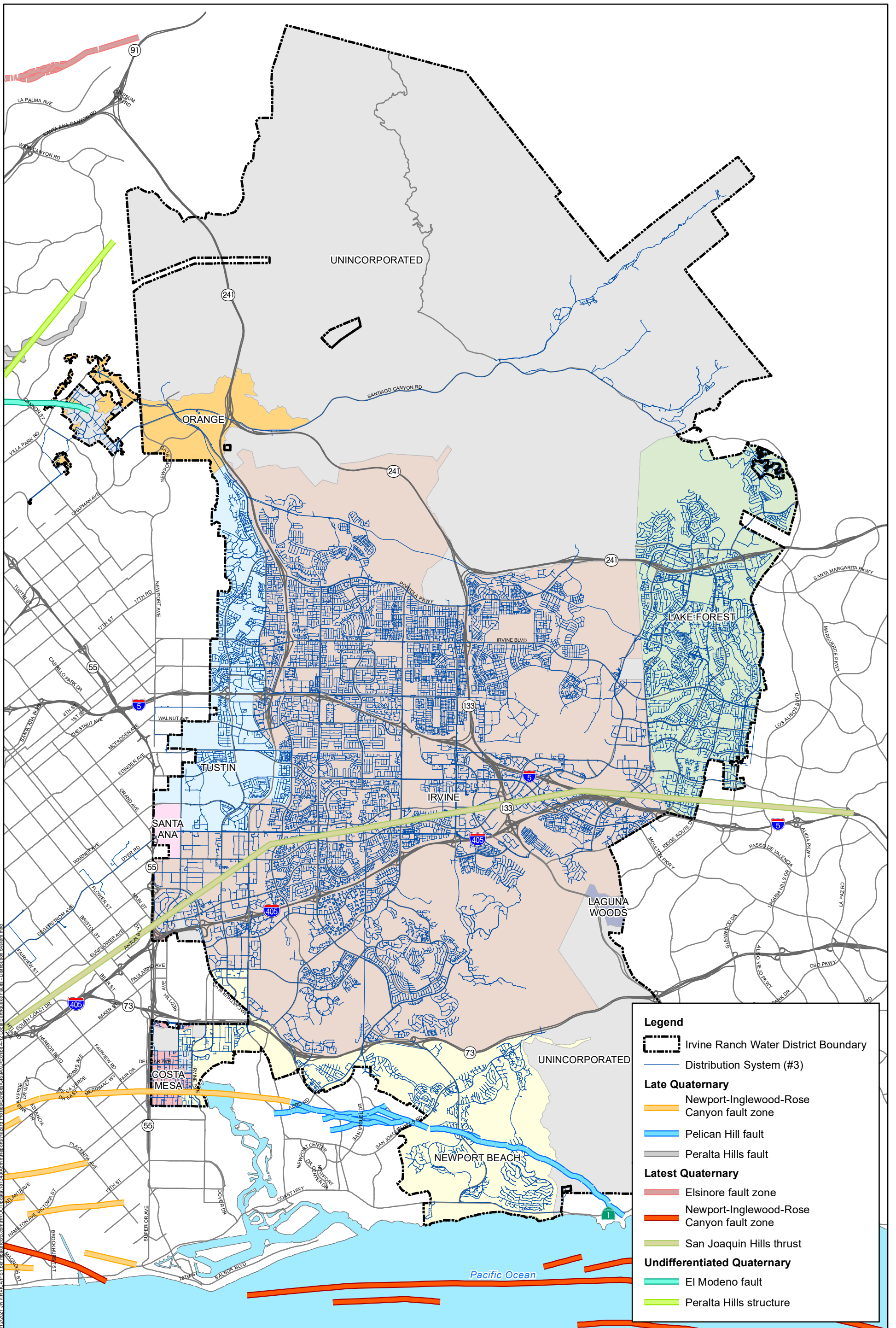
2. Critical Facility #3, Distribution System is mapped on Exhibit 4-12.

3. Critical Facility # 63, Sewer Collection System is mapped on Exhibit 4-13.



Irvine Ranch Water District Local Hazard Mitigation Plan Flood Hazard Zone - Critical Facilities

Data Source: IRWD, 2021, USGS, 2018



Legend

- Irvine Ranch Water District Boundary
- Distribution System (#3)
- Late Quaternary**
 - Newport-Inglewood-Rose Canyon fault zone
 - Pelican Hill fault
 - Peralta Hills fault
- Latest Quaternary**
 - Elsinore fault zone
 - Newport-Inglewood-Rose Canyon fault zone
 - San Joaquin Hills thrust
- Undifferentiated Quaternary**
 - El Modeno fault
 - Peralta Hills structure

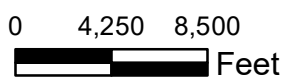
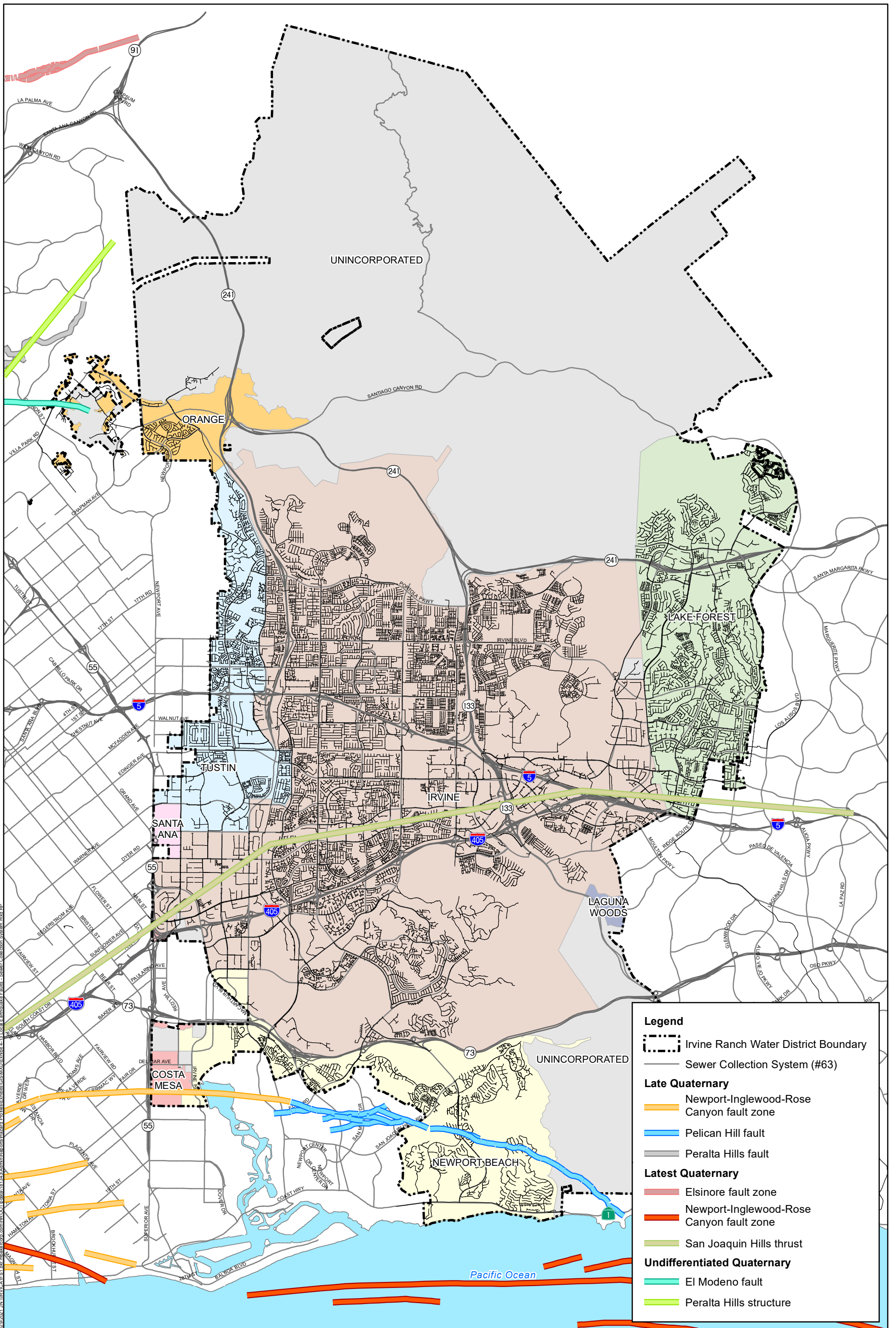


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Feet

Irvine Ranch Water District Local Hazard Mitigation Plan

Local Earthquake Faults - Distribution System

Source: IRWD, 2021, USGS, 2018



Irvine Ranch Water District Local Hazard Mitigation Plan

Local Earthquake Faults - Sewer Collection System

Ground Shaking

The extent and magnitude of seismic ground shaking is measured by the Richter Magnitude Scale and the Modified Mercalli Intensity Scale. The Richter scale was developed in 1935 and measures the magnitude of ground shaking from the logarithm of wave amplitude created by seismographs. Adjustments are included for variation in the distance between the seismograph and the earthquake epicenter. Magnitude is expressed in whole numbers and decimal fractions beginning at zero with no upper limit, as described in [Table 4-11, *Richter Scale of Earthquake Magnitude*](#). The Richter Scale of an earthquake is not an adequate measurement of damage, as low magnitude earthquakes in high density environments can still generate significant damage.⁵⁰

**Table 4-11
Richter Scale of Earthquake Magnitude**

Magnitude Level	Category
1.0 – 2.9	Micro
3.0 – 3.9	Micro
4.0 – 4.9	Light
5.0 – 5.9	Moderate
6.0 – 6.9	Strong
7.0 – 7.9	Major
8.0 or higher	Great

Source: Encyclopedia Britannica, *Richter Scale*, <https://www.britannica.com/science/Richter-scale>, accessed February 15, 2021.

The Modified Mercalli Intensity (MMI) Scale consists of a series of certain key impacts and responses from ground shaking such as people waking from sleep, movement of furniture, damage to chimneys, and destruction. The MMI Scale was developed in 1931, with twelve increasing levels of intensity ranging from imperceptible shaking to catastrophic destruction. The levels do not have a mathematical basis and the MMI Scale is an arbitrary ranking based on observed effects.

Thus, the MMI level of intensity is a more meaningful level of severity to the non-scientist because the actual impacts are referenced. Refer to [Table 4-12, *The Modified Mercalli Intensity Scale Summary*](#), for further information.

**Table 4-12
The Modified Mercalli Intensity Scale Summary**

Intensity	Shaking	Description/Damage
I	Non felt	Not felt except by a very few under especially favorable conditions.
II	Weak	Felt only by few persons at rest, especially on upper floors of buildings.
III	Weak	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
IV	Light	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Moderate	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Strong	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Very Strong	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.

⁵⁰ U.S. Geological Survey, *The Severity of an Earthquake*, <https://pubs.usgs.gov/gip/earthq4/severitygip.html>, accessed February 15, 2021.

**Table 4-12 (continued)
The Modified Mercalli Intensity Scale Summary**

Intensity	Shaking	Description/Damage
VIII	Severe	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Violent	Damage considerable in specifically designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Extreme	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.

Source: U.S. Geologic Survey, *The Modified Mercalli Intensity Scale*, https://www.usgs.gov/natural-hazards/earthquake-hazards/science/modified-mercalli-intensity-scale?qt-science_center_objects=0#qt-science_center_objects, accessed February 15, 2021.

Magnitude and intensity measure different characteristics of earthquakes but are often correlated. Magnitude measures the energy released at the source of the earthquake, determined by measurements on seismographs. Intensity measures the strengths of shaking produced by an earthquake at a certain location and is determined by effects on people, structures, and the natural environment. Refer to [Table 4-13, *Moment Magnitude and Modified Mercalli Intensity Scale Comparison*](#), for the intensities typically observed at locations near the epicenter of earthquakes with different magnitudes.

**Table 4-13
Moment Magnitude and Modified Mercalli Intensity Scale Comparison**

Moment Magnitude	Typical Maximum Modified Mercalli Intensity
1.0 – 3.0	I
3.0 – 3.9	II – III
4.0 – 4.9	IV – V
5.0 – 5.9	VI – VII
6.0 – 6.9	VII – IX
7.0 or higher	VIII or higher

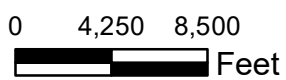
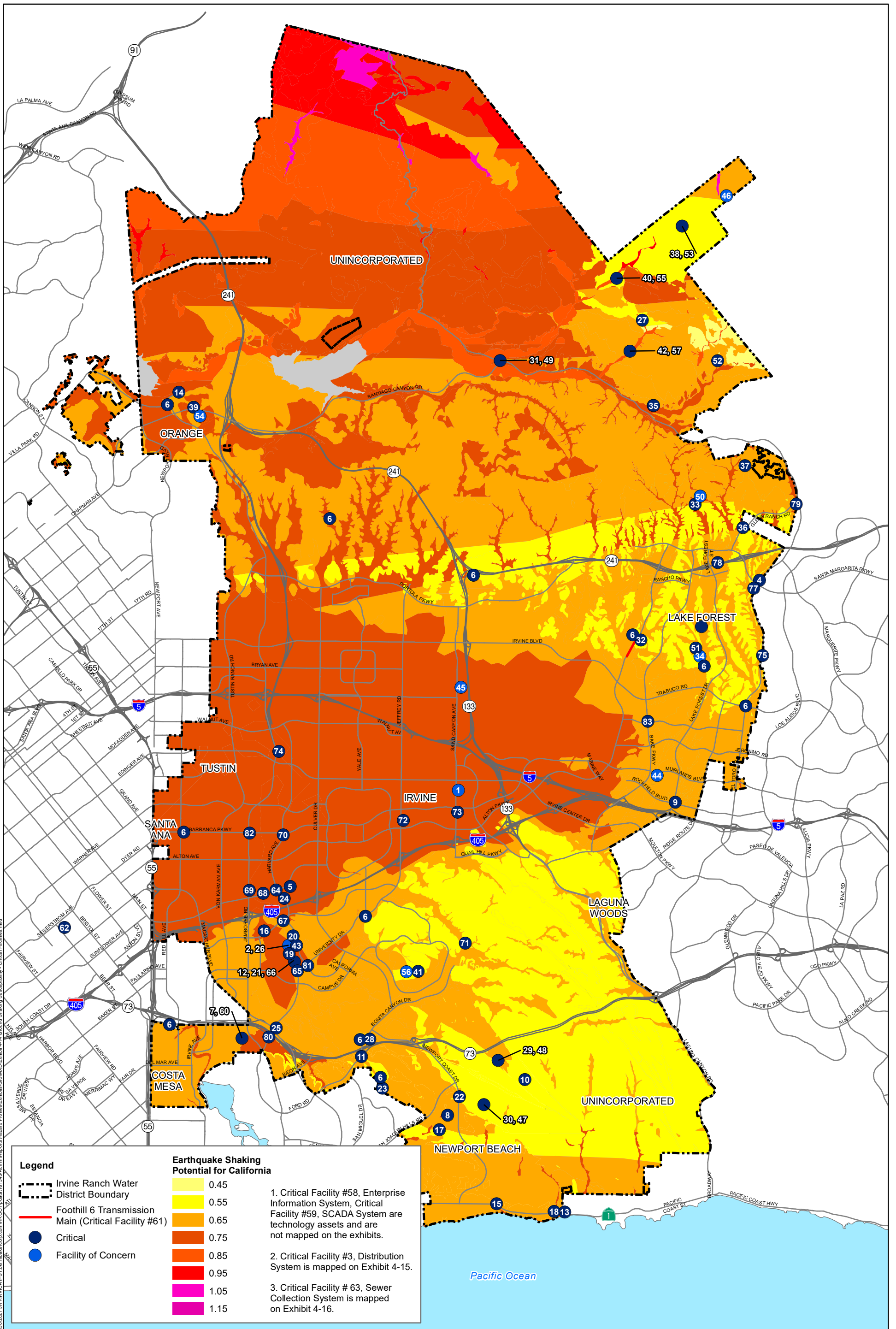
Source: U.S. Geological Survey, *Earthquake Magnitude, Energy Release, and Shaking Intensity*, https://www.usgs.gov/natural-hazards/earthquake-hazards/science/earthquake-magnitude-energy-release-and-shaking-intensity?qt-science_center_objects=0#qt-science_center_objects, accessed February 15, 2021.

[Exhibit 4-14, *Ground Shaking Susceptibility – Critical Facilities*](#), [Exhibit 4-15, *Ground Shaking Susceptibility – Distribution System*](#) and [Exhibit 4-16, *Ground Shaking Susceptibility – Sewer Collection System*](#), illustrate the range of potential ground shaking in the IRWD jurisdiction.

Strong ground shaking that occurs outside of the IRWD jurisdiction could have a significant impact on drinking water supplies. As a portion of IRWD’s water portfolio relies on imported water from the State Water Project, failure of regional or State-wide infrastructure as a result of ground shaking could disrupt water supplies for undetermined lengths of time.

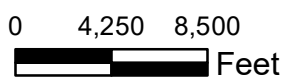
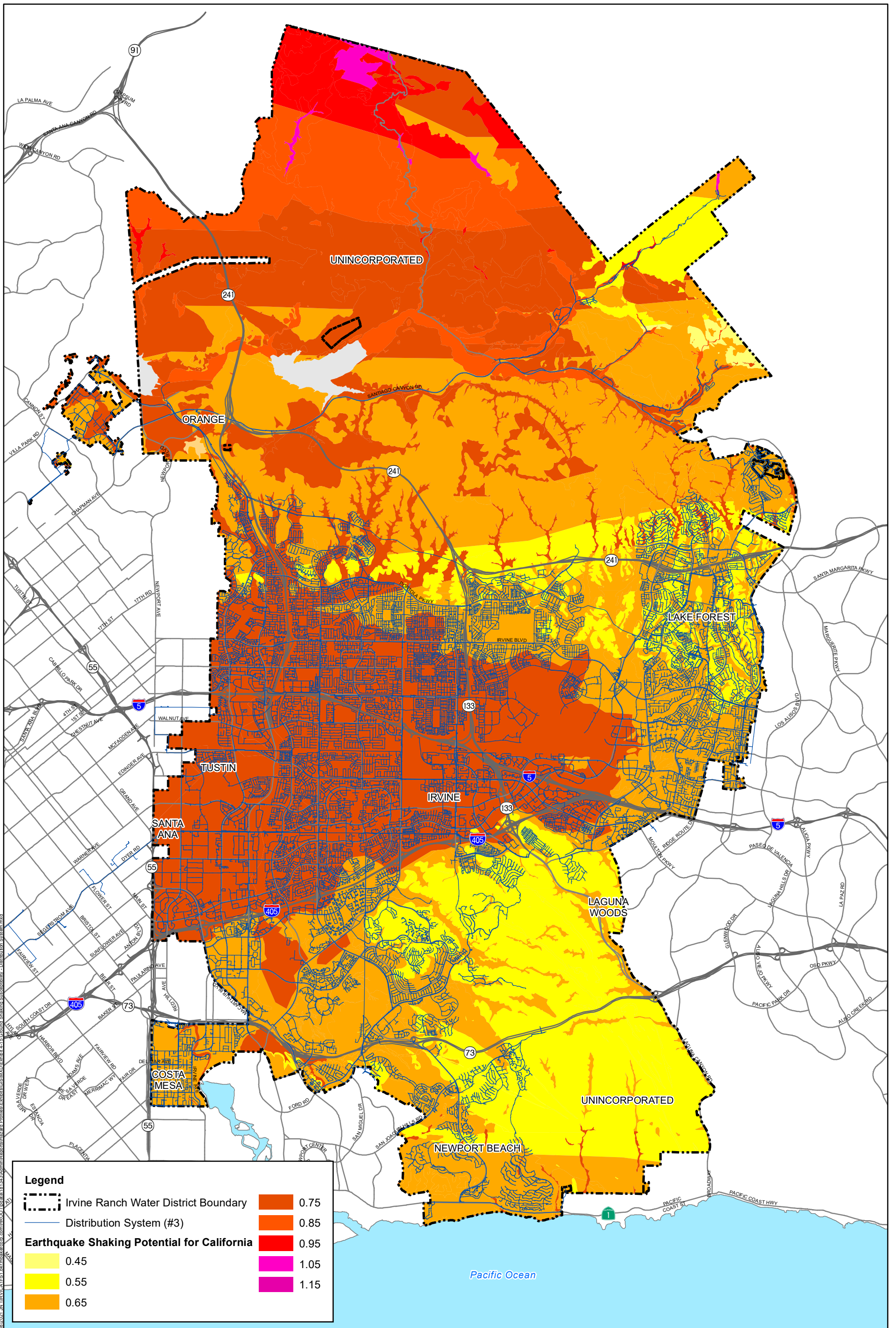
Liquefaction

The potential for liquefaction exists in areas susceptible to ground shaking with loose soils and/or shallow groundwater. Given the active faults in the region and the presence of geologically young, unconsolidated sediments and hydraulic fills, liquefaction is possible throughout significant portions of the IRWD service area. The California Geological Survey’s Seismic Hazard Zonation program identifies and maps areas prone to liquefaction; refer to [Exhibit 4-17, *Liquefaction Hazard Zone – Critical Facilities*](#), [Exhibit 4-18, *Liquefaction Hazard Zone – Distribution System*](#), and [Exhibit 4-19, *Liquefaction Hazard Zone – Sewer Collection System*](#).



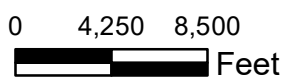
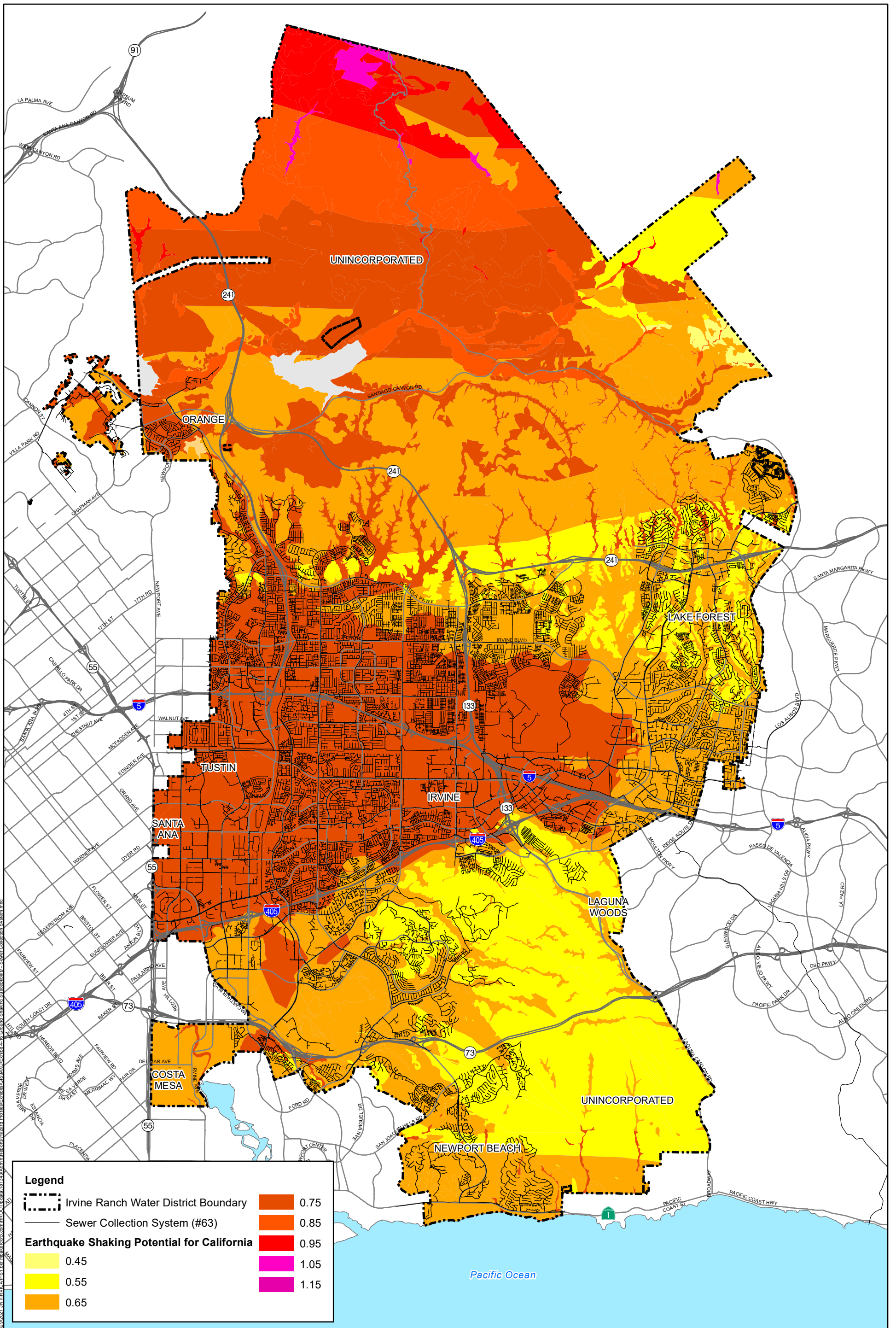
Irvine Ranch Water District Local Hazard Mitigation Plan

Ground Shaking Susceptibility - Critical Facilities



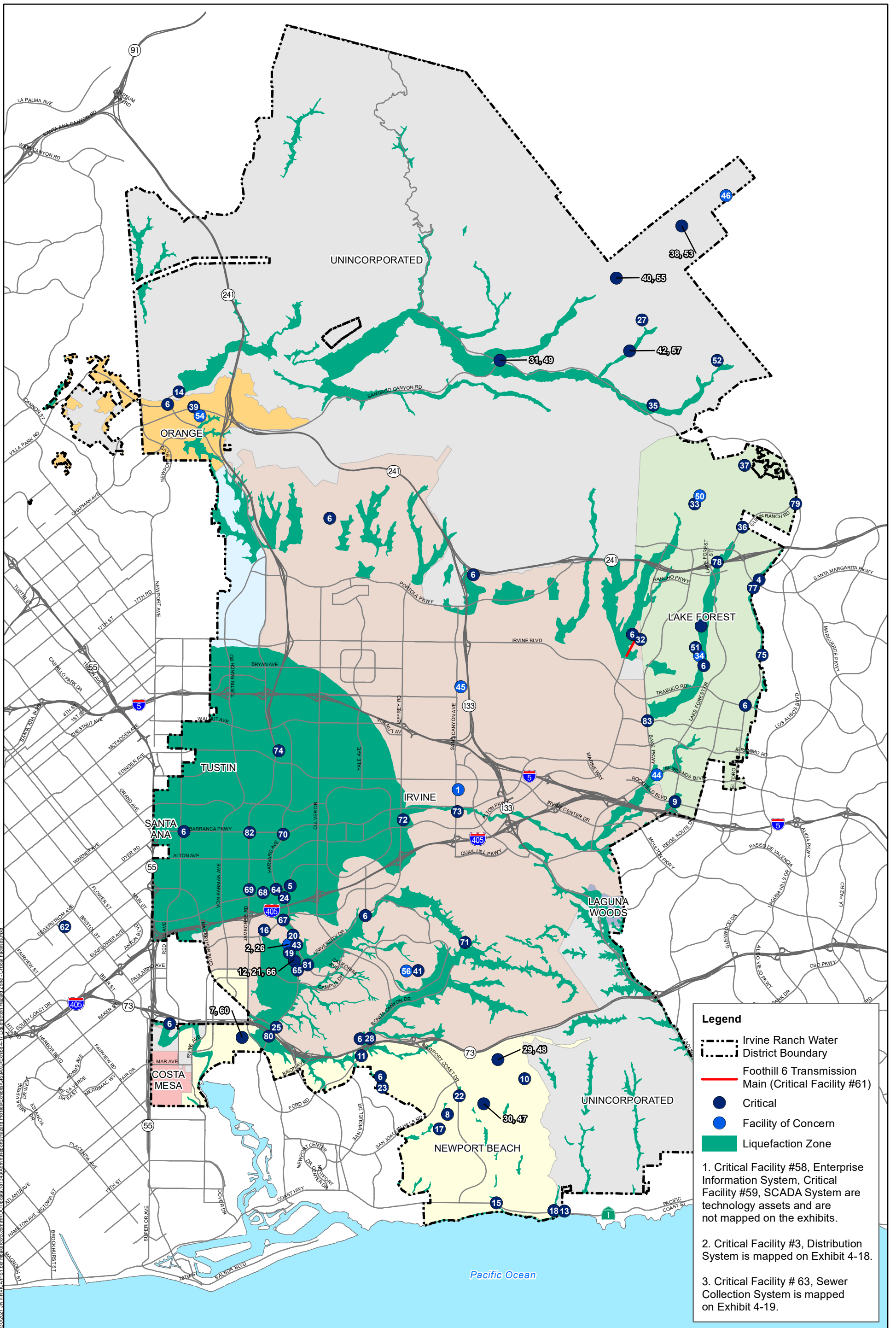
Irvine Ranch Water District Local Hazard Mitigation Plan

Ground Shaking Susceptibility - Distribution System



Irvine Ranch Water District Local Hazard Mitigation Plan

Ground Shaking Susceptibility - Sewer Collection System



Legend

- Irvine Ranch Water District Boundary
- Foothill 6 Transmission Main (Critical Facility #61)
- Critical
- Facility of Concern
- Liquefaction Zone

1. Critical Facility #58, Enterprise Information System, Critical Facility #59, SCADA System are technology assets and are not mapped on the exhibits.

2. Critical Facility #3, Distribution System is mapped on Exhibit 4-18.

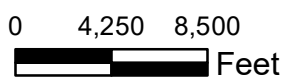
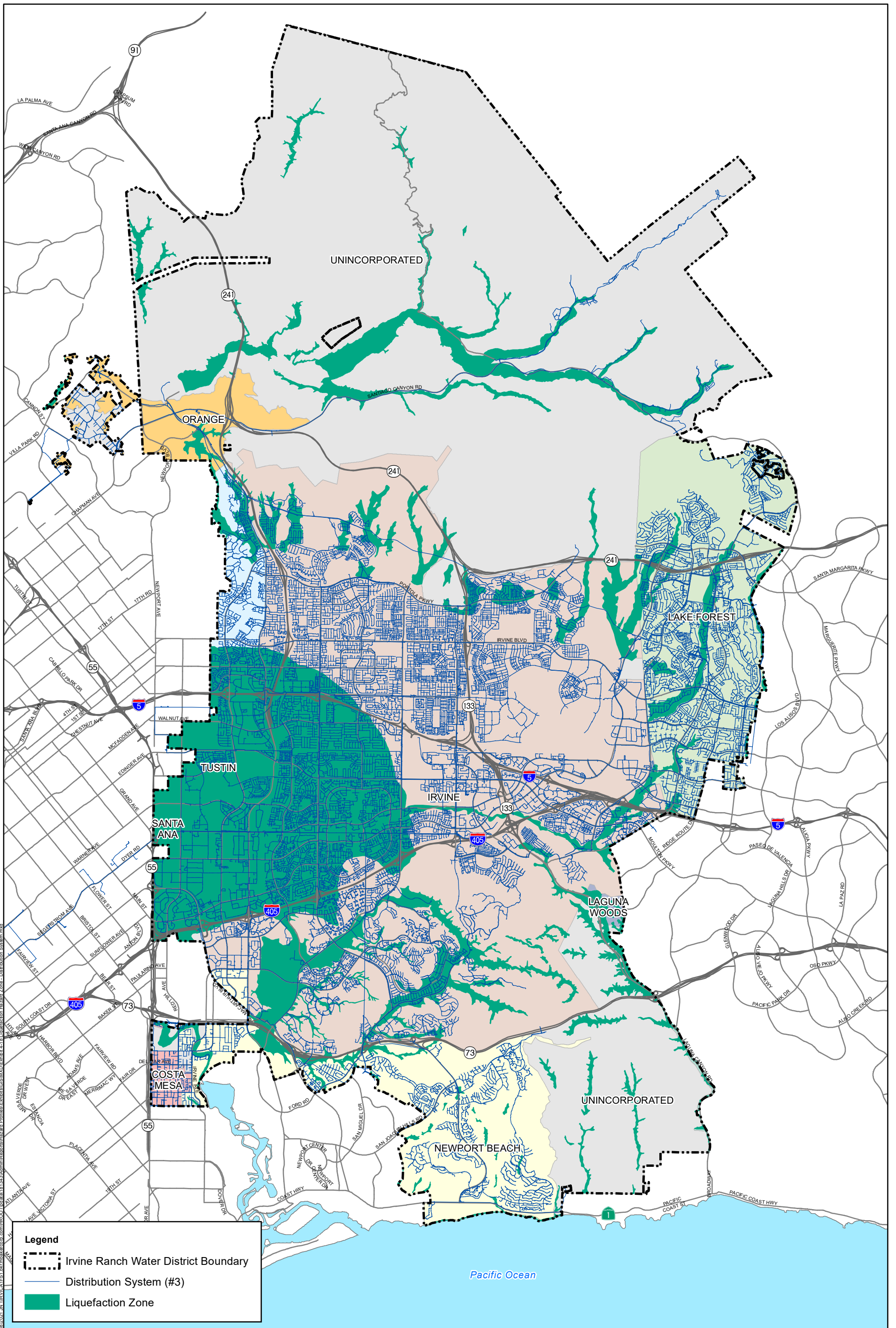
3. Critical Facility # 63, Sewer Collection System is mapped on Exhibit 4-19.



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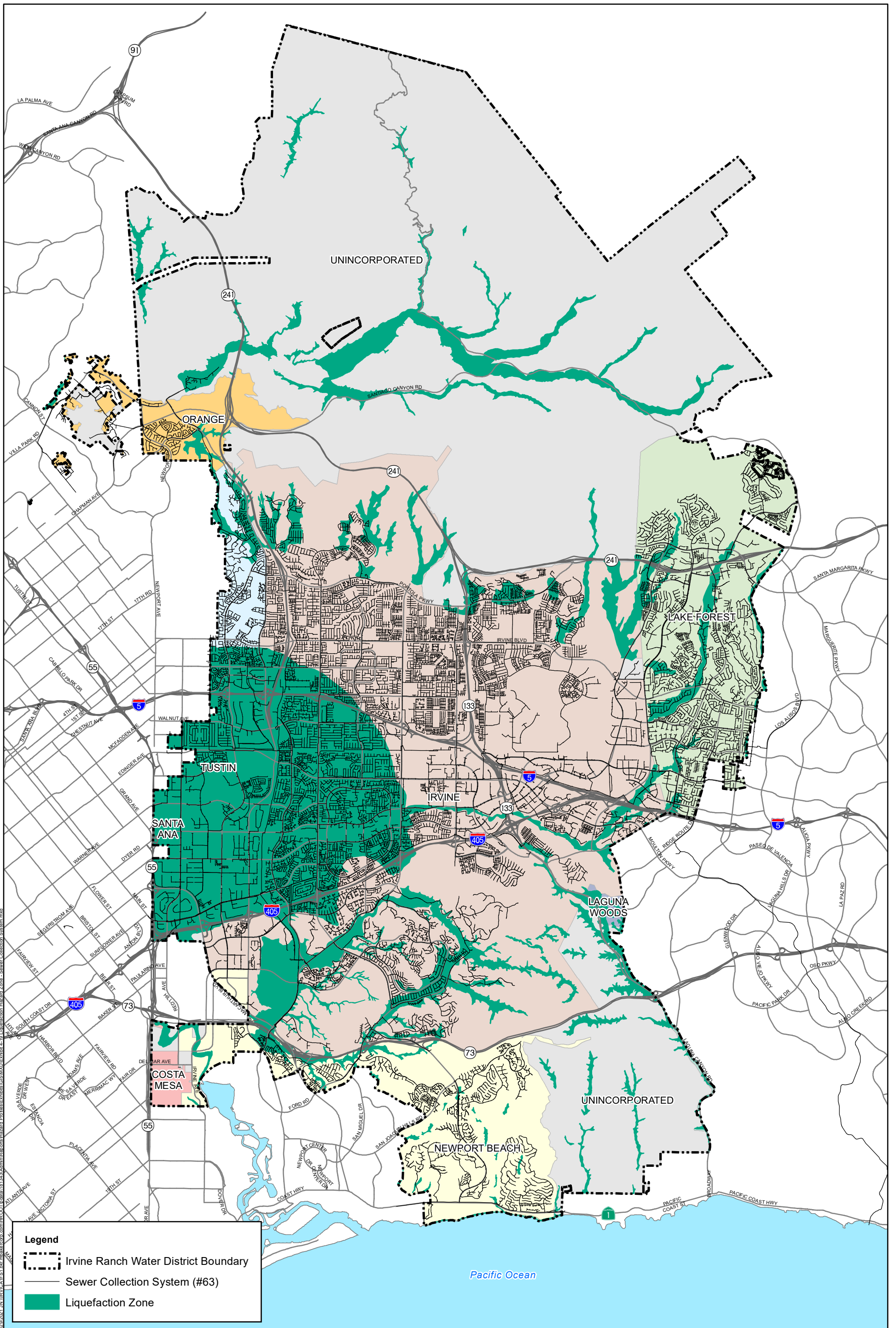
Irvine Ranch Water District Local Hazard Mitigation Plan Liquefaction Hazard Zone - Critical Facilities

Data Source: IRWD, 2021, CGS, 1998, 2001, 2002



Irvine Ranch Water District Local Hazard Mitigation Plan

Liquefaction Hazard Zone - Distribution System



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Legend

- Irvine Ranch Water District Boundary
- Sewer Collection System (#63)
- Liquefaction Zone



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 Feet

Irvine Ranch Water District Local Hazard Mitigation Plan

Liquefaction Hazard Zone - Sewer Collection System

Large liquefaction zones are located in the City of Irvine, City of Tustin, and the City of Santa Ana. Various drainages in the unincorporated communities of the IRWD service area have been mapped as soil liquefaction hazard areas.

Previous Occurrences

Fault Rupture & Ground Shaking

As discussed above, a variety of faults are located within or near the IRWD service area. Table 4-14, *Major Earthquake Faults of Particular Concern*, identifies faults of concern for the IRWD jurisdiction and last major ruptures.

**Table 4-14
Major Earthquake Faults of Particular Concern**

Fault Name	Type of Faulting	Last Major Rupture	Slip Rate	Interval Between Major Ruptures	Probable Magnitudes
Elsinore	Right-lateral strike-slip	May 15, 1910 Magnitude 6.0 (no surface rupture)	Roughly 4.0 mm/year	Roughly 250 years	6.5-7.5
Newport- Inglewood	Right-lateral; local reverse slip	March 10, 1933 Magnitude 6.4 (no surface rupture)	0.6 mm/year	Unknown	6.0-7.4
San Andreas	Right-lateral strike-slip	April 18, 1906 Magnitude 7.9	20 to 35 mm/year	Varies; between 20 and 300 years	6.8-8.0
San Jacinto	Right-lateral strike-slip; minor right-reverse	April 9, 1968 Magnitude 6.5	7 to 17 mm/year	Varies; between 100 and 300 years	6.5-7.5
San Joaquin Hills	Blind thrust	Unknown; potentially 1855	0.42 to 0.79 mm/year	Unknown	>7.0
Sources: Southern California Earthquake Center, <i>Significant Earthquakes and Faults</i> , http://scedc.caltech.edu/significant/fault-index.html , accessed February 15, 2021. Grant, Lisa B. et al, <i>Coastal Uplift of the San Joaquin Hills, Southern Los Angeles Basin, California, by a Large Earthquake since A.D. 1635</i> , Bulletin of the Seismological Society of America, Volume 92, No. 2, pp 590–599, March 2002.					

Table 4-15, *Significant Historical Earthquakes in Southern California*, identifies major earthquakes that have occurred in southern California. Several of these earthquakes occurred prior to IRWD’s establishment in 1961; therefore, specific information regarding IRWD impacts from these incidents are not available. However, ground shaking was experienced in the IRWD service area from the earthquakes below that occurred after 1961. The Northridge and Whittier Narrows Earthquakes both resulted in major disaster declarations from the federal government, which included Orange County as a designated area.⁵¹ To date, no historical earthquakes have caused damage or significantly impacted IRWD infrastructure. Continued and regular maintenance and/or seismic retrofitting will be required in the future to further safeguard against seismic hazards.

**Table 4-15
Significant Historical Earthquakes in Southern California**

Earthquake Name	Year	Estimated Magnitude
Wrightwood	1812	7.5
Los Angeles	1855	6.0
San Bernardino	1858	6.0
Elsinore	1910	6.0
San Jacinto	1918	6.8

⁵¹ Federal Emergency Management Agency, *California Northridge Earthquake (DR-1008-CA)*, <https://www.fema.gov/disaster/1008>, accessed February 15, 2021.

**Table 4-15 (continued)
Significant Historical Earthquakes in Southern California**

Earthquake Name	Year	Estimated Magnitude
North San Jacinto	1923	6.3
Long Beach	1933	6.4
San Fernando	1971	6.5
Whittier Narrows	1987	5.8
Newport Beach	1989	4.7
Northridge	1994	6.7
Chino Hills	2008	5.4
Ridgecrest Sequence	2019	6.4 and 7.1

Source: Southern California Earthquake Data Center, *Earthquake Information: Chronological Earthquake Index*, <https://scedc.caltech.edu/earthquake/chronological.html>, accessed May 26, 2021.

Liquefaction

Comprehensive, historic accounts of damage within the IRWD service area from liquefaction are not readily available. The Irvine Local Hazard Mitigation Plan does not report any local liquefaction incidents in recent history but does report that liquefaction occurred at the mouth of the San Gabriel River at Alamitos Bay as a result of the Long Beach Earthquake in 1933.⁵² Regionally, some damage in Los Angeles County during the Northridge earthquake of 1994 was due to liquefaction as opposed to ground shaking.⁵³

Probability of Future Occurrences

Fault Rupture & Ground Shaking

The IRWD service area is known as seismically active, and thus the probability for future seismic hazard occurrences is considered high. Given the significant seismic shaking events in the region, it is certain that such events will continue. The USGS Uniform Earthquake Rupture Forecast Version 3 released in 2017 provides a perspective of the likelihood each California region will experience a magnitude 6.7 or larger earthquake in the next 30 years; refer to Table 4-16, *Likelihood of One or More Earthquakes Occurring in the Next 30 Years in Orange County Region by Fault.*

**Table 4-16
Likelihood of One or More Earthquakes Occurring in the Next 30 Years in Orange County
Region by Fault**

Magnitude	Elsinore Fault	Newport- Inglewood Fault	Southern San Andreas Fault	San Jacinto Fault	San Joaquin
M ≥ 6.7	3.66%	0.70%	19.21%	5.41%	0.42%
M ≥ 7.0	1.82%	0.63%	12.86%	5.39%	0.40%
M ≥ 7.5	0.90%	0.20%	10.21%	5.28%	0.24%
M ≥ 8.0	<0.01%	--	3.24%	2.75%	--

Notes:
 1. M≥6.7 means magnitude greater than or equal to 6.7, and likewise for the other magnitude thresholds.
 2. The 30-year period measured by this report is 2014 to 2044; a 30-year period is the typical duration of a homeowner mortgage.
 3. Percentages for fault sections closest to IRWD jurisdiction.

Source: U.S. Department of the Interior and U.S. Geological Survey, *The Third California Earthquake Rupture Forecast (UCERF3)*, Google Earth file with fault probabilities, March 2015.

⁵² City of Irvine, *Local Hazard Mitigation Plan Public Review Draft*, June 2020.

⁵³ Municipal Water District of Orange County, *Orange County Regional Water and Wastewater Hazard Mitigation Plan*, adopted August 2019.

Liquefaction

As significant portions of the IRWD service area are located within an identified liquefaction zone, the likelihood for future occurrences is considered medium. Because seismic activity is expected to continue in the southern California region, liquefaction should also be expected and anticipated as a secondary impact from this hazard.

However, it should be noted that liquefaction would only be triggered by a significant earthquake on one of the faults close to or within the IRWD service area. Regional faults such as the San Andreas and San Jacinto Fault Zones, are statistically more likely to produce a significant earthquake when compared to the Newport-Inglewood Fault or San Joaquin Fault. At the same time, these regional faults are located miles away from the IRWD service area and may not generate enough ground shaking to trigger liquefaction within the jurisdiction.

Climate Change

Earthquakes are caused by seismic activity, which is not correlated with climate change. Thus, fault ruptures or ground shaking is not more likely to occur as climate change impacts become more significant. However, climate change could bring more severe rain events increasing the amount of water saturation in loose soils. The increased saturation combined with an earthquake event could cause liquefaction or landslides to occur.

4.2.8 SEVERE WEATHER

Description

Coastal/Winter Storm

According to the National Weather Service/National Oceanic and Atmospheric Administration, a severe thunderstorm must have at least one of the following: 1) hail that is one inch in diameter or larger; or 2) winds of 58 miles per hour or greater.⁵⁴ About 10 percent of thunderstorms in Orange County are classified as severe. They usually occur when cool, moist air moves in to break a prolonged hot spell. The storms are usually short-lived, infrequent, and no more than a quarter of a mile wide. Over the interior mountain areas, storms are more intense, and they may become unusually severe on occasion at intermediate and high elevations. Although not defined as severe weather, the IRWD service area experiences heavy rain events that can result in localized flooding, mudflows, and fallen tree limbs or brush that block roadways and drainage systems.

Santa Ana Winds

High winds are defined as those that last longer than one hour at greater than 39 miles per hour (mph) or for any length of time at greater than 57 mph. High winds that affect the IRWD service area are usually the Santa Ana winds. Santa Ana winds push dry air from the inland deserts of California and the Southwest over the mountains that lie between these desert areas and coastal California. Santa Ana winds are created when high pressure over the high desert of the Great Basin region causes winds to blow from the east, toward the Pacific Ocean and the lower air pressure offshore. The phenomenon usually occurs during the fall and early winter (October through March) and is usually accompanied by warmer than average temperatures. Hot and very dry winds dry out vegetation, increasing the fuel available to feed fires. Gusty winds also fan flames and spread fire.⁵⁵

⁵⁴ National Weather Service, *What Constitutes a Severe Thunderstorm*, https://www.weather.gov/bmx/outreach_svr, accessed Feb 8, 2021

⁵⁵ Los Angeles Times, *Etymology of the name "Santa Ana winds"*, http://people.atmos.ucla.edu/fovell/LATimes_SantaAna.html, published January 2008, accessed Feb 8, 2021

Power Outage

Power outages are a major secondary effect of severe weather events in the IRWD service area. An outage could result in damaged power equipment or equipment failures and can affect multiple counties for hours. This type of event can range from a moderate event to a catastrophic regional event that may threaten human life, safety, and health, or interferences with vital services. During severe weather incidents such as high winds or severe flooding, Southern California Edison (SCE) may implement an operational practice called Public Safety Power Shutoffs (PSPS) to preemptively shut off power in high-risk areas during potentially dangerous fire conditions. This program is designed to proactively prevent SCE facilities from starting a wildfire when winds and temperatures are high.

Strong Santa Ana winds, high temperatures, and low humidity are all severe weather conditions that could trigger a PSPS event. It is possible for extreme weather incidents outside of the IRWD service area to trigger a PSPS that affects the jurisdiction (i.e., strong winds affecting regional infrastructure that powers SCE grids in Orange County). The frequency of these events depends on the weather and environmental factors, and SCE makes decisions based on internal threat thresholds, assessment of real-time information, and situational awareness data. When possible, SCE intends to notify customers prior to a PSPS event. When weather forecasts indicate extreme fire conditions, SCE begins predictive modeling to assess the potential impacts while monitoring weather watch alerts from the National Weather Service. Three days prior to the forecasted PSPS, SCE would coordinate first with local government, the emergency management community, first responders, and other critical infrastructure/service providers. Two days prior to the forecasted PSPS, notices would go out to SCE customers with a follow-up one day before a notice of power shut off. It is noted that actual or sudden onset of extreme weather conditions could impact the intended coordination and notification efforts.⁵⁶

Outside of the PSPS events, there is the potential for unplanned power outages to occur within the IRWD service area. SCE defines a major outage as a large unexpected outage caused by either accidents or natural disasters. While uncommon, loss of electrical power is a potential secondary effect of heavy rains or strong winds. Other types of events that could occur is mechanical power failure due to aging equipment, without being a secondary effect of natural hazards impacts.

Location/Extent

A severe winter storm or Santa Ana wind activity would occur throughout the entirety of the IRWD service area. Specific magnitudes and the severity of impacts are outlined below.

Coastal/Winter Storm

One of the indicators for a heavy rain season is the Oceanic Niño Index (ONI), used to monitor the El Niño-Southern Oscillation (ENSO). To calculate the ONI, scientists from the National Oceanic and Atmospheric Administration's (NOAA) Climate Prediction Center calculate the average sea surface temperature in the El Niño 3.4 region (area of the east-central equatorial Pacific Ocean) for each month, and then average it with values from the previous and following months. This running three-month average is compared to a 30-year average. The observed difference from the average temperature in that region, whether warmer or cooler, is the ONI

⁵⁶ Southern California Edison, *Public Safety Power Shutoff*, <https://www.sce.com/wildfire/psps>, accessed February 16, 2021.

value for that three-month “season”. Based on the ONI, the El Niño (warm) and La Niña (cool) events in the tropical Pacific are categorized as weak, moderate, strong, or very strong.⁵⁷

The NOAA additionally calculates the monthly averages of each region and sub-region of California. These calculations are based on the data collected by weather stations. There are approximately six weather service stations that collect precipitation data for municipalities within the IRWD service area; refer to Table 4-17, *Monthly Average Precipitation in IRWD Service Area*.

**Table 4-17
Monthly Average Precipitation in IRWD Service Area**

Weather Station	Monthly Average Precipitation
Silverado Canyon, CA	1.9 inches
Silverado Canyon ESE	2.0 inches
Irvine Ranch, CA	1.9 inches
Irvine 4.1 NNE	1.4 inches
Newport Beach Harbor	1.05 inches
Santa Ana John Wayne Airport	0.39 inches

Source: National Oceanic and Atmospheric Administration, *Data Tools: 2018 Monthly Summaries*, <https://gis.ncdc.noaa.gov/maps/clim/summaries/monthly>, accessed March 17, 2021.

Typically, within the IRWD service area, municipal drainage infrastructure systems are able to accommodate heavy rain events. During uncharacteristically heavy winter storms or rain events (such as those caused by an El Niño weather pattern), these drainage systems may not be sufficient to move stormwater flows and thus, result in flooding (refer to Section 4.2.3). Severe storms could also cause overtopping of dams or reservoirs (refer to Section 4.2.1) or threaten slope stability (refer to Section 4.2.4 and Section 4.2.6).

Santa Ana Winds

Santa Ana winds blow westward through the canyons and into the coastal areas of southern California, including the IRWD service area. The winds would not be location specific, but instead would impact the entire planning area.

Wind speeds are typically 35 knots through and below passes and canyons with gusts up to 50 knots. Stronger Santa Ana winds can have gusts greater than 60 knots over widespread areas with gusts greater than 100 knots in some areas. Frequently, the strongest winds in the basin occur during the night and morning hours due to the absence of a sea breeze. The sea breeze which typically blows onshore daily, can moderate the Santa Ana winds during the late morning and afternoon hours. Santa Ana winds are an important forecast challenge because of the high fire danger associated with them. Santa Ana winds can adversely affect power utilities that have transformers and power lines, in turn affecting the ability of some water and wastewater utilities to operate when back-up generation is unavailable (planned power outages because of high wind/wildfire conditions are discussed in Section 4.2.9). The magnitude and severity of Santa Ana winds are similar throughout the planning area.

The severity and magnitude of hurricane winds are measured using the Saffir-Simpson Hurricane Wind Scale. Although hurricane events are not typical within IRWD customer cities, the scale can be used to measure strong winds that are not associated with a hurricane event. The scale uses measurements in pressure, wind speed, and damage potential to identify the types of damage associated with sustained wind events; refer to Table 4-18, *Saffir-Simpson Hurricane Wind Scale*.

⁵⁷ National Oceanic and Atmospheric Administration, *Climate Variability: Oceanic Niño Index*, <https://www.climate.gov/news-features/understanding-climate/climate-variability-oceanic-ni%C3%B1o-index>, accessed Feb 8, 2021

Table 4-18
Saffir-Simpson Hurricane Wind Scale

Category	Sustained Wind Speed	Description of Damage
1	74–95 mph	Very dangerous winds will produce some damage: Well-constructed frame homes could have damage to roof, shingles, vinyl siding, and gutters. Large branches of trees will snap, and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	96–110 mph	Extremely dangerous winds will cause extensive damage: Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3	111–129 mph	Devastating damage: Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4	130–156 mph	Catastrophic damage: Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5	157 mph or higher	Catastrophic damage: A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
Source: National Hurricane Center, <i>Saffir-Simpson Hurricane Wind Scale</i> , https://www.nhc.noaa.gov/aboutsshws.php , accessed February 2021.		

Power Outage

SCE designates High Fire Risk Areas as areas with circuits within California Public Utilities Commission’s (CPUC) Tier 2 (elevated risk) and Tier 3 (extreme risk) Fire Threat Areas. The CPUC Fire-Threat Map was developed with input from the U.S. Forest Service, California Department of Forestry and Fire Protection, and the State’s investor-owned utilities, including SCE. SCE uses their own thresholds prior to initiating a PSPS event. When evaluating weather and environmental conditions, SCE considers a variety of factors which include but are not limited to:

- National Weather Service Red Flag Warnings;
- SCE meteorological assessments;
- SCE Fire Potential Index;
- SCE Fire Scientist assessments;
- Real-time situational awareness information;
- SCE Fire Management/Office of Emergency Management input;
- Concerns from local or State fire authorities;
- Mandatory or voluntary evacuation orders in place;
- Expected impact of de-energizing circuits on essential services (including public safety agencies, water pumps, traffic controls, etc.); and
- Other operational considerations to minimize wildfire ignitions.

The magnitude of impacts to IRWD infrastructure would depend on the length of time power is out and the size of the impacted area. Many of IRWD’s critical infrastructure systems have generators or secondary power sources in case of SCE power loss. In addition to this, IRWD can transport and install temporary, portable generators if the primary backup generators fail. However, significant periods of PSPS could impact water delivery to IRWD customers or the timely treatment of wastewater.

Previous Occurrences

Coastal/Winter Storm

The rainy season in the IRWD service area traditionally occurs between November and early May; although, severe rains have occurred during other times of the year when weather conditions permit. Refer to the flood hazard profile ([Section 4.2.3](#)) for a summary of significant regional storms that resulted in heavy rains within the IRWD jurisdiction. The MWDOC Multi-Jurisdictional Hazard Mitigation Plan reports three winter storms in 2017 that began on January 18 and occurred over six days. The heavy rains, combined with already saturated soil, produced flash flooding that spanned across multiple cities within the IRWD service area. Cities, such as Santa Ana and Newport Beach, experienced street flooding with one to three feet of water, Responders conducted rescue operations on the Santa Ana River in the City of Orange. The storms resulted in a Presidential Disaster Declaration for 16 counties throughout the state.⁵⁸

Santa Ana Winds

Santa Ana winds occur annually between October and March in the IRWD service area. The MWDOC Multi-Jurisdictional Hazard Mitigation Plan reports several major high wind events in Orange County history since 1998, with wind speeds up to 105 knots. While winds are regularly experienced, no major damage has been incurred by IRWD.

Power Outage

IRWD has never experienced a jurisdiction-wide power outage due to severe weather or an SCE PSPS. Short-term power losses have occurred as isolated incidents, without major impacts to IRWD infrastructure. IRWD maintains infrastructure to account for short-term losses in power at many facilities. Historically, wildfires have resulted in long duration SCE service interruptions that have extended up to one week or longer. Instances like these have required significant replacement of SCE infrastructure to return power to IRWD facilities.

Probability of Future Occurrences

Based on previous occurrences and weather trends in southern California and Orange County, there is a medium probability that heavy rains will occur in the IRWD service area. The probability of future Santa Ana winds is considered high. The probability of power outages as a secondary impact is also considered high, based on the continued Santa Ana wind and wildfire conditions in the southern California region.

Climate Change

Climate change will affect the frequency and intensity of heavy rain events. According to research conducted by UCLA, California will experience both extremely wet and extremely dry seasons by the end of the century. Climate scientists predict that “over the next 40 years, the State will be 300 to 400 percent more likely to have a prolonged storm sequence as severe as the one that caused the legendary California flood more than 150 years ago.” This could increase secondary effects, such as flooding, erosion, or wildfire events.

Climate change could also increase the severity and frequency of Santa Ana wind occurrences. Stronger than normal Santa Ana winds have occurred in recent years, which were likely exacerbated by climate change.

⁵⁸ Municipal Water District of Orange County, *Orange County Regional Water and Wastewater Hazard Mitigation Plan*, adopted August 2019.

SCE reports that increased power outages are directly related to climate change, and that PSPS will become “the new normal during high fire/wind events”. PSPS will become increasingly necessary to mitigate fire risk if increased severity and duration of extreme weather events occur as predicted.

Additionally, climate change may result in storm events and Santa Ana winds occurring outside of traditional seasons of the year.

4.2.9 WILDFIRE

Description

A wildfire is defined as an unplanned and unwanted wildland fire, including unauthorized human-caused fires, escaped wildland fire use events, escaped prescribed fire projects, and all other wildland fire where the object is to extinguish the fire. Wildfire is a natural part of the southern California ecosystem, helping to clear brush and debris, and is a necessary part of various species’ life cycles. Wildfires can be sparked by lightning, accidents, or arson.

Human activity has changed the buffer zone between urbanized and undeveloped areas, known as the wildland-urban interface, where naturally fire-prone landscapes abut developed neighborhoods. The natural setting of a wildland-urban interface can make these areas highly desirable places to live, and many of these areas in California are now developed. This development has brought more people into wildfire-prone areas. The availability of fuel and increasing encroachment into the wildland-urban interface have made wildfires a common and dangerous hazard in southern California. Certain development patterns pose more difficult fire problems. These include multi-story, wood frame, high-density apartment developments; multi-story research developments; large continuous developed areas with combustible roofing materials; and facilities that use and/or store hazardous materials. Features of structural conditions that affect fire control include the type and use of a structure, area of building, number of stories, roof covering, and exposures to the building.

Certain conditions must be present for significant interface fires to occur. The most common conditions include hot, dry and windy weather, the inability of fire protection forces to contain or suppress the fire, the occurrence of multiple fires that overwhelm committed resources, and a large fuel load (dense vegetation). The three primary factors that lead to high wildfire fuel loads in Orange County are drought, insect infestation causing tree decimation (bark beetles), and wildfire suppression. Road side ignition and arson have both occurred in Orange County and triggered wildfires as well. Once a fire has started, several conditions influence its behavior, including fuel topography, weather, drought, and development.

During wildfire season, SCE monitors weather conditions in fire prone areas. To prevent strong winds and extreme heat from causing fire accidents, SCE may proactively turn off power in a PSPS. Power outages as a secondary effect is discussed in detail within the Severe Weather Hazard Profile.

Location/Extent

CAL FIRE prepares wildfire hazard severity maps including mapping areas of significant fire hazards based on fuels, terrain, weather, and other relevant factors. These zones, referred to as Fire Hazard Severity Zones (FHSZ), define the application of various mitigation strategies and influence how people construct buildings and protect property to reduce risk associated with wildland fires. While FHSZ do not predict when or where a wildfire will occur, they do identify

areas where wildfire hazards could be more severe and therefore are of greater concern. Zones are designated on varying degrees from moderate, high, and very high.

A large portion of land within the IRWD service area is open space and includes rugged topography with highly flammable native vegetation, making wildland fires a significant risk to IRWD infrastructure. Infrastructure in certain areas of the IRWD jurisdiction, such as the cities of Newport Beach, Orange, Lake Forest, Irvine and Laguna Woods are located within a Very High Hazard Wildfire Zone under Local Responsibility; refer to Exhibit 4-20, *Wildfire Hazard Zone – Critical Facilities*, Exhibit 4-21, *Wildfire Hazard Zone – Distribution System*, and Exhibit 4-22, *Wildfire Hazard Zone – Sewer Collection System*.

Additionally, unincorporated Orange County areas within the northern IRWD service area are located in Very High Wildfire Zones under State Responsibility. This area can experience long duration service interruptions during major wildfire incidents because of damaged SCE infrastructure.

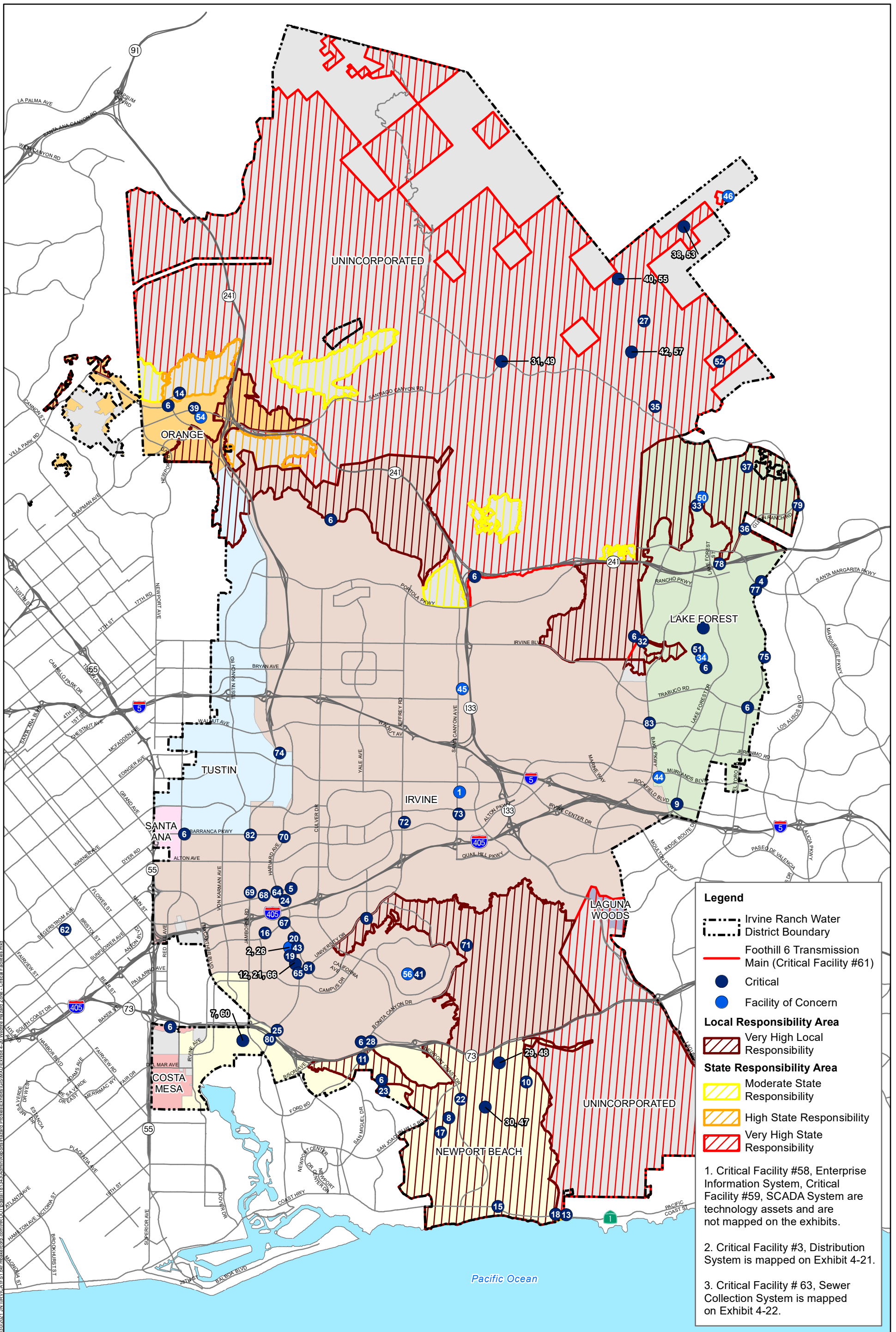
Fire protection challenges occur where development is located within and directly adjacent to wildland urban interface areas. As the number of structural features increases, so does the risk of incidence of fire. Wildfires are not measured on a specific scale and are usually classified by size or impact. The size and severity of any fire depends on the availability of fuel, weather conditions, and topography, although wildfires in the wildland urban interface do not need to be significant in acreage to be damaging. Due to the location of development within and adjacent to Moderate, High, and Very High Fire Hazard Severity Zones, there is the potential for a wildfire to spread quickly within the IRWD service area, depending on the conditions and nature of the fire.

Previous Occurrences

Major Fires in Orange County History

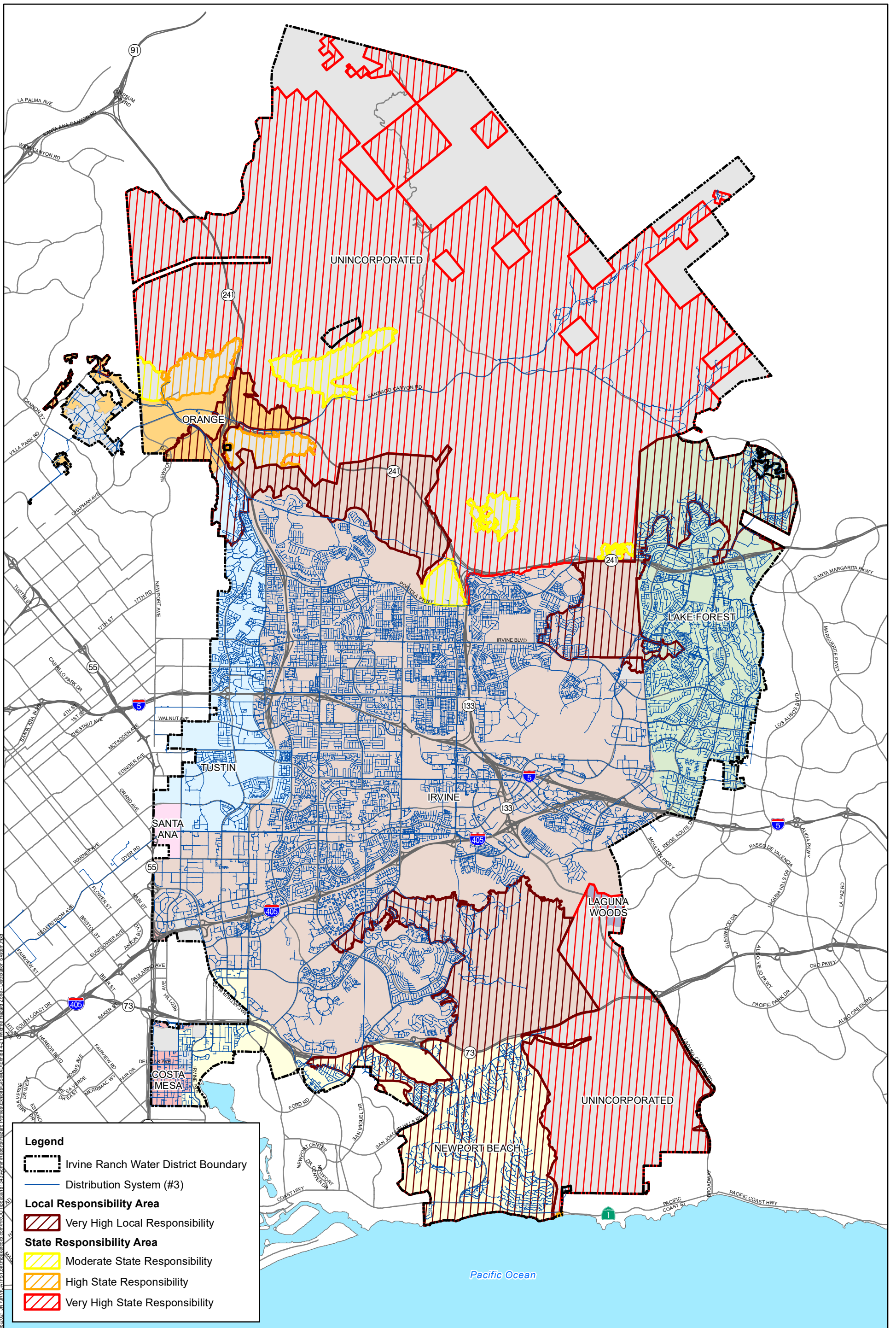
Fire season in southern California traditionally has occurred between May and September. However, it should be noted that Orange County has experienced some of its most devastating fires during the fall and winter (outside of the traditional fire season), including the Laguna Fire, Freeway Complex Fire, and recent Bond Fire, described below.

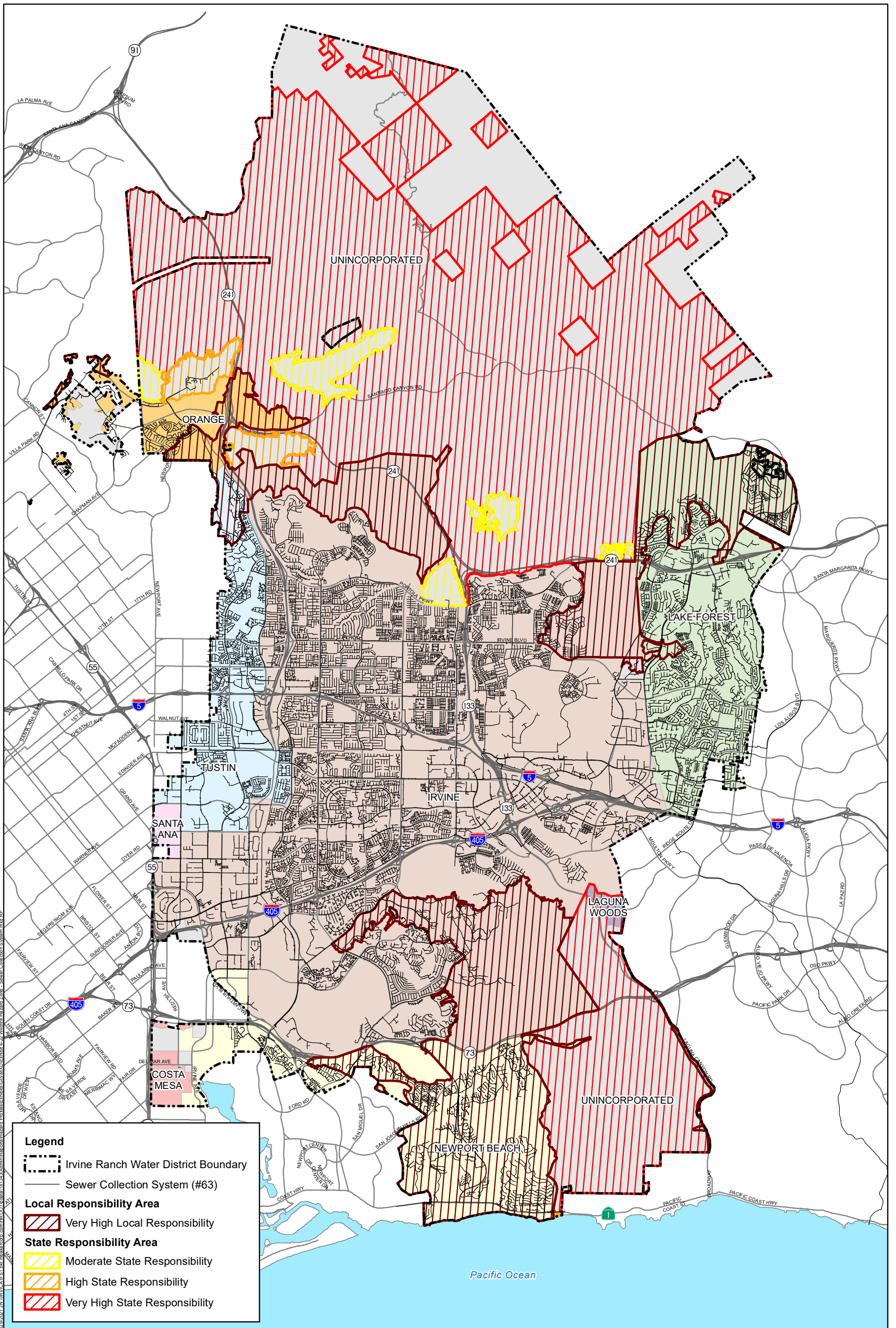
Table 4-19, *Recent Fires in Orange County*, summarizes wildfire activity in Orange County dating back to 1996. These fires have resulted in varying impacts with the amount of acreage ranging from three acres to over 23,000 acres. These fires have occurred both within and outside of what has been referred to as the traditional wildfire season. In comparison to Table 4-20, *Major Wildfires in Orange County History*, identifies the most significant historical fires in Orange County dating back to 1948 in terms of the amount of acreage claimed.



0 4,250 8,500
Feet

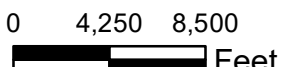
Irvine Ranch Water District Local Hazard Mitigation Plan Wildfire Hazard Zone - Critical Facilities





Legend

- Irvine Ranch Water District Boundary
- Sewer Collection System (#63)
- Local Responsibility Area**
- Very High Local Responsibility
- State Responsibility Area**
- Moderate State Responsibility
- High State Responsibility
- Very High State Responsibility



Irvine Ranch Water District Local Hazard Mitigation Plan

Wildfire Hazard Zone - Sewer Collection System

Source: IRWD, 2021, CALFIRE, 2018

**Table 4-19
Recent Fires in Orange County**

Location	Name	Begin Date	Acres Claimed
Lemon Heights	N/A	10/21/1996	Unknown
El Toro MCAS	N/A	10/13/1997	6,000
Santiago Canyon	N/A	8/31/1998	9,000
Fountain Valley	N/A	12/9/1998	Unknown
Mission Viejo	N/A	12/27/1999	38
San Clemente	N/A	8/22/2000	Unknown
San Clemente	N/A	9/11/2000	500
Laguna Beach	N/A	8/7/2001	Unknown
El Toro MCAS	N/A	9/9/2001	30
Trabuco	N/A	1/23/2002	Unknown
Anaheim	N/A	2/9/2002	2,400
Yorba Linda	N/A	4/21/2002	Unknown
Mission Viejo	N/A	5/13/2002	1,100
Los Alamitos	N/A	5/14/2002	Unknown
Mission Viejo	N/A	5/14/2002	Unknown
Costa Mesa	N/A	7/16/2002	30
Garden Grove	N/A	7/29/2002	Unknown
Yorba Linda	N/A	11/20/2002	477
Mission Viejo	N/A	11/26/2002	3
Santa Ana Mountains	Sierra Fire	2/6/2006	10,854
Santa Ana Mountains	Windy Ridge Fire	3/11/2007	2,036
Santa Ana Mountains	Santiago Fire	10/21/2007	28,400
Santa Ana Canyon	Freeway Complex Fire	11/15/2008	30,305
Santa Ana Mountains	Long Canyon	9/23/2010	40
Santa Ana Mountains	Falls Fire	8/5/2013	1,416
Santa Ana Mountains	Silverado Fire	9/12/2014	1,600
Santa Ana Mountains	Canyon Fire	9/25/2017	2,662
Anaheim Hills	Canyon 2 Fire	10/9/2017	9,000
Aliso Viejo Canyon Park	N/A	6/2/2018	200
Trabuco Canyon	Holy Fire	8/6/2018	23,136
Loma Ridge	Silverado Fire	10/26/2020	12,466
Chino Hills	Blue Ridge Fire	10/26/2020	13,964
Loma Ridge	Bond Fire	12/2/2020	6,686

Sources: National Oceanic and Atmospheric Information - National Centers for Environmental Information, *Storm Events Database*, <https://www.ncdc.noaa.gov/stormevents/>, accessed February 16, 2021; CALFIRE, 2020 CalFIRE Incidents, <https://www.fire.ca.gov/incidents/2020/>, accessed February 16, 2021.

**Table 4-20
Major Wildfires in Orange County History**

Fire Name	Year	Acres Claimed
Green River	1948	53,079
Steward	1958	69,444
Paseo Grande	1967	51,075
Indian	1980	28,408
Owl	1980	18,332
Gypsum	1982	19,986
Laguna	1993	16,682
Ortega	1993	21,010
Sierra	2006	10,584
Santiago	2007	28,517
Freeway Complex	2008	30,305
Holy Fire	2018	23,136
Silverado Fire	2020	12,466

**Table 4-20 (continued)
Major Wildfires in Orange County History**

Fire Name	Year	Acres Claimed
Blue Ridge Fire	2020	13,964
Source: County of Orange and Orange County Fire Authority, Local Hazard Mitigation Plan, adopted November 2015; CALFIRE, 2020 <i>CalFIRE Incidents</i> , https://www.fire.ca.gov/incidents/2020/ , accessed February 16, 2021.		
NOTE: Major fires in Orange County are defined as burning more than 10,000 acres in total.		

Some of the most recent fires within IRWD's service areas or within the vicinity of the service area are described below.

Silverado Fire

The most recent major fire in Orange County, the Silverado Fire originated on October 26, 2020 in Silverado Canyon. Extreme winds and low humidity levels created the most dangerous conditions seen since October 2019 in the larger Los Angeles area.⁵⁹ The cause of the fire was thought to be related to a lashing wire connected to telecommunication lines that came into contact with SCE's overhead primary conductor. Over 90,000 residents in Orange County were evacuated, primarily in the Cities of Irvine and Lake Forest, within the IRWD service area.⁶⁰ Over 1,200 firefighters were deployed, and two firefighters were critically injured. A total of five structures were destroyed, and another nine damaged. The Governor declared a State of Emergency to deploy further resources to Orange County.⁶¹

Challenges fighting the Silverado Fire emerged when the Blue Ridge Fire broke out in northeast Orange County later in the same day that the Silverado Fire began. The Blue Ridge Fire was located north of SR-91 in the Yorba Hills area. Concerns emerged as conditions for the Silverado Fire appeared to replicate the 2007 Santiago Fire footprint, but firefighting efforts were able to slow the spread before the Silverado Fire reached the same extent as the Santiago Fire. A total of 12,466 acres were burned in the Silverado Fire, and 13,964 acres were burned in the Blue Ridge Fire. IRWD facilities relied on emergency generators to maintain water service for customers and firefighting services. No facilities were damaged by the wildfire.

Bond Fire

The Bond Fire broke out on December 17, 2020, outside of the traditional southern California fire season (usually consisting of late summer to early autumn). Uncharacteristically warm temperatures combined with strong winds resulted in the wildfire spreading north of the Silverado Fire burn area, prompting evacuations in the Santa Ana mountains, Trabuco Canyon, and Portola Hills (City of Lake Forest) neighborhoods. Ultimately, 6,686 acres were burned, 31 structures destroyed and 21 structures damaged. While this wildfire is not one of the largest or most significant fires in Orange County history, this occurrence outside of the traditional fire season poses concern for future extended wildfire seasons locally.⁶² IRWD facilities relied on emergency generators to maintain water service for customers and firefighting services. No facilities were damaged by the wildfire.

⁵⁹ The Washington Post, *California wildfires force tens of thousands to evacuate Orange County amid strong winds*, <https://www.washingtonpost.com/weather/2020/10/27/california-wildfires-orange-county-winds/>, accessed May 12, 2021.

⁶⁰ The Laist, *Silverado Fire: 2 Firefighters Critically Injured, Evacuations for 90,000 Residents*, <https://laist.com/latest/post/20201026/silverado-fire-irvine-day-1>, accessed February 16, 2021.

⁶¹ CalFIRE, *2020 Incidents Mapper – Blue Ridge and Silverado Fires*, <https://www.fire.ca.gov/incidents/2020/>, accessed February 16, 2021.

⁶² CalFIRE, *Bond Fire*, <https://www.fire.ca.gov/incidents/2020/12/2/bond-fire/>, accessed February 16, 2021.

Other Wildfires

During the Santiago Wildfire in 2007, electricity and communication links were lost to nine reservoirs, six pump stations, and a small water treatment plant. IRWD crews implemented emergency operations procedures to keep the water flowing to fire fighters by connecting emergency generators, operating pumps, and manually measuring reservoir depths in areas where loss of power disabled electronic monitoring systems. Because of these efforts, water service to residents and fire fighters was maintained throughout the episode. An estimated 10 million gallons of water per day assisted in fighting the Santiago Wildfire.⁶³

IRWD experienced the loss of one facility during the Santiago Wildfire. The Portola Zone 9 Booster Pump Station (originally built in 1987, serving the Zone 9 system in Portola Hills) was destroyed during this fire. The pump station was replaced in 2008, incorporating fire-proof design and protective features. Vegetation around the facility has been removed, and the updated design is less susceptible to wildfire hazards. Additionally, the District stationed a permanent emergency generator at the booster pump station to improve the reliability of the water system during power outages caused by wildfires in the nearby canyons.⁶⁴

Probability of Future Occurrences

Wildfires have a high probability of occurring due to the developed nature and geographic extent of the FHSZ within the IRWD service area. IRWD's service area is continually exposed to Santa Ana winds during the summer and autumn; however, these winds can occur at other times of the year (as demonstrated by the recent Bond Fire). Additionally, with the increase of major regional fires in southern California, it is highly probable that fires of regional significance will occur in Orange County, Riverside County, and San Bernardino County, that could impact the IRWD service area. The wildland-urban interface is likely to experience increased rates of wildfires in future years. The recent fires in Orange County demonstrate the ability for a wildfire to begin in one place and spread to other cities or to cross county lines.

Climate Change

Several of the largest California wildfires have occurred in the past two years, including the Mendocino Complex Fire, Thomas Fire, and Carr Fire. During 2018, the Camp Fire became the deadliest wildfire in California history, killing 86 civilians and burning 153,000 acres in Butte County. Southern California experienced several severe fires in recent history, including the Woolsey Fire. Three significant wildfires occurred in Orange County during 2020, prompting mass evacuations across the IRWD service area.

Climate change and global warming patterns are expected to cause an increase in temperatures, as well as more frequent and intense drought conditions. As mentioned previously, the severity of a wildfire is dependent on the amount of oxygen, heat, wind, relative humidity, and fuel. Excessive heat and low humidity during the summer and fall months are likely to occur. It is possible that higher temperatures could cause local native chaparral and scrub ecosystems to change to grasslands. This would increase dry plant matter, which could cause wildfires to move more quickly or spread into developed areas.

It is well documented that regional wildfires will likely become an increased threat, which could have secondary consequences for IRWD. Specifically, parts of Riverside and San Bernardino counties could see wildfire risk increase between 50 and 100 percent. Wildfires release smoke, ash, and other particulate matter that substantially degrade air and water quality. Thus, fires

⁶³ Irvine Ranch Water District, *Santiago Fire – 2007*, <https://www.irwd.com/services/santiago-fire-2007>, accessed March 15, 2021.

⁶⁴ Notice of Exemption, *Project Name: Portola Zone 9 Booster Pump Station Generator Project*, November 21, 2021.

located in different parts of Orange, Riverside, or San Bernardino counties can negatively impact air and water quality within the IRWD service area.

4.3 VULNERABILITY/RISK ASSESSMENT

Vulnerability describes how exposed or susceptible to damage an asset is, and depends on an asset's construction, condition, contents, and economic value of functions. A vulnerability analysis predicts the extent of injury/damage on the built environment that may result from a hazard event of a given intensity in a specific area. Due to the interrelatedness of water and wastewater infrastructure and the key role IRWD plays in public health and safety, vulnerabilities from one hazard are often interrelated with other hazard vulnerabilities. Indirect effects can be significant and have the potential to be more widespread and damaging than direct effects. For example, damage to a major water distribution line could result in significant disruptions and outages that would far exceed the cost of repairing the distribution line. IRWD customers who were not impacted directly by the hazard impacts could be impacted by the secondary impacts.

The vulnerability assessment below quantifies, to the extent feasible using the best available data, IRWD assets at risk to hazards and estimates potential losses. This section focuses on the profiled hazards and risks specific to IRWD's jurisdiction.

4.3.1 METHODOLOGY

For each hazard profiled in [Section 4.2, *Hazard Identification and Prioritization*](#), a vulnerability/risk assessment is provided in this section. The vulnerability/risk assessment gives equal weight to all hazards, regardless of the identified probability. The specific hazard and associated probability are considered as part of the mitigation prioritization, discussed in [Section 5.0, *Mitigation Strategy*](#). This assessment considers the physical threats to IRWD critical facilities and facilities of concern. It should be noted that actual losses will depend on the type, location, magnitude, and extent of the actual hazard event.

The critical facilities and facilities of concern listed in [Section 3.0, *Jurisdictional Profile*](#), were mapped in GIS and overlaid with mapped hazard areas (those hazards that have a specific geographic area) to determine which assets are located in each hazard area. Hazard area and critical facility overlays were conducted for the following hazards: flood, landslide, fault zones, ground shaking susceptibility, liquefaction (specific to seismic conditions), wildfire and dam inundation. Dam inundation mapping included the failure of five extremely high hazard dams owned and operated by IRWD, including: Rattlesnake Canyon Dam, Sand Canyon Dam (Main Dam), Sand Canyon (Spillway), San Joaquin Dam, Santiago Dam, and Syphon Canyon Dam. Dam inundation mapping exhibits and detailed vulnerability assessment are located within [Appendix C, *Dam/Reservoir Failure Vulnerability Assessment*](#) maintained separately by IRWD.

Overlays were not prepared for the following hazards: drought, geologic hazards (land subsidence and expansive soils), human-caused hazards (hazardous materials releases, terrorism/sabotage), and severe weather. These hazards are not geographically defined and have the potential to affect the entire IRWD jurisdiction. Due to the geographic distribution of Critical Facility #3, Distribution System, and Critical Facility #63, Sewer Collection System, both facilities are identified by the number of linear miles located within the mapped hazard area. For the purposes of this LHMP and vulnerability assessment, it is assumed that drought, geologic hazards, human-caused hazards, and severe weather could impact IRWD's entire jurisdiction, including all critical facilities and facilities of concern.

Replacement values for the critical facilities and facilities of concern (where available) are provided to estimate the potential losses based on the method described above. For the critical facilities and facilities of concern that were previously identified as a “critical asset” in the IRWD Water System Risk and Resilience Assessment (RRA) (dated March 2020), the replacement costs were already identified and were extracted for use in the Vulnerability/Risk Assessment for this LHMP. For critical facilities or facilities of concern that were not included in the IRWD RRA, the LHMP Project Management Team coordinated with the IRWD Finance Department to identify replacement costs.

After coordination with the Finance Department, information was missing for seven critical facilities. For these facilities, the LHMP Project Management Team coordinated with the IRWD Engineering Department for professional judgements and opinions on critical facility replacement values. For Critical Facility #4, El Toro Diversion Structure, and Critical Facility #5, San Mateo Diversion Structure, the replacement value was based on estimates for a private lift station and an increase in size. Four lift stations (Critical Facility #12, Duck Club, Critical Facility #20, MRWP Auto Shop, Critical Facility #21, MWRP Caretaker Housing, and Critical Facility #23, San Joaquin Housing) replacement values were estimated to be \$300,000 each based on estimates for the manhole, pump, and prevailing wage costs.

Siphon replacement costs (Critical Facilities #65 to #83) were developed by identifying the diameter of the siphon, multiplying the length of the siphon by an estimated replacement cost per foot for deep sewer below a creek. This estimate is provided for informational purposes only, as there is no other cost information for siphons within the IRWD library. IRWD has inherited all siphon facilities during water district consolidation processes and has never constructed one as a district. If a hazard event resulted in a total loss or failure of any siphons, IRWD would not replace siphon facilities “as is” and instead would replace with newer technology.

Replacement costs are not included for Critical Facility #5, Met Source Water, as these facilities are maintained by the Metropolitan Water District of Orange County for the purposes of distributing imported water to IRWD.

Finally, the replacement cost for Critical Facility #3, Distribution System, is labeled as replacement for a “significant portion” of the system. The replacement cost for Critical Facility #63, Sewer Collection System, is a replacement cost for the total system. It is noted that it is unlikely that a hazard incident would cause failure of the entire distribution system or sewer collection system, but these replacement costs are included as a “worst-case” scenario evaluation.

4.3.2 VULNERABILITY/RISK ASSESSMENT

Dam/Reservoir Failure

Dam and reservoir failures have the capacity to cause environmental and property damage, loss of human life, and displacement to persons residing in the inundation path. Currently, inundation mapping is available for the following five extremely high hazard dams owned and operated by IRWD: Rattlesnake Canyon Dam, Syphon Canyon Dam, San Joaquin Dam, Santiago Creek Dam, and Sand Canyon Dam. The critical facilities within these dam inundation areas, illustrative exhibits and additional vulnerability analysis are included as [Appendix C](#).

The threat and extent of damage from dam inundation is dependent on the location of the incident and the size/severity of the failure. Dam inundation maps indicate “sunny-day” failure scenarios and estimate total failure at maximum capacity of either the dam or an appurtenant structure.

Incidents could be less severe than the mapped inundation (e.g., if a total failure occurred when the dam was at 20 percent capacity). A failure could result in critical facility and infrastructure inundation (e.g., roads, water, wastewater, electricity, natural gas), resulting in short-term interruption or extended loss of IRWD service, loss of business income, and displacement of individuals and businesses. Inundation or failure of transportation or other utility infrastructure could disrupt IRWD response to critical facilities. An immediate catastrophic dam failure, depending on the size of dam and the population downstream, could exceed the response capability of public safety personnel and resources, or significantly impair the ability to respond.

Additionally, portions of the IRWD service area are vulnerable to dam inundation and flooding from dam and reservoir facilities operated by other public agencies outside of the jurisdiction. The most significant example is Prado Dam with a gross storage capacity of 217,000 acre-feet. Inundation mapping from Prado Dam failure is not publicly accessible, and thus the potential area of impact is currently unknown.

Drought

Drought conditions would affect the entirety of IRWD's service area; therefore, all critical facilities/facilities of concern, infrastructure systems, structures, and customers within the jurisdiction are within the drought hazard area. Droughts do not typically result in physical damage to buildings and infrastructure, but instead would potentially limit the availability of water supplies for delivery to IRWD customers.

Prolonged drought conditions often result in strict conservation measures, such as targeted reduction percentages or penalties for using potable water above a specific threshold. Higher rates or penalties could disproportionately impact lower-income households or residents on a fixed income. IRWD maintains a diverse water portfolio to limit reliance on imported water. Additionally, IRWD operates in a drought-proof recycled water program to ensure reliable supplies during times of drought. Several water conservation programs implemented during the 2011 – 2017 statewide drought remain in place at IRWD, including conservation rebates and a free home water assessment for residential customers.

Flood

Flood-prone areas in IRWD's jurisdiction, as identified by FEMA, are primarily located within and adjacent to major drainages within the service area. Table 4-21, *Facilities in a Flood Hazard Zone*, identifies the critical facilities within the flood hazard zone; there are no facilities of concern located within the flood hazard zone.

Table 4-21
Facilities in a Flood Hazard Zone

Map ID	Name	Asset Type	Flood Zone	Total Loss Potential
3	Distribution System – 20.25 miles	Distribution System	FEMA 100 YR	\$790,000,000.00 ¹
3	Distribution System – 55.06 miles	Distribution System	FEMA 500 YR	\$790,000,000.00 ¹
6	Met Source Water	Intake	FEMA 100 YR	N/A
12	Duck Club	Lift Station	FEMA 100 YR	\$300,000.00
14	Irvine Park	Lift Station	FEMA 100 YR	\$2,605,484.00
21	MWRP Caretaker Housing	Lift Station	FEMA 100 YR	\$300,000.00
40	Shaw Pump Station	Pump Station	FEMA 100 YR	\$1,649,200.00
53	Read Reservoir	Reservoir	FEMA 100 YR	\$3,306,300.00

**Table 4-21 (continued)
Facilities in a Flood Hazard Zone**

Map ID	Name	Asset Type	Flood Zone	Total Loss Potential
63	Sewer Collection System – 15.06 miles	Wastewater Collection System	FEMA 100 YR	\$781,131,700.00 ²
63	Sewer Collection System – 37.94 miles	Wastewater Collection System	FEMA 500 YR	\$781,131,700.00 ²
65	S1	Siphon	FEMA 100 YR	\$585,000.00
66	S2	Siphon	FEMA 100 YR	\$1,266,000.00
67	S3	Siphon	FEMA 100 YR	\$1,302,000.00
68	S4	Siphon	FEMA 100 YR	\$1,365,000.00
69	S5	Siphon	FEMA 100 YR	\$222,000.00
70	S6	Siphon	FEMA 100 YR	\$444,000.00
72	S8	Siphon	FEMA 100 YR	\$807,000.00
73	S9	Siphon	FEMA 100 YR	\$870,000.00
74	S10	Siphon	FEMA 100 YR	\$549,000.00
75	S11	Siphon	FEMA 100 YR	\$948,000.00
77	S13	Siphon	FEMA 100 YR	\$1,122,000.00
78	S14	Siphon	FEMA 100 YR	\$432,000.00
81	S18	Siphon	FEMA 100 YR	\$807,000.00
83	S17	Siphon	FEMA 100 YR	\$324,000.00
1. Replacement cost for Critical Facility #3, Distribution System, is labeled as replacement for a “significant portion” of the system.				
2. Replacement cost for Critical Facility #63, Sewer Collection System, is labeled as replacement for a “significant portion” of the system.				

Significant flood events could result in inundation or damage to the critical facilities identified above, which could impact IRWD’s ability to provide potable water and wastewater services to customers. While there are a few potable water assets (distribution system, intake, pump station and reservoir) listed in [Table 4-21](#), the majority of the assets located within the flood zone are critical to providing prompt and efficient wastewater services. IRWD does not have any repetitive loss or severe repetitive loss properties, as defined by FEMA.

Geologic Hazards

Land subsidence and expansive soils are considered under the geologic hazards profile. Both hazards are known to exist within the majority of Orange County, and thus are assumed to apply to the entirety of the IRWD jurisdiction. Therefore, all critical facilities and facilities of concern within the IRWD service area are considered at risk for land subsidence and expansive soil hazards. Geologic hazards are more likely to result in physical damages to structures, primarily underground distribution/collection systems and the foundations for other IRWD assets. Damaged IRWD water and wastewater infrastructure could cause service interruptions, depending on the significance of the incident.

Human-Caused Hazards

Human-induced hazards have the potential to affect all of the IRWD jurisdiction, and therefore all critical facilities within the jurisdiction are within the human-induced hazards area. Hazardous materials spills could occur due to an IRWD operations related accident or an unintended release by an outside individual or entity that impacts IRWD facilities or operations. Although hazardous materials could result in damages to structures, the most significant impact is the potential human health hazards or potable water contamination. IRWD has several plans and programs in place to dictate follow-up actions in the case of unintentional release. Terrorism and sabotage attempts (including cyberattacks) are more likely to cause damage to physical structures and infrastructure systems. Recent cyberattacks against water districts have involved remotely adjusting chemical levels used in the potable water sterilization process to deadly levels if consumed by humans.

IRWD has information technology (IT) defense programs in place, and conduct tabletop exercises to evaluate and prepare for internal responses to both physical threats and cyberattacks.

The entire IRWD jurisdiction is susceptible to harm associated with a human-induced hazard. However, the extent of harm or injury is highly dependent upon the nature of the actual incident. Hazardous materials releases, terrorism, sabotage and cyberattacks could damage the environment, interfere with water quality, and delay service to IRWD customers. Damage to water and wastewater infrastructure systems could interrupt service or cause long-term outages. Hazardous materials spills that contaminate potable water sources could involve costly long-term clean-up actions and measures. Attacks focused on dam or reservoir infrastructure could cause structural failure or inundation. Cyberattacks could involve the release of sensitive IRWD data or interfere with other remote communication systems.

Landslide/Mudflow

Within the IRWD jurisdiction, areas of steep slopes are mapped as at-risk for landslides. [Table 4-22, Facilities in a Landslide Hazard Zone](#), identifies critical facilities and one facility of concern located within zones with mapped potential for landslides.

**Table 4-22
Facilities in a Landslide Hazard Zone**

Map ID	Name	Asset Type	Total Loss Potential
Critical Facilities			
3	Distribution System – 40.65 miles	Distribution System	\$790,000,000.00 ¹
8	Buck Gully	Lift Station	\$1,935,024.00
25	University	Multi-Purpose: Lift Station, Telemetry Site, Pump Station	\$6,999,844.00
27	Benner Reservoir	Pump Station	\$1,138,600.00
52	Modjeska Reservoir	Reservoir	\$4,478,500.00
53	Read Reservoir	Reservoir	\$3,306,300.00
57	Williams Canyon Reservoir	Reservoir	\$2,653,400.00
63	Collection System – 31.68 miles	Wastewater Collection System	\$781,131,700.00 ²
Facilities of Concern			
46	Chapman Reservoir	Reservoir	\$1,510,400.00
1. Replacement cost for Critical Facility #3, Distribution System, is labeled as replacement for a “significant portion” of the system. 2. Replacement cost for Critical Facility #63, Sewer Collection System, is labeled as replacement for a “significant portion” of the system.			

Critical facilities within the mapped landslide zone include both water and wastewater collection facilities, along with one reservoir listed as a facility of concern. It is noted that there are areas within the IRWD service area that may be susceptible to landslide conditions due to moisture-induced conditions or other steep slopes that were not mapped in the hazard zone. Further, areas susceptible to mudflow conditions are not specifically defined. Mudflows have historically occurred in canyon areas and have also occurred in wildfire hazard zones in the past.

Both landslides and mudslides could result in damages to critical facilities and other IRWD infrastructure. Depending on the nature of the hazard incident, landslides and mudslides could also impede access to critical facilities and infrastructure thus causing service interruptions or outages.

Seismic Hazards

The IRWD service area is located within a seismically active region, and experiences different vulnerabilities from the following seismic hazards: ground shaking, fault rupture and liquefaction. The entire IRWD jurisdiction is at risk to seismic ground shaking, and thus all critical facilities, facilities of concern and IRWD infrastructure is at risk in the event of an earthquake. The extent of damage would depend upon the location and magnitude of the earthquake. Damage to IRWD infrastructure could be significant and result in the disruption of both potable water delivery and wastewater services. Depending on the extent of the earthquake, transportation systems and other utility services (i.e., communication) could be hindered which would further disrupt the IRWD response.

Three critical facilities are within close proximity to mapped fault lines within the IRWD service area, outlined in [Table 4-23, *Facilities in a Fault Rupture Zone*](#). Fault ruptures could physically impact the outlined critical facilities by displacing foundations or underground infrastructure, potentially disrupting IRWD service.

**Table 4-23
Facilities in a Fault Rupture Zone**

Map ID	Name	Asset Type	Total Loss Potential
Critical Facilities			
3	Distribution System	Distribution System	\$790,000,000.00 ¹
17	Montecito	Lift Station	\$1,935,024.00
63	Collection System	Wastewater Collection System	\$781,131,700.00 ²
1. Replacement cost for Critical Facility #3, Distribution System, is labeled as replacement for a "significant portion" of the system.			
2. Replacement cost for Critical Facility #63, Sewer Collection System, is labeled as replacement for a "significant portion" of the system.			

The IRWD jurisdiction is also susceptible to seismic-induced liquefaction, and mapped liquefaction zones are known throughout the service area. [Table 4-24, *Facilities in a Liquefaction Hazard Zone*](#), identifies the critical facilities and facilities of concern located within the liquefaction hazard area. Similar to groundshaking and fault rupture hazards, liquefaction can physically damage critical facilities and other IRWD infrastructure, particularly pipelines within soils subject to liquefaction. Again, depending on the extent of the liquefaction incident, transportation systems and other utility services could be hindered which would further disrupt the IRWD response. Damaged infrastructure can result in IRWD service interruptions or outage.

**Table 4-24
Facilities in a Liquefaction Hazard Zone**

Map ID	Name	Asset Type	Total Loss Potential
Critical Facilities			
3	Distribution System – 475.14 miles	Distribution System	\$790,000,000.00 ¹
4	El Toro Diversion Structure	Diversion Structure	\$500,000.00
5	San Mateo Diversion	Diversion Structure	\$500,000.00
6	Met Source Water	Intake	N/A
9	Canada	Lift Station	\$3,508,247.00
12	Duck Club	Lift Station	\$300,000.00
15	Los Trancos Low Flow	Lift Station	\$1,935,024.00
18	Muddy Canyon Low Flow	Lift Station	\$1,935,024.00
19	MWRP MPS-3	Lift Station	\$4,226,529.00
21	MWRP Caretaker Housing	Lift Station	\$300,000.00
22	Newport Coast	Lift Station	\$6,999,844.00

**Table 4-24 (continued)
Facilities in a Liquefaction Hazard Zone**

Map ID	Name	Asset Type	Total Loss Potential
24	HATS Lift Station	Lift Station	\$5,115,644.00
28	Coastal OC 63-Zn.4 Pump Station	Pump Station	\$3,076,700.00
42	Williams Canyon Pump Station (Benner)	Pump Station	\$1,649,200.00
43	Michelson MWRP	Recycled Water	\$500,000,000.00
61	Foothill 6 Transmission Line	Transmission Main	\$504,104.32
63	Collection System – 387.35	Wastewater Collection System	\$781,131,700.00 ²
64	Harvard Area Trunk Diversion Structure (HATS)	Diversion Structure	\$5,115,644.00
65	S1	Siphon	\$585,000.00
66	S2	Siphon	\$1,266,000.00
67	S3	Siphon	\$1,302,000.00
68	S4	Siphon	\$1,365,000.00
69	S5	Siphon	\$222,000.00
70	S6	Siphon	\$444,000.00
71	S7	Siphon	\$1,056,000.00
72	S8	Siphon	\$807,000.00
73	S9	Siphon	\$870,000.00
74	S10	Siphon	\$549,000.00
75	S11	Siphon	\$948,000.00
76	S12	Siphon	\$738,000.00
77	S13	Siphon	\$1,122,000.00
80	S16	Siphon	\$951,000.00
81	S18	Siphon	\$807,000.00
82	S19	Siphon	\$180,000.00
Facilities of Concern			
2	Michelson Biosolids	Biosolids Treatment	\$250,000,000.00
26	Michelson Operations Center	Operations Staff Offices	\$20,900,000.00
44	Los Alisos Water Recycling Plant (LAWRP)	Recycling Plant	\$10,185,000.00
1. Replacement cost for Critical Facility #3, Distribution System, is labeled as replacement for a “significant portion” of the system. 2. Replacement cost for Critical Facility #63, Sewer Collection System, is labeled as replacement for a “significant portion” of the system.			

Severe Weather

Severe weather includes winter storms and windstorms (Santa Ana winds). Both of these natural hazards could impact the entire IRWD service area; therefore, all critical facilities and the entirety of the jurisdiction is located within a severe weather hazard area. Heavy rain events and Santa Ana winds could cause damage to IRWD infrastructure, although it is usually not significant enough to impact service operations or critical facilities.

Power outages are more likely to occur during a severe weather event, primarily strong associated with Santa Ana wind events. Proactive power outages are becoming more common during predicted strong Santa Ana wind conditions due to the risk of wildfires. The associated power outages impact IRWD’s ability to deliver water and wastewater services and require IRWD to rely on generators while SCE power is unavailable.

Wildfire

A significant portion of the IRWD service area is located within a fire hazard zone (ranked very high, high, and moderate). Table 4-25, *Facilities in a Wildfire Hazard Zone*, identifies the critical

facilities and facilities of concern located within the fire hazard zones. These include both water and wastewater facilities.

**Table 4-25
Facilities in a Wildfire Hazard Zone**

Map ID	Name	Asset Type	Wildfire Hazard Zone	Total Loss Potential
Critical Facilities				
3	Distribution System – 184.77 miles	Distribution System	Very High Local Responsibility	\$790,000,000.00 ¹
3	Distribution System – 36.81 miles	Distribution System	Very High, High and Moderate State Responsibility	\$790,000,000.00 ¹
6	Met Source Water	Intake	Very High Local Responsibility	N/A
8	Buck Gully	Lift Station	Very High Local Responsibility	\$1,935,024.00
10	Coastal Ridge	Lift Station	Very High Local Responsibility	\$2,605,484.00
11	Coyote Canyon	Lift Station	Very High Local Responsibility	\$2,605,484.00
14	Irvine Park	Lift Station	High State Responsibility	\$2,605,484.00
15	Los Trancos Low Flow	Lift Station	Very High Local Responsibility	\$1,935,024.00
17	Montecito	Lift Station	Very High Local Responsibility	\$1,935,024.00
18	Muddy Canyon Low Flow	Lift Station	Very High State Responsibility	\$1,935,024.00
22	Newport Coast	Lift Station	Very High Local Responsibility	\$6,999,844.00
23	San Joaquin Housing	Lift Station	Very High Local Responsibility	\$300,000.00
27	Benner Reservoir	Pump Station	Very High State Responsibility	\$1,138,600.00
29	Coastal Zn 6-7 Pump Station	Pump Station	Very High Local Responsibility	\$2,671,800.00
30	Coastal Zn. 4-6 Pump Station	Pump Station	Very High Local Responsibility	\$2,268,700.00
31	Fleming Pump Station	Pump Station	Very High State Responsibility	\$2,268,700.00
32	Foothill Zn 4-6 Pump Station	Pump Station	Very High Local Responsibility	\$3,076,700.00
33	Foothill Zn 6-6A Pump Station	Pump Station	Very High Local Responsibility	\$2,671,800.00
35	Manning Pump Station	Pump Station	Very High State Responsibility	\$1,649,200.00
36	Portola Hills Zn 6-8	Pump Station	Very High Local Responsibility	\$3,076,700.00
37	Portola Hills Zn 8-9 Pump Station	Pump Station	Very High Local Responsibility	\$3,076,700.00
38	Read Pump Station	Pump Station	Very High State Responsibility	\$1,649,200.00
40	Shaw Pump Station	Pump Station	Very High State Responsibility	\$1,649,200.00
42	Williams Canyon Pump Station (Benner)	Pump Station	Very High State Responsibility	\$1,649,200.00
47	Coastal Zn 4 Reservoir	Reservoir	Very High Local Responsibility	\$8,813,300.00
48	Coastal Zn 6 Reservoir	Reservoir	Very High Local Responsibility	\$1,230,590.00
49	Fleming Reservoir	Reservoir	Very High State Responsibility	\$1,556,800.00
53	Read Reservoir	Reservoir	Very High State Responsibility	\$3,306,300.00
55	Shaw Reservoir	Reservoir	Very High State Responsibility	\$1,728,100.00
57	Williams Canyon Reservoir	Reservoir	Very High State Responsibility	\$2,653,400.00
61	Foothill 6 Transmission Line	Transmission Line	Very High Local Responsibility	\$504,104.32
63	Collection System – 148.58	Wastewater Collection System	Very High Local Responsibility	\$781,131,700.00 ²
63	Collection System – 2.68	Wastewater Collection System	Very High, High and Moderate State Responsibility	\$781,131,700.00 ²
71	S7	Siphon	Very High Local Responsibility	\$1,056,000.00
78	S14	Siphon	Very High Local Responsibility	\$432,000.00
79	S15	Siphon	Very High Local Responsibility	\$915,000.00
Facilities of Concern				
46	Chapman Reservoir	Reservoir	Very High State Responsibility	\$1,510,400.00
50	Foothill Zn 6 Reservoir	Reservoir	Very High Local Responsibility	\$7,794,900.00
1. Replacement cost for Critical Facility #3, Distribution System, is labeled as replacement for a “significant portion” of the system.				
2. Replacement cost for Critical Facility #63, Sewer Collection System, is labeled as replacement for a “significant portion” of the system.				

Depending upon the location and extent of the wildfire, transportation routes could become impaired or inaccessible and as a result limit IRWD’s ability to respond to threatened critical facilities.

4.3.3 LAND USE AND DEVELOPMENT TRENDS/CHANGES IN DEVELOPMENT

IRWD is the primary water and wastewater provider to a service area that equals approximately 20 percent of Orange County. It is estimated IRWD serves a daytime population greater than 600,000 individuals with over 118,263 drinking water service connections and a residential population of 425,208. Depending on the hazard and its magnitude and duration, a considerable number of people and businesses could be impacted. The primary concern is a hazard event that results in the loss of water supply and wastewater services to the IRWD jurisdiction. As discussed above, a variety of hazards could impact vulnerable infrastructure, as well as indirect damage resulting from business disruption.

Although Orange County is generally urbanized and nearly built out, the Southern California Association of Governments (SCAG) projects continued population, employment, and housing growth into 2045. The SCAG 6th Cycle Final Regional Housing Needs Assessment (RHNA) Allocation Plan was approved in March 2021 and identifies housing growth by county and city to accommodate projected population growth needs. The County of Orange and all cities are currently in the process of updating their respective Housing Elements to accommodate the RHNA projected housing needs. The RHNA Allocation for IRWD customer cities is outlined in Table 4-26, RHNA Allocation for IRWD Customer Cities. It is important to note that the RHNA allocation for the City of Irvine would be planned within the IRWD service area. The remaining jurisdictions (City of Costa Mesa, Lake Forest, Newport Beach, Orange and unincorporated Orange County) only have a portion of land located within the IRWD service area. Thus, the total RHNA allocation is not expected to occur entirely in the IRWD service area. Planned growth within these jurisdictions may occur within the IRWD service area to varying extents, and locations for new housing units would not be finalized until the adoption of the jurisdiction’s updated Housing Element.

**Table 4-26
RHNA Allocation for IRWD Customer Cities**

Jurisdiction	Total RHNA Allocation	RHNA Allocation by Income Level			
		Very-Low Income	Low Income	Moderate Income	Above Moderate Income
City of Costa Mesa ¹	11,760	2,919	1,794	2,088	4,959
City of Irvine ²	23,610	6,396	4,235	4,308	8,671
City of Lake Forest ¹	3,236	956	543	559	1,178
City of Newport Beach ¹	4,845	1,456	930	1,050	1,409
City of Orange ¹	3,936	1,067	604	677	1,588
City of Tustin ¹	6,782	1,724	1,046	1,132	2,880
Unincorporated Orange County ¹	10,406	3,139	1,866	2,040	3,361

1. Only a portion of the listed City/unincorporate County jurisdiction is located within the IRWD service area. Thus, the total RHNA allocation is not expected to occur entirely in the IRWD service area, but areas of planned growth may be located within the portions of the IRWD service area.
2. The entirety of the City of Irvine is located within IRWD jurisdiction, and thus this planned growth would occur within the IRWD service area.
Source: Southern California Association of Government, *SCAG 6th Cycle Final RHNA Allocation Plan (Approved by HCD on 3/22/31)*, <https://scag.ca.gov/sites/main/files/file-attachments/6th-cycle-rhna-final-allocation-plan.pdf?1616462966>, accessed May 12, 2021.

The County of Orange and IRWD’s customer cities maintain General Plans that identify planned growth and development for their respective jurisdictions, including both residential and non-residential land uses. At the time of this LHMP writing, growth is specifically occurring within the City of Irvine and City of Tustin (with significant residential and commercial developments planned within the Great Park/historic Marine Corps Air Station El Toro and Tustin Legacy/historic Marine

Corps Air Station Tustin). IRWD will continue to work with customer cities and the community to identify service needs, including the construction, expansion, or modification of water and wastewater infrastructure. The construction of new facilities or infrastructure would be completed in coordination with customer cities to ensure compliance with appropriate codes and regulations, including consideration of potential hazards.

Due to the highly developed nature of the IRWD service area, along with the presence of natural hazards throughout the jurisdiction, development and population growth has continued to occur within areas of risk. Recent drought conditions have placed a greater emphasis on the ability for new development to be served by water supplies and planning for prolonged drought conditions. Recent wildfire activity (including wildfires outside the traditional wildfire season) has blurred the edge of the urban-wilderness interface and are bringing hazardous conditions closer to urbanized areas. IRWD continues to coordinate with the applicable public safety agencies to meet the demands of the respective communities while strengthening local infrastructure and overall reliability of service in the event of a hazard. IRWD has modified infrastructure with these hazards in mind to mitigate potential threats.

4.3.4 VULNERABLE POPULATIONS

Water supplies used for safe drinking, sanitation and hygiene are relied upon by the entire population. The social threat to IRWD customers is generally discussed in this section, as specific population data pertaining to vulnerable populations is not readily available. However, it is noted that there are populations within the IRWD service area that would be considered more vulnerable in the event of a hazard that affects water and wastewater infrastructure. Hazard events may have different impacts on different vulnerable populations. Vulnerable populations include those that are reliant on others for their wellbeing, such as young children, individuals with disabilities, individuals dependent on medical equipment, and individuals with impaired mobility, as well as people with low socioeconomic levels. Age, socioeconomic status, access to services, physical and mental conditions, and other conditions affect the ability to prepare for and respond to a hazard event. Disabled persons typically are unable to care for themselves completely and they rely on others. Lower-income households are less likely to have financial resources to implement mitigation actions in their homes and are less likely to have the financial means to recover as a result of a hazard event. Both disabled persons and lower-income households may not have access to other drinking water sources if potable water supplies were cut off and may not have the ability to purchase supplies elsewhere. Depending on the nature of the hazard incident, the ability to travel out of the affected area could be challenging or impossible if water/wastewater services are interrupted for a period of time. Due to the dynamic nature of hazards, the extent of impacts can vary greatly. Vulnerable populations are more significantly impacted in the event of a natural or man-made disaster.

4.3.5 SUMMARY OF VULNERABILITY

Table 4-27, *Risk Assessment Summary*, shows a summary of critical facilities and facilities of concern that intersect with hazards in the IRWD service area. These critical facilities that intersect with a hazard area are indicated with a “Y” and a red-shaded cell. Critical facilities that do not fall within the hazard area are designated with an “N” and a green-shaded cell. The risks of drought, geologic hazards (land subsidence and expansive soils), human-caused hazards (hazardous materials releases, terrorism/sabotage), and severe weather are equal throughout the jurisdiction.

**Table 4-27
Risk Assessment Summary**

Map ID	Facility	Dam/Reservoir Failure	Drought	Flood	Geologic Hazards	Human-Caused Hazards	Landslide/Mudslide	Seismic Hazards – Liquefaction	Seismic Hazards – Ground Shaking	Seismic Hazards – Fault Rupture	Severe Weather	Wildfire
1	Headquarters Building	N	Y	N	Y	Y	N	N	Y	N	Y	N
2	Michelson Biosolids	Y	Y	N	Y	Y	N	Y	Y	N	Y	N
3	Distribution System	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4	El Toro Diversion Structure	N	Y	N	Y	Y	N	Y	Y	N	Y	N
5	San Mateo Diversion	N	Y	N	Y	Y	N	Y	Y	N	Y	N
6	Met Source Water	Y	Y	Y	Y	Y	N	Y	Y	N	Y	Y
7	Bayview	N	Y	N	Y	Y	N	N	Y	N	Y	N
8	Buck Gully	N	Y	N	Y	Y	Y	N	Y	N	Y	Y
9	Canada	N	Y	N	Y	Y	N	Y	Y	N	Y	N
10	Coastal Ridge	N	Y	N	Y	Y	N	N	Y	N	Y	Y
11	Coyote Canyon	Y	Y	N	Y	Y	N	N	Y	N	Y	Y
12	Duck Club	N	Y	Y	Y	Y	N	Y	Y	N	Y	N
13	El Morro School	N	Y	N	Y	Y	N	N	Y	N	Y	N
14	Irvine Park	Y	Y	Y	Y	Y	N	N	Y	N	Y	Y
15	Los Trancos Low Flow	N	Y	N	Y	Y	N	Y	Y	N	Y	Y
16	Michelson	N	Y	N	Y	Y	N	N	Y	N	Y	N
17	Montecito	N	Y	N	Y	Y	N	N	Y	Y	Y	Y
18	Muddy Canyon Low Flow	N	Y	N	Y	Y	N	Y	Y	N	Y	Y
19	MWRP MPS-3	Y	Y	N	Y	Y	N	Y	Y	N	Y	N
20	MWRP Auto Shop	N	Y	N	Y	Y	N	N	Y	N	Y	N
21	MWRP Caretaker Housing	N	Y	Y	Y	Y	N	Y	Y	N	Y	N
22	Newport Coast	N	Y	N	Y	Y	N	Y	Y	N	Y	Y
23	San Joaquin Housing	N	Y	N	Y	Y	N	N	Y	N	Y	Y
24	HATS Lift Station	N	Y	N	Y	Y	N	Y	Y	N	Y	N
25	University	Y	Y	N	Y	Y	Y	N	Y	N	Y	N
26	Michelson Operations Center	Y	Y	N	Y	Y	N	Y	Y	N	Y	N
27	Benner Reservoir	N	Y	N	Y	Y	Y	N	Y	N	Y	Y
28	Coastal OC 63-Zn.4 Pump Station	N	Y	N	Y	Y	N	Y	Y	N	Y	N
29	Coastal Zn 6-7 Pump Station	N	Y	N	Y	Y	N	N	Y	N	Y	Y
30	Coastal Zn. 4-6 Pump Station	N	Y	N	Y	Y	N	N	Y	N	Y	Y
31	Fleming Pump Station	N	Y	N	Y	Y	N	N	Y	N	Y	Y
32	Foothill Zn 4-6 Pump Station	N	Y	N	Y	Y	N	N	Y	N	Y	Y
33	Foothill Zn 6-6A Pump Station	N	Y	N	Y	Y	N	N	Y	N	Y	Y
34	Lake Forest 4 - 5 West	N	Y	N	Y	Y	N	N	Y	N	Y	N
35	Manning Pump Station	N	Y	N	Y	Y	N	N	Y	N	Y	Y
36	Portola Hills Zn 6-8	N	Y	N	Y	Y	N	N	Y	N	Y	Y
37	Portola Hills Zn 8-9 Pump Station	N	Y	N	Y	Y	N	N	Y	N	Y	Y
38	Read Pump Station	N	Y	N	Y	Y	N	N	Y	N	Y	Y
39	Santiago Hills Zn 5-6	N	Y	N	Y	Y	N	N	Y	N	Y	N
40	Shaw Pump Station	N	Y	Y	Y	Y	N	N	Y	N	Y	Y
41	Turtle Rock Zn 3-4 Pump Station	N	Y	N	Y	Y	N	N	Y	N	Y	N
42	Williams Canyon Pump Station (Benner)	N	Y	N	Y	Y	N	Y	Y	N	Y	Y
43	Michelson MWRP	Y	Y	N	Y	Y	N	Y	Y	N	Y	N

**Table 4-27 (continued)
Risk Assessment Summary**

Map ID	Facility	Dam/Reservoir Failure	Drought	Flood	Geologic Hazards	Human-Caused Hazards	Landslide/Mudslide	Seismic Hazards – Liquefaction	Seismic Hazards – Ground Shaking	Seismic Hazards – Fault Rupture	Severe Weather	Wildfire
44	Los Alisos Water Recycling Plant (LAWRP)	N	Y	N	Y	Y	N	Y	Y	N	Y	N
45	Central Irvine Zn 1 Reservoir	N	Y	N	Y	Y	N	N	Y	N	Y	N
46	Chapman Reservoir	N	Y	N	Y	Y	Y	N	Y	N	Y	Y
47	Coastal Zn 4 Reservoir	N	Y	N	Y	Y	N	N	Y	N	Y	Y
48	Coastal Zn 6 Reservoir	N	Y	N	Y	Y	N	N	Y	N	Y	Y
49	Fleming Reservoir	N	Y	N	Y	Y	N	N	Y	N	Y	Y
50	Foothill Zn 6 Reservoir	N	Y	N	Y	Y	N	N	Y	N	Y	Y
51	Lake Forest Zn 4 Tank 1 & Tank 2	N	Y	N	Y	Y	N	N	Y	N	Y	N
52	Modjeska Reservoir	N	Y	N	Y	Y	Y	N	Y	N	Y	N
53	Read Reservoir	N	Y	Y	Y	Y	Y	N	Y	N	Y	Y
54	Santiago Canyon Zn 5	N	Y	N	Y	Y	N	N	Y	N	Y	N
55	Shaw Reservoir	N	Y	N	Y	Y	N	N	Y	N	Y	Y
56	Turtle Rock Zn 3	N	Y	N	Y	Y	N	N	Y	N	Y	N
57	Williams Canyon Reservoir	N	Y	N	Y	Y	Y	N	Y	N	Y	Y
58	Enterprise Information System	N	Y	N	Y	Y	N	N	Y	N	Y	N
59	SCADA System	N	Y	N	Y	Y	N	N	Y	N	Y	N
60	Bayview Telemetry	N	Y	N	Y	Y	N	N	Y	N	Y	N
61	Foothill 6 Transmission Line	N	Y	N	Y	Y	N	Y	Y	N	Y	Y
62	Deep Aquifer Treatment System (DATS)	Y	Y	N	Y	Y	N	N	Y	N	Y	N
63	Collection System	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
64	Harvard Area Trunk Diversion Structure (HATS)	N	Y	N	Y	Y	N	Y	Y	N	Y	N
65	S1	Y	Y	Y	Y	Y	N	Y	Y	N	Y	N
66	S2	Y	Y	Y	Y	Y	N	Y	Y	N	Y	N
67	S3	Y	Y	Y	Y	Y	N	Y	Y	N	Y	N
68	S4	Y	Y	Y	Y	Y	N	Y	Y	N	Y	N
69	S5	Y	Y	Y	Y	Y	N	Y	Y	N	Y	N
70	S6	Y	Y	Y	Y	Y	N	Y	Y	N	Y	N
71	S7	N	Y	N	Y	Y	N	Y	Y	N	Y	Y
72	S8	N	Y	Y	Y	Y	N	Y	Y	N	Y	N
73	S9	N	Y	Y	Y	Y	N	Y	Y	N	Y	N
74	S10	Y	Y	Y	Y	Y	N	Y	Y	N	Y	N
75	S11	N	Y	Y	Y	Y	N	Y	Y	N	Y	N
76	S12	N	Y	N	Y	Y	N	Y	Y	N	Y	N
77	S13	N	Y	Y	Y	Y	N	Y	Y	N	Y	N
78	S14	N	Y	Y	Y	Y	N	N	Y	N	Y	Y
79	S15	N	Y	N	Y	Y	N	N	Y	N	Y	Y
80	S16	Y	Y	N	Y	Y	N	Y	Y	N	Y	N
81	S18	Y	Y	Y	Y	Y	N	Y	Y	N	Y	N
82	S19	Y	Y	N	Y	Y	N	Y	Y	N	Y	N
83	S17	N	Y	Y	Y	Y	N	N	Y	N	Y	N

SECTION 5: MITIGATION STRATEGY

Hazard mitigation strategies are used to reduce hazard impacts on critical facilities and facilities of concern identified by IRWD. This section is developed from an in-depth review of the vulnerabilities and capabilities described in the previous plan section. Overall, the actions represent IRWD's approach for reducing and/or eliminating the potential losses as identified in the Vulnerability/Risk Assessment section.

5.1 HAZARD MITIGATION OVERVIEW

5.1.1 FEMA'S NATIONAL FLOOD INSURANCE PROGRAM

The National Flood Insurance Program (NFIP) provides affordable flood insurance to property owners, renters, and businesses by encouraging communities to adopt and enforce floodplain management regulations. Participation in the NFIP is optional; however, property owners who live in a non-participating community with flood-prone areas are not able to buy flood insurance through the program. Communities with mapped floodplains cannot receive federal grants or loans for development activities in flood-prone areas and cannot receive federal disaster assistance to repair flood damaged buildings in mapped floodplains if they are not participants of the NFIP.

All customer cities within the IRWD service area are participants in the NFIP¹, including Costa Mesa, Irvine, Lake Forest, Newport Beach, Orange, and Tustin. As a water purveyor, IRWD does not participate directly in the NFIP but instead participates in the program through the six customer cities. As each city has adopted floodplain management regulations that meet or exceed the NFIP requirements, IRWD infrastructure is plan checked and evaluated against the appropriate regulations during the permitting process. Thus, IRWD participates in the NFIP through coordination with customer cities. At the time of this LHMP writing, IRWD does not purchase flood insurance through the NFIP and instead purchases flood insurance through a separate mechanism.

5.1.2 HAZARD MITIGATION GOALS

The mitigation goals (presented in [Section 1.0, *Introduction and Purpose*](#)) serve as the basis for direction to promote sound public policy designed to protect IRWD critical facilities, facilities of concern, and infrastructure from hazard incidents. The plan goals guide the direction of future IRWD activities aimed at reducing risk and preventing loss or interruption of water/wastewater services from hazards. The goals also serve as checkpoints as IRWD begins to implement mitigation action items.

The hazard mitigation actions identified below list the activities that IRWD will use to reduce risk of potential hazards. These mitigation actions were identified through discussions and collaboration with the LHMP Project Management Team, LHMP Planning Team, and direct conversations with specific department managers at IRWD. Some of these actions may be eligible for funding through federal and State grant programs, or other funding sources as made available to IRWD. The mitigation actions are intended to address the comprehensive range of identified hazards. Several actions may address risk reduction from multiple hazards (specifically outlined as appropriate).

¹ Federal Emergency Management Agency, *FEMA's National Flood Hazard Layer (NFHL) Viewer*, <https://hazards-fema.maps.arcgis.com/apps/webappviewer/index.html?id=8b0adb51996444d4879338b5529aa9cd>, accessed May 25, 2021.

5.1.3 HAZARD MITIGATION PRIORITIZATION

The LHMP Project Management Team and the LHMP Planning Team discussed each mitigation action to identify the priority, using the following as guidance:

- **High Priority:** Top organizational priority and is generally a well-detailed project idea. Protects population, resource, or property at high risk. Uses feasible methods, techniques, or technology.
- **Medium Priority:** A good idea that needs more information or is an action that addresses a moderate hazard.
- **Low Priority:** An idea that needs a lot more information or will take a lot of preliminary action to build support.

The hazard ranking completed as part of the first LHMP Planning Team meeting and additional discussion during the fourth LHMP Planning Team meeting influenced the priority/timeline of the specific mitigation action. For example, some actions may require further study or information but were identified as a high priority because of current conditions (i.e., heightened risk of the hazard, probability of future occurrences, or lack of redundancy established in a specific portion of the service area). Several actions were identified as high priority, while the nature and complexity of the action involves a “long-term” timeline of five or more years. The LHMP Planning Team considered the frequency and severity of the hazard; the vulnerability of IRWD critical facilities and infrastructure; the impacts the mitigation action would avoid or reduce; the benefits of the action on the community; the critical facilities that would benefit; the environmental benefits of the action; and the capability of IRWD (and external partners, when appropriate) to implement the action.

The LHMP Planning Team reviewed the STAPLE/E (Social, Technical, Administrative, Political, Legal, Economic, and Environmental) criteria, as described in [Table 5-1, *STAPLE/E Review and Selection Criteria*](#), when considering and prioritizing the mitigation actions. This methodology, as endorsed by FEMA, provides for social, technical, administrative, political, legal, economic, and environmental factors to be considered when reviewing potential actions.

5.1.4 HAZARD MITIGATION BENEFIT – COST REVIEW

FEMA requires LHMP preparers to analyze the benefits and costs of a range of mitigation actions that can reduce the effects of each hazard within their communities. Benefit-cost analysis is used in hazard mitigation to show if the benefits to life and property protected through mitigation efforts exceed the cost of the mitigation activity. Conducting benefit-cost analysis for a mitigation activity can assist communities in determining whether a project is worth undertaking now in order to avoid disaster-related damages later. The analysis is based on calculating the frequency and severity of a hazard, avoiding future damages, and risk.

**Table 5-1
STAPLE/E Review and Selection Criteria**

STAPLE/E REVIEW	SELECTION CRITERIA
Social	<ul style="list-style-type: none"> Is the proposed action socially acceptable to the jurisdiction and surrounding community? Are there equity issues involved that would mean that one segment of the jurisdiction and/or community is treated unfairly? Will the action cause social disruption?
Technical	<ul style="list-style-type: none"> Will the proposed action work? Will it create more problems than it solves? Does it solve a problem or only a symptom? Is it the most useful action in light of other jurisdiction goals?
Administrative	<ul style="list-style-type: none"> Can the jurisdiction implement the action? Is there someone to coordinate and lead the effort? Is there sufficient funding, staff, and technical support available? Are there ongoing administrative requirements that need to be met?
Political	<ul style="list-style-type: none"> Is the action politically acceptable? Is there public support both to implement and to maintain the project?
Legal	<ul style="list-style-type: none"> Is the jurisdiction authorized to implement the proposed action? Are there legal side effects? Could the activity be construed as a taking? Will the jurisdiction be liable for action or lack of action? Will the activity be challenged?
Economic	<ul style="list-style-type: none"> What are the costs and benefits of this action? Do the benefits exceed the costs? Are initial, maintenance, and administrative costs considered? Has funding been secured for the proposed action? If not, what are the potential funding sources (public, nonprofit, and private)? How will this action affect the fiscal capability of the jurisdiction? What burden will this action place on the tax base or local economy? What are the budget and revenue effects of this activity? Does the action contribute to other jurisdiction goals? What benefits will the action provide?
Environmental	<ul style="list-style-type: none"> How will the action affect the environment? Will the action need environmental regulatory approvals? Will it meet local and State regulatory requirements? Are endangered or threatened species likely to be affected?

A hazard mitigation plan must demonstrate that a process was employed which emphasized a review of benefits and costs when prioritizing the mitigation actions. The benefit-cost review must be comprehensive to the extent that it can evaluate the monetary as well as the nonmonetary benefits and costs associated with each action. The benefit-cost review should at least consider the following questions:

- How many customers will benefit from the action?
- How large an area is impacted? Which areas would benefit from the action?
- How critical are the facilities that benefit from the action (e.g., which is more beneficial to protect, the lift station or the administrative building)?
- Environmentally, does it make sense to do this project for the overall service area?

These questions were considered to help determine the appropriateness of mitigation actions. Those actions that did not have adequate benefits to IRWD were excluded from the list of mitigation actions.

5.2 HAZARD MITIGATION OVERVIEW

The LHMP Project Management Team and Planning Team worked together to identify mitigation actions and establish the responsible department, priority level and timeline. The process used is outlined below:

- Review of the vulnerability and risk assessment presented in Section 4.0;
- Review of the capability's assessment presented in Section 5.3;
- Review of the results of the community survey and feedback received as part of the focus outreach meetings; and
- The LHMP Planning Team's discussion of concerns/issues that need to be addressed to reduce hazards to critical facilities and the community.

Table 5-2, Hazard Mitigation Actions, identifies the mitigation action, hazard(s) addressed, the IRWD Department (and external partner, when appropriate) responsible for implementation, priority, and implementation timeline. The timeline for implementation is defined as follows:

- Ongoing: currently in process; or, 1-2 years and ongoing thereafter;
- Short-Term: 1 to 2 years;
- Medium-Term: 3 to 4 years; and
- Long-Term: 5+ years.

The majority of mitigation actions outlined below are anticipated to be funded through the IRWD budget. However, IRWD may also explore funding for specific mitigation actions through local, state, or federal grant programs.

**Table 5-2
Hazard Mitigation Actions**

#	Mitigation Action	Hazard(s) Assessed	Responsible Department	Priority	Timeline
1	Coordinate with the County of Orange for opportunities to allow shared communication space on cell towers for IRWD. Shared space would allow for IRWD SCADA radio communication only.	All Hazards	Information Systems	High	Ongoing
2	Build redundancy into the wastewater collection, treatment, disposal, and non-potable distribution system to mitigate major structural defects.	All Hazards	Recycling Operations, Engineering	High	Ongoing
3	Identify additional back-up communication systems (such as satellite phones or radio) for purchase, to utilize if primary communication systems become unavailable. Ensure that coverage includes the entirety of the IRWD service area. Include annual training opportunities.	All Hazards	Safety, Information Services, Facilities/Fleet	High	Short Term
4	Develop a technical communications plan to build redundancy and evaluate the cost/benefit and feasibility of different communications systems.	All Hazards	Safety, Information Services, Facilities/Fleet	High	Short Term
5	Implement and maintain both internal and external alert/warning systems to effectively communicate hazard threats to staff and customers. Include utilization of the alert/warning system in a regular training program.	All Hazards	Customer Service, Safety, Public Affairs	High	Ongoing
6	Implement and maintain information sharing mechanisms/platforms for involved departments to utilize during a disaster response. Ensure the platform can be viewed on network devices and mobile devices, while maintaining data security.	All Hazards	Safety, Information Services	High	Short Term
7	Evaluate and study the practicality of an alternate regulatory lab, in the case of failure at Michelson. Consider the feasibility of locating and certifying an alternative regulatory lab site at LAWRP.	All Hazards	Water Quality	Low	Medium Term
8	Develop and maintain Specific Hazard Response Plans (SHRPs) as vulnerabilities become apparent. Include SHRPS in regular training and exercise programs.	All Hazards	Safety, related departments	Medium	Ongoing
9	Maintain Water Emergency Response Organization of Orange County (WEROC) membership for communication and collaboration opportunities with regional water districts, including identification and implementation of mitigation actions with shared benefits.	All Hazards	Safety	High	Ongoing
10	Enhance phone system to support phone connectivity when people are working offsite through Voice over Internet Protocol (VoIP).	All Hazards	Information Services	Medium	Ongoing
11	Establish alternate route mapping for critical facilities that avoid bridges, and incorporate into the IRWD EOP once complete.	All Hazards	Engineering, Water Operations, Recycling Operations, Safety	Medium	Medium Term
12	Conduct an update of the IRWD Energy and Greenhouse Gas Master Plan.	All Hazards	Water Resources	Medium	Long Term

**Table 5-2 (continued)
 Hazard Mitigation Actions**

#	Mitigation Action	Hazard(s) Assessed	Responsible Department	Priority	Timeline
13	Evaluate dam improvements to increase resiliency in coordination with the Dam Safety Program and Implementation Plan.	Dam/Reservoir Failure	Engineering	High	Ongoing
14	Seek funding opportunities to further study, plan and implement the IRWD potable reuse program.	Drought	Water Resources	Medium	Medium Term
15	Continue to proactively monitor drought conditions or water conservation warnings issued by state agencies or regional water authorities.	Drought	Water Resources	Medium	Ongoing
16	Prepare a Recycled Water Shortage Contingency Plan.	Drought	Water Resources	Medium	Short Term
17	Implement the Kern Fan Groundwater Storage Project. The project develops water recharge and recovery facilities in the San Joaquin Valley Groundwater Basin to recharge, store, recover and deliver State Water Project water, Central Valley Project water, Kern River water available with existing right holders, and water from other sources when available.	Drought	Water Resources	Medium	Long Term
18	Implement the Syphon Reservoir Improvement Project to increase the capacity of the existing reservoir. The existing dam would be replaced with a new and larger engineered dam and allow for additional recycled water storage during periods of low demand (winter months) for use during periods of high demand.	Drought	Engineering Department	Medium	Medium Term
19	<p>Conduct an inflow & infiltration study to determine where 50 year and 100 year flood waters would collect. Study outcomes should include the following:</p> <ul style="list-style-type: none"> • What assets, including the collections conveyance system, would be affected? • What facilities or equipment would need rehabilitation or replacement after a 50 year or 100 year flood? How should that work be prioritized? • What would be the cost of the necessary temporary equipment to get the service area up and running, during the replacement/rehabilitation project? • How would these impacts on the wastewater system affect potable water operations? Will they contaminate storage wells? • How would this affect IRWD's recycled water business? • What measures could IRWD take to prevent or mitigate any of the identified damage? 	Flood	Engineering, Recycling Operations	Low	Long Term
20	Assess permanently elevating water-sensitive equipment and anchoring fuel tanks in flood-prone locations.	Flood	Engineering	Low	Long Term
21	Regularly check and maintain radar flood level gauges located in San Diego Creek.	Flood	Electrical and Instrumentation	High	Ongoing

**Table 5-2 (continued)
 Hazard Mitigation Actions**

#	Mitigation Action	Hazard(s) Assessed	Responsible Department	Priority	Timeline
22	Designate alternative locations for residual dirt and fill storage, away from the Michelson Yard.	Flood	Construction, Facilities	Low	Short Term
23	Continue coordination with police and public safety agencies for IRWD-preferred response actions during localized flooding incidents, to prevent increased flood waters impacting IRWD facilities associated with the lifting of manhole covers.	Flood	Safety, Collection Systems, in coordination with WEROC (external partner)	Low	Medium Term
24	Continue to coordinate with customer cities and the County to ensure proper storm drain maintenance, to prevent against localized flooding due to sediment or debris in the drainage system.	Flood	Safety, Collection Systems, in coordination with WEROC (external partner)	Medium	Ongoing
25	Continue to conduct geotechnical studies for geologic hazards on new construction projects when appropriate, to evaluate vulnerabilities for land subsidence and expansive soils.	Geologic Hazards (Land Subsidence, Expansive Soil)	Engineering	High	Ongoing
26	Continue to support customer cities and the County in community outreach actions regarding the proper handling, storage, and disposal of hazardous materials.	Human-Caused Hazards (Hazardous Materials)	Safety, Public Affairs	Medium	Ongoing
27	Continue to monitor and track regulatory requirements and updates as they relate to hazardous materials storage and response actions.	Human-Caused Hazards (Hazardous Materials)	Safety	High	Ongoing
28	Develop a Cybersecurity Plan in coordination with a consultant and include an IS/Network focused Business Continuity Plan (BCP).	Human-Caused Hazards (Terrorism/Sabotage, Cyberattacks)	Information Services	High	Short Term
29	Evaluate and study critical facilities and facilities of concern that could benefit from protective retaining wall installation.	Landslide/Mudflow	Engineering	Low	Long Term
30	Following wildfire events continue to partner with CAL FIRE, Orange County Office of Emergency Preparedness, Orange County Fire Authority, and Orange County Sheriff's Department, to identify the potential for and location of landslide and/or mudflow events associated with heavy rainfall.	Landslide/Mudflow	Engineering, Safety, in coordination with WEROC (external partner)	Medium	Ongoing
31	Consider development of a project utilizing the recent hyper-local landslide study and resulting report (2021 WERT report) in combination with assessment of canyon facilities to determine potential for additional mitigation projects protecting against debris flow.	Landslide/Mudflow	Water Operations, Collection Systems, Facilities, Engineering in coordination with Operational Area partners and WEROC (external partner).	Low	Medium Term
32	Continue to conduct geotechnical studies to determine the potential for onsite landslides in any new construction project.	Landslide/Mudflow	Engineering	High	Ongoing
33	Implement the Santiago Creek Dam Improvements Project. The proposed activity includes removal and replacement of the existing outlet tower, outlet works and spillway facilities, in accordance with recommendations from the DSOD.	Multiple Hazards – Dam/Reservoir Failure, Drought, Flood, Seismic Hazards (Fault Rupture, Ground Shaking, Liquefaction)	Engineering Department; Serrano Water District, Department of Safety of Dams (external partners)	High	Medium Term

**Table 5-2 (continued)
 Hazard Mitigation Actions**

#	Mitigation Action	Hazard(s) Assessed	Responsible Department	Priority	Timeline
34	Assess the communications resilience in canyon areas; address capacity of canyon facilities to communicate with each other (some are linked and dependent), as well as sending communications back to IRWD staff in other locations monitoring facility status.	Multiple Hazards – Flood, Landslide/Mudflow, Severe Weather (Coastal Storm/Winter Storm, Windstorm/Santa Ana Winds, Power Outage), Wildfire	Automation, Information Systems, Facilities	Medium	Short Term
35	Establish procedures for staging District vehicles, materials, and equipment at alternative work locations prior to significant storm events.	Multiple Hazards – Flood, Severe Weather (Coastal Storm/Winter Storm)	Safety, Fleet, all relevant departments	Medium	Short Term
36	Continue to locate electrical generators at Water Treatment Plants for short-term power solutions.	Multiple Hazards – Severe Weather (Coastal Storm/Winter Storm, Windstorm/Santa Ana Winds, Power Outage), Wildfire	Electrical and Mechanical	High	Ongoing
37	Perform monthly maintenance checks on permanent and portable back-up generators, and check fuel supply.	Multiple Hazards – Severe Weather (Coastal Storm/Winter Storm, Windstorm/Santa Ana Winds, Power Outage), Wildfire	Mechanical	High	Ongoing
38	Seek funding opportunities to rehabilitate or replace aging generators in order to maintain critical water and wastewater operations during power outages.	Multiple Hazards – Severe Weather (Coastal Storm/Winter Storm, Windstorm/Santa Ana Winds, Power Outage), Wildfire	Electrical, Engineering, Safety	High	Short Term
39	Coordinate with Southern California Edison prior to any planned power outage to ensure generator capacity and provide time to pre-position supplies as applicable.	Multiple Hazards – Severe Weather (Coastal Storm/Winter Storm, Windstorm/Santa Ana Winds, Power Outage), Wildfire	Electrical, Safety, in coordination with WEROC (external partner)	High	Ongoing
40	Establish a communication plan with Southern California Edison for use during an unplanned power outage to assess the potential duration and extent of the power outage, and associated need for generators and supplies.	Multiple Hazards – Severe Weather (Coastal Storm/Winter Storm, Windstorm/Santa Ana Winds, Power Outage), Wildfire	Electrical, Safety, in coordination with WEROC (external partner)	High	Ongoing
41	Utilize data from ongoing generator replacement project to develop further wildfire and power outage mitigation projects, once above study results become available.	Multiple Hazards – Severe Weather (Coastal Storm/Winter Storm, Windstorm/Santa Ana Winds, Power Outage), Wildfire	Engineering, Water Operations, Collection Systems, Maintenance	High	Medium Term
42	The necessity for fire agency escorts into fire-affected areas has complicated physical access to facilities for refueling. Increase the capacity of current portable fueling equipment to allow better access to affected facilities with fewer trips during active fire activity. This project will also increase efficiency during power outages that do not involve wildfires.	Multiple Hazards – Severe Weather (Windstorm/Santa Ana Winds, Power Outage), Wildfire	Fleet, Maintenance	Medium	Medium Term

**Table 5-2 (continued)
Hazard Mitigation Actions**

#	Mitigation Action	Hazard(s) Assessed	Responsible Department	Priority	Timeline
43	Extend battery life for the Supervisory Control and Data Acquisition (SCADA) system by purchasing long runtime or extended long runtime uninterruptible power supply (UPS) to prevent outages in canyon facilities. Evaluate which locations would benefit from the upgraded UPS.	Multiple Hazards - Wildfire, Windstorm (Power Outage)	Automation	Medium	Medium Term
44	Monitor changes/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.	Seismic Hazards (Fault Rupture, Ground Shaking, Liquefaction)	Engineering	High	Ongoing
45	If any IRWD-owned critical facility is determined to be seismically vulnerable, identify a plan to conduct structural retrofitting, including funding sources.	Seismic Hazards (Fault Rupture, Ground Shaking, Liquefaction)	Engineering	High	Long Term
46	As repair and rehabilitation needs are identified in vertical structural facilities, consider options that increase seismic stability and resiliency as needed. Make improvements in accordance with current codes.	Seismic Hazards (Fault Rupture, Ground Shaking, Liquefaction)	Engineering	High	Ongoing
47	Consider developing and seeking funding for an evaluation program to determine the seismic vulnerability of critical assets.	Seismic Hazards (Fault Rupture, Ground Shaking, Liquefaction)	Engineering	Medium	Medium Term
48	Include assessment and mitigation of potential liquefaction conditions in the scope of any new building or infrastructure project.	Seismic Hazards (Liquefaction)	Engineering	High	Ongoing
49	Annually review defensible space, brush clearing and weed abatement needs for all canyon water facilities.	Wildfire	Facilities	Medium	Ongoing
50	Collaborate with the California Department of Fish and Wildlife (CDFW), CAL FIRE, and local firefighting agencies to establish a defensible space strategy in compliance with existing plans and environmental policies that provides IRWD the ability to maintain/remove vegetation around critical facilities in the wildfire hazard zone.	Wildfire	Facilities, Safety, in coordination with WEROC (external partner)	Medium	Short Term
51	Evaluate opportunities to enhance infrastructure building hardscape (including protective walls) and undergrounding power lines as appropriate.	Wildfire	Engineering	Medium	Medium Term
52	Conduct a study to assess canyon facilities: <ul style="list-style-type: none"> Which facilities are in the historic fire field? With increased fire activity, is that area growing/changing? Which facilities could be further fire hardened or have protective retaining walls added? How should IRWD prioritize any mitigation measures planned? 	Wildfire	Engineering, Water Operations, Collection Systems, Maintenance	Medium	Medium Term

**Table 5-2 (continued)
Hazard Mitigation Actions**

#	Mitigation Action	Hazard(s) Assessed	Responsible Department	Priority	Timeline
53	Develop measures to improve access to canyon facilities for fueling and maintenance during wildfires. Collaboration with fire agencies and pre-planning with WEROC are two possibilities.	Wildfire	Safety, Water Operations, Collection Systems, Maintenance	High	Short Term
54	Continue existing community and customer outreach programs/modules, including landscaping, irrigation, water quality, water efficiency, leak detection, and other relevant topics as needed.	All Hazards	Public Affairs	Medium	Ongoing
55	Explore opportunities to partner with external agencies (such as WEROC, local/county police, local/county fire, customer cities, and other water/wastewater providers) to expand opportunities for education regarding hazards and hazard mitigation. By collaborating with other agencies, outreach will engage larger audiences across a variety of platforms.	All Hazards	All Departments	Medium	Ongoing

5.3 CAPABILITIES ASSESSMENT

This capabilities assessment is designed to identify existing IRWD departments, personnel, planning tools, public policy and programs, technology, and funds that have the capability to support hazard mitigation activities and strategies outlined in this plan. To create this capability assessment, the LHMP Project Management Team and LHMP Planning Team collaborated to identify capabilities and mechanisms available to IRWD for reducing damage from future hazard events. After initial identification, the capabilities were reviewed again and updated in the context of developing the mitigation actions.

The capabilities assessment considered the following types of resources:

- Planning and regulatory capabilities are based on the implementation of ordinances, policies, local laws, and State statutes, and plans and programs that relate to guiding and managing growth and development.
- Administrative and technical capabilities refer to the staff and their skills and tools that can be used for mitigation planning and to implement specific mitigation actions. It also refers to the ability to access and coordinate these resources effectively.
- Financial capabilities are the resources that a jurisdiction has access to or is eligible to use to fund mitigation actions.
- Education and outreach capabilities are programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information.

Refer to [Table 5-3, *Capabilities Assessment*](#), below for the summary of IRWD capabilities.

**Table 5-3
Capabilities Assessment**

Resource	Description and Ability to Support Mitigation
Planning and Regulatory	
General Plan Responsible Department: Community Development Department at City of Costa Mesa, Irvine, Lake Forest, Newport Beach, Orange, and Tustin, County of Orange	A municipal General Plan establishes long-range growth, development planning and community character visioning. General Plans contain policies and programs designed to provide a basis for land use decisions, including associated water and wastewater infrastructure as appropriate. IRWD complies with the goals, policies, and objectives of the General Plans for each respective municipal jurisdiction within the IRWD service area.
Zoning Ordinance Responsible Department: Community Development Department at City of Costa Mesa, Irvine, Lake Forest, Newport Beach, Orange, and Tustin, County of Orange	A municipal Zoning Code implements the General Plan (outlined above) by establishing regulations for land use control within the jurisdiction, including controls designed to minimize risk associated with known regional natural hazards or mapped hazard zones. Zoning is used to protect public health, safety, and welfare. IRWD complies with the Zoning Ordinances for each respective municipal jurisdiction within the IRWD service area.
Subdivision Ordinance Responsible Department: Community Development Department at City of Costa Mesa, Irvine, Lake Forest, Newport Beach, Orange and Tustin, County of Orange	A municipal Subdivision Ordinance regulates the development of public infrastructure/utilities, housing commercial, industrial and other uses, as land is subdivided into buildable lots. Subdivision Ordinances account for the risk of natural hazards on future development. IRWD complies with applicable Subdivision Ordinances and regulations, and coordinates with the respective municipal jurisdictions within the IRWD service area.

**Table 5-3
Capabilities Assessment (continued)**

Resource	Description and Ability to Support Mitigation
<p>Building Codes, Permitting and Inspections Responsible Department: Community Development Department at City of Costa Mesa, Irvine, Lake Forest, Newport Beach, Orange and Tustin, County of Orange</p>	<p>A building code regulates the standards, materials, and occupancy of constructed buildings within the jurisdiction. Often, cities and counties adopt the California Building Code, with amendments. IRWD complies with all building code regulations, along with permitting and inspection requirements, with the respective municipal jurisdictions within the IRWD service area.</p>
<p>National Flood Insurance Program Responsible Department: Community Development Department at City of Costa Mesa, Irvine, Lake Forest, Newport Beach, Orange and Tustin, County of Orange</p>	<p>The National Flood Insurance Program (NFIP) provides affordable flood insurance to property owners, renters and businesses by encouraging communities to adopt and enforce floodplain management regulations. All customer cities within the IRWD service area participate in NFIP. IRWD complies with the floodplain regulations set forth by the respective municipal jurisdictions within the IRWD service area.</p>
<p>Emergency Operations Plan Responsible Department: IRWD Safety Department</p>	<p>The IRWD Emergency Operations Plan (EOP) outlines responsibility and resource deployment during and following emergencies or disasters. The EOP was updated in 2020 as part of the American Water Infrastructure Act (AWIA) requirements. The EOP outlines the emergency organization, activation, and Emergency Operations Center (EOC) operations. The EOP includes a Continuity of Operations Plan, outlining a clear chain of command, line of succession, and plans for backup or alternate emergency facilities in the case of an extreme emergency or disaster. Additionally, the EOP includes an outline of a Disaster Recovery Plan, located in Appendix H of the EOP. The Disaster Recovery outline includes recovery organization, plan of action, and completion of recovery actions, to later be expanded in a formal plan. Together, the EOP and LHMP provide a mitigation and response strategy to hazard events.</p>
<p>Capital Improvement Plan Responsible Department: IRWD Engineering Department, Capital Projects Department</p>	<p>The Capital Improvement Program (CIP) is established to provide for the planning, funding, design, construction, maintenance, and repair of IRWD facilities, property or infrastructure. The CIP is a “roadmap” that IRWD establishes to plan and manage capital and infrastructure assets. The CIP would be used to identify and fund mitigation actions identified in the LHMP that involve physical facilities and infrastructure improvements.</p>
<p>Urban Water Management Plan Responsible Department: IRWD Water Resources Department and Environmental Compliance Department</p>	<p>The Urban Water Management Plan (UWMP) is prepared every five years, to support IRWD’s long-term resource planning and ensure adequate water supplies are available to meet existing and future water supply needs. The UWMP also addresses drought conditions, and the ability of IRWD to continue supplying water to customers. IRWD is in the process of updating the UWMP for 2021. Separately, IRWD updated the Water Shortage Contingency Plan in 2020 to accompany the UWMP. The Water Shortage Contingency Plan provides a series of response actions that IRWD may implement in the event of a water shortage due to drought or emergency. The UWMP and Water Shortage Contingency Plan can be used in coordination with the LHMP to implement mitigation actions associated with drought and water supply reliability (redundancy).</p>
<p>Groundwater Management Plan Responsible Department: IRWD Water Resources Department and Environmental Compliance Department, Orange County Water District (external)</p>	<p>Orange County Water District (OCWD) is the responsible agency for regional groundwater basin resources and updated the County-wide Groundwater Management Plan in 2015. The Groundwater Management Plan update sets forth basin management goals and objectives, and outlines management practices in accordance with the Sustainable Groundwater Management Act. The intent is to prevent overdraft conditions and ensure sustainable supply for utilization in drought years. IRWD works with OCWD as a major water producer and works cooperatively where service areas overlap the basin. The Groundwater Management Plan and coordination with OCWD can be used to implement mitigation actions associated with geologic hazards, drought and water supply reliability.</p>
<p>Overflow Emergency Response Plan (Sewer System Management Plan) Responsible Department: IRWD Recycling Operations Department</p>	<p>The Overflow Emergency Response Plan supports orderly and effective response to Sanitary Sewer overflow incidents. This plan provides guidelines for IRWD to follow in responding to, cleaning up, and reporting Sanitary Sewer Overflows within the service area. The Overflow Emergency Response Plan outlines response procedures that can be used to prevent future sewer overflows/spills caused by natural or manmade hazards.</p>

**Table 5-3
Capabilities Assessment (continued)**

Resource	Description and Ability to Support Mitigation
<p>Dam Emergency Action Plan and Inundation Maps Responsible Department: IRWD Engineering Department, Operations Department</p>	<p>The IRWD extremely high hazard dam Emergency Action Plans (EAP) identify incidents that can lead to emergency conditions at the dam, identifies areas that could be affected by inundation, and specifies pre-planned actions to be followed to minimize property damage, loss of infrastructure/water resources, and loss of life. The EAP is reviewed and approved by the California Office of Emergency Services (Cal OES), and the inundation maps are approved by the California Department of Water Resources, Division of Safety of Dams (DSOD). IRWD is responsible for five dam EAPs: Rattlesnake Canyon Dam, Syphon Canyon Dam, San Joaquin Reservoir Dam, Santiago Dam, and Sand Canyon Dam. The EAPs identify specific vulnerabilities that have been incorporated into the LHMP, and dam specific risk evaluations coordinate with identified mitigation actions.</p>
<p>Baker Water Treatment Plant Emergency Action Plan Responsible Department: IRWD Safety Department</p>	<p>The Baker Water Treatment Plant (BWTP) Emergency Action Plan (EAP) provides emergency preparedness guidelines and procedures for IRWD employees in the case of emergencies as outlined by California Code of Regulations (CCR) Title 8. The BWTP EAP identifies vulnerabilities associated with specific natural/manmade hazards, including some pre-hazard mitigation actions. Together, the LHMP and EAP provide a mitigation and response strategy for hazards at BWTP.</p>
<p>Michelson Operations Center Emergency Action Plan Responsible Department: IRWD Safety Department</p>	<p>The Michelson Operations Center (MOC) Emergency Action Plan (EAP) provides emergency preparedness guidelines and procedures for IRWD employees in the case of emergencies as outlined by CCR Title 8. The MOC EAP identifies vulnerabilities associated with specific natural/manmade hazards, including some pre-hazard mitigation actions. Together, the LHMP and EAP provide a mitigation and response strategy for hazards at MOC.</p>
<p>Water System Risk and Resilience Assessment Responsible Department: IRWD Risk Department</p>	<p>The Water System Risk and Resilience Assessment (RRA) develops a risk baseline for IRWD critical assets, as well as an analysis of potable water system resilience and recommendations for enhancement. The RRA was prepared in 2018 in accordance with the American Water Infrastructure Act. The RRA identified vulnerabilities similar to the LHMP and includes recommendations for mitigation actions to increase resilience and reduce risk.</p>
<p>Dam Safety Program Responsible Department: Engineering Operations Support, IRWD</p>	<p>The Dam Safety Program ensures continual monitoring, inspection, and maintenance for IRWD dams and reservoirs. The Dam Safety Program exceeds current state standards and establishes a Risk-Informed Decision-Making process to identify and reduce risk. The program outlines safe operation and management, design, regulation and oversight, and commitment to community conversation. IRWD is currently implementing the Dam Safety Program that addresses risk identified in dam portfolio assessment. The Dam Safety Program works with the LHMP to provide a foundation for infrastructure and safety protocols at IRWD's five "extremely high" hazard dams.</p>
<p>Water Supply Reliability Evaluation Responsible Department: Water Resources & Environmental Compliance, IRWD</p>	<p>The Water Supply Reliability Evaluation (Evaluation) provides an updated understanding of how current and projected conditions, such as imported water supply shortages, climate change, and facility outages impact water supply. This Evaluation includes an analysis of IRWD's ability to maintain a minimum level of service under a reasonably foreseeable hydrologic and system outage conditions and emergency scenarios. The Evaluation, in coordination with the LHMP, evaluates vulnerabilities of drought and climate change, and includes recommendations to maintain water service to IRWD customers.</p>
<p>Cybersecurity Assessment Responsible Department: Network and Cyber Security, IRWD</p>	<p>The Cybersecurity Assessment analyzes IRWD's cybersecurity controls and the ability to remediate vulnerabilities. The assessment provides a high-level analysis of IRWD's cyber weaknesses, so security teams can begin implementing controls to mitigate them. The assessment in coordination with the LHMP evaluates vulnerabilities related to terrorism and sabotage of IRWD's technology assets, and work together to implement mitigation actions to reduce risk.</p>
<p>Sewage Treatment Master Plan & Potable Reuse Program Responsible Department: Water Resources, Capital Projects</p>	<p>The Sewage Treatment Master Plan outlines IRWD's long-term vision for a potable reuse program. Sewage treated at LAWRP could be treated to advanced purified water, conveyed to Baker WTP, and treated again for domestic purposes. This would offset the need for import water and improve IRWD's drought resiliency. This program can be utilized in coordination with the LHMP to identify and mitigate risks related to drought resiliency.</p>

**Table 5-3
Capabilities Assessment (continued)**

Resource	Description and Ability to Support Mitigation
Hazardous Materials Program Responsible Department: IRWD Safety, Operations and Regulatory Compliance	The IRWD Hazardous Materials Program includes a Hazardous Materials Emergency Response Plan, training for current HazMat Team members and employees working on site near certain hazardous materials, regular equipment maintenance and periodic exercises. During a hazardous materials emergency, IRWD would reference industry resources (Department of Transportation's Emergency Response Guide [ERG] and Wireless Information System for Emergency Responders [WISER]), that provides information regarding the potential plume size and behavior. The IRWD Hazardous Materials Program can be utilized in coordination with the LHMP to manage and mitigate risks related to hazardous materials use.
Administrative and Technical	
Engineers or professionals trained in construction practices related to buildings and/or infrastructure	Four engineering teams are staffed within the following IRWD departments: Capital Improvements, Development and Inspection Services, Operations, and Support and Planning. Each department employs engineers trained in construction practices related to buildings and infrastructure, and staff has the capability to implement mitigation actions.
Engineers with an understanding of natural hazards and/or infrastructure	Four engineering teams are staffed within the following IRWD departments: Capital Improvements, Development and Inspection Services, Operations, and Support and Planning. Each department employs engineers trained with an understanding of natural hazards and how they affect IRWD infrastructure. Staff has the capability to implement mitigation actions.
Emergency manager	The Safety Specialist in the Safety Department is a full-time emergency manager, with extensive experience in emergency preparedness, response and recovery. The emergency manager writes and implements related plans, provides training, manages exercise projects, and/or develops and facilitates safety exercises. The Safety Specialist is the Project Manager for the LHMP and has the capability to implement mitigation actions.
Emergency Response Team	The IRWD ERT is comprised of managers and supervisors in the Water Operations and Recycling Operations Department. The ERT is supported by Safety, Security and other departments as needed (Facilities, Mechanical/Electrical, Fleet, Finance or HR).
Personnel skilled in Geographic Information Systems	The Planning Department employs a full-time Geographic Information Systems (GIS) group to maintain internal databases and assist with mapping and infrastructure planning.
Resource development staff or grant writers	The Water Resources and Water Efficiency Departments employ staff with experience in grant preparation and writing.
Water Emergency Response Organization of Orange County (WERO) membership	WERO is administered by the Municipal Water District of Orange County (MWD), supports and manage countywide emergency preparedness, planning, response, and recovery efforts among Orange County water and wastewater utilities. IRWD participates in trainings and exercises and utilizes resources from WERO for emergency preparedness purposes.
Financial	
Federal Emergency Management Agency – Hazard Mitigation Assistance Grants	The Federal Emergency Management Agency (FEMA) is the federal agency responsible for hazard mitigation, emergency preparedness, and emergency response and recovery activities. It provides guidance to State and local governments on hazard mitigation activities, including best practices and how to comply with federal requirements. FEMA also provides funding for hazard mitigation actions through three grant programs: Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance (FMA) Grant, and Building Resilient Infrastructure and Communities (BRIC). The HMGP requires a presidential hazard declaration before funding is available; after a hazard is declared, grant applications can be submitted on a rotating basis. Both BRIC and FMA applications typically open during the fall. Outside of Hazard Mitigation Assistance Grants, FEMA also administers Preparedness Grants and Resilience Grants that may be applicable to future IRWD projects.

**Table 5-3
Capabilities Assessment (continued)**

Resource	Description and Ability to Support Mitigation
California Governor's Office of Emergency Services	Cal OES is responsible for overseeing and coordinating emergency preparedness, response, recovery and homeland security activities within California. Cal OES regularly dispatches team members to join first responders, emergency leaders and those affected by disasters that threaten public safety, to provide information essential to the public. Cal OES can assist in obtaining funding for mitigation actions identified in the plan and providing guidance on future plan updates. Additionally, Cal OES is responsible for administration and distribution of federal grant funding for the programs listed above.
Development Impact Fees	IRWD collects developer impact fees during the plan check and permitting process, to off-set infrastructure improvements and increased water/wastewater service demand related to new developments within the service area.
Emergency Reserve Fund	IRWD holds and maintains an emergency reserve fund for emergency needs.
Education and Outreach	
AlertOC	AlertOC is a mass notification system designed to keep Orange County residents and businesses informed of emergencies and certain community events. By registering with AlertOC, time-sensitive voice messages from the County are sent directly to participants via text or automated voice recording.
Emergency Preparedness Outreach	Disasters cannot be prevented; however, the community can reduce the effects of disasters before they occur, prepare for what could happen, and improve response and recovery. Some mitigation actions pertain to outreach and information to the community and can be implemented through a variety of programs and events in coordination with IRWD and other partner agencies and stakeholders.
IRWD Website, E-Newsletter, Social Media, Brochures and Pamphlets	The IRWD Public Affairs Department maintains the IRWD website, writes the monthly e-newsletter, and posts regularly through IRWD social media channels. These various forms of communication provide an opportunity to convey information and implement mitigation actions specific to educating and informing the community regarding all hazards and ways to reduce impacts from the hazards.
<p>How can these capabilities be expanded upon and improved to reduce risk?</p> <p>Multiple mitigation measures are priority projects to expand on IRWD capabilities. Examples of opportunities to expand capabilities include the following mitigation actions:</p> <p><u>Planning/Regulatory:</u> Technical Communications Plan (Mitigation Action #4), Specific Hazard Response Plans (Mitigation Action #8), Energy and Greenhouse Gas Master Plan (Mitigation Action #12), Recycled Water Shortage Contingency Plan (Mitigation Action #16), Inflow and Infiltration Study (Mitigation Action #19), Cybersecurity Plan (Mitigation Action #28), SCE Communications Plan (Mitigation Action #40).</p> <p><u>Admin/Technical:</u> Back-up communications system (Mitigation Action #3 and #4), WEROC membership (Mitigation Action #9), phone system enhancements (Mitigation Action #10), communication resilience in canyon areas (Mitigation Action #34), extend battery life for the SCADA (Mitigation Action #43), improve canyon facility access for staff (Mitigation Action #53).</p> <p><u>Financial:</u> Seek funding opportunities for potable reuse program (Mitigation Action #14), funding for seismic vulnerability evaluation (Mitigation Action #47).</p> <p><u>Education/Outreach:</u> Annual communication system training (Mitigation Action #3), annual alert/warning system training (Mitigation Action #5), Specific Hazard Response Plans regular training and exercise programs (Mitigation Action #8), WEROC membership for communication and collaboration (Mitigation Action #9), coordination with police for IRWD-preferred response in localized flooding incidents (Mitigation Action #23), support customer cities in community outreach regarding hazardous materials (Mitigation Action #26), coordination with public safety agencies after wildfires (Mitigation Action #30), collaboration with CDFW & CAL FIRE regarding defensible space strategy (Mitigation Action #50), continue existing outreach programs (Mitigation Action #54), and explore opportunities for additional outreach programs (Mitigation Action #55).</p>	

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SECTION 6: PLAN MAINTENANCE AND CAPABILITIES

This section identifies the formal process that ensures the LHMP remains an active and relevant document for IRWD. The plan maintenance process includes a schedule for monitoring and evaluating the plan annually and producing an update every five years to ensure IRWD maintains eligibility for federal and State hazard mitigation funding. This section also describes how IRWD will integrate public participation throughout the plan maintenance and implementation process. Finally, this section describes how IRWD intends to incorporate the mitigation actions outlined in this plan into existing planning mechanisms and programs.

6.1 PURPOSE OF THE PLAN AND AUTHORITY

Under the direction of the Project Management Team, (comprised of the Safety Specialist and Safety Manager) the LHMP Planning Team (identified in [Section 2.0, *Planning Process*](#)) will be responsible for the on-going maintenance of this LHMP. The Project Management Team will take the primary lead by coordinating maintenance of this plan with the LHMP Planning Team, including undertaking the formal review process and updating of the plan. Key IRWD departments are identified below.

- Automation;
- Collection Systems;
- Construction Services;
- Contracts & Risk Management and Security;
- Electrical Services – Maintenance Operations;
- Engineering – Operations Support;
- Engineering – Planning;
- Facilities Services & Fleet Services – Maintenance Operations;
- Field Services;
- Information Services;
- Mechanical Services – Maintenance Operations;
- Michelson Water Recycling Plant Operations/Biosolids;
- Natural Treatment System Operations;
- Public Affairs;
- Regulatory Compliance;
- Safety Department;
- Water Operations Department;
- Water Quality; and
- Water Resources.

In addition to IRWD staff, the following partner agencies who participated on the Planning Team during plan preparation should be included in the maintenance and update activities:

- California State Water Resources Control Board;
- City of Costa Mesa (Office of Emergency Management);
- City of Irvine (Office of Emergency Management);
- City of Lake Forest (Management Services);
- City of Newport Beach (Police Department);
- City of Orange (Fire Department);
- City of Santa Ana (Emergency Management);

- City of Tustin (Tustin Police Department);
- Municipal Water District of Orange County (Water Emergency Response Organization of Orange County); and
- Orange County Sheriff Department
- Orange County Fire Authority.

Although specific LHMP Planning Team members may change, the IRWD staff positions and departments and other partner agencies and organizations should continue to be included in the plan implementation and maintenance process.

The Project Management Team will facilitate the Planning Team meetings and will assign tasks such as updating and presenting the plan to other departments, stakeholder groups, and/or elected officials. The Planning Team will be responsible for maintaining and updating the plan and will coordinate implementation of the plan through their respective positions and agencies. Plan implementation and evaluation will be a shared responsibility among all LHMP Planning Team members.

6.1.1 EVALUATION

At a minimum, an annual LHMP Planning Team meeting will be conducted to evaluate the progress of the plan and incorporate the actions into other planning documents. This review will include the following:

- Summary of any hazard events that occurred during the prior year and their impacts on the community;
- Review of successful mitigation initiatives identified in the plan;
- Brief discussion regarding why targeted mitigation actions were not completed;
- Reevaluation of mitigation actions to determine if the timelines for identified projects need to be amended (such as changing a long-term project to a short-term project due to funding availability);
- Recommendations for new mitigation actions;
- Changes in, or potential for, new funding options/grant opportunities;
- Integration of new data and maps that can be used to inform the plan; and
- Evaluation of any other planning programs or initiatives from IRWD that involve hazard mitigation.

The purpose of the annual evaluation will be to ensure consideration and implementation of the LHMP and document progress in order to inform future LHMP updates.

6.2 METHOD AND SCHEDULE FOR UPDATING THE PLAN WITHIN FIVE YEARS

Section 201.6.(d)(3) of Title 44 of the Code of Federal Regulations requires that local hazard mitigation plans be reviewed, revised if appropriate, and resubmitted for approval in order to remain eligible for benefits awarded under the Disaster Mitigation Act of 2000 (DMA 2000). Monitoring the progress of the mitigation actions will be on-going throughout the five-year period between the adoption of the LHMP and the next update effort. The LHMP Planning Team will meet on an annual basis to monitor the status of the implementation of mitigation actions and develop updates as necessary.

IRWD intends to update the plan on a five-year cycle from the date of initial plan adoption. It is anticipated that this update process will be initiated at least one year prior to expiration of the existing plan. The cycle may be accelerated to less than five years based on the following triggers:

- A presidential disaster declaration that impacts IRWD; and/or
- A hazard event that causes loss of life.

Should a significant disaster occur within the IRWD jurisdiction, the LHMP Planning Team will reconvene to review and update the LHMP as appropriate.

6.2.1 PROCESS

The intent of the five-year update process will be to add new planning process methods, jurisdictional profile data, hazard data and events, vulnerability analyses, mitigation actions, and goals to the adopted plan so that the LHMP will always be current and up to date. Based on the needs identified by the Planning Team, the update will, at a minimum, include the elements below:

1. The update process will be convened through a Planning Team identified by the Project Management Team.
2. The hazard risk assessment will be reviewed and updated using best available information and technologies.
3. Based on new/updated information and available funding, the evaluation of critical facilities/facilities of concern and mapping will be updated and improved.
4. The mitigation actions will be reviewed and revised to account for any actions completed, deferred, or changed to account for changes in the risk assessment or new IRWD policies identified under other planning mechanisms, as appropriate.
5. The draft update will be sent to appropriate agencies for comment.
6. The public will be given an opportunity to comment prior to adoption.
7. The IRWD Board of Directors will adopt the updated LHMP.

The Project Management Team will coordinate with responsible IRWD departments and external partners identified for each mitigation action. These responsible departments and external partners will monitor and evaluate the progress made on the implementation of mitigation actions and report to the LHMP Planning Team on an annual basis. Working with the LHMP Planning Team, these responsible departments and external partners will be asked to assess the effectiveness of the mitigation actions and modify the mitigation actions as appropriate. A LHMP Mitigation Action Progress Report worksheet or tracking mechanism will assist departments and external partners responsible for implementing mitigation actions in reporting on the status and assessing the effectiveness of the mitigation actions.

Information from the IRWD departments and external partners will be used to monitor mitigation actions and inform the annual evaluation of the LHMP. The following questions will be considered as criteria for evaluating the plan's effectiveness:

- Has the nature or magnitude of hazards affecting IRWD or the service area changed?
- Are there new hazards that have the potential to impact IRWD or the service area?
- Do the identified goals and actions address current and expected conditions?
- Have mitigation actions been implemented or completed?
- Has the implementation of identified mitigation actions resulted in expected outcomes?
- Are current resources adequate to implement the LHMP?

- Should additional local resources be committed to address identified hazards?

An annual LHMP review questionnaire worksheet will be used to provide guidance to the LHMP Planning Team on what should be included in the evaluation. Future updates to the LHMP will account for any new hazard vulnerabilities, special circumstances, or new information that becomes available. Issues that arise during monitoring and evaluating the LHMP, which require changes to the risk assessment, mitigation strategy, and other components of the plan, will be incorporated into the next update of the LHMP in 2026. The questions identified above would remain valid during the preparation of the 2026 plan update.

6.3 ADOPTION

The IRWD Board of Directors is the responsible entity for adopting the LHMP. This formal adoption should take place every five years. Once the plan has received “FEMA Approval Pending Adoption,” the Board of Directors will need to adopt the plan. Upon adoption, the IRWD Safety Department will transmit the adopted plan to FEMA for final approval.

6.4 IMPLEMENTATION THROUGH EXISTING PROGRAMS AND PLANNING MECHANISMS

The effectiveness of the LHMP depends on implementation of the plan and incorporation of the outlined mitigation actions into existing plans, policies, and programs. This plan includes a range of action items that, if implemented, would reduce loss or interruption of service in the IRWD planning area. Together, the mitigation action items in the LHMP provide the framework for activities that IRWD chooses to implement over the next five years. IRWD has identified the plan’s goals and prioritized actions that will be implemented (resources permitting) through existing plans, policies, and programs.

The LHMP Project Manager (Safety Specialist) is responsible for overseeing the plan’s implementation and maintenance through IRWD’s existing programs and planning mechanisms. The Safety Specialist, or designated appointee, will assume lead responsibility for facilitating LHMP implementation and maintenance meetings. Upon adoption of the plan, IRWD will use the LHMP as a baseline of information on the hazards that impacts operations and infrastructure. The LHMP can also build upon related planning efforts and mitigation programs that are already occurring within the IRWD service area. This will also facilitate applying for funding opportunities as they become available. Progress on implementing mitigation actions through other IRWD planning programs and mechanisms should be monitored and integrated into future updates.

By adopting a resolution to approve this LHMP, IRWD agrees to reference and incorporate the document into planning documents, programs, decisions, processes, and regulations. The LHMP will be reviewed and considered by internal IRWD departments, as applicable plans or programs are created or updated in the future. Upon creating or updating new plans, programs or policies, IRWD will review this LHMP and consider the following:

- What hazard and/or vulnerability information should be considered and/or integrated into this plan?
- Are there opportunities for this plan to support and/or implement mitigation actions?
- What mitigation actions can and should be integrated into this plan?
- Are there other community mechanisms that mitigation can be integrated?
- Is there information from this plan that can be integrated into the next LHMP update?

Some of the ways IRWD will integrate information from this LHMP into planning mechanisms are described below.

Planning and zoning law require California cities to adopt a comprehensive, long-term general plan for the physical development of the city. General plans are required to address natural hazards that could impact the jurisdiction and plan for the impact of natural hazards. IRWD utilizes General Plans for cities within the service area to understand natural hazards and to identify future development/growth and the associated demands to water and wastewater services. This information informs various IRWD plans such as the Capital Improvement Program (CIP) and Urban Water Management Plan (UWMP). IRWD will use both these plans and the LHMP as complementary documents that work together to reduce the risk of natural hazards in the service area.

IRWD updated the UWMP for 2021. UWMPs are intended to be integrated with other urban planning requirements and management plans, including LHMPs. As the documents were prepared concurrently, the updated UWMP is not incorporated by reference in the LHMP but the UWMP preparers reviewed and commented on the draft LHMP during the Planning Team review period. The update interval is five years.

The CIP identifies capital projects and equipment purchases, that provides a link between the annual general plan and annual budget. As part of the annual review and update of the CIP, the mitigation actions identified in this LHMP will be reviewed to determine which actions should be included within the CIP.

IRWD recently prepared a Risk and Resilience Assessment (RRA) and updated the existing Emergency Operations Plan (EOP) in accordance with the America's Water Infrastructure Act of 2018 (AWIA). The RRA and EOP are incorporated by reference into the LHMP, and IRWD integrated pertinent information from the RRA and EOP into this LHMP. Similarly, the LHMP will be incorporated into the RRA and EOP at the time of update. The update interval is five years.

IRWD also recently prepared five approved Emergency Action Plans for extremely high hazard dams within the jurisdiction: Rattlesnake, San Joaquin, Sand Canyon, Santiago Creek and Syphon Dams. Inundation mapping prepared in accordance with DSOD standards was incorporated into [Section 4.2.1](#) and [Appendix C](#) for evaluation of dam/reservoir failure hazards and vulnerability assessment. Any significant updates to the EAPs will result in a review of the LHMP hazard profiles (including exhibits), risk assessment and mitigation actions, to ensure consistency. Dam EAPs must be updated annually.

This LHMP will be added or incorporated by reference into all IRWD emergency plans as they are updated. The hazard profiles, risk assessment and mitigation actions will be reviewed during updates to these plans. Further, mitigation actions not currently provided in the LHMP will be identified for consideration as part of the HMP update.

Other opportunities for integration of this LHMP include education programs and continued coordination between IRWD and the identified external partners. IRWD maintains a website and utilizes social media to provide updated information to customers and the service area. In the future, IRWD may provide in-person educational events and activities to further inform the community.

6.5 CONTINUED PUBLIC INVOLVEMENT

IRWD is dedicated to involving the public in review and updates to the LHMP. The public will continue to be informed on LHMP actions through the IRWD website and through the annual progress report to the IRWD Board of Directors. The adopted LHMP will remain permanently available for review on the IRWD website, with contact information for interested parties to direct comments and concerns. All public feedback will be reviewed and considered for incorporation (if deemed appropriate) into the next LHMP update.

Upon initiation of the LHMP update, a new public involvement strategy will be developed based on guidance from the Planning Team. This strategy will be based on the needs and capabilities of IRWD at the time of the update. At a minimum, this strategy will include the use of the IRWD website, email distribution lists, and social media, as well as coordination with partner agencies and organizations.

6.6 POINT OF CONTACT

Alix Stayton, Safety Specialist

Irvine Ranch Water District
3512 Michelson Drive, Irvine, California 92612
Mailing Address: PO Box 57000, Irvine, California 92619-7000
(626) 598-1627
stayton@irwd.com

SECTION 7: REFERENCES

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APPENDIX

APPENDIX A

IRWD Adoption Resolution

APPENDIX B

LHMP Planning Team Meetings

B.1

Planning Team Meetings

Michael Baker

I N T E R N A T I O N A L

IRVINE RANCH WATER DISTRICT LOCAL HAZARD MITIGATION PLAN

PROJECT MANAGEMENT TEAM KICK-OFF MEETING

November 18, 2020, 10:30 AM

Via WebEx

AGENDA

ATTENDEES

Irvine Ranch Water District

Alix Stayton, Safety Specialist

Emilyn Zuniga

Marina Lindsay

Jenny Roney

Michael Baker International

Noelle Steele, Project Manager

Eddie Torres, Project Principal

De Novo Planning Group

Starla Barker, Technical Consultant

1. Introduction and Roles/Responsibilities

- Primary contacts and communications
- Information gathering and dissemination
- Planning process documentation

2. HMP Planning Team Organization

- Participants (names, titles, agencies, email, telephone number)
- Meetings – monthly/consistent day and time
 - Virtual format platform/preferences

3. Work Program and Schedule

- Resource identification and data needs
 - Emergency operations plans/emergency action plans, capital improvement plan, OC Water Reliability Study, general plans, any other hazard related assessments or reports
- Community engagement strategy
 - Online community survey, web content/social media

4. Additional Discussion/Questions

5. Next Steps/Action Items

Steele, Noelle

Subject: IRWD Local Hazard Mitigation Plan Kick-Off Meeting - WebEx Link

Start: Wed 11/18/2020 10:30 AM
End: Wed 11/18/2020 11:30 AM

Recurrence: (none)

Meeting Status: Meeting organizer

Organizer: Steele, Noelle

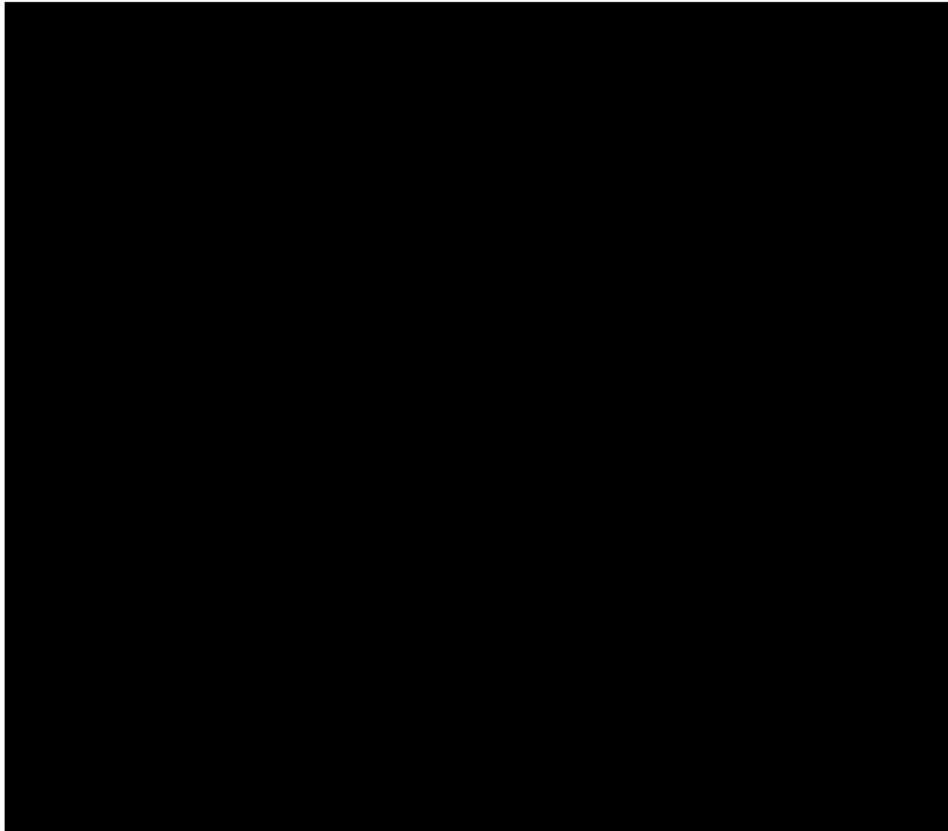
Required Attendees: Alix Stayton; Emilyn Zuniga; Marina Lindsay; Jenny Roney; Torres, Eddie;
s [REDACTED]

Webex link for the LHMP kick-off meeting is below. Agenda to follow. Thank you!

Noelle Steele

-- Do not delete or change any of the following text. --

When it's time, join your Webex meeting here.



Join using Microsoft Lync or Microsoft Skype for Business

Dial [1731576129](tel:1731576129).mbakermeet@lync.webex.com

If you are a host, [click here](#) to view host information.

Need help? Go to <http://help.webex.com>

Michael Baker

I N T E R N A T I O N A L

IRVINE RANCH WATER DISTRICT LOCAL HAZARD MITIGATION PLAN

PROJECT MANAGEMENT TEAM KICK-OFF MEETING

November 18, 2020, 10:30 AM

Via WebEx

MEETING MINUTES

ATTENDEES

Irvine Ranch Water District

Alix Stayton, Safety Specialist

Emilyn Zuniga, Safety Manager

Marina Lindsay, Water Resources Planner

Jenny Roney, HR Representative

Michael Baker International

Noelle Steele, Project Manager

Eddie Torres, Project Principal

De Novo Planning Group

Starla Barker, Technical Consultant

1. Introduction and Roles/Responsibilities

- Primary contacts and communications
 - Alix serving as Project Manager and primary contact for IRWD
 - Noelle serving as Project Manager and primary contact for Baker
- Information gathering and dissemination
 - Baker will rely on IRWD to guide/provide information, specifically localized information
- Planning process documentation
 - Baker will document the planning process, including any team meeting minutes, ppt presentation, attendee lists and pictures to append in the plan.

2. HMP Planning Team Organization

- Participants (names, titles, agencies, email, telephone number)
 - Potential Planning Team Members, Internal department suggestions: Operations, Maintenance, Engineering & Water Quality, Public Affairs (include representatives from both water and wastewater facilities)
 - External suggestions: city representatives and their emergency services provider (Newport, Irvine, Lake Forest, Costa Mesa, Tustin, Santa Ana, Orange); county representative (EMD, OCS, OCFA); Cal Fire/County representative; State Water Resource Board representative; MWDOC representative

Steele, Noelle

Subject: EXTERNAL: Hazard Mitigation plan workgroup meeting #1
Location: Microsoft Teams Meeting

Start: Wed 1/27/2021 1:30 PM
End: Wed 1/27/2021 3:30 PM

Recurrence: (none)

Meeting Status: Accepted

Organizer: Alix Stayton

Good afternoon,

This will serve as the kickoff meeting for the IRWD Local Hazard Mitigation Plan (LHMP) project. The Michael Baker team will provide insight into the project scope, schedule and process. Please forward this meeting to anyone you think should attend; this first meeting will allow stakeholders to better understand who should represent their department for this project going forward. This will be the first of three workgroup meetings for this project, all on the last Wednesday of the month (Jan, Feb and Mar 2021). We understand that folks may be able to attend part of a meeting, or only some of the three-part series. We appreciate your time and will continue to keep you in the loop and provide opportunities for review and comment along the way.

Please call, text or email anytime with questions about this project. We are excited to get the project under way.

Best,

Alix

ALIX STAYTON
SAFETY SPECIALIST



Microsoft Teams meeting

Join on your computer or mobile app

[Click here to join the meeting](#)

[Learn More](#) | [Meeting options](#)

Eddy, Clara

From: Alix Stayton [REDACTED]
Sent: Monday, January 25, 2021 3:40 PM
To: Emilyn Zuniga; Ken Pfister; Gaspar Garza; Dorien McElroy; Owen O'Neill; Colton Martin; Todd Colvin; Dave Crowe; John Dayer; Malcolm Cortez; Eric Akiyoshi; Ian Swift; Allen Shinbashi; Randy Williams; Joe Lam; Lars Oldewage; Lisa Haney; John Fabris; Steele, Noelle
Cc: Wendy Chambers; Jose Zepeda; Richard Mykitta; Kevin Burton; Thomas Malone; Cheryl Clary; James Colston; Marina Lindsay; Malik, Anisha
Subject: EXTERNAL: Hazard Mitigation plan workgroup meeting #1
Follow Up Flag: Follow up
Flag Status: Completed

Good afternoon,

This is a friendly reminder that the first working group call for the IRWD LHMP will be conducted this Wednesday, January 27th from 1:30-3:30pm. We will review the scope and schedule of the project, identify and prioritize hazards for plan focus, and discuss critical assets that should be included. We look forward to speaking with you.

If you cannot attend, please feel free to forward this invitation to a representative. Call or email anytime with questions or to change your department's representative on this distribution list.

Microsoft Teams meeting

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Best,

Alix

ALIX STAYTON
SAFETY SPECIALIST



3512 Michelson Drive, Irvine, California 92612
Mailing: PO Box 57000, Irvine, California 92619-7000

ALIX STAYTON
SAFETY SPECIALIST



3512 Michelson Drive, Irvine, California 92612
Mailing: PO Box 57000, Irvine, California 92619-7000



Eddy, Clara

From: Alix Stayton [REDACTED]
Sent: Monday, January 25, 2021 3:38 PM
To: [REDACTED]
Cc: Steele, Noelle; Emilyn Zuniga
Subject: EXTERNAL: Reminder: HazMit Plan kickoff call Wednesday, January 27th from 1:30-3:30pm
Follow Up Flag: Follow up
Flag Status: Completed

Good afternoon,

This is a friendly reminder that the first working group call for the IRWD LHMP will be conducted this Wednesday, January 27th from 1:30-3:30pm. We will review the scope and schedule of the project, identify and prioritize hazards for plan focus, and discuss critical assets that should be included. We look forward to speaking with you.

If you cannot attend, please feel free to forward this invitation to a representative. Call or email anytime with questions or to change your jurisdiction/agency's representative on this distribution list.

Microsoft Teams meeting

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[Click here to join the meeting](#)

[Learn More](#) | [Meeting options](#)

Best,

Alix

ALIX STAYTON
SAFETY SPECIALIST



3512 Michelson Drive, Irvine, California 92612
Mailing: PO Box 57000, Irvine, California 92619-7000



**Irvine Ranch Water District
Local Hazard Mitigation Plan
Planning Team Meeting #1
January 27, 2020**

First Name and Last Name	Title	Organization/Department	Mailing Address	E-Mail Address	Present?
Alix Stayton	Safety Specialist, Safety Department	Irvine Ranch Water District	██████████ ██████████	██████████	✓
Allen Shinbashi	Manager of Risk & Contracts, Contracts & Risk Management	Irvine Ranch Water District	██████████ ██████████	██████████	✓
Amy Stonich	Assistant Director of Community Development	City of Lake Forest	████████████████████ ██████████	██████████████████	✓
Anisha Malik	Planner	Michael Baker International	██████████████ ██████████	██████████████████	✓
Baryic Hunter	Division Chief	Operations District 4, Orange County Fire Authority	██████████ ██████████	██████████████	
Colt Martin	Mechanical Services Manager, Mechanical Services – Maintenance Operations	Irvine Ranch Water District	██████████████ ██████████	██████████	✓
Dave Crowe	Construction Manager, Construction Services	Irvine Ranch Water District	██████████████ ██████████	██████████	✓
Denien Rivenburg	Public Affairs	Irvine Ranch Water District	██████████	██████████	✓
Dorien McElroy	Collections Systems Manager, Collection Systems	Irvine Ranch Water District	██████████████ ██████████	██████████████████	✓

**Irvine Ranch Water District
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January 27, 2020**

First Name and Last Name	Title	Organization/Department	Mailing Address	E-Mail Address	Present?
Dustin Grinstead	Admin Captain for Chief Sherwood	Orange County Fire Authority	██████████ ██████████	██████████████████	✓
Emilyn Zuniga	Safety Manager, Safety Department	Irvine Ranch Water District	██████████████████ ██████████	██████████	✓
Eric Akiyoshi	Engineering Manager, Planning	Irvine Ranch Water District	██████████████████ ██████████	██████████	✓
Gaspar Garza	Operations Manager, MWRP Operations/Biosolids	Irvine Ranch Water District	██████████████████ ██████████	██████████	✓
Ian Swift	Natural Resources Manager, Natural Treatment System Operations	Irvine Ranch Water District	██████████████████ ██████████	██████████	✓
James Colston	Director Water Quality Compliance	Irvine Ranch Water District	██████████████████ ██████████	██████████	✓
Jason Dempsey	Emergency Services Administrator	City of Costa Mesa	██████████ ██████████████████	██████████████████	✓
Joe Lam	Automation Manager, Automation	Irvine Ranch Water District	██████████████████ ██████████	██████████	✓
Joe Meyers	Emergency Management Coordinator	Tustin Police Department	██████████████████ ██████████	██████████	

**Irvine Ranch Water District
Local Hazard Mitigation Plan
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January 27, 2020**

First Name and Last Name	Title	Organization/Department	Mailing Address	E-Mail Address	Present?
John Dayer	Facilities/Fleet Manager, Facilities Services & Fleet Services – Maintenance Operations	Irvine Ranch Water District	██████████ ██████████	██████████	✓
John Fabris	Public Affairs Manager, Public Affairs	Irvine Ranch Water District	██████████ ██████████	██████████	
Joyce LaPointe	Lieutenant	Office of Emergency Management, Costa Mesa Police Department	██████████ ██████████	██████████	
Katie Eing	Disaster Services Coordinator	Newport Beach Police Department	██████████ ██████████	██████████	
Ken Pfister	Operations Manager, Water Operations	Irvine Ranch Water District	██████████ ██████████	██████████	✓
Lars Oldewage	Water Quality Manager, Water Quality	Irvine Ranch Water District	██████████ ██████████	██████████	
Lisa Haney	Regulatory Compliance Manager, Regulatory Compliance	Irvine Ranch Water District	██████████ ██████████	██████████	✓
Malcolm Cortez	Engineering Manager, Engineering – Operations Support	Irvine Ranch Water District	██████████ ██████████	██████████	✓
Marina Lindsay	Water Resources Planner, Planning	Irvine Ranch Water District	██████████ ██████████	██████████	

**Irvine Ranch Water District
Local Hazard Mitigation Plan
Planning Team Meeting #1
January 27, 2020**

First Name and Last Name	Title	Organization/Department	Mailing Address	E-Mail Address	Present?
Noelle Steele	Project Manager	Michael Baker International	██████████ ██████████	██████████	✓
Oliver Pacifico	Water – South Coast Section	State Water Resources Control Board	██████████ ██████████	██████████	✓
Owen O’Neill	Electrical & Instrumentation Manager, Electrical Services – Maintenance Operations	Irvine Ranch Water District	██████████ ██████████	██████████	✓
Randy Williams	Network and Cybersecurity Manager, Information Systems	Irvine Ranch Water District	██████████ ██████████	██████████	✓
Richard (Rick) Mykitta	Director of Maintenance	Irvine Ranch Water District	██████████	██████████	✓
Robert (Bobby) Simmons	Emergency Management Administrator	Office of Emergency Management, City of Irvine	██████████ ██████████	██████████	✓
Robert Stefano	Deputy Chief of Operations	Emergency Operations Section, Orange City Fire Department	██████████ ██████████	██████████	
Shane Sherwood	Division Chief	Operations District 2, Orange County Fire Authority	██████████ ██████████	██████████	
Sharlyn de la Paz	Senior Management Analyst	City of Lake Forest	██████████ ██████████	██████████	✓

**Irvine Ranch Water District
Local Hazard Mitigation Plan
Planning Team Meeting #1
January 27, 2020**

First Name and Last Name	Title	Organization/Department	Mailing Address	E-Mail Address	Present?
Starla Barker	Technical Consultant	De Novo Planning	██████████ ██████████	██████████	✓
Steve Rhyner	Emergency Operations Coordinator	Emergency Management, City of Santa Ana	██████████ ██████████	██████████ -	✓
Thomas Malone	Director for Information Services	Irvine Ranch Water District	██████████	██████████	✓
Todd Colvin	Water Maintenance Supervisor, Field Services	Irvine Ranch Water District	██████████ ██████████	██████████	
Vicki Osborn	Director of Emergency Management	Metropolitan Water District of Orange County	██████████ ██████████	██████████	✓

IRVINE RANCH WATER DISTRICT LOCAL HAZARD MITIGATION PLAN

PLANNING TEAM MEETING #1

Wednesday, January 27, 2021

1:30 PM – 3:30 PM via Microsoft Teams

MEETING SUMMARY

Presentation/Discussion:

- Introductions
 - Introduce the sign in sheet/roll call and group introductions
- Project Goals, Objectives & Expectations
 - Working meetings to create the plan; adoption of a LHMP means availability of certain FEMA funds to IRWD
 - HMP Goals
 - Data Needs
 - Planning Team Meetings
- Purpose and Requirements of the LHMP
 - FEMA focuses on natural hazards and natural hazard mitigation in their review
 - Importance of Planning Process – FEMA looks at the process of plan development, and who was involved
 - Review of existing plan studies and technical information that would be important
 - Approved for 5 years and update process every 5 years
 - For hazards that can be mapped, they will be incorporated into the plan
 - Submittal goes to Cal OES first, then FEMA
- Hazard Identification and Prioritization
 - Reviewed previously evaluated hazards for EOP and RRA updates (based on AWIA and EPA guidelines)
 - FEMA suggested hazards presented; highlighted the hazards that were included in the MWDOC LHMP; identified potential hazards that the team may want to consider/discuss further
- Hazard Prioritization Activity
- Critical Facilities Discussion

Next Steps/Action Items:



Irvine Ranch
WATER DISTRICT

IRVINE RANCH WATER DISTRICT

HAZARD MITIGATION PLAN

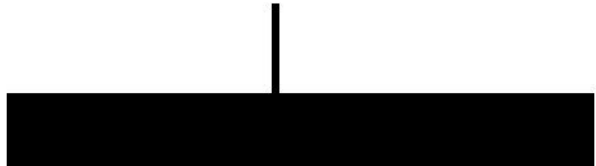
January 27, 2021, 1:30 PM

A-161

Michael Baker
INTERNATIONAL

Agenda

- Introductions
- Project goals, objectives & expectations
- Purpose and requirements of LHMP
- Hazard identification and prioritization
- Critical facilities
- Next steps
- Questions/additional discussion



Project Goals, Objectives and Expectations

Project Goals and Objectives

- Identify and address hazards specific to the IRWD service area
- Identify mitigation actions to reduce the severity/impact of the hazard
- Achieve certification by FEMA for hazard mitigation funding



Disaster Mitigation Act (DMA) of 2000 requires states and local governments prepare a multi-hazard mitigation plan as a precondition for receiving FEMA mitigation project grants.

Roles and Responsibilities

Our Job

- Facilitate the process
- Provide technical expertise
- Maintain schedule
- Do the heavy work
- Ensure FEMA-compliant plan

Your Job

- Participate
- Meet internal deadlines
- Provide agency-specific information/local insight
- Ensure plan is feasible and meets needs

Data Needs

- Plans/studies
- Policies/programs
- Technical and GIS data
- Intrinsic/historic knowledge
- Photos
- Asset inventory for loss estimations



Provide any information or resources to Alix Stayton

HMP Planning Team Meetings

- Four Planning Team meetings:
 - Meeting #1: January 27th
 - Meeting #2: February 24th
 - Meeting #3: March 31st
 - Meeting #4: early May
- Review of draft plan – mid June

Purpose and Requirements of the LHMP

What is Hazard Mitigation?

- Sustained actions taken to reduce or eliminate long-term risk to life and property from hazards

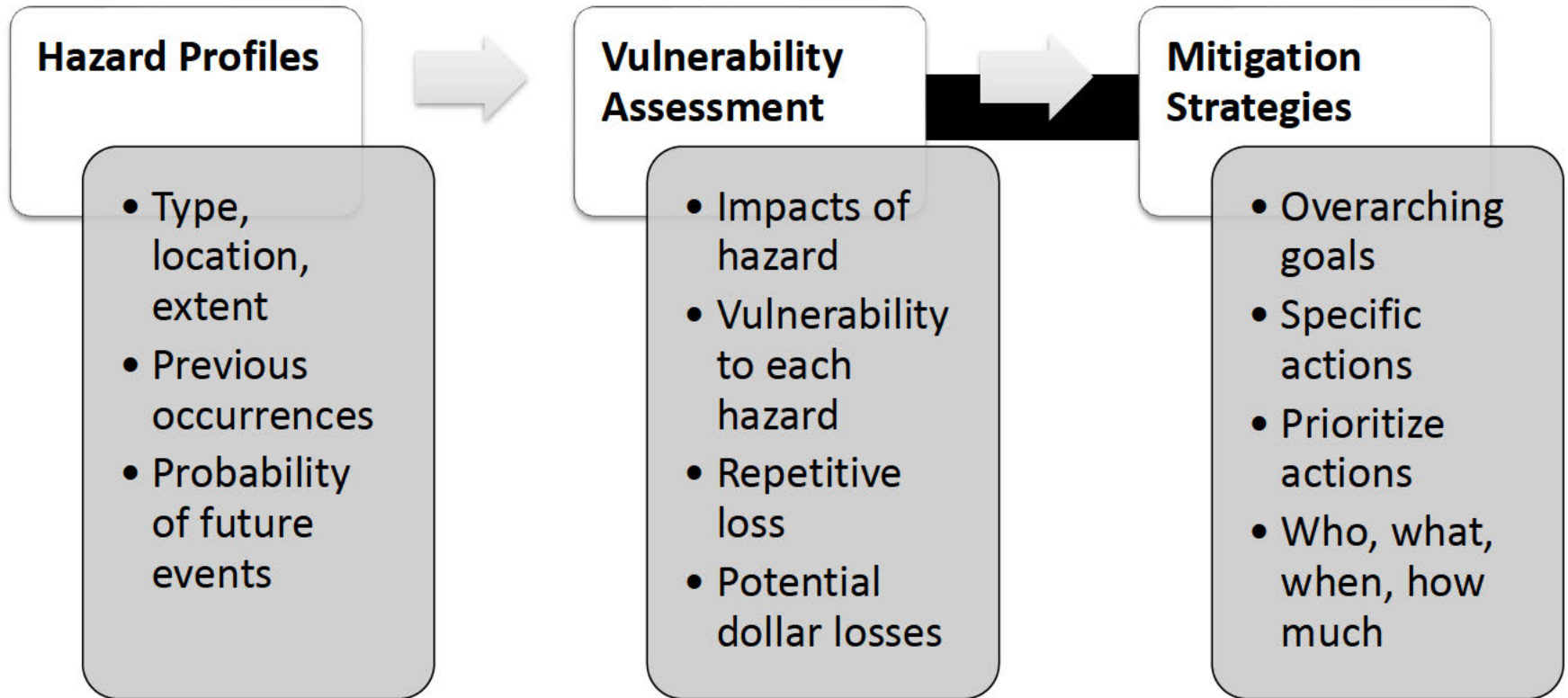
What is a Hazard Mitigation Plan?

- A plan based on a community's values and needs
- Results from a process oriented approach (important)
- Focuses on mitigation strategies (making the future safer)

Plan Requirements

- Provide and **document** opportunities for stakeholder and public involvement [REDACTED]
- Review and **incorporate** existing plans, studies, reports, and technical information
- **Document how** the plan was prepared and **who** was involved
- **Identify how** the plan will be monitored, evaluated, and updated within a five-year cycle
 - Provide for continued public participation in plan maintenance

LHMP Development



Summarize and Document Risk Assessment

Mitigation Strategy

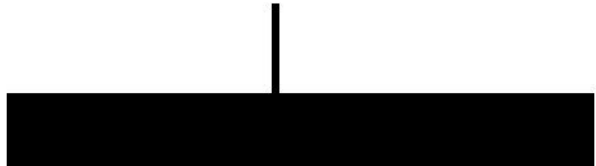
- Comprehensive range of mitigation actions and projects
 - Emphasize existing and new infrastructure
- Types of mitigation actions
 - Local plans and regulations
 - Structure and infrastructure projects
 - Natural systems protection
 - Education and awareness programs
- Action Plan
 - Incorporate into existing plans and policies
 - Identify who is responsible, funding mechanism, other resources, when completed and how purchased

Plan Adoption

- Plan submitted to Cal OES/FEMA for Review
 - Receive “Approval Pending” [REDACTED]
- IRWD adopts the LHMP
 - Must be adopted within one calendar year
 - Documentation of adoption (resolution) provided to FEMA
- FEMA issues approval letter

Relationship to Previously Prepared Plans

- **Emergency Operations Plan (Sept. 2020)**
 - Approved by the EPA
 - Focus is response after the emergency or natural hazard has already occurred
- **Water System Risk and Resilience Assessment (March 2020)**
 - Approved by the EPA
 - Focus is risk & resilience based on criteria established in AWIA (signed into law in 2018)
- **Emergency Action Plans for IRWD Dams/Reservoirs**
 - Approved by Cal OES
 - Focus is emergency response and criteria established in SB 92 (signed into law June 2017)



Hazard Identification and Prioritization

Previously Evaluated Hazards

- **EOP**

- Earthquake
- Active Shooter
- Power Outage
- Water Interruption
- Wildfire
- Major Sewer Overflow
- Flood – General
- Flood – MWRP
- Water Contamination
- Explosive Device
- Hazardous materials

- **R&RA**

- [REDACTED]
- Contamination: Chemical, Bio-Toxin, or Pathogen
- Sabotage, Physical: Insider or Outsider
- Sabotage, Cyber: Insider or Outsider
- Theft, Cyber: Insider or Outsider
- Theft, Physical: Insider or Outsider
- Dependency: Utility or Key Supplier
- Natural: Earthquake, Liquefaction, Flood or Wildfire

FEMA-Suggested Hazards

Avalanche	Flood	Sea level rise
Climate change	Geological hazards	Seismic hazards
Coastal erosion	Hailstorm	Severe winter storm
Coastal storm	Hazardous materials	Tornado
Dam failure	Human-caused hazards	Tsunami
Disease/pest management	Hurricane	Volcano
Drought	Land subsidence	Wildfire
Earthquake fault rupture	Landslide and mudflow	Wind
Expansive soils	Lightning	Windstorm
Extreme heat	Liquefaction	

Potential Hazards

Avalanche	Flood	Sea level rise
Climate change	Geological hazards	Seismic hazards
Coastal erosion	Hailstorm	Severe winter storm
Coastal storm	Hazardous materials	Tornado
Dam/Reservoir failure	Human-caused hazards	Tsunami
Disease/pest management	Hurricane	Volcano
Drought	Land subsidence	Wildfire
Earthquake fault rupture	Landslide and mudflow	Wind
Expansive soils	Lightning	Windstorm
Extreme heat	Liquefaction	

Proposed Hazards List

- Climate Change
- Coastal Hazards – coastal erosion, sea level rise, tsunami
- Dam/reservoir failure
- Drought
- Flood
- Geologic hazards – expansive soils, land subsidence
- Human caused hazards – [REDACTED]S, terrorism, power outage
- Landslide/mudflow
- Seismic hazards – fault rupture, ground shaking, liquefaction
- Severe Weather – coastal storm, winter storm, windstorm (Santa Ana winds)
- Wildfire/urban fire

Hazard Prioritization

- Four criteria
 - Probability (likelihood of occurrence)
 - Location (size of potentially affected area)
 - Maximum Probable Extent (intensity of damage)
 - Secondary impacts (severity of impacts to community)
- A value of 1 – 4 is assigned for each criteria
- Every criteria has an importance score
 - Can be used to weigh the influence of an individual criterion
 - Criteria and importance values are combined to calculate a Total Score

Score Example: Avalanche

Probability

Importance score:
2.0



$$\text{Probability score: } 2.0 \times 3 = 6$$

Location

Importance score:
0.8



$$\text{Affected Area score: } 0.8 \times 4 = 3.2$$

Score Example: Avalanche

Maximum Probable Extent

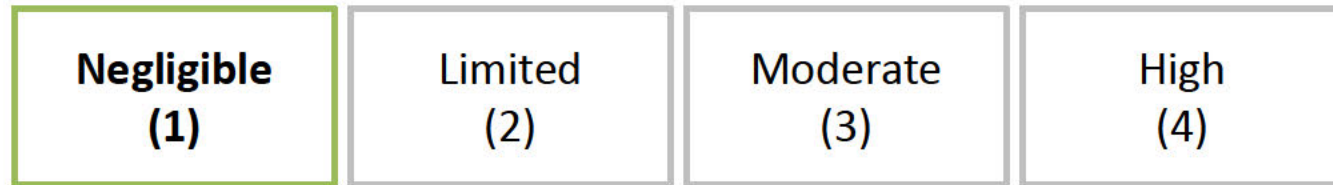
Importance score:
0.7



Primary Impact score: $0.7 \times 2 = 1.4$

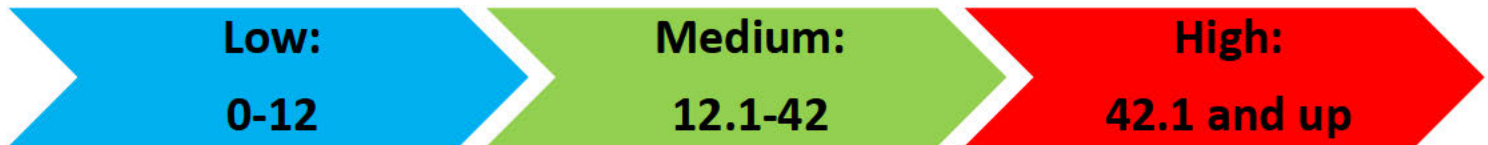
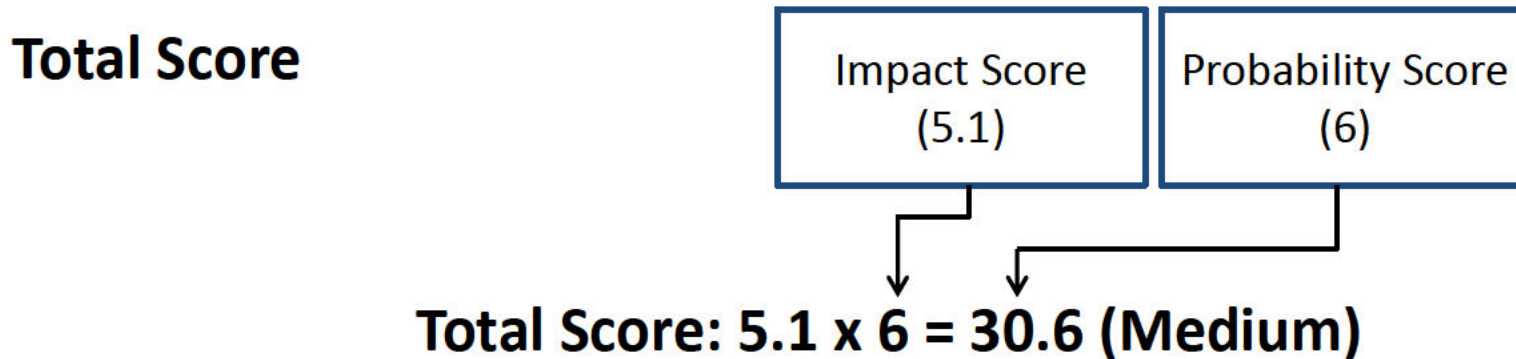
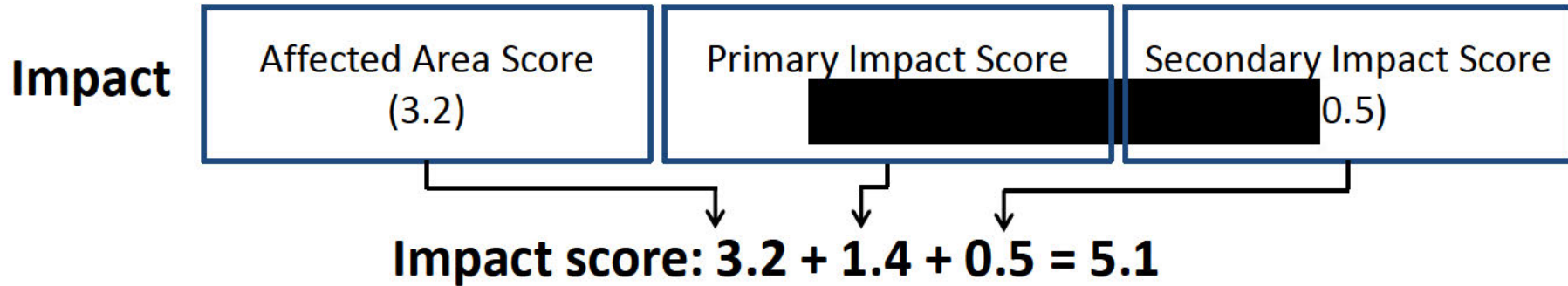
Secondary Impacts

Importance score:
0.5



Secondary Impacts score: $0.5 \times 4 = 0.5$

Score Example: Avalanche





Hazard Prioritization Exercise



Critical Facilities

Critical Facilities

- Standard FEMA Definition:
 - *Facilities or infrastructure [REDACTED] for the delivery of vital services*
- Proposed Definition for IRWD HMP:
 - *Public infrastructure used to provide water to IRWD customers and to maintain wastewater services for public health and safety*

Critical Facilities Approach

- Proposed Approach:
 - Utilize identified “critical [REDACTED] Risk and Resilience Assessment (March 2020)
 - Build upon this list to include wastewater treatment facilities/infrastructure
 - Add or subtract any facilities as necessary

Critical Facilities List - DRAFT

Asset Type	Critical Asset
Building	Headquarters Building
Building	Chemical Storage Building
Building	Michelson Operations Center
Building	LAWRP Fuel Facility
Building	Michelson Ops Complex LF
All	Distribution System
All	Single Source Supply Transmission Mains
All	SCADA System
All	Enterprise Information System
All	Met Source Water
All	Dyer Road Ground Water System
All	Dyer Road Groundwater (GW) Complex LF
WTP	Dyer Rd Initial Disinfection Facility (IDF)
WTP	Dyer Rd Primary Disinfection Facility (PDF)
WTP	Lake Forest Baker Filtration

Critical Facilities List - DRAFT

Asset Type	Critical Asset
Pump Station	Turtle Rock Zn 3-4 Pump Station
Pump Station	East Irvine Zn. 1-3 Pump Station
Pump Station	Foothill Zn 6-6A Pump Station
Pump Station	Foothill Zn 4-6 Pump Station
Pump Station	Coastal Zn. 4-6 Pump Station
Pump Station	Coastal Zn. 7 Pump Station & H
Pump Station	Portola Hills Zn 8 – 9 Pump Station
Pump Station	Coastal OC 63-Zn.4 Pump Station
Pump Station	Turtle Rock Zn 1-3 Pump Station
Pump Station	Portola Hills Zn 6-8
Pump Station	Lake Forest Zn 1-2 West Pump Station
Pump Station	Quail Hill Zn 3-4 Pump Station
Pump Station	Shaw Pump Station
Pump Station	Read Pump Station
Pump Station	Fleming Pump Station

Critical Facilities List - DRAFT

Asset Type	Critical Asset
Pump Station	William Canyon Pump Station
Pump Station	Cabinland Booster Pump Station
Pump Station	Manning Pump Station
Pump Station	Santiago Hills Zn 5-6

Critical Facilities List - DRAFT

Asset Type	Critical Asset
Reservoir	Foothill Zn 6 Reservoir
Reservoir	Foothill Zn 6A Reservoir
Reservoir	Coastal Zn 2 Reservoir
Reservoir	Coastal Zn 4 Reservoir
Reservoir	Portola Hills Zn 8 Reservoir
Reservoir	Portola Hills Zn 9 Reservoir
Reservoir	Orchard Zn 5 Reservoir
Reservoir	Lake Forest Emergency Storage #1 Zn 1 & Zn 2 (4) Reservoir
Reservoir	Quail Hill Zn 3 Reservoir
Reservoir	Quail Hill Zn 4 Reservoir
Reservoir	Portola Springs Zn 6 Reservoir – Rattle Snake Canyon Dam Res
Reservoir	Shaw Reservoir
Reservoir	Read Reservoir
Reservoir	Chapman Reservoir

Critical Facilities List - DRAFT

Asset Type	Critical Asset
Reservoir	Fleming Reservoir
Reservoir	Williams Canyon Reservoir
Reservoir	Modjeska Reservoir
Reservoir	Benner Reservoir
Reservoir	Santiago Canyon Zn 5
Reservoir	Fleming Pump Station & Reservoir LF
Reservoir	Central Irvine Zn 1 Reservoir

Critical Facilities

- Risk assessment looks at what facilities are in hazard zones
[REDACTED]
- Considers replacement cost and value to the community
- Mitigation strategies reflect vulnerabilities of critical facilities
 - Strengthen existing vulnerable facilities
 - Avoid building new facilities in at-risk areas



Next Steps

What We Need From You:

- Provide data needs – by **February 10th** or sooner
 - Forward to Alix Stayton, [REDACTED]
- Distribute survey within your jurisdiction
 - Via newsletters, social media, and other meetings
 - Link via Survey Monkey disseminated by Feb 5th
 - Survey will be open for 30 days
- Attend Meeting #2: **February 24th**

Next Steps

- Develop content for IRWD's [REDACTED] community outreach
- Preparation of hazard profiles and mapping
- Initiate risk assessment
- Planning Team Meeting
 - Meeting #2: February 24th
 - Meeting #3: March 31st

Timeline

- HMP Meeting #2: Feb. 24th
 - Preliminary findings from risk assessment, inventory review, group analysis/risk factor development
- HMP Meeting #3: March 31st
 - Identification of goals, discussion of capability assessment, mitigation action development
- HMP Meeting #4: early May
 - Prioritization of mitigation actions, development of implementation strategy and plan maintenance process
- Draft LHMP for Planning Team Review: early June
- Draft LHMP for Public Review: early July



Questions/Additional Discussion?

Forward all data/information to:

Alix Stayton

stayton@irwd.com

(626) 598 – 1627 (cell)

IRVINE RANCH WATER DISTRICT LOCAL HAZARD MITIGATION PLAN

PLANNING TEAM MEETING #1

Wednesday, January 27, 2021

1:30 PM – 3:30 PM via Microsoft Teams

MEETING SUMMARY

Presentation/Discussion:

- Introductions
 - Introduce the sign in sheet/roll call and group introductions

- Project Goals, Objectives & Expectations
 - Working meetings to create the plan; adoption of a LHMP means availability of certain FEMA funds to IRWD
 - HMP Goals: Look at IRWD water/wastewater infrastructure systems and how the local hazards impact these systems/ability to provide services; focus is to identify the actions to reduce the severity of the impact
 - Hazard mitigation planning differs from previous/existing response plans, mitigation looking to proactively reduce severity of impacts to these hazards
 - Data Needs – request planning team participants to provide Alix (IRWM PM) with any information, plans/policies, mitigation activities, GIS data, etc., that may be relevant. If not sure, still send it. Historical knowledge & day to day operations of each participant is what helps make the plan meet IRWD needs
 - Planning Team Meetings – identified four monthly meetings, two hours each; anticipate draft plan for review by June

- Purpose and Requirements of the LHMP
 - FEMA focuses on natural hazards and natural hazard mitigation in their review
 - Importance of Planning Process – FEMA looks at the process of plan development, and who was involved
 - Review of existing plan studies and technical information that would be important
 - Approved for 5 years and update process every 5 years
 - For hazards that can be mapped, they will be incorporated into the plan
 - Submittal goes to Cal OES first, then FEMA

- Hazard Identification and Prioritization
 - Reviewed previously evaluated hazards for EOP and RRA updates (based on AWIA and EPA guidelines)
 - FEMA suggested hazards presented; highlighted the hazards that were included in the MWDOC LHMP; identified potential hazards that the team may want to consider/discuss further
 - *Question from Tom Malone (Director for Information Services, IRWD) – should cyber security breach be considered as a hazard?*

- *Answer from Noelle Steele (Project Manager, Michael Baker International) – recommend locating under terrorism hazard profile and if it is a mitigable concern.*
- *Question from Rick Mykitta (Director of Maintenance, IRWD) – is the overlap of some of the FEMA hazards intentional?*
 - *Answer from Noelle Steele (Project Manager, Michael Baker International) – yes, the FEMA hazards do incorporate some overlap. Our proposition for organizational structure is to evaluate a few hazards together, to reduce redundancy (i.e., all seismic hazards under one profile)*
- *Question from Owen O’Neill (Electrical & Instrumentation Manager, IRWD)— is the loss of electrical power due to equipment failure a hazard to be profiled?*
 - *Answer from Noelle Steele (Project Manager, Michael Baker International): Yes, was included as a human induced hazard under MWDOC, if the team thinks there are mitigable actions IRWD could be involved with then we can incorporate it on its own*
 - *Answer from Alix Stayton (Project Manager, IRWD): Owen’s group has done things already which we can incorporate into the plan*
 - *Answer from Starla Barker (Technical Consultant, De Novo Planning Group): Power outage could also be tied to fires or winds, so there are opportunities to discuss implications and secondary impacts from a natural hazard*
- *Question from Dorien McElroy (Collection Systems Manager, IRWD): Consider looking at ruptured infrastructure and water mainline breaks? IRWD has an overflow emergency response plan (OERP)*
 - *Answer from Noelle Steele (Project Manager, Michael Baker International): For hazard mitigation planning purposes, we would evaluate the hazard behind the ruptured infrastructure, such as seismic hazards. Important to evaluate the cause behind the damage, in order to properly mitigate. Approach differs from emergency response efforts.*
 - *Answer from Vicki Osborn (Director of Emergency Management, WEROC): Recommends incorporating flood and severe weather under the same profile*
- *Question from Eric Akiyoshi (Engineering Manager, IRWD): How will climate change be incorporated into the hazard profiles?*
 - *Answer from Noelle Steele (Project Manager, Michael Baker International): Two options for documenting climate change as a hazard; evaluate how climate change exacerbates each hazard (within each separate profile) or evaluate climate change as its own hazard; FEMA requires the analysis/evaluation of climate change to be incorporated into HMP.*
 - *Comment from Eric Akiyoshi, (Engineering Manager, IRWD): I like that De Novo and MBI have been talking to Alix about Climate Change and incorporating this as a potential "amplifier" for any other given hazard, not so much as a hazard on its own. Maybe we can take a straight forward example first (e.g. Earthquake) for hazard ranking tool.*

- *Question from David Crowe (Construction Manager, IRWD): Have you ever included a simple mainline break to the list? If we have a linebreak there are two hospitals within 200 feet from each other, and we have a break. Is that something we would look into?*
 - *Answer from Noelle Steele (Project Manager, Michael Baker International): We would look into the hazard behind the mainline break – for example, seismic or soil instability.*
 - *Comment from Rick Mykitta (Director of Maintenance, IRWD): Is criticality exercise something we would be discussing?*
 - *Answer from Starla Barker (Technical Consultant, De Novo Planning Group): The facility could be in an area susceptible to multiple hazards. But we are wanting to focus on how likely these hazards are to happen. The score in the hazard ranking tool will help in understanding the secondary impacts, and we can review and go back and adjust.*
 - *Answer from Noelle Steele: We can talk about the specific main water line of concern when we go through critical facilities later in the presentation.*

- Hazard Prioritization Activity

- Presented the hazard prioritization activity, and discussion based on previous hazards in the service area/community based on the committee’s best knowledge. Human related hazards – hazardous material spill, power outage, terrorism/sabotage – added to the hazards list. Generally discussed combining hazards under a major heading where appropriate (e.g., seismic hazards including ground shaking, fault rupture and liquefaction under one profile). The planning team prioritized the hazards, but ran out of meeting time to finish the exercise. Noelle Steele and Starla Barker recommended an IRWD focus group completes the prioritization exercise off-line for the hazards that were not prioritized below. Specific notes during the hazard prioritization activities are attached to these minutes. *NOTE: This information is now included in the hazard ranking worksheet (below).*

HAZARD RANKING WORKSHEET - IRWD LHMP					DATE: 2/3/2021	
Hazard Type	Probability	Impact			Total Score	Hazard Planning Consideration
		Location	Primary Impact	Secondary Impacts		
Climate Change					0.00	Low
Coastal Erosion	1	1	1	2	5.00	Low
Coastal Storm/Severe Winter Storm	3	2	2	2	24.00	Medium
Dam/Reservoir Failure	1	1	1	4	7.00	Low
Drought	4	4	1	1	35.20	Medium
Fault Rupture/Seismic Hazards/Groundshaking	4	4	4	4	64.00	High
Flood	2	1	3	4	19.60	Medium
Geological Hazards - expansive soils/subsidence	1	1	1	1	4.00	Low
Hazardous Materials Spill					0.00	Low
Terrorism/Sabotage					0.00	Low
Landslide/Mudflow					0.00	Low
Liquefaction					0.00	Low
Sea Level Rise					0.00	Low
Tsunami					0.00	Low
Wildfire	4	3	2	2	38.40	Medium
Windstorm	4	4	1	1	35.20	Medium
Power Outage	4	2	1	2	26.40	Medium

- Critical Facilities Discussion:

- Critical facilities from the AWIA Risk and Resiliency Document were presented and discussed, as a starting point for discussion purposes. The definition of critical facilities was provided to the team.
- Request for any additional infrastructure/facilities to include or remove from the list. Noted that IRWD intends to add wastewater facilities and pump stations to the list, as they were not required for the AWIA analysis but should be included as critical infrastructure.
- IRWD to discuss and evaluate internally and resubmit to Michael Baker.

Next Steps/Action Items:

- Michael Baker - developing content for IRWD’s website, preparing hazard profiles and mapping, developing community outreach survey, initiate risk assessment.
- Forward plans/policies that may be relevant and provide value to this effort to Alix by Feb. 15th
- Provide any additional input on critical facilities by Feb. 15th
- Attend Meeting on February 24th at 1:30 PM.

Following the Planning Team Meeting

- IRWD completed the hazard ranking tool for the prioritization of the following five hazards: hazardous materials spill, terrorism/sabotage, landslide/mudflow, liquefaction, sea level rise, tsunami. This information has been incorporated into the notes and action items for the HMP. The updated hazard ranking worksheet was completed on March 4, 2021 and a screenshot is provided below.

HAZARD RANKING WORKSHEET - IRWD LHMP					DATE: 3/4/2021	
Hazard Type	Probability	Impact			Total Score	Hazard Planning Consideration
		Location	Primary Impact	Secondary Impacts		
Climate Change					0.00	Low
Coastal Erosion	1	1	1	2	5.00	Low
Coastal Storm/Severe Winter Storm	3	2	2	2	24.00	Medium
Dam/Reservoir Failure	1	1	1	4	7.00	Low
Drought	4	4	1	1	35.20	Medium
Fault Rupture/Seismic Hazards/Groundshaking	4	2	2	3	36.00	Medium
Flood	2	1	3	4	19.60	Medium
Geological Hazards - expansive soils/subsidence	1	1	1	1	4.00	Low
Hazardous Materials Spill	2	2	2	3	18.00	Medium
Terrorism	1	3	3	3	12.00	Low
Sabotage/Vandalism	1	1	1	2	5.00	Low
Landslide/Mudflow	3	2	3	3	31.20	Medium
Liquefaction	1	2	3	3	10.40	Low
Sea Level Rise	1	1	1	1	4.00	Low
Tsunami	1	1	1	1	4.00	Low
Wildfire	4	3	2	2	38.40	Medium
Windstorm	4	4	1	1	35.20	Medium
Power Outage	4	2	1	2	26.40	Medium

Attachment 1, Hazard Prioritization Activity Discussion

- Alix Stayton, IRWD: Is the hazard mitigation project more subjective for hazard prioritization purposes?
 - Eric Akiyoshi, IRWD: Are there metrics we can use for probability? For example, with drought it seems like it should be more data driven (similar to earthquake).
 - Noelle Steele, Michael Baker: For this exercise we can base it off our expertise, the data will then later be incorporated into the plan preparation. Professional judgment is sufficient for the exercise.
 - Starla Barker, De Novo Planning Group: We can revisit the worksheet after drafting profiles. Some of the information is readily available, but more localized information will also be incorporate based on your local experience. Whether or not it has affected you as an agency. Identify any red flags that might not have the level of probability that we thought. Recommend we don't profile climate change in this case. It gets wrapped into all the other hazards and doesn't need to be something we have to prioritize on its own.
- Windstorm Discussion:
 - Rick Mykitta, IRWD: Have we seen the entire district impacted by winds?
 - Colt Martin, IRWD: I think it is more so the winds will be all within the area and not necessarily cause a power outage. The impact of windstorm could be negligible but it could hit the entire area.
 - Ken Pfister, IRWD: No impact to service area from the winds except the power loss.
 - Rick Mykitta, IRWD: Most of power outages we get are manmade (proactive shutoffs).
 - Owen O'Neill, IRWD: Power outages are not dependent on the winds blowing in our district/service area. It could be the winds are in another area and they hit a circuit tied to us. They can be linked but wind and power are separate from each other.
 - Rick Mykitta, IRWD: If we are looking at the windstorm itself, it doesn't have consequences. The reaction of Edison is tied to the windstorms.
- Power Outage:
 - Colt Martin, IRWD: A transponder caught fire and we were out power for a while.
 - Rick Mykitta, IRWD: How can we address PSPS (Public Safety Power Shutoff) in these exercises? It puts us in a place that is not optimal.
 - Owen O'Neill, IRWD: The impact of these need to be acknowledged. We've been lucky so far and we are dependent on the power system that we have to back us up. But we need to look at this and provide for it. We aren't set up for multiple day outages.
 - Noelle Steele, Michael Baker International: In the past we have incorporated it in the fire portion and we can incorporate it in one of the overarching hazard types.
 - Alix Stayton, IRWD: Maybe it makes sense under wildfire because that is when it would be most urgent.
- Severe Storms/Winter Storms
 - Eric Akiyoshi, IRWD: To Rick's earlier comment, severe storms and flooding would overlap more.
 - Rick Mykitta, IRWD: I think they should go together, but the probability of this on its own is a 2-3. Canyon areas are vulnerable particularly after a wildfire.
 - James Colston, IRWD: Too much flow, someone pops a manhole, there are things that happen even if you have excellent engineers.
 - Colt Martin, IRWD: Defer to others—even under the worst storms in the 90s, did we have significant accessibility issues? Some sites become more difficult to get to (mudslides, etc)

- Eric Akiyoshi, IRWD: Two or three spots that keep happening over and over again. So how should we rank it?
- Noelle Steele, Michael Baker International: I would go with a 2, limited primary and moderate secondary. It doesn't sound like a frequent impact or that it would cause a loss of function.
- Starla Barker, De Novo Planning Group: We want to capture these instances and issues in the plan and discuss in the plan. When we get to mitigation actions, it is where we want to focus. We will have a more detailed discussion about this later as well.
- Dams/ Reservoirs
 - Rick Mykitta, IRWD: Risk informed decision making with our dam programs, we are moving our whole safety program in that direction.
 - Noelle Steele, Michael Baker International: FEMA has provided a lot of dam guidance related to safety recently.
 - Rick Mykitta, IRWD: Which way should we think about this? From mechanisms or operationally?
 - Noelle Steele, Michael Baker International: We want to focus from an operations standpoint. In a drought most reservoirs aren't at their capacity anyways, so we can keep this as more limited.
 - Rick Mykitta, IRWD: Even though the most catastrophic event is the least likely, we need to capture the intensity of it. Primary impact could be low but the secondary to the community could be very high.
- Flood
 - Rick Mykitta, IRWD: If we do a good job keeping the creeks cleaned out, then our flood risks go down.
 - Eric Akiyoshi, IRWD: I thought about all our canyon areas with flooding. We've built infrastructure to prevent treatment plants from flooding as well.
 - Rick Mykitta, IRWD: We have partnerships with our downstream organizations as well and they've been keeping everything cleared as well.
 - Dave Crowe, IRWD: If the Irvine dam broke, would we put that under this or dams?
 - Rick Mykitta, IRWD: Part of the district is going to be higher than the overall area.

Hazard Ranking Tool

The importance of each category is a weight assigned to each category. In the default setting of this tool, probability is weighted more highly than other categories. The user can define these weights based on the relative importance of these categories to the community for its decision-making process.

Probability

The probability of a hazard occurring should be based on estimated likelihood of occurrence from historical data. These definitions are from FEMA in the Local Mitigation Planning Workbook, March 2013. *This tool assigns numeric values to each level of probability.*

Definitions:

Unlikely: Less than 1 percent probability of occurrence in the next year or a recurrence interval of greater than every 100 years.

Occasional: 1 to 10 percent probability of occurrence in the next year or a recurrence interval of 11 to 100 years.

Likely: 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.

Highly Likely: 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.

Location

Based on size of geographical area of community affected by hazard. Definitions are from the FEMA Local Mitigation Planning Handbook, March 2013.

Definitions:

Negligible: less than 10 percent of planning area or isolated single point occurrences.

Limited: 10 to 25 percent of the planning area or limited single point occurrences.

Significant: 25-75 percent of planning area or frequent single-point occurrences.

Extensive: 75 to 100 percent of planning area or consistent single-point occurrences.

Maximum Probable Extent (Primary Impact)

Based on percentage of damage to typical facility in a community. Definitions are from the FEMA Local Mitigation Planning Handbook, March 2013.

Definitions:

Weak: Limited classification on scientific scale, slow speed of onset or short duration of event, result in little to no damage.

Moderate: Moderate classification of scientific scale, moderate speed of onset or moderate duration of event, resulting in some damage and loss of services for days.

Severe: Severe classification on scientific scale, fast speed of onset or long duration of event, resulting in devastating damage and loss of services for weeks or months.

Extreme: Extreme classification on scientific scale, immediate onset or extended duration of event, resulting in catastrophic damage and uninhabitable conditions.

Secondary Impacts

Based on estimated secondary impacts to community at large. These impacts are not from FEMA but constitute important impacts that ripple through communities.

Definitions:

Negligible: no loss of function, downtime, and/or evacuations

Limited: minimal loss of function, downtime, and/or evacuations

Moderate: some loss of function, downtime, and/or evacuations

High: major loss of function, downtime, and/or evacuations

Hazard Planning Consideration

Hazard planning consideration is a numerical score calculated for each hazard. This score enables users to rank the potential impacts of hazards and get a sense for their relative dangers. These values are not derived from FEMA guidance but have been widely used in hazard planning.

Each hazard is scored along four categories on a scale of 1-4. These values are then multiplied by the importance assigned to each category.

Overall Importance

The overall importance of a hazard is a summary descriptor use defined by the FEMA Local Mitigation Handbook. There are no numeric ratings assigned to the overall importance of a hazard though these designations are roughly equivalent to the numeric scoring used in this tool.

Definitions:

Low: Two or more criteria fall in the lower classifications or the event has a minimal impact on the planning area. This rating is sometimes used for hazards with minimal or unknown record of occurrences or for hazards with minimal mitigation potential.

Medium: The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is sometimes used for hazards with a high extent rating but very low probability rating.

High: The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area.

HAZARD RANKING WORKSHEET - IRWD LHMP

DATE: 2/22/2021

Hazard Type	Probability	Impact			Total Score	Hazard Planning Consideration
		Location	Primary Impact	Secondary Impacts		
Climate Change					0.00	Low
Coastal Erosion	1	1	1	2	5.00	Low
Coastal Storm/Severe Winter Storm	3	2	2	2	24.00	Medium
Dam/Reservoir Failure	1	1	1	4	7.00	Low
Drought	4	4	1	1	35.20	Medium
Fault Rupture/Seismic Hazards/Groundshaking	4	4	4	4	64.00	High
Flood	2	1	3	4	19.60	Medium
Geological Hazards - expansive soils/subsidence	1	1	1	1	4.00	Low
Hazardous Materials Spill					0.00	Low
Terrorism/Sabotage					0.00	Low
Landslide/Mudflow					0.00	Low
Liquefaction					0.00	Low
Sea Level Rise					0.00	Low
Tsunami					0.00	Low
Wildfire	4	3	2	2	38.40	Medium
Windstorm	4	4	1	1	35.20	Medium
Power Outage	4	2	1	2	26.40	Medium

Probability <i>Based on estimated likelihood of occurrence from historical data</i>	Importance 2.0
<u>Probability</u>	<u>Score</u>
Unlikely	1
Occasional	2
Likely	3
Highly Likely	4

Location <i>Based on size of geographical area of community affected by</i>	Importance 0.8
<u>Affected Area</u>	<u>Score</u>
Negligible	1
Limited	2
Significant	3
Extensive	4

Maximum Probable Extent (Primary Impact) <i>Based on percentage of damage to typical facility in community</i>	Importance 0.7
<u>Impact</u>	<u>Score</u>
Weak - little to no damage	1
Moderate - some damage, loss of service for days	2
Severe - devastating damage, loss of service for months	3
Extreme- catastrophic damage, uninhabitable conditions	4

Secondary Impacts <i>large</i>	Importance 0.5
<u>Impact</u>	<u>Score</u>
Negligible - no loss of function, downtime, and/or evacuations	1
Limited - minimal loss of function, downtime, and/or evacuations	2
Moderate - some loss of function, downtime, and/or evacuations	3
High - major loss of function, downtime, and/or	4

Total Score = Probability x Impact, where:
Probability = (Probability Score x Importance)
Impact = (Affected Area + Primary Impact + Secondary Impacts), where:
Affected Area = Affected Area Score x Importance
Primary Impact = Primary Impact Score x Importance
Secondary Impacts = Secondary Impacts Score x Importance

<u>Total Score</u>	Hazard Planning Consideration			<u>Hazard Level</u>
	<u>Range</u>	<u>Distribution</u>		
0.0	12.0	10		Low
12.1	42.0	6		Medium
42.1	64.0	1		High

The probability of each hazard is determined by assigning a level, from unlikely to highly likely, based on the likelihood of occurrence from historical data. The total impact value includes the affected area, primary impact

Hazard Type	Probability	Impact			Hazard Planning Consideration
		Location	Primary Impact	Secondary Impacts	
Climate Change					
Coastal Erosion	Unlikely	Negligible	Weak	Limited	
Coastal Storm/Severe Winter Storm	Likely	Limited	Moderate	Limited	
Dam/Reservoir Failure	Unlikely	Negligible	Weak	High	
Drought	Highly Likely	Extensive	Weak	Negligible	
Fault Rupture/Seismic Hazards/Groundshaking	Highly Likely	Extensive	Extreme	High	
Flood	#REF!	#REF!	#REF!	#REF!	
Geological Hazards - expansive soils/subsidence	Occasional	Negligible	Severe	High	
Hazardous Materials Spill	Unlikely	Negligible	Weak	Negligible	
Terrorism/Sabotage					
Landslide/Mudflow					
Liquefaction					
Sea Level Rise					
Tsunami					
Wildfire					
Windstorm					
Power Outage					

Probability
Based on estimated likelihood of occurrence from historical data
Score
 1
 2
 3
 4

Importance

Probability
 Unlikely
 Occasional
 Likely
 Highly Likely

Maximum Probable Extent (Primary Impact)
Based on percentage of damage to typical facility in community
Score
 1
 2
 3
 4

Importance

Impact
 Weak
 Moderate
 Severe
 Extreme

Location
Based on size of geographical area of community affected by hazard
Score
 1
 2
 3
 4

Importance

Affected Area
 Negligible
 Limited
 Significant
 Extensive

Secondary Impacts
Based on estimated secondary impacts to community at large
Score
 1
 2
 3
 4

Importance

Impact
 Negligible
 Limited
 Moderate
 High

Overall Importance (Based on overall hazard to community)

- Low Minimal impact on the planning area. Hazards have minimal or unknown record of occurrences or minimal mitigation potential.
- Medium Event's impacts on the planning area are noticeable but not devastating. Hazards with a high extent rating but very low probability rating.
- High Event is likely/highly likely to occur with sever strength over a significant to extensive portion of the planning area.

Steele, Noelle

From: Alix Stayton [REDACTED]
Sent: Thursday, March 4, 2021 10:18 AM
To: Steele, Noelle
Cc: Emilyn Zuniga
Subject: EXTERNAL: updated hazard prioritization list
Attachments: IRWD Worksheet_Team Prioritization focus group.xlsx

Follow Up Flag: Follow up
Flag Status: Completed

Good morning,

I went back to engineering at Eric and Rick's request (you might remember they had different views on the scoring we did for the seismic events item) and worked through IRWD code compliance/retrofitting data, and potential issues with underground assets. Seismic events have been re-scored and both Engineering and Maintenance are now in agreement on that.

Best,

Alix

ALIX STAYTON
SAFETY SPECIALIST



3512 Michelson Drive, Irvine, California 92612
Mailing: PO Box 57000, Irvine, California 92619-7000



HAZARD RANKING WORKSHEET - IRWD LHMP

DATE: 3/4/2021

Hazard Type	Probability	Impact			Total Score	Hazard Planning Consideration
		Location	Primary Impact	Secondary Impacts		
Climate Change					0.00	Low
Coastal Erosion	1	1	1	2	5.00	Low
Coastal Storm/Severe Winter Storm	3	2	2	2	24.00	Medium
Dam/Reservoir Failure	1	1	1	4	7.00	Low
Drought	4	4	1	1	35.20	Medium
Fault Rupture/Seismic Hazards/Groundshaking	4	2	2	3	36.00	Medium
Flood	2	1	3	4	19.60	Medium
Geological Hazards - expansive soils/subsidence	1	1	1	1	4.00	Low
Hazardous Materials Spill	2	2	2	3	18.00	Medium
Terrorism	1	3	3	3	12.00	Low
Sabotage/Vandalism	1	1	1	2	5.00	Low
Landslide/Mudflow	3	2	3	3	31.20	Medium
Liquefaction	1	2	3	3	10.40	Low
Sea Level Rise	1	1	1	1	4.00	Low
Tsunami	1	1	1	1	4.00	Low
Wildfire	4	3	2	2	38.40	Medium
Windstorm	4	4	1	1	35.20	Medium
Power Outage	4	2	1	2	26.40	Medium

Probability	Importance 2.0
<i>Based on estimated likelihood of occurrence from historical data</i>	
<u>Probability</u>	<u>Score</u>
Unlikely	1
Occasional	2
Likely	3
Highly Likely	4

Location	Importance 0.8
<i>hazard</i>	
<u>Affected Area</u>	<u>Score</u>
Negligible	1
Limited	2
Significant	3
Extensive	4

Maximum Probable Extent (Primary Impact)	Importance 0.7
<i>Based on percentage of damage to typical facility in community</i>	
<u>Impact</u>	<u>Score</u>
Weak - little to no damage	1
Moderate - some damage, loss of service for days	2
Severe - devastating damage, loss of service for months	3
Extreme- catastrophic damage, uninhabitable conditions	4

Secondary Impacts	Importance 0.5
<i>large</i>	
<u>Impact</u>	<u>Score</u>
Negligible - no loss of function, downtime, and/or evacuations	1
Limited - minimal loss of function, downtime, and/or evacuations	2
Moderate - some loss of function, downtime, and/or evacuations	3
High - major loss of function, downtime, and/or	4

Total Score = Probability x Impact, where:
Probability = (Probability Score x Importance)
Impact = (Affected Area + Primary Impact + Secondary Impacts), where:
Affected Area = Affected Area Score x Importance
Primary Impact = Primary Impact Score x Importance
Secondary Impacts = Secondary Impacts Score x Importance

Hazard Planning Consideration				
<u>Total Score</u>	<u>Range</u>	<u>Distribution</u>	<u>Hazard Level</u>	
0.0	12.0	9	Low	
12.1	42.0	9	Medium	
42.1	64.0	0	High	

The probability of each hazard is determined by assigning a level, from unlikely to highly likely, based on the likelihood of occurrence from historical data. The total impact value includes the affected area, primary impact

Hazard Mitigation plan workgroup meeting #1

Show participants

Irvine Ranch WATER DISTRICT

Sharilyn de la Paz, Lake Forest (Guest)

Allen Shinbashi

Eric Akiyoshi

Irvine Ranch WATER DISTRICT

Alix Stayton

Steele, Noelle

Starla Barker, De Novo Planning (Guest)

JD DC VO IS EZ LH RW DG JC OP CD DR RM CM OO TM JL

Request control



Relationship to Previously Prepared Plans

- **Emergency Operations Plan (Sept. 2020)**
 - Approved by the EPA
 - Focus is response after the emergency or natural hazard has already occurred
- **Water System Risk and Resilience Assessment (March 2020)**
 - Approved by the EPA
 - Focus is risk & resilience based on criteria established in AWIA (signed into law in 2018)
- **Emergency Action Plans for IRWD Dams/Reservoirs**
 - Approved by Cal OES
 - Focus is emergency response and criteria established in SB 92 (signed into law June 2017)



Steele, Noelle

Participants

Type a name

- GG Gaspar Garza
Outside your organization
- DG Grinstead, Dustin
Outside your organization
- IS Ian Swift
Outside your organization
- JC James Colston
Outside your organization
- CD Jason Dempsey, Costa Mesa (...)
- JL Joe Lam
Outside your organization
- JD John Dayer
Outside your organization
- KP Ken Pfister
Outside your organization
- LH Lisa Haney
Outside your organization
- MC Malcolm Cortez
Outside your organization
- OO Owen O'Neill
Outside your organization
- OP Pacifico, Oliver@Waterboards
Outside your organization
- RW Randy Williams
Outside your organization
- RM Richard Mylatta
Outside your organization
- RS Robert Simmons
Outside your organization
- LP Sharlyn de la Paz, Lake Forest ...

+18

OO

EA

LH

RM

LP

MC

TM

VO

AS

Malcolm Cortez

Thomas Malone

Vicki Osborn (WEROC)...

Alix Stayton

Steele Noelle

Starla Barker, De Novo

Request control

Meeting chat

Last read

- DC Dave Crowe 2:44 PM
93 was Northridge 94 🌵
- EA Eric Akiyoshi 2:46 PM
Seems like the winds may impact the canyons most. Potentially tree falls on pump stations, tanks, etc
- AS Alix Stayton 2:59 PM
Hmm! Owen maybe this is our next project then
<https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities>
- OO Owen O'Neill 3:01 PM 🙌 1
I think so, It's not going away. The sites were designed with standby power systems, but the PSPS's frequently push us into a prime power generation situation.
- TM Thomas Malone 3:15 PM
All this talk of dams breaking... I just finished a book about the Great Johnstown Flood - look it up, it was terrible. Also, note what happened in Michigan last spring.

AutoSave On IRWD Wor... Steele, Noelle

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HAZARD RANKING WORKSHEET - IRWD LHMP DATE:

Hazard Type	Probability	Location	Impact Primary Impact	Secondary Impacts	Total Score
Climate Change					0.00
Coastal Erosion	1	1	1	2	5.00
Coastal Storm/Severe Winter Storm	3	2	2	2	24.00
Dam/Reservoir Failure	1	1	1	4	7.00
Drought	4	4	1	1	35.20
Fault Rupture/Seismic Hazards/Groundshaking	4	4	4	4	64.00
Flood	2	1			3.20
Geological Hazards - expansive soils/subsidence					0.00
Hazardous Materials Spill					0.00
Terrorism/Sabotage					0.00
Landslide/Mudflow					0.00
Liquefaction					0.00
Sea Level Rise					0.00
Tsunami					0.00
Wildfire	4	3	2	2	38.40
Windstorm	4	4	1	1	35.20
Power Outage	4	2	1	2	26.40
					0.00

Page 1

Definitons Hazard Ranking (Numeric) Hz ...

Hazard Ranking T... - Saved Steele, Noelle

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Based on percentage of damage to typical facility in a community. Definitions are from the FEMA Local Mitigation Planning Handbook, March 2013.

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 Moderate: Moderate classification of scientific scale, moderate speed of onset or moderate duration of event, resulting in some damage and loss of services for days.
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 Extreme: Extreme classification on scientific scale, immediate onset or extended duration of event, resulting in catastrophic damage and uninhabitable conditions.

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Hazard Planning Consideration
 Hazard planning consideration is a numerical score calculated for each hazard. This score enables users to rank the potential impacts of hazards and get a sense for their relative dangers. These values are not derived from FEMA guidance but have been widely used in hazard planning.

Page 2 of 3 665 words

Steele, Noelle Type here to search

3:24 PM 1/27/2021

+11 TM DM JC AS DB

Steele, Noelle Richard Mykita Eric Akiyoshi Colton Martin Ken Pfister Owen O'Neill

Hazard Mitigation plan workgroup meeting #1

Request control

AutoSave On HMP Meeting #1 Search Steele, Noelle

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Critical Facilities

- Risk assessment looks at what facilities are in hazard zones I
 - Considers replacement cost and value to the community
- Mitigation strategies reflect vulnerabilities of critical facilities
 - Strengthen existing vulnerable facilities
 - Avoid building new facilities in at-risk areas

Steve Rhyner, Santa Ana (Gue...)

Thomas Malone
Outside your organization

Others from chat (13)

Gaspar Garza
Outside your organization

Todd Colvin
Outside your organization

Malcolm Cortez
Outside your organization

Ian Swift
Outside your organization

Lars Oldewage
Outside your organization

John Fabris
Outside your organization

Wendy Chambers
Outside your organization

Jose Zepeda
Outside your organization

Kevin Burton
Outside your organization

Cheryl Clary
Outside your organization

James Colston
Outside your organization

Marina Lindsay
Outside your organization

Dave Crowe
Outside your organization

Slide 33 of 38

Steele, Noelle Type here to search

3:30 PM 1/27/2021

Stella Barker, De Novo... Steele, Noelle RM Eric Akoyoshi Colton Martin CM Ken Pfister KP

Steele, Noelle

Subject: EXTERNAL: Hazard Mitigation plan workgroup meeting #2
Location: Microsoft Teams Meeting

Start: Wed 2/24/2021 1:30 PM
End: Wed 2/24/2021 3:30 PM

Recurrence: (none)

Meeting Status: Accepted

Organizer: Alix Stayton

Meeting agenda and materials will be attached before the call.

Microsoft Teams meeting

Join on your computer or mobile app

[Click here to join the meeting](#)

[Learn More](#) | [Meeting options](#)

Steele, Noelle

From: Alix Stayton [REDACTED]
Sent: Wednesday, February 24, 2021 11:22 AM
To: Emilyn Zuniga; Ken Pfister; Gaspar Garza; Dorien McElroy; Owen O'Neill; Colton Martin; Todd Colvin; Dave Crowe; John Dayer; Malcolm Cortez; Eric Akiyoshi; Ian Swift; Allen Shinbashi; Randy Williams; Joe Lam; Lars Oldewage; Lisa Haney; John Fabris; Steele, Noelle
Cc: Wendy Chambers; Jose Zepeda; Richard Mykitta; Kevin Burton; Thomas Malone; Cheryl Clary; James Colston; Marina [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] Stonich, Amy; Levey, Nathan
Subject: EXTERNAL: RE: Hazard Mitigation plan workgroup meeting #2
Attachments: IRWD LHMP_Meeting #2 Agenda.docx

Good morning,

Attached is the agenda for today's LHMP planning meeting. Talk to you all at 1:30pm.

Best,

Alix

ALIX STAYTON
SAFETY SPECIALIST
[REDACTED]

-----Original Appointment-----

From: Alix Stayton
Sent: Wednesday, December 30, 2020 4:52 PM
To: Alix Stayton; Emilyn Zuniga; Ken Pfister; Gaspar Garza; Dorien McElroy; Owen O'Neill; Colton Martin; Todd Colvin; Dave Crowe; John Dayer; Malcolm Cortez; Eric Akiyoshi; Ian Swift; Allen Shinbashi; Randy Williams; Joe Lam; Lars Oldewage; Lisa Haney; John Fabris; Noelle Steele
Cc: Wendy Chambers; Jose Zepeda; Richard Mykitta; Kevin Burton; Thomas Malone; Cheryl Clary; James Colston; Marina Lindsay; [REDACTED]
[REDACTED] Stonich, Amy; Levey, Nathan
Subject: Hazard Mitigation plan workgroup meeting #2
When: Wednesday, February 24, 2021 1:30 PM-3:30 PM (UTC-08:00) Pacific Time (US & Canada).
Where: Microsoft Teams Meeting

Meeting agenda and materials will be sent prior to the call.

Microsoft Teams meeting

Join on your computer or mobile app

[Click here to join the meeting](#)

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Eddy, Clara

From: Alix Stayton [REDACTED]
Sent: Friday, February 19, 2021 11:25 AM
To: [REDACTED]
Cc: Steele, Noelle; Emilyn Zuniga
Subject: EXTERNAL: Reminder: IRWD LHMP planning team call Wed Feb 4 at 1:30pm

Good morning partners,

I hope this email finds everyone well. This email will serve as a reminder that we're conducting the second of four planning team calls for our Local Hazard Mitigation Plan (LHMP) next Wednesday, February 4th at 1:30pm. For your convenience, I have added you all to the calendar invite; you'll find the call-in or connection info there. Please accept or decline as appropriate, and feel free to forward to anyone you feel would be helpful to the planning process. If you cannot attend, you're welcome to send someone to represent you. Please let me know (and thank you to those who have already) if I should replace you on the distribution list with someone more suitable. The third call is scheduled for Wednesday, March 31 at 1:30pm.

I expect to receive a meeting agenda from the consultants before the call and will send along next week. In short, we're going to give the hazard prioritization table overall one more look, then discuss the hazard profiles in more detail and talk about protective measures we're already taking (as a water district, as partners, and within the OA).

Looking forward to speaking with you all then. Have a great weekend.

Best,

Alix

ALIX STAYTON
SAFETY SPECIALIST



3512 Michelson Drive, Irvine, California 92612
Mailing: PO Box 57000, Irvine, California 92619-7000



**Irvine Ranch Water District
Local Hazard Mitigation Plan
Planning Team Meeting #2
February 24, 2021**

First Name and Last Name	Title	Organization/Department	Mailing Address	E-Mail Address	Present?
Alix Stayton	Safety Specialist, Safety Department	Irvine Ranch Water District	██████████ ██████████	██████████	✓
Allen Shinbashi	Manager of Risk & Contracts, Contracts & Risk Management	Irvine Ranch Water District	██████████ ██████████	██████████	✓
Amy Stonich	Assistant Director of Community Development	City of Lake Forest	████████████████████ ██████████	████████████████	
Anisha Malik	Planner	Michael Baker International	██████████████ ██████████	██████████████	
Baryic Hunter	Division Chief	Operations District 4, Orange County Fire Authority	██████████ ██████████	██████████	✓
Colt Martin	Mechanical Services Manager, Mechanical Services – Maintenance Operations	Irvine Ranch Water District	██████████████ ██████████	██████████	✓
Dave Crowe	Construction Manager, Construction Services	Irvine Ranch Water District	██████████████ ██████████	██████████	✓
Denien Rivenburg	Public Affairs	Irvine Ranch Water District	██████████	██████████	
Dorien McElroy	Collections Systems Manager, Collection Systems	Irvine Ranch Water District	██████████████ ██████████	██████████	✓

**Irvine Ranch Water District
Local Hazard Mitigation Plan
Planning Team Meeting #2
February 24, 2021**

First Name and Last Name	Title	Organization/Department	Mailing Address	E-Mail Address	Present?
Dustin Grinstead	Admin Captain for Chief Sherwood	Orange County Fire Authority	██████████ ██████████	██████████	
Emilyn Zuniga	Safety Manager, Safety Department	Irvine Ranch Water District	██████████ ██████████	██████████	
Eric Akiyoshi	Engineering Manager, Planning	Irvine Ranch Water District	██████████ ██████████	██████████	✓
Gaspar Garza	Operations Manager, MWRP Operations/Biosolids	Irvine Ranch Water District	██████████ ██████████	██████████	✓
Ian Swift	Natural Resources Manager, Natural Treatment System Operations	Irvine Ranch Water District	██████████ ██████████	██████████	
James Colston	Director Water Quality Compliance	Irvine Ranch Water District	██████████ ██████████	██████████	✓
Jason Dempsey	Emergency Services Administrator	City of Costa Mesa	██████████ ██████████	██████████	✓
Joe Lam	Automation Manager, Automation	Irvine Ranch Water District	██████████ ██████████	██████████	✓
Joe Meyers	Emergency Management Coordinator	Tustin Police Department	██████████ ██████████	██████████	

**Irvine Ranch Water District
Local Hazard Mitigation Plan
Planning Team Meeting #2
February 24, 2021**

First Name and Last Name	Title	Organization/Department	Mailing Address	E-Mail Address	Present?
John Dayer	Facilities/Fleet Manager, Facilities Services & Fleet Services – Maintenance Operations	Irvine Ranch Water District	██████████ ██████████	██████████	✓
John Fabris	Public Affairs Manager, Public Affairs	Irvine Ranch Water District	██████████ ██████████ ██████████	██████████	✓
Jose Zepeda	Director of Recycling Operations	Irvine Ranch Water District	██████████ ██████████	██████████	✓
Joyce LaPointe	Lieutenant	Office of Emergency Management, Costa Mesa Police Department	██████████ ██████████	██████████	
Katie Eing	Disaster Services Coordinator	Newport Beach Police Department	██████████ ██████████	██████████	
Ken Pfister	Operations Manager, Water Operations	Irvine Ranch Water District	██████████ ██████████	██████████	✓
Lars Oldewage	Water Quality Manager, Water Quality	Irvine Ranch Water District	██████████ ██████████	██████████	
Lisa Haney	Regulatory Compliance Manager, Regulatory Compliance	Irvine Ranch Water District	██████████ ██████████	██████████	✓
Malcolm Cortez	Engineering Manager, Engineering – Operations Support	Irvine Ranch Water District	██████████ ██████████	██████████	

**Irvine Ranch Water District
Local Hazard Mitigation Plan
Planning Team Meeting #2
February 24, 2021**

First Name and Last Name	Title	Organization/Department	Mailing Address	E-Mail Address	Present?
Marina Lindsay	Water Resources Planner, Planning	Irvine Ranch Water District	██████████ ██████████	██████████	✓
Nathan Levey	Assistant Environmental Planner	Michael Baker International	██████████████████ ██████████	██████████████████	✓
Noelle Steele	Project Manager	Michael Baker International	██████████████████ ██████████	██████████████████	✓
Oliver Pacifico	Water – South Coast Section	State Water Resources Control Board	██████████████████ ██████████	██████████████████	✓
Owen O’Neill	Electrical & Instrumentation Manager, Electrical Services – Maintenance Operations	Irvine Ranch Water District	██████████████████ ██████████	██████████████████	✓
Randy Williams	Network and Cybersecurity Manager, Information Systems	Irvine Ranch Water District	██████████████████ ██████████	██████████	
Richard (Rick) Mykitta	Director of Maintenance	Irvine Ranch Water District	██████████	██████████	✓
Robert (Bobby) Simmons	Emergency Management Administrator	Office of Emergency Management, City of Irvine	██████████ ██████████	██████████████████	
Robert Stefano	Deputy Chief of Operations	Emergency Operations Section, Orange City Fire Department	██████████ ██████████	██████████████████	

**Irvine Ranch Water District
Local Hazard Mitigation Plan
Planning Team Meeting #2
February 24, 2021**

First Name and Last Name	Title	Organization/Department	Mailing Address	E-Mail Address	Present?
Sarah Fetterling	Sargent	City of Tustin Police Department	██████████ ██████████	██████████	✓
Shane Sherwood	Division Chief	Operations District 2, Orange County Fire Authority	██████████ ██████████	██████████	
Sharlyn de la Paz	Senior Management Analyst	City of Lake Forest	████████████████████ ██████████	██████████	
Starla Barker	Technical Consultant	De Novo Planning	████████████████ ██████████	████████████████	✓
Steve Rhyner	Emergency Operations Coordinator	Emergency Management, City of Santa Ana	██████████ ██████████	██████████	
Thomas Malone	Director for Information Services	Irvine Ranch Water District	██████████████ ██████████	██████████	✓
Todd Colvin	Water Maintenance Supervisor, Field Services	Irvine Ranch Water District	██████████████ ██████████	██████████	
Vicki Osborn	Director of Emergency Management	Metropolitan Water District of Orange County	██████████ ██████████████	██████████	✓
Wendy Chambers	Executive Director of Operations	Irvine Ranch Water District	██████████████ ██████████	██████████	✓

IRVINE RANCH WATER DISTRICT LOCAL HAZARD MITIGATION PLAN

PLANNING TEAM MEETING #2

Wednesday, February 24, 2021

1:30 PM – 3:30 PM

MEETING AGENDA

Attendees: Refer to Sign-in Sheet

Presentation/Discussion:

- Introductions
 - Sign in sheet and group introductions

- Summary of Hazards/Hazard Profiles
 - COASTAL HAZARDS – COASTAL EROSION, SEA LEVEL RISE, TSUNAMI
 - DAM/RESERVOIR FAILURE
 - DROUGHT
 - FLOOD
 - GEOLOGIC HAZARDS – EXPANSIVE SOILS, LAND SUBSIDENCE
 - HUMAN-CAUSED HAZARDS – HAZARDOUS MATERIALS SPILLS, TERRORISM/SABOTAGE
 - LANDSLIDE/MUDFLOW
 - SEISMIC HAZARDS – GROUND SHAKING, FAULT RUPTURE, LIQUEFACTION
 - SEVERE WEATHER – WINTER STORM, SANTA ANA WINDS, POWER OUTAGE
 - WILDFIRE

- Capabilities Assessment
 - Planning & regulatory, admin & tech, financial, education & outreach.
 - FEMA wants to know how hazard mitigation is integrated into your planning mechanisms.

- Hazard Mitigation Goals

- Public Involvement Update
 - Webpage
 - Survey
 - E-newsletter

Next Steps/Action Items:

- Complete capabilities assessment
- Critical facilities values
- Hazard profiles
- Prepare vulnerability/risk assessment
- Preparation for focused meetings
- Meeting 3 – March 31st

- Risk assessment
- Hazard mitigation strategies.
- Action items
 - Provide additional information/data through Alix
 - Continue sending out survey on website, social media, etc. Screenshots and documentation to Alix for the plan.

** Denotes a Planning Team Member who indicated they will be sending Alix data/information regarding their facilities or a specific hazard.*



Irvine Ranch
WATER DISTRICT

IRVINE RANCH WATER DISTRICT

HAZARD MITIGATION PLAN

Michael Baker
INTERNATIONAL

Agenda

- Summary of hazards/hazard profiles
- Capabilities assessment
- Hazard mitigation goals
- Public involvement update
- Next steps
- Questions/additional discussion

Meeting #1 Recap

- Project goals, objectives & expectations
- Purpose and requirements of the LHMP
 - Process/regulations differ from previously prepared emergency plans
- Hazard Identification and Prioritization
- Critical Facilities Identification
- Community Outreach Component

Summary of Hazards/ Hazard Profiles

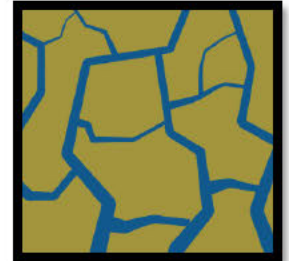
Hazard Identification

Hazard Ranking Worksheet

Hazard Type	Probability	Impact			Total Score	Hazard Planning Consideration
		Location	Primary Impact	Secondary Impacts		
Seismic Hazards (Fault Rupture, Groundshaking)	4	4	4	4	64.00	High
Wildfire	4	3	2	2	38.40	Medium
Drought	4	4	1	1	35.20	Medium
Windstorm	4	4	1	1	35.20	Medium
Landslide/Mudflow	3	2	3	3	31.20	Medium
Power Outage	4	2	1	2	26.40	Medium
Coastal Storm/Severe Winter Storm	3	2	2	2	24.00	Medium
Flood	2	1	3	4	19.60	Medium
Hazardous Materials Spill	2	2	2	3	18.00	Medium
Terrorism	1	3	3	3	12.00	Low
Liquefaction	1	2	3	3	10.40	Low
Coastal Erosion	1	1	1	2	5.00	Low
Sabotage/Vandalism	1	1	1	2	5.00	Low
Geological Hazards (Expansive Soils, Subsidence)	1	1	1	1	4.00	Low
Sea Level Rise	1	1	1	1	4.00	Low
Tsunami	1	1	1	1	4.00	Low

Hazards to be Profiled

- Costal Hazards
 - Coastal Erosion
 - Sea Level Rise
 - Tsunami
- Dam/Reservoir Failure
- Drought
- Flood
- Geologic Hazards
 - Expansive Soils
 - Land Subsidence
- Human Caused Hazards
 - Hazardous Materials
 - Terrorism/Sabotage
- Landslide/Mudflow
- Seismic Hazards
 - Fault Rupture
 - Ground Shaking
 - Liquefaction
- Severe Weather
 - Coastal Storm/Winter Storm
 - Windstorm (Santa Ana winds)
 - Power Outage (secondary impact)
- Wildfire



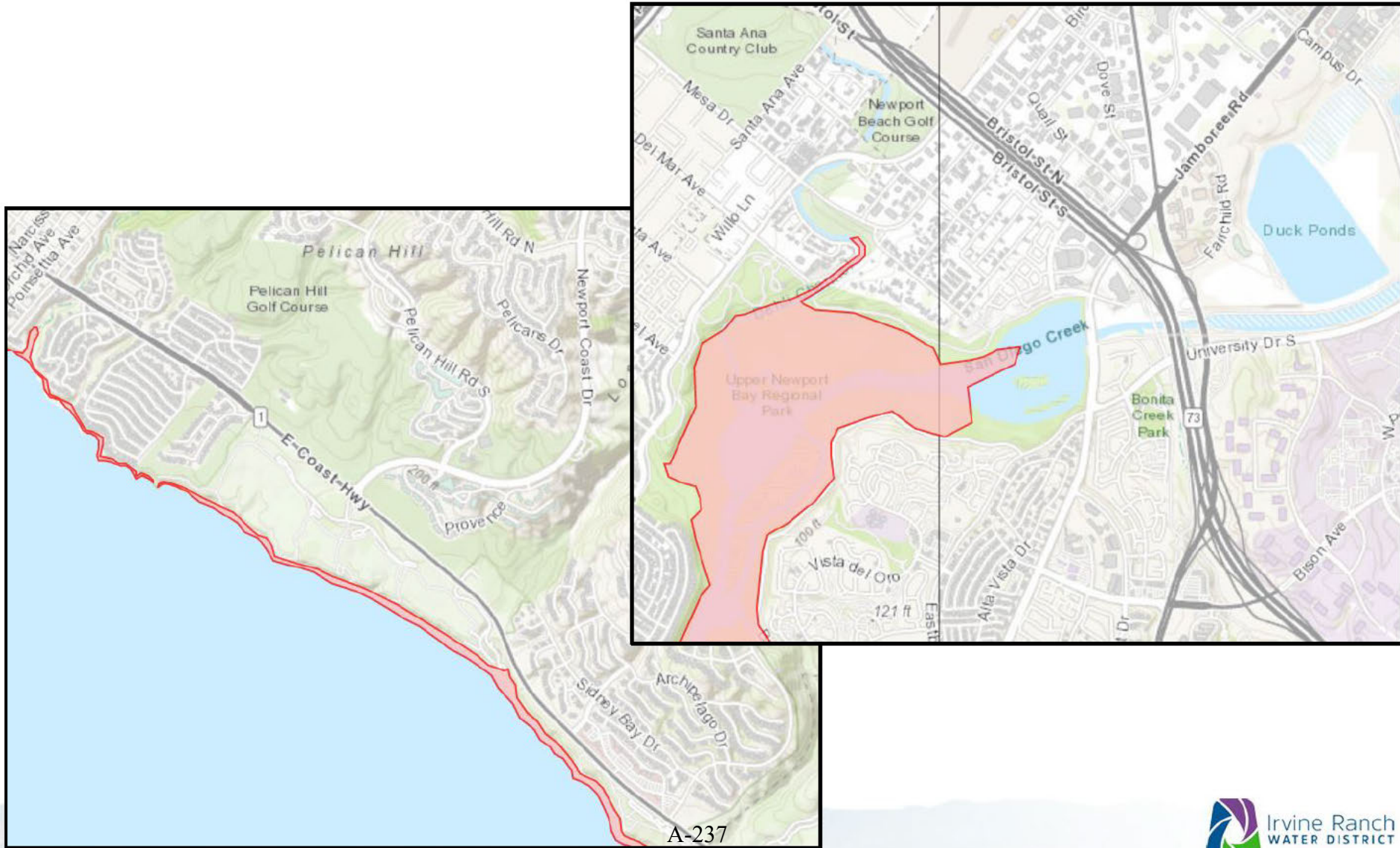
Hazard Profiles

- Description
- Location/Geographic Extent
- Previous Occurrences
- Probability of Future Occurrence

Coastal Hazards

- Description
 - Coastal erosion –weathering of rocks, soils, sands along coast
 - Sea level rise – the gradual rise of global sea level because of thermal expansion from the warming of the ocean and increased melting of land-based ice
 - Tsunami – a series of giant waves triggered by earthquakes, submarine landslide or volcanic eruptions on the ocean floor
- Location/Geographic Extent
 - Newport Coast/Crystal Cove neighborhood, within the City of Newport Beach
 - Minor tsunami run up area identified in Costa Mesa

Tsunami Run-Up



Coastal Hazards

- Previous Occurrences
 - No major coastal erosion or sea level rise within service area
 - Tsunami
 - April 1946; March 1964; March 2011 – major tsunamis in northern and central California resulting in major damage
 - April 2014; September 2015 – tsunami events generated local emergency response within Orange County
- Probability of Future Occurrence
 - Coastal erosion – Medium
 - Sea level rise – Medium
 - Tsunami – Low

Costal Hazards

- Climate Change
 - Continued rising sea levels
 - Costal erosion exacerbated by the impact of high tides and waves as a result of rising sea levels
 - Increase the frequency and severity of storms

Dam/Reservoir Failure

- Description
 - Catastrophic type of failure characterized by the sudden, rapid, and uncontrolled release of impounded water
- Location/Geographic Extent
 - Major Dams: Rattlesnake Canyon, Syphon Canyon, San Joaquin, Santiago Creek, and Sand Canyon
 - All classified as “extremely high” hazard
 - Smaller water reservoirs/storage tanks across the service area – including some critical facilities

Dam/Reservoir Failure

- Previous Occurrences
 - No major dam failure experienced by Orange County – Two incidents within LA
 - St. Francis Dam (1928) – Santa Clara Valley
 - Baldwin Hills Dam (1963) – Los Angeles
 - Water tank failure in Westminster (1998)
 - 5-million-gallon water storage tank ruptured – corrosion and construction defects
- Probability of Future Occurrence – Low
 - 2015 County of Orange & Orange County Fire Authority LHMP also classifies dam failure as unlikely

Drought

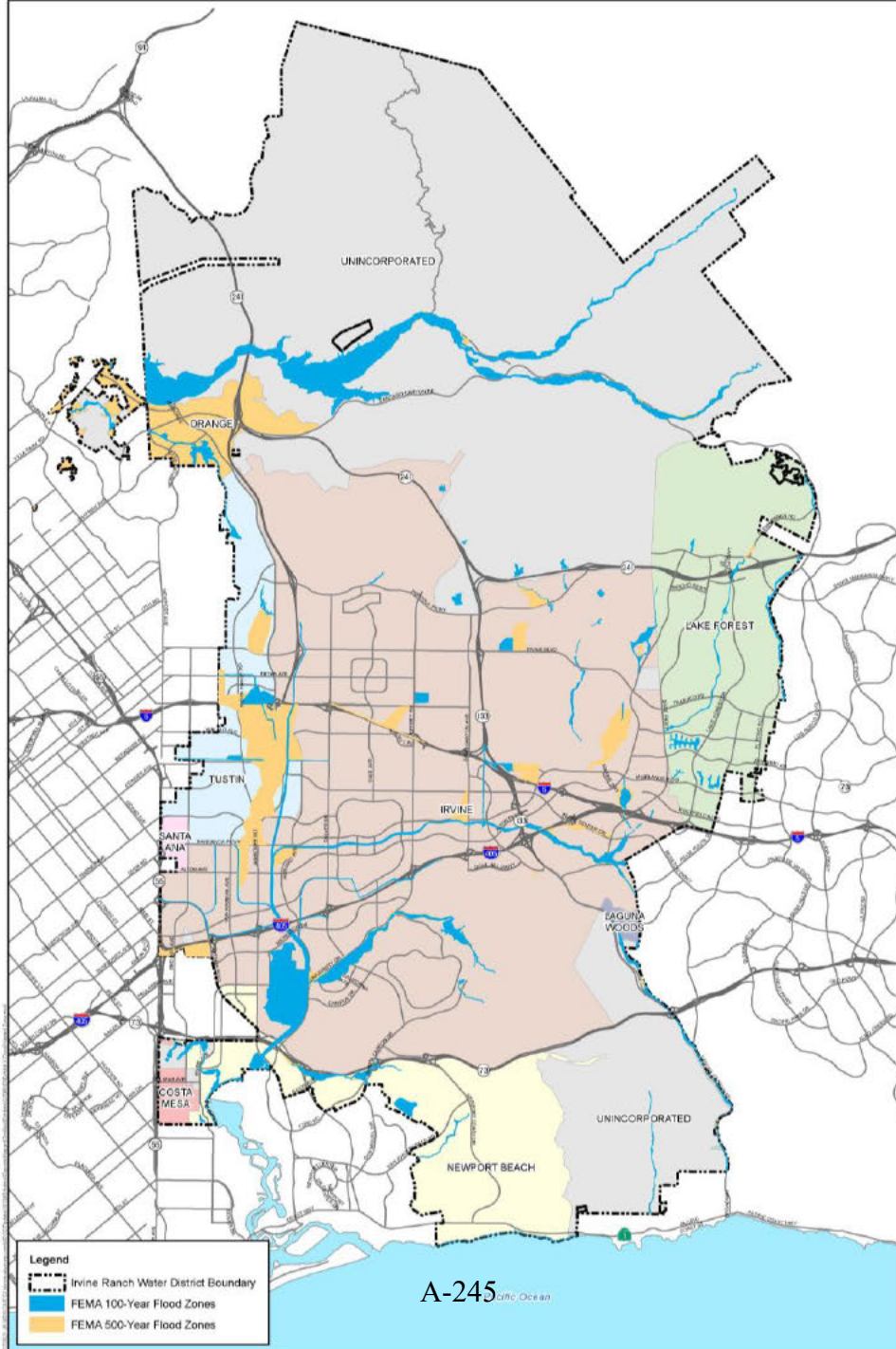
- Description
 - Period of drier than normal conditions resulting in water-related issues
 - Agricultural – soil moisture deficiencies
 - Hydrological – precipitation shortfalls on stream flows, reservoir, lake and groundwater levels
 - Meteorological – defined on degree of dryness compared to expected average
 - Socioeconomic – demand for water exceeds supply as a result of weather-related shortfall
- Location/Geographic Extent
 - Across entire IRWD service area

Drought

- Previous Occurrences
 - FEMA declared drought emergency – January 1977
 - State declared drought emergency – 8x between 1972 and 2009
 - Persistent & historical drought - December 2011 to March 2017
 - January 17, 2014 – CA Governor proclaimed State of Emergency
 - April 1, 2015 – imposed restrictions to achieve a 25% reduction in potable water usage by February 28, 2016
- Probability of Future Occurrence – High
 - Function of precipitation and intensity of current drought conditions
 - Higher probability based on drought history
- Climate change
 - Higher temperatures and prolonged durations – reduced precipitation and reduced water supplies

Flood

- Description
 - Water level exceeds capacity of waterway or failure of drainage infrastructure
- Location/Geographic Extent
 - FEMA Flood maps
 - Areas around creeks/drainages located within the 100-year flood plain
 - Silverado Creek & Lake Irvine
 - San Diego Creek (including tributaries & drainage channels)
 - Other isolated basins & drainages
 - 100-year; 1% chance of flood event in any given year



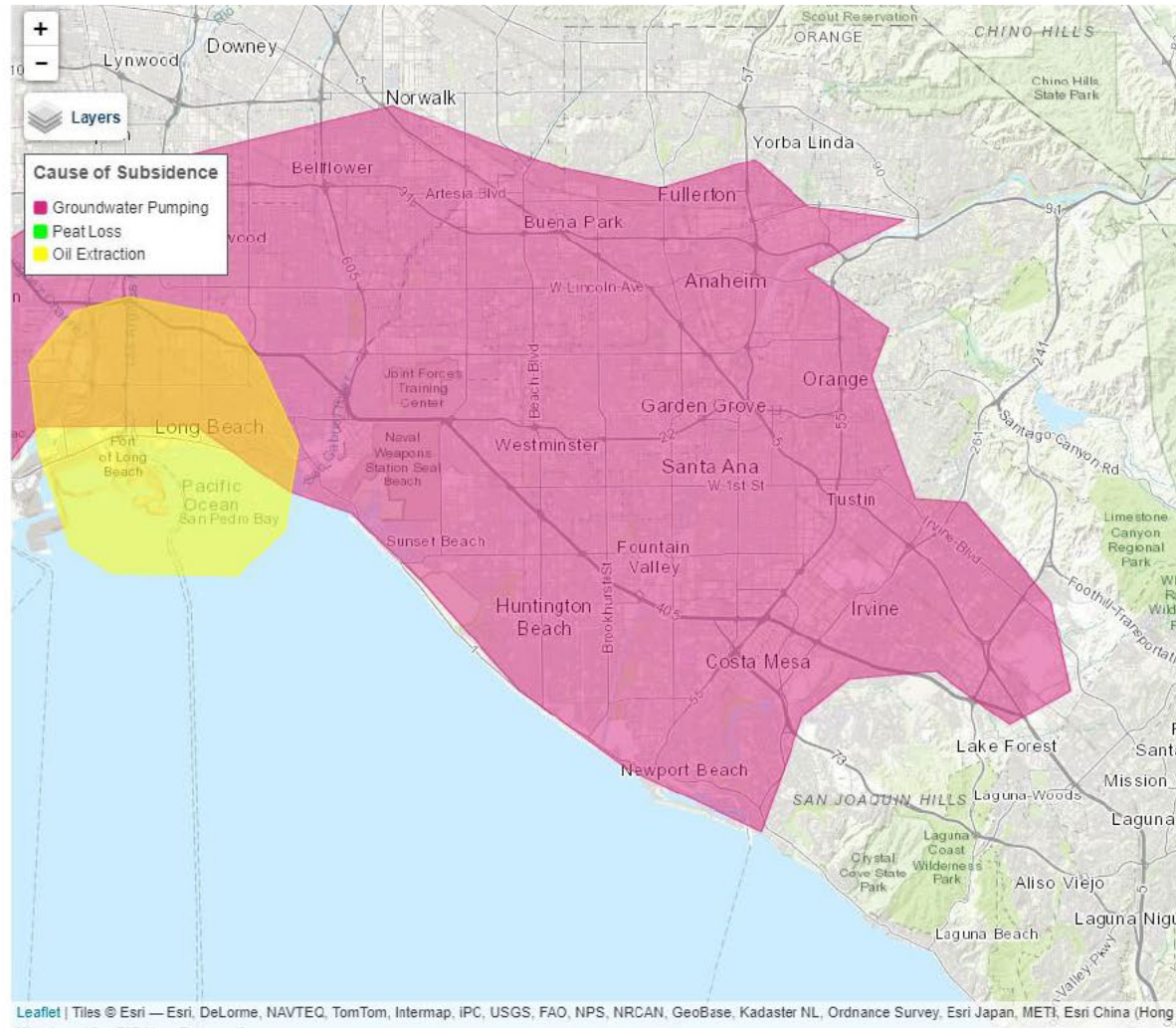
Flood

- Previous Occurrences
 - Flooding/mudflow, Silverado Canyon Jan. 2021
 - December 1997, December 2010, February 2014 – flooding within Orange County
- Probability of Future Occurrence – Medium
 - FEMA
 - *100-year; 1% chance of a flood event in any given year*
 - *500-year; 0.2% chance of a flood event in any given year*
- Climate Change
 - Extreme wet and dry seasons
 - Increased and prolonged rain events

Geologic Hazards

- Description
 - Expansive Soils – soils that can expand or contract, changing in volume based on their moisture content
 - Land subsidence – a gradual settling or sudden sinking of the Earth’s surface due to removal or displacement of earth materials
- Location/Geographic Extent
 - Expansive soils underly the majority of Orange County
 - Land subsidence occurring in western Orange County/IRWD service area

Geologic Hazards – Land Subsidence

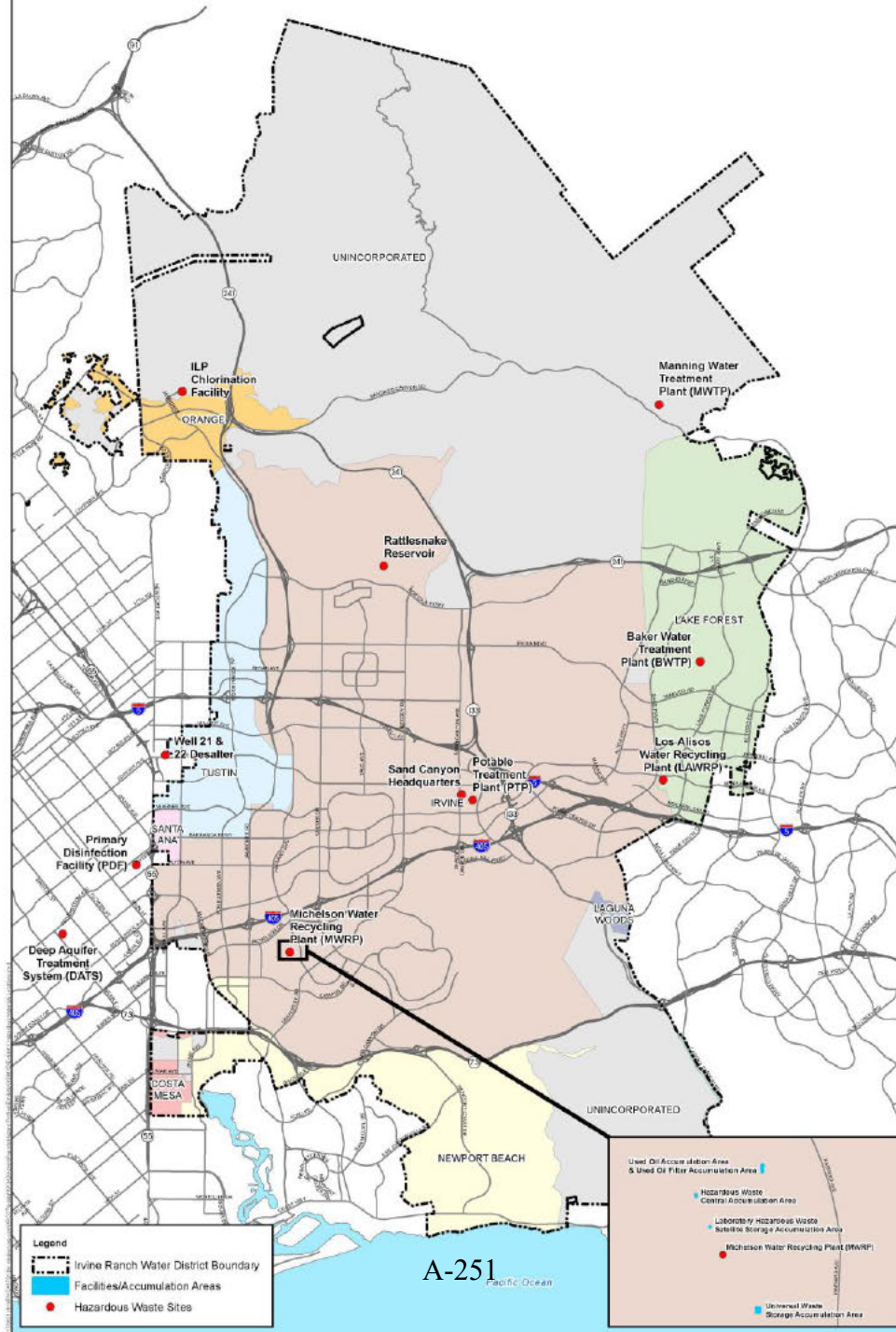


Geologic Hazards

- Previous Occurrences
 - No major historical incidents in IRWD service area
- Probability of Future Occurrence: Low
- Climate Change
 - Drought conditions could introduce groundwater over-drafting incidents
 - Heavy rains/storms could trigger shrink/swell cycles with expansive soils

Human Caused Hazards

- Description
 - Hazardous Materials – release, spill or contamination of materials posing a hazard to human health and safety or to the environment
 - Terrorism/Sabotage – individuals and/or groups inspired by or associated with a movement that espouses extremist ideologies of a political, religious, social, racial, or environmental nature
- Location/Geographic Extent
 - Hazardous Materials – stored within defined area
 - Terrorism/Sabotage – service areawide – property and infrastructure downstream of a dam/reservoir and water or wastewater treatment facilities



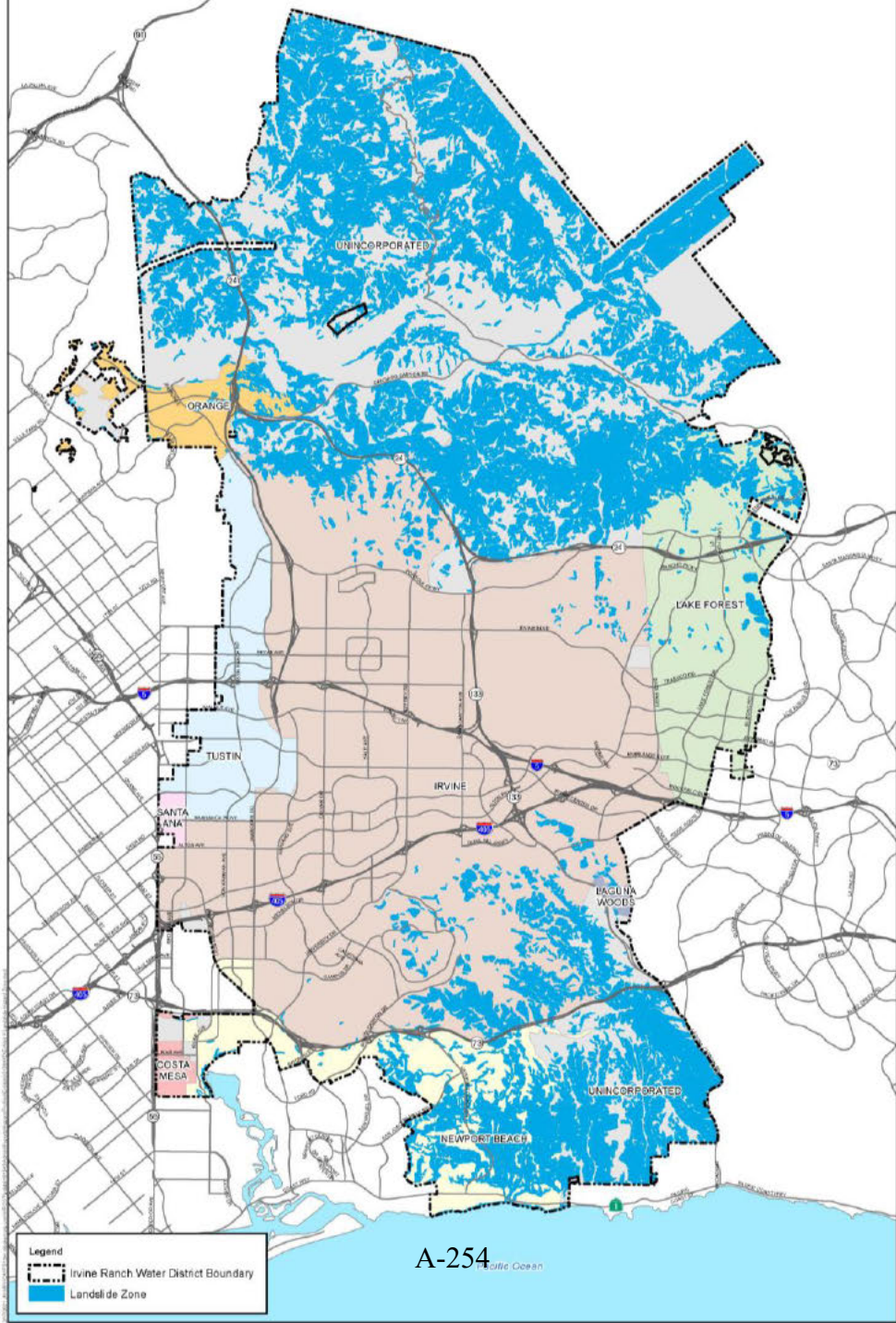
A-251
Pacific Ocean

Human Caused Hazards

- Previous Occurrences
 - Hazardous Materials – IRWD has reported minor spills of sewage, saline water/brine, petroleum or chemical
 - Terrorism/Sabotage – none
- Probability of Future Occurrence
 - Hazardous Materials – medium
 - Terrorism/Sabotage – low

Landslide/Mudflow

- Description
 - Landslide – down slope movement of soil and rock under direct influence of gravity
 - Mudflow – river of rock, earth, and other debris, including vegetation that is saturated with water
- Location/Geographic Extent
 - Landslide/Mudflow
 - Earthquake-induced – defined area
 - Areas of steep slopes and creeks
 - High wildfire hazard areas

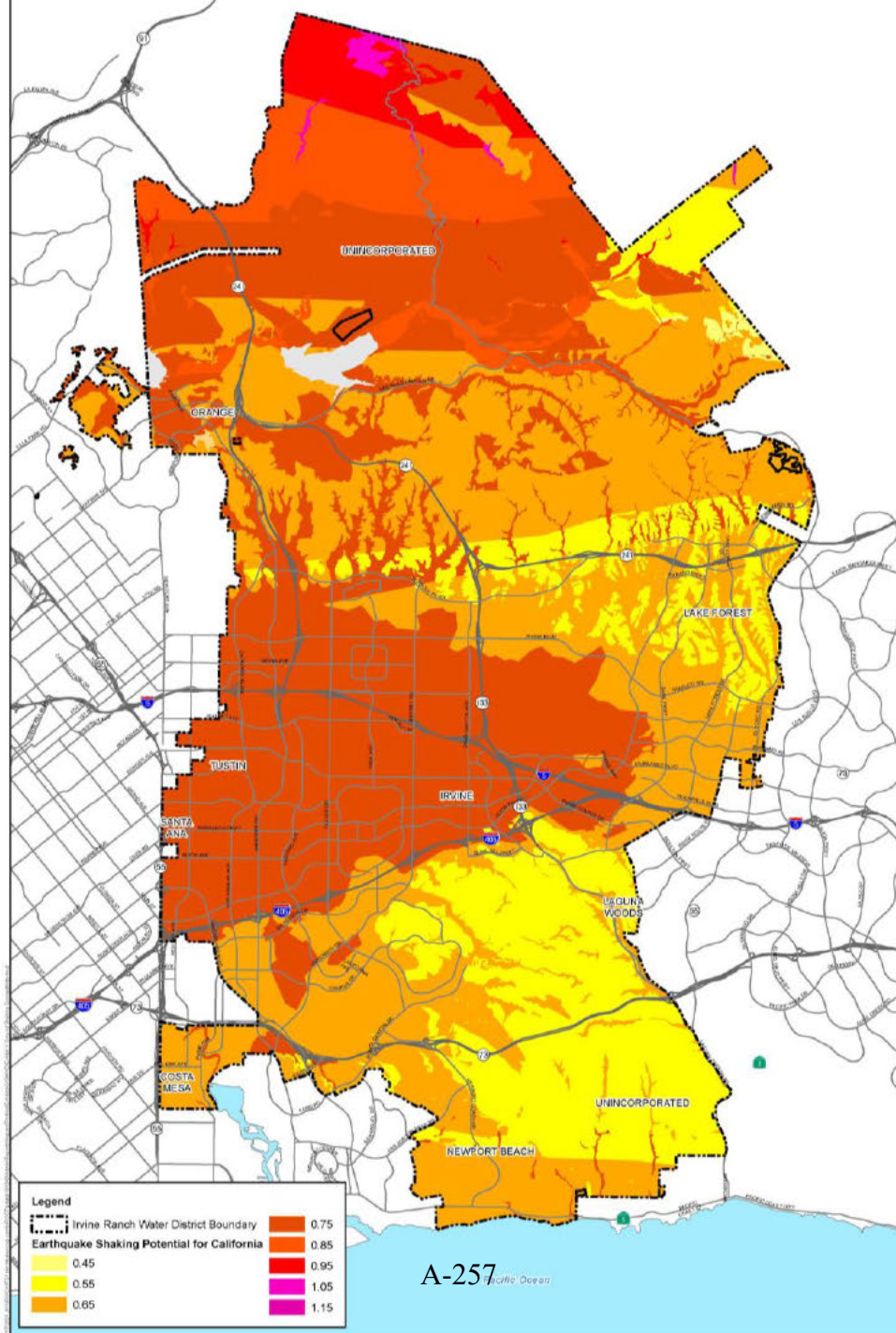


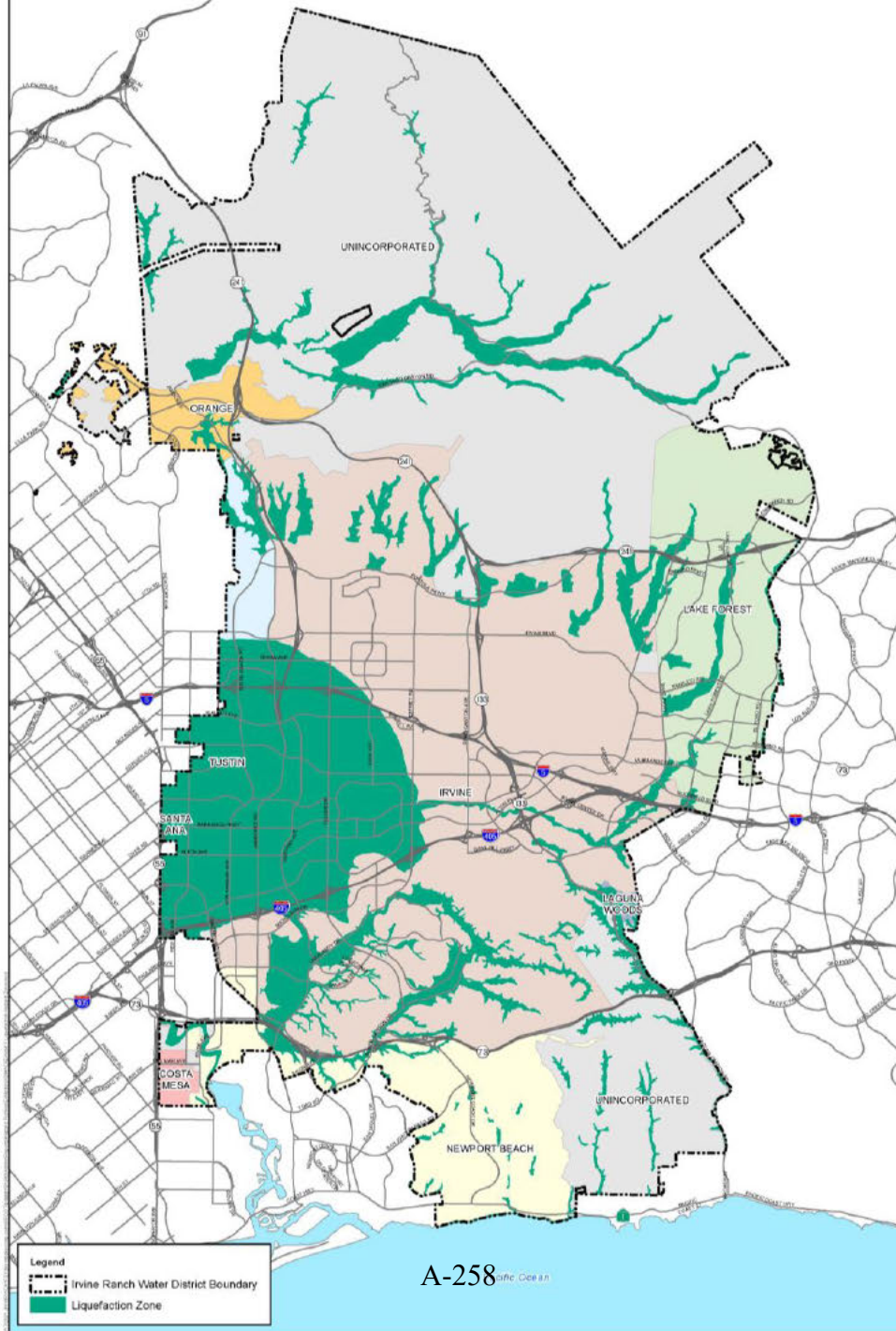
Landslide/Mudflow

- Previous Occurrences
 - Landslide – 1978 and 2005 Blue Bird Canyon Landslides (Laguna Beach); 2005 SCWD Landslide (Laguna Niguel); 2018 Cannon Cliff Landslide (Dana Point)
 - Mudflow – Silverado Canyon January 2021 within the IRWD service area
- Probability of Future Occurrence – Medium
 - Earthquake-induced landslides – High
- Climate Change
 - Increased precipitation
 - Drought followed by period of increased precipitation
 - Increase in frequency, severity of wildfires

Seismic Hazards

- Description
 - Primary = ground shaking & fault rupture
 - Secondary = Liquefaction – results from ground shaking causing soils to act like liquid
- Location/Geographic Extent
 - Fault rupture – occurs on fault lines
 - Ground shaking – service areawide
 - Liquefaction – within defined area (mapped by California Geological Survey)





A-258

Seismic Hazards

- Previous Occurrences
 - Chino Hills; 2008 – 5.4, La Habra; 2014 – 5.1, Borrego Springs; 2016 – 5.2, Ridgecrest Sequence; 2019 – 6.4 and 7.1
- Probability of Future Occurrence
 - Fault rupture & ground shaking – High
 - Liquefaction – Medium

Magnitude	Fault				
	Elsinore	Newport-Inglewood	Southern San Andreas	San Jacinto	San Joaquin
M ≥ 6.7	3.66%	0.70%	19.21%	5.41%	0.42%
M ≥ 7.0	1.82%	0.63%	12.86%	5.39%	0.40%
M ≥ 7.5	0.90%	0.20%	10.21%	5.28%	0.24%
M ≥ 8.0	<0.01%	--	3.24%	2.75%	--

Notes:
 1. M≥6.7 means magnitude greater than or equal to 6.7, and likewise for the other magnitude thresholds.
 2. The 30-year period measured by this report is 2014 to 2044; a 30-year period is the typical duration of a homeowner mortgage.
 3. Percentages for fault sections closest to IRWD jurisdiction.

Severe Weather

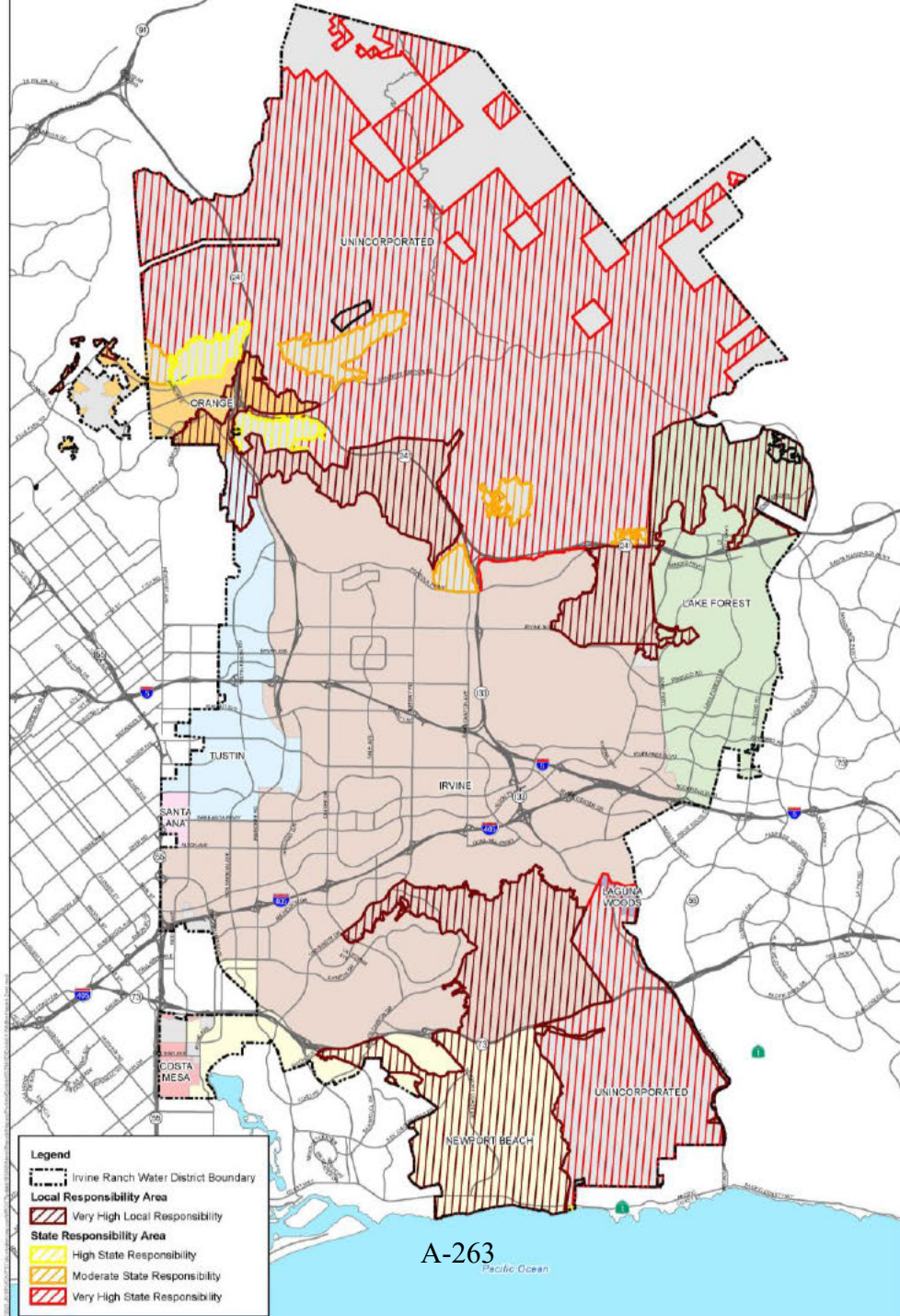
- Description
 - Coastal/Winter Storm – hail that is one inch in diameter or larger; or winds of 58 miles per hour or greater
 - Santa Ana Winds – winds that last longer than one hour at greater than 39 mph or for any length of time at greater than 57 mph
 - Power Outage (secondary) – severe weather such as strong Santa Ana winds, high temperatures, and low humidity could trigger a Public Safety Power Shutoff event
- Location/Geographic Extent
 - Service Areawide

Severe Weather

- Previous Occurrences
 - Coastal/Winter Storm – outlined in Flood section
 - Santa Ana Winds – winds are regularly experienced; no major significant damage has been incurred by IRWD
 - Power Outage (secondary) – none
- Probability of Future Occurrence
 - Coastal/Winter Storm – Medium
 - Santa Ana Winds – High
 - Power Outage (secondary) – High
- Climate Change
 - Affect the frequency and intensity of heavy rain events
 - increase the severity and frequency of Santa Ana wind occurrences
 - increased power outages
 - storm events and Santa Ana winds occurring outside of traditional seasons of the year

Wildfire

- Description
 - Uncontrolled fire spreading through vegetative fuels
 - Wildland urban interface – urban and suburban development adjacent to wildland areas
 - Mixed wildland urban interface – isolated communities/structures in wildland settings
 - Occluded wildland urban interface – island of wildland vegetation in urbanized area
- Location/Geographic Extent
 - Large portion of the IRWD service area located within or adjacent to a mapped Fire Hazard Severity Zone



A-263
Pacific Ocean

Wildfire

- Previous Occurrences
 - Silverado Fire; 2014
 - Canyon and Canyon 2 Fire; 2017
 - Blue Ridge Fire & Silverado Fire; 2020
 - Bond Fire; 2020
- Probability of Future Occurrence – High
- Climate change
 - Increased temperatures and drought can increase frequency, extent, and severity
 - Drier conditions, more vegetative fuel, longer fire season

Capabilities Assessment

Capabilities Assessment

- Two components
 - Inventory of existing resources and tools to accomplish mitigation and reduce long-term vulnerability, and understanding of ability to use them effectively
 - Identification of gaps, conflicts, and/or weaknesses that may need to be addressed through mitigation
- Types of capabilities
 - Planning and regulatory
 - Administrative and technical
 - Financial
 - Education and outreach

Capabilities Identification Worksheets

- Planning and regulatory
 - Ordinances
 - Policies
 - Local laws and state statutes
 - Plans and program that guide and manage growth
- Questions to consider:
 - Does the plan address hazards?
 - Does the plan identify projects to include in the mitigation strategy?
 - Can the plan be used to implement mitigation actions?
 - How can the capabilities be expanded and improved to reduce risk?

Capabilities Identification Worksheets

- Administrative and technical
 - City staff – skills/tools and capacity
 - Public and private resources
 - Ability to access and coordinate resources effectively
- Questions to consider:
 - Is coordination effective?
 - Is staffing adequate to enforce regulations?
 - Is staff trained on hazards and mitigation?
 - Is coordination between agencies and staff effective?
 - Has the capability been used to assess/mitigate risk in the past?
 - How can the capabilities be expanded and improved to reduce risk?

Capabilities Identification Worksheets

- Financial
 - Resources have or eligible to use to fund mitigation
 - Staff time, existing operating budgets, impact fees
 - Local, state and federal funding sources
- Questions to consider:
 - Has the funding resource been used in the past and for what types of activities?
 - Could the resource be used to fund future mitigation actions?
 - How can the capabilities be expanded and improved to reduce risk?

Capabilities Identification Worksheets

- Education and outreach
 - Programs and methods in place to implement mitigation actions and communicate hazard-related information
 - Fire safety programs, education programs
 - Public information or communication activities
- Questions to consider:
 - Could the program/organization help to implement future mitigation activities?
 - How can the capabilities be expanded and improved to reduce risk?

Hazard Mitigation Goals

Hazard Mitigation Goals

- Goal 1: Minimize vulnerabilities of critical facilities to minimize damage from hazards
- Goal 2: Minimize security risks to water and wastewater infrastructure
- Goal 3: Minimize interruption to water and wastewater utilities
- Goal 4: Improve public outreach, awareness, education and preparedness for hazards to increase community resilience
- Goal 5: Eliminate or minimize wastewater spills and overflows
- Goal 6: Protect water quality and supply, critical aquatic resources and habitat to ensure safe water supply
- Goal 7: Strengthen Emergency Response Services to insure preparedness, response and recovery during any major or multi-hazard event.

Public Involvement Update

Public Involvement Update

- Survey link & webpage is live
 - [IRWD.com/lhmp](https://www.irwd.com/lhmp)
 - Please share with your constituents and jurisdictions via social media, newsletters, etc.
 - Screenshot all instances the survey link was shared for inclusion into the LHMP Appendix

Next Steps

Next Steps

- Complete capabilities assessment worksheets
- Finalize hazard profiles
- Critical facilities list finalization and hazard mapping
- Prepare vulnerability/risk assessment
- Attend Meeting #3
 - March 31 at 1:30 PM

Questions/Additional Discussion?

RANCHO SANTA MARGARITA LOCAL HAZARD MITIGATION PLAN

PLANNING TEAM MEETING #2

Wednesday, February 24, 2021

1:30 PM – 3:30 PM

MEETING SUMMARY

Attendees: Refer to Sign-in Sheet

Presentation/Discussion:

- Introductions
 - Sign in sheet and brief introductions

- Meeting #1 Recap
 - Project goals, objectives & expectations
 - Purpose & requirements of LHMP
 - Hazard identification and prioritization
 - Critical facilities identification
 - Community outreach component

- Summary of Hazards/Hazard Profiles
 - COASTAL HAZARDS – COASTAL EROSION, SEA LEVEL RISE, TSUNAMI
 - *Question from Noelle Steele (Project Manager, Michael Baker Intl) – are coastal hazards considered significant or of high importance for IRWD?*
 - *Answer from Colton Martin (Mechanical Services Manager, IRWD), Ken Pfister (Operations Manager, IRWD) and Eric Akiyoshi (Engineering Manager, IRWD) – don't think this is of high concern, would not have significant water impact*
 - *Question from Dave Crowe (Construction Manager, IRWD) – How is the map presented, is there a significant change in elevation on Newport Coast? If looking at the tsunami run-up map correctly, then it shouldn't impact IRWD infrastructure.*
 - *Answer from Dorien McElroy (Collections Systems Manager, IRWD) – There is a sewer lift station within the vicinity of the run up maps.*
 - *Question from Noelle Steele (Project Manager, Michael Baker Intl) – is there any other IRWD infrastructure of concern in this area?*
 - *Answer from Dorien McElroy (Collections Systems Manager, IRWD) – there are two urban runoff stations of the PCH*
 - *Response from Dave Crowe (Construction Manager, IRWD) – these will not be impacted, though*
 - *Reply from Dorien McElroy (Collections Systems Manager, IRWD) – yeah, they are higher (elevations)*

- *Follow-up question from Gaspar Garza (Operations Manager, IRWD) – Couldn't we look at the elevation markup as well?*
 - *Answer from Noelle Steele (Project Manager, Michael Baker Intl) – we can do further research*
 - *Answer from Richard Mykitta (Director of Maintenance, IRWD) – neither one of our lift stations would be impacted according to the map*
 - *Reply from Noelle Steele (Project Manager, Michael Baker Intl) – these maps are the best information we have from USGS. If the infrastructure is up top [of the cliff] it wouldn't be as big of a concern*
 - *Answer from Richard Mykitta (Director of Maintenance, IRWD) – we do have a flooding area that is a concern on the creek, but that flooding is from above, it is not from below as would be caused by tsunami inundation*
 - *Question from Noelle Steele (Project Manager, Michael Baker Intl) – Are there coastal erosion concerns in that area of infrastructure or around Back Bay?*
 - *Answer from Dave Crowe (Construction Manager, IRWD) – Newport Coast, state park (Crystal Cove State Park?), has about 50- to 70-foot cliffs so influx of ocean water would have to be higher than that cliff. For Back Bay it would have to make it in quite a ways before sea rise would be an issue.*
 - *Comment from Starla Barker (Technical Consultant, De Novo Planning) – we are working with Alix to recognize critical infrastructure which will all be confirmed with IRWD staff. If you have a hazard identified as something of concern, you have to have a mitigation for it.*
 - *Further comment from Alix Stayton (Safety Specialist, IRWD) – Do we need to have a new mitigation action? Can we use existing ones?*
- **DAM/RESERVOIR FAILURE**
 - *Question from Noelle Steele (Project Manager, Michael Baker Intl) – Are there any concerns about upstream dams or reservoirs that are not IRWD owned or operated?*
 - *Answer from Ken Pfister (Operations Manager, IRWD) – The closest one is Oso Reservoir, all the ones in the local area are owned by IRWD.*
 - *Follow up from Noelle Steele (Project Manager, Michael Baker Intl) – Additional information on reservoirs and tanks would be good.*
 - *Answer from Ken Pfister (Operations Manager, IRWD) – There is also Prado Dam, but that is divided by hills from IRWD service area, so should be a concern*
 - *Reply from Richard Mykitta (Director of Maintenance, IRWD) – it doesn't hit much, but it does hit the IRWD area, it goes right down the Santa Ana River. Also, the one [dam] above Prado Dam is also a concern.*
 - *Follow up from Noelle Steele (Project Manager, Michael Baker Intl) – we are looking for a comprehensive list of all reservoirs and storage tanks.**
- **DROUGHT**

- *Question from Noelle Steele (Project Manager, Michael Baker Intl) – we would like to understand the impacts of the latest drought. Are there any plans or strategies that are still in place? The likely future incidence of drought is high.*
 - *Written comment from Eric Akiyoshi (Engineering Manager, IRWD) – The WSA and UWMP have adequate water supply even in multiple dry years; DWR is asking for a 5-year analysis; OCWD and Metro WD results also support this.*
 - *Response from Richard Mykitta (Director of Maintenance, IRWD) – the biggest struggle was to get customers to cut back, but for statewide purposes, meeting water usage reductions was not necessarily due to water shortage in IRWD.*
 - *Reply from Eric Akiyoshi (Engineering Manager, IRWD) – we achieved our mandated reduction and have communications and documentation to show method and other information.*
- *Question from Noelle Steele (Project Manager, Michael Baker Intl) – Are there any conservation measures that were implemented that have been kept as a conservation method?*
 - *Reply from Eric Akiyoshi (Engineering Manager, IRWD) – Amy McNolty and Fiona Sanchez should have some info on this.*
 - *Reply from Alix Stayton (Safety Specialist, IRWD) – I will talk to them about this.*
 - *Reply from Starla Baker (Technical Consultant, De Novo Planning) – If we have anything – programs, incentives, etc. – then documenting this will be helpful.*
- *Question from Noelle Steele (Project Manager, Michael Baker Intl) – Any other thoughts on drought?*

○ FLOOD

- *Comments from Noelle Steele (Project Manager, Michael Baker Intl) – This was discussed in depth last meeting as a hazard of concern. There are several areas of concern in Silverado Creek, Lake Irvine, and San Diego Creek. Does any localized and/or repetitive flooding occur outside of the marked areas for the 100- and 500-year flood plain?*
 - *Reply from Eric Akiyoshi (Engineering Manager, IRWD) – the map might be outdated, the Michaelson Water Plant is shown in the map as in the flood zone (South of 405 in the bottom left corner). That would historically have contained the Michaelson plant, which was placed in the flood zone in the early 2000s. However, a Letter of Map Revision was filed with FEMA to get the Michaelson Plant removed from the flood plain because flood walls were constructed around the entire plant. So the map in the presentation should be updated or at least noted. I can get in touch with Rich Morey and see if he can get Alix the Letter of Map Revision.**
 - ***Followed up-post meeting and it was determined the presented floodplain mapping was correct and Michelson Water Treatment Plant is excluded from the 100-year flood zone.***

- *Reply from Richard Mykitta (Director of Maintenance, IRWD) – I would like to know about the 500-year flood plain around the Michaelson Plant – we know that the 100-year flood plain should be removed, but not sure on the 500-year.*
 - *Question from Starla Baker (Technical Consultant, De Novo Planning) – In terms of more localized flooding is there anything? Areas where, because of drainage or other situations that cause flooding? Have you had situations where your facilities have been impacted due to local issues? Every time there is a storm event, are there areas that flood or things that need to be looked at? Even if not in IRWD control.*
 - *Follow up from Noelle Steele (Project Manager, Michael Baker Intl) – was there a pipe that was surfaced due to severe flooding?*
 - *Reply from Richard Mykitta (Director of Maintenance, IRWD) – it was in the Canyons. Dave should have more information about this.**
 - *Follow up – with the flooding in Silverado Canyon, were there any IRWD impacts? Was there mud flow?*
 - *Reply from Dave Crowe (Construction Manager, IRWD) – there was minimal mud flow that impacted IRWD in Silverado and Williams Canyons. We are working to obtain permits to protect the pipeline, but there is a lot of length in the Williams Canyon Creek, so this is taking longer.*
 - *Follow up from Alix Stayton (Safety Specialist, IRWD) – what year did the Williams Canyon incident happen?*
 - *Reply from Dave Crowe (Construction Manager, IRWD) – about 10 years ago, but just over time there has been some failure due to slope. Over the last 18-24 months this has become worse and after the fires the issues became more apparent. Hopefully this year repairs will happen to prevent damage to this from mud flow.*
 - *Question from Noelle Steele (Project Manager, Michael Baker Intl) – any concerns from other jurisdictions or groups in IRWD areas?*
 - *No comment*
- **GEOLOGIC HAZARDS – EXPANSIVE SOILS, LAND SUBSIDENCE**
 - *Question from Noelle Steele (Project Manager, Michael Baker Intl) – are there any previous incidences of subsidence causing damage to infrastructure?*
 - *Answer from Dave Crowe (Construction Manager, IRWD) – In West Irvine around Barranca to Jamboree and Jamboree to Red Hills, issues due to high water level and liquefaction when construction roads and structures.*
 - *Question from Noelle Steele (Project Manager, Michael Baker Intl) – with issues like groundwater overdraft, what programs is IRWD involved in to manage aquifers? What steps are being taken to reduce overdraft?*
 - *Answer from Eric Akiyoshi (Engineering Manager, IRWD) – OCWD and Producers manage the aquifer to avoid subsidence due to overdraft. The Groundwater basin is managed and doesn't seem to be an issue, at least that I am aware of because of the ongoing management of the*

groundwater basin. There should be an Engineers Report that should discuss this from OCWD.

- *Comment from Noelle Steele (Project Manager, Michael Baker Intl) – if expansive soils or land subsidence doesn't have a significant risk, then it can be reevaluated for inclusion of hazards.*
- HUMAN-CAUSED HAZARDS – HAZARDOUS MATERIALS SPILLS, TERRORISM/SABOTAGE
 - *Comments and question from Noelle Steele (Project Manager, Michael Baker Intl) – FEMA doesn't evaluate human caused hazards the same way as other hazards, they are not as prioritized as natural hazards. When FEMA evaluates the LHMP, their focus will be on natural hazards, but they don't discourage the inclusion of human induced hazards. Have there been any hazardous materials spills that have interrupted or impacted IRWD activities – whether IRWD or outside party?*
 - *Reply from Emilyn Zuniga (Safety Manager, IRWD) – I am not aware of anything*
 - *Reply from Ken Pfister (Operations Manager, IRWD) – I am not aware of anything, even if someone was able to get in and make a change to the system, there are other devices that would block that, other mechanisms stop that.*
 - *Question from Noelle Steele (Project Manager, Michael Baker Intl) – are there any evaluations that occur for cyberterrorism? [Brief discussion of incident in Florida]*
 - *Answer from Richard Mykitta (Director of Maintenance, IRWD) – Yes, quite a bit of work has been done on cyberterrorism. We have done a couple exercises and mitigated some vulnerabilities for the past year. More specific information can be found from Tome Malone or Joe Lam*
 - *Reply from Tom Malone (Director for Info Services, IRWD) – Cyber security is an area of increasing concern. We have run table-top exercises. The Automation group, with Joe Lam, would be where the attack in Florida happened, but it is something we are concerned about.**
 - *Reply from Joe Lam (Automation Manager, IRWD) – maybe a year ago, we had a cyber security assessment and filled out a cybersecurity questionnaire as well.**
- LANDSLIDE/MUDFLOW
 - *Comments and question from Noelle Steele (Project Manager, Michael Baker Intl) – there is a nexus between flooding hazards and seismic hazards and this topic. For convenience, we discuss these as their own hazard. There is a California DoC map for landslides. We have already discussed the Silverado Canyon and Williams Canyon previously, are there any other localized slope failures potentially affecting IRWD Infrastructure? Mud flows, landslides outside what was previously discussed?*
 - *No Comment*
- SEISMIC HAZARDS – GROUND SHAKING, FAULT RUPTURE, LIQUEFACTION

- *Reply from Gaspar Garza (Operations Manager, IRWD) – that is correct.*
 - *Comment from Ken Pfister (Operations Manager, IRWD) – we have adequate generation at facilities for power outages caused by wind, we just need to get fuel out there.*
 - *Follow up form Noelle Steele (Project Manager, Michael Baker Intl) – how long would the outage need to be to trigger difficulties?*
 - *Reply from Ken Pfister (Operations Manager, IRWD) – as is it causes difficulties, but mostly because of other issues that occur due to lack of power, like the cell towers.*
 - *Reply from Colton Martin (Mechanical Services Manager, IRWD) – some facilities aren’t able to completely be powered by back-up generators.*
 - *Reply from Owen O’Neill (Electrical and Instrumentation Manager, IRWD) – the chief concern is that the generators are not prime service generators, they are back-up generators. The permits list them at 200 hours per year. We usually lose San Diego 5 at least once a year due to drunk driving. But now we are getting more outages due to fires and power infrastructure issues.*
 - *Question from Noelle Steele (Project Manager, Michael Baker Intl) – is there any interest in increasing generator capacity?*
 - *Reply from Owen O’Neill (Electrical and Instrumentation Manager, IRWD) – We would need to verify generator capacity. We run into issues where the backup generator fails, we have difficulties getting the portable generators up to sites. But some generators can only run partial facilities, but we have been able to manage with this, so not likely to need to invest too much.**
- WILDFIRE
- *Comments from Noelle Steele (Project Manager, Michael Baker Intl) – fairly significant portions of IRWD service area are in some area of fire hazard severity. We know that there have been several major fires, including one occurring outside the traditional fire season and the likelihood of more fires is high. Have there been any service interruptions or impacts to IRWD infrastructure?*
 - *Reply from Owen O’Neill (Electrical and Instrumentation Manager, IRWD) – Long duration service interruptions in the regions that the maps outline, extending a week or maybe longer requiring the replacement of 50 to 100 power poles. Edison did look at improving construction and materials to increase reliability.*
 - *Reply from Ken Pfister (Operations Manager, IRWD) – only issue was with Lowman 3 Reservoir, but that was redundant so no impact to service. Where we have had power outages, we have had back-up generators. In 2007 fire burnt down Station 9, and had to have a replacement station built and we lost the aboveground line and fencing in recent fires.*
 - *Reply from Dave Crowe (Construction Manager, IRWD) – fire season is year-round now, do we need to restructure to reflect that?*

- *Reply from Noelle Steele (Project Manager, Michael Baker Intl) – likelihood of fires to occur beyond what we have traditionally thought of as fire season is what was intended. We are only speaking of the Bond Fire occurring outside the season as an example of severity, not as part of an analysis that limits risk being high to specific time of year. Was the pump station rebuilt in the same location and in same way?*
- *Reply from Ken Pfister (Operations Manager, IRWD) – the original structure had a wooden roof, it was an old facility that was inherited. There was fire damage at the Portola 9 Pump Station.*
- *Reply from John _ (__, IRWD) – we removed all vegetation and put in fire resistant vegetation and material and the new design is less susceptible to fire.*
- *Reply from Owen O’Neill (Electrical and Instrumentation Manager, IRWD) – wasn’t phos-chek enacted during Canyon 2?*
- *Reply from Ken Pfister (Operations Manager, IRWD) – yes, I called that in and they were dropping phos-chek on our facilities.*
- *Question from Noelle Steele (Project Manager, Michael Baker Intl) – are there any wildfire mitigation plans or any solidified planning documents associated with wildfire?*
 - *Reply from Alix Stayton (Safety Specialist, IRWD) – there is an annex in the response plan.*
 - *Reply from Dave Crowe (Construction Manager, IRWD) – another water agency local to IRWD installed a helicopter quick-filling station. Is that something that should be talked about? Yorba Linda just installed this.*
 - *Reply from Ken Pfister (Operations Manager, IRWD) – during the 2010 fire, they put in one in an IRWD reservoir, he would recommend putting a hold on incorporating this idea without further discussion.*
- Critical Facilities
 - Discuss as a group which facilities listed are in hazard zones and differentiate between which ones are critical and which ones are facilities of concern. Critical facility functions for the community should be considered if there was an event/hazard in the future.
- Risk Assessment Methodology
 - Geographic area (hazard location), population, critical facilities and potential loss.
 - Talking about costs associated with damage and potential loss – also talking about loss of the facility and associated activities.
- Capabilities Assessment
 - Planning & regulatory, admin & tech, financial, education & outreach.
 - FEMA wants to know how hazard mitigation is integrated into your planning mechanisms.
- Hazard Mitigation Goals
 - Previous plan goals presented, are these still relevant? Overarching framework for the LHMP.
 - No comments; goals are still relevant and adequately portray the goals for the plan.
- Public Involvement Update

- Webpage
- Survey
- E-newsletter

Next Steps/Action Items:

- Complete capabilities assessment
- Critical facilities values
- Hazard profiles
- Prepare vulnerability/risk assessment
- Preparation for focused meetings
- Meeting 3 – March 31st
 - Risk assessment
 - Hazard mitigation strategies.
- Action items
 - Provide additional information/data through Alix
 - Continue sending out survey on website, social media, etc. Screenshots and documentation to Alix for the plan.

** Denotes a Planning Team Member who indicated they will be sending Alix data/information regarding their facilities or a specific hazard.*

[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

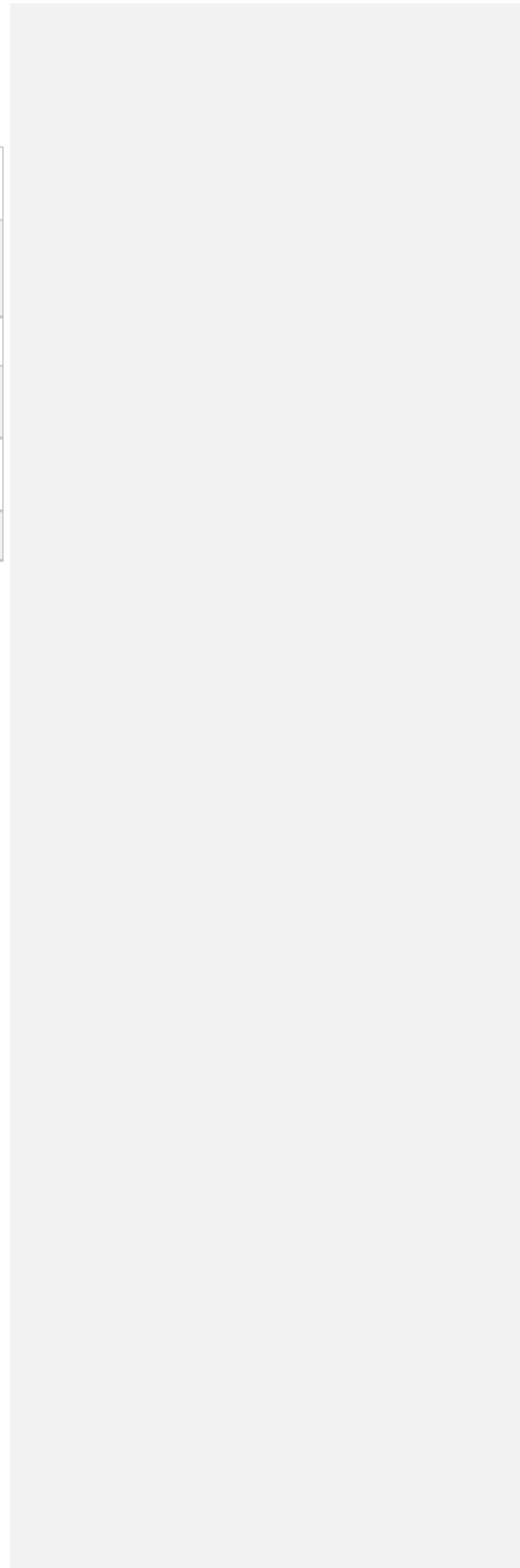
3. Treatment Plants

PLANT NAME	LOCATION	CAPACITY	TREATMENT TRAIN
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

4. Storage and Distribution System – Reservoirs, Primary Mains and Pumping Stations

ASSET TYPE	ASSET NAME	LOCATION	AREA SERVED
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]





Agenda

- Summary of hazards/hazard profiles
- Capabilities assessment
- Hazard mitigation goals
- Public involvement update
- Next steps
- Questions/additional discussion



Steele, Noelle

+12

GG

TM

Thomas Malone

DC

Dave Crowe



CM

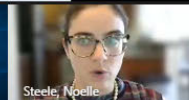
Colton Martin

DM

Dorien McElroy



Alix Stayton



Steele, Noelle



Request control

Participants

Type a name

In this meeting (26) Mute all

- Levey, Nathan
- Alix Stayton
Organizer
External
- Allen Shinbashi
External
- Colton Martin
External
- Dave Crowe
External
- Dorien McElroy
External
- Emilyn Zuniga
External
- Eric Akiyoshi
External
- Gaspar Garza
External
- Hunter, Baryic
External
- James Colston
External
- Joe Lam
External
- John Dayer
External
- John Fabris
External
- Jose Zepeda
External

Legend

- Irvine Ranch Water District Boundary
- FEMA 100-Year Flood Zones
- FEMA 500-Year Flood Zones

Irvine Ranch WATER DISTRICT

Steele, Noelle

+18 DC KP RM AS EA

Steele, Noelle Richard Mykitta Alix Stayton Eric Akiyoshi Starla Barker, De Novo Pla...

Leave

Request control

Capabilities Identification Worksheets

- Education and outreach
 - Programs and methods in place to implement mitigation actions and communicate hazard-related information
 - Fire safety programs, education programs
 - Public information or communication activities
- Questions to consider:
 - Could the program/organization help to implement future mitigation activities?
 - How can the capabilities be expanded and improved to reduce risk?

Irvine Ranch WATER DISTRICT

Participants

Type a name

- JL Joe Larr External
- JD John Dayer External
- JF John Fabris External
- KP Ken Pfister External
- LH Lisa Haney External
- ML Marina Lindsay External
- OO Owen O'Neill External
- OP Pacifico, Oliver@Waterboards External
- RM Richard Mykitta External
- SF Sarah Fetterling (Guest)
- DB Starla Barker, De Novo Planni...
- Steele, Noelle
- TM Thomas Malone External
- WC Wendy Chambers External

Others from chat (8)

- JZ Jose Zepeda External

Steele, Noelle

+17 JD OO Steele, Noelle AS Alix Stavton DC Dave Crowe KP Ken Pfister Starla Barker, De Novo Planni...

Request control

Public Involvement Update

- Survey link & webpage is live
 - [IRWD.com/lhmp](https://www.irwd.com/lhmp)
 - Please share with your constituents and jurisdictions via social media, newsletters, etc.
 - Screenshot all instances the survey link was shared for inclusion into the LHMP Appendix

Irvine Ranch WATER DISTRICT

Participants

Type a name

- EA ΕΠΙΣ ΑΚΥΩΣΗ External
- GG Gaspar Garza External
- JC James Colston External
- CD Jason Dempsey, Costa Mesa
- JL Joe Lam External
- JD John Dayer External
- JF John Fabris External
- KP Ken Pfister External
- LH Lisa Haney External
- ML Marina Lindsay External
- OO Owen O'Neill External
- OP Pacifico, Oliver@Waterboards External
- RM Richard Mykitta External
- SF Sarah Fetterling (Guest)
- DB Starla Barker, De Novo Planni...
- Steele, Noelle

Steele, Noelle

+17 OO DC

Steele, Noelle AS KP

Alix Stayton Ken Pfister

Starla Barker, De Novo Planni... John Fabris

Steele, Noelle

Subject: EXTERNAL: Hazard Mitigation Plan workgroup meeting #3
Location: Microsoft Teams Meeting

Start: Wed 3/31/2021 1:30 PM
End: Wed 3/31/2021 3:30 PM

Recurrence: (none)

Meeting Status: Accepted

Organizer: Alix Stayton

Meeting agenda and materials will be attached before the call.

Microsoft Teams meeting

Join on your computer or mobile app

[Click here to join the meeting](#)

[Learn More](#) | [Meeting options](#)

Eddy, Clara

From: Alix Stayton [REDACTED]
Sent: Monday, March 22, 2021 9:20 PM
To: Emilyn Zuniga; Ken Pfister; Gaspar Garza; Dorien McElroy; Owen O'Neill; Colton Martin; Todd Colvin; Dave Crowe; John Dayer; Malcolm Cortez; Eric Akiyoshi; Ian Swift; Allen Shinbashi; Randy Williams; Joe Lam; Lars Oldewage; Lisa Haney; John Fabris
Cc: Wendy Chambers; Jose Zepeda; Richard Mykitta; Kevin Burton; Thomas Malone; Cheryl Clary; James Colston
Subject: EXTERNAL: LHMP Planning Meeting #3
Attachments: Planning Team Meeting #3 Agenda final.docx; Capability Assessment Worksheets_Copy for Alix_March 2021 Update.docx

Good evening,

Attached you will find the agenda for next week's Local Hazard Mitigation Planning Meeting #3. Please do the following to get ready for the meeting:

1. Expect to hear from me regarding hazard mitigation projects you have done, are doing, or will do. Thanks to the departments who have already been working on this list with me. We will also use this information to inform the Capabilities Assessment (attached, in case you'd like to see).
2. Go to pre-register for an IdeaFlip account using <https://ideafli.com/>. It only asks for an email address, and doesn't send any spam emails to your account. This will allow us to do a collaborative post-it note activity and identify mitigation actions during the meeting.
3. Do your best to answer questions or respond to requests for information as quickly as you are able.

Please feel free to call or email if you need more information or have questions. As we build this list of hazard mitigation projects, it will likely become obvious who should attend the meeting for each team. I will discuss with teams that need more direction. This way, we can develop the needed information in a timely manner with the correct subject matter experts. Everyone has been so helpful with this initial heavy lift of getting the foundational data together, I appreciate your help. Looking forward to talking with all of you about your hazard mitigation work.

Best,

Alix

ALIX STAYTON
SAFETY SPECIALIST



Eddy, Clara

From: Alix Stayton [REDACTED]
Sent: Tuesday, April 20, 2021 12:09 PM
To: Emilyn Zuniga; pfister; garza; mcelroy; Owen O'Neill; martinc; colvin; crowe; John Dayer; Malcolm Cortez; akiyoshi; swift; shinbash; williams; lam; oldewage; hane; John Fabris; Steele, Noelle; Marina Lindsay; moeder; toland; moreno
Cc: chambersw; zepeda; Richard Mykitta; burton; malone; clary; colston; [REDACTED] Stonich, Amy; Levey, Nathan; Daniel Harrison; palacio; Matthew Barba
Subject: EXTERNAL: RE: Hazard Mitigation Plan workgroup meeting #3
Attachments: Meeting 3 Worksheet.docx
Follow Up Flag: Follow up
Flag Status: Flagged

Good afternoon,

Thanks to all who were able to attend Planning Meeting #3. If you have not yet already, please send your completed worksheet (attached again for your convenience) as soon as possible, for inclusion in the plan documentation. Please let me know if you have questions or need more information.

Best,

Alix

ALIX STAYTON
SAFETY SPECIALIST
[REDACTED]

**Irvine Ranch Water District
Local Hazard Mitigation Plan
Planning Team Meeting #3
March 31, 2021**

First Name Last Name	Title	Organization/Department	Mailing Address	E-Mail Address	Present?
Alix Stayton	Safety Specialist, Safety Department	Irvine Ranch Water District	[REDACTED]	[REDACTED]	✓
Allen Shinbashi	Manager of Risk & Contracts, Contracts & Risk Management	Irvine Ranch Water District	[REDACTED]	[REDACTED]	✓
Amy Stonich	Assistant Director of Community Development	City of Lake Forest	[REDACTED]	[REDACTED]	
Andy Lauridsen	Vice President	Orange City Firefighters, Executive Board	[REDACTED]	[REDACTED]	✓
Anisha Malik	Planner	Michael Baker International	[REDACTED]	[REDACTED]	
Ashley Melchor	Management Assistant	City of Lake Forest	[REDACTED]	[REDACTED]	✓
Baryic Hunter	Division Chief	Operations District 4, Orange County Fire Authority	[REDACTED]	[REDACTED]	
Cheryl Clary	Executive Director, Finance and Administration	Irvine Ranch Water District	[REDACTED]	[REDACTED]	✓
Colt Martin	Mechanical Services Manager, Mechanical Services – Maintenance Operations	Irvine Ranch Water District	[REDACTED]	[REDACTED]	

**Irvine Ranch Water District
Local Hazard Mitigation Plan
Planning Team Meeting #3
March 31, 2021**

First Name Last Name	Title	Organization/Department	Mailing Address	E-Mail Address	Present?
Dave Crowe	Construction Manager, Construction Services	Irvine Ranch Water District	██████████ ██████████	██████████	✓
Denien Rivenburg	Public Affairs	Irvine Ranch Water District	██████████	██████████	
Derek Moreno	Asset Systems Analyst	Irvine Ranch Water District	██████████ ██████████	██████████	✓
Dorien McElroy	Collections Systems Manager, Collection Systems	Irvine Ranch Water District	██████████ ██████████	██████████	✓
Dustin Grinstead	Admin Captain for Chief Sherwood	OC Fire	██████████ ██████████	██████████	
Emilyn Zuniga	Safety Manager, Safety Department	Irvine Ranch Water District	██████████ ██████████	██████████	✓
Eric Akiyoshi	Engineering Manager, Planning	Irvine Ranch Water District	██████████ ██████████	██████████	✓
Gaspar Garza	Operations Manager, MWRP Operations/Biosolids	Irvine Ranch Water District	██████████ ██████████	██████████	✓
Ian Swift	Natural Resources Manager, Natural Treatment System Operations	Irvine Ranch Water District	██████████ ██████████	██████████	✓

**Irvine Ranch Water District
Local Hazard Mitigation Plan
Planning Team Meeting #3
March 31, 2021**

First Name Last Name	Title	Organization/Department	Mailing Address	E-Mail Address	Present?
Jacob Moeder	Capital Projects Senior Engineer	Irvine Ranch Water District	██████████ ██████████	██████████	✓
James Colston	Director Water Quality Compliance	Irvine Ranch Water District	██████████ ██████████	██████████	✓
Jason Dempsey	Emergency Services Administrator	City of Costa Mesa	██████████ ██████████	██████████	
Joe Lam	Automation Manager, Automation	Irvine Ranch Water District	██████████ ██████████	██████████	✓
Joe Meyers	Emergency Management Coordinator	Tustin Police Department	██████████ ██████████	██████████	
John Dayer	Facilities/Fleet Manager, Facilities Services & Fleet Services – Maintenance Operations	Irvine Ranch Water District	██████████ ██████████	██████████	✓
John Fabris	Public Affairs Manager, Public Affairs	Irvine Ranch Water District	██████████ ██████████	██████████	✓
Jose Zepeda	Director of Recycling Operations	Irvine Ranch Water District	██████████ ██████████	██████████	✓
Joyce LaPointe	Lieutenant	Office of Emergency Management, Costa Mesa Police Department	██████████ ██████████	██████████	

**Irvine Ranch Water District
Local Hazard Mitigation Plan
Planning Team Meeting #3
March 31, 2021**

First Name Last Name	Title	Organization/Department	Mailing Address	E-Mail Address	Present?
Katie Eing	Disaster Services Coordinator	Newport Beach Police Department	██████████ ██████████	██████████	
Ken Pfister	Operations Manager, Water Operations	Irvine Ranch Water District	██████████ ██████████	██████████	✓
Lars Oldewage	Water Quality Manager, Water Quality	Irvine Ranch Water District	██████████ ██████████	██████████	✓
Lisa Haney	Regulatory Compliance Manager, Regulatory Compliance	Irvine Ranch Water District	██████████ ██████████	██████████	✓
Malcolm Cortez	Engineering Manager, Engineering – Operations Support	Irvine Ranch Water District	██████████ ██████████	██████████	✓
Marina Lindsay	Water Resources Planner, Planning	Irvine Ranch Water District	██████████ ██████████	██████████	✓
Matthew Barba	Director	Orange City Firefighters, Board of Directors	██████████ ██████████	██████████	✓
Natalie Palacio	Water Resources Specialist	Irvine Ranch Water District	██████████ ██████████	██████████	✓
Nathan Levey	Assistant Environmental Planner	Michael Baker International	██████████████████ ██████████	██████████████████	✓

**Irvine Ranch Water District
Local Hazard Mitigation Plan
Planning Team Meeting #3
March 31, 2021**

First Name Last Name	Title	Organization/Department	Mailing Address	E-Mail Address	Present?
Noelle Steele	Project Manager	Michael Baker International	██████████ ██████████	██████████	✓
Oliver Pacifico	Water – South Coast Section	State Water Resources Control Board	██████████ ██████████	██████████	
Owen O’Neill	Electrical & Instrumentation Manager, Electrical Services – Maintenance Operations	Irvine Ranch Water District	██████████ ██████████	██████████	✓
Randy Williams	Network and Cybersecurity Manager, Information Systems	Irvine Ranch Water District	██████████ ██████████	██████████	✓
Richard (Rick) Mykitta	Director of Maintenance	Irvine Ranch Water District	██████████	██████████	✓
Robert (Bobby) Simmons	Emergency Management Administrator	Office of Emergency Management, City of Irvine	1 ██████████ ██████████	██████████	
Robert Stefano	Deputy Chief of Operations	Emergency Operations Section, Orange City Fire Department	██████████ ██████████	██████████	
Sarah Fetterling	Sargent	City of Tustin Police Department	██████████ ██████████	██████████	
Scott Toland	Senior Engineer	Irvine Ranch Water District	██████████ ██████████	██████████	✓

**Irvine Ranch Water District
Local Hazard Mitigation Plan
Planning Team Meeting #3
March 31, 2021**

First Name Last Name	Title	Organization/Department	Mailing Address	E-Mail Address	Present?
Shane Sherwood	Division Chief	Operations District 2, Orange County Fire Authority	[REDACTED]	[REDACTED]	
Sharlyn de la Paz	Senior Management Analyst	City of Lake Forest	[REDACTED]	[REDACTED]	
Starla Barker	Technical Consultant	De Novo Planning	[REDACTED]	[REDACTED]	✓
Stephen Foster	Emergency Management Coordinator	City of Tustin	[REDACTED]	[REDACTED]	✓
Steve Rhyner	Emergency Operations Coordinator	Emergency Management, City of Santa Ana	[REDACTED]	[REDACTED]	
Thomas Malone	Director for Information Services	Irvine Ranch Water District	[REDACTED]	[REDACTED]	✓
Todd Colvin	Water Maintenance Supervisor, Field Services	Irvine Ranch Water District	[REDACTED]	[REDACTED]	✓
Vicki Osborn	Director of Emergency Management	Metropolitan Water District of Orange County	[REDACTED]	[REDACTED]	
Wendy Chambers	Executive Director of Operations	Irvine Ranch Water District	[REDACTED]	[REDACTED]	✓

**IRVINE RANCH WATER DISTRICT
LOCAL HAZARD MITIGATION PLAN**

PLANNING TEAM MEETING #3
Wednesday, March 31, 2021
1:30 PM – 3:30 PM – via Microsoft Teams

AGENDA

1) Risk Assessment/Vulnerability Overview

- Hazards Profiled
 - a. Mapped Hazards: Coastal Hazards, Dam/Reservoir Failure, Flood, Geologic Hazards, Human Caused Hazards, Landslide/Mudflow, Seismic Hazards, Wildfire
 - b. Non-Mapped Hazards: Drought, Severe Weather
- Coastal Hazards
- Dam/Reservoir Failure
- Flood
- Geologic Hazards
- Human Caused Hazards
- Landslide/Mudflow
- Seismic Hazards
- Wildfire
- Summary of Vulnerability
 - a. Table showing any overlaps in hazard vulnerability for all mapped/non-mapped hazard

2) Mitigation Strategy Discussion – using IdeaFlip.com

- For each hazard:
 - Identify 2-3 issues or concerns specific to each hazard
 - Write 1 issue/concern on each post-it
 - Place post-its on hazard sheet grouping like ideas
- Select 1-2 issues or concerns:
 - Identify a potential mitigation action
 - Write the issue/concern on the post-it with the mitigation action
 - Place post-its when done

3) Capabilities Assessment

- Review of capabilities that we received
- Are there opportunities to improve upon the capabilities?
 - Can a plan be used to identify hazards and implement mitigation actions?
 - How can the capabilities be expanded and improved to reduce risk?

Michael Baker

I N T E R N A T I O N A L

- Is there a missing capability that needs to be considered?
- Is additional staff/community training needed?
- What financial resources can be used?
- How can partner agencies/organizations work together to inform/educate the community?

4) Public Involvement Update

- Webpage
- Survey

5) Next Steps

- Summarize survey results
- Complete vulnerability assessment
- Mitigation actions and prioritization
- Prepare draft plan components
- Meeting 4



Irvine Ranch
WATER DISTRICT

IRVINE RANCH WATER DISTRICT

HAZARD MITIGATION PLAN

March 31, 2021

A-307

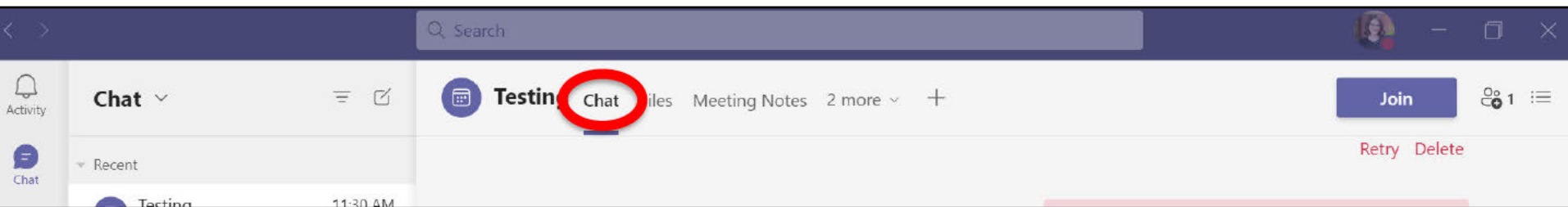
Michael Baker
INTERNATIONAL

Agenda

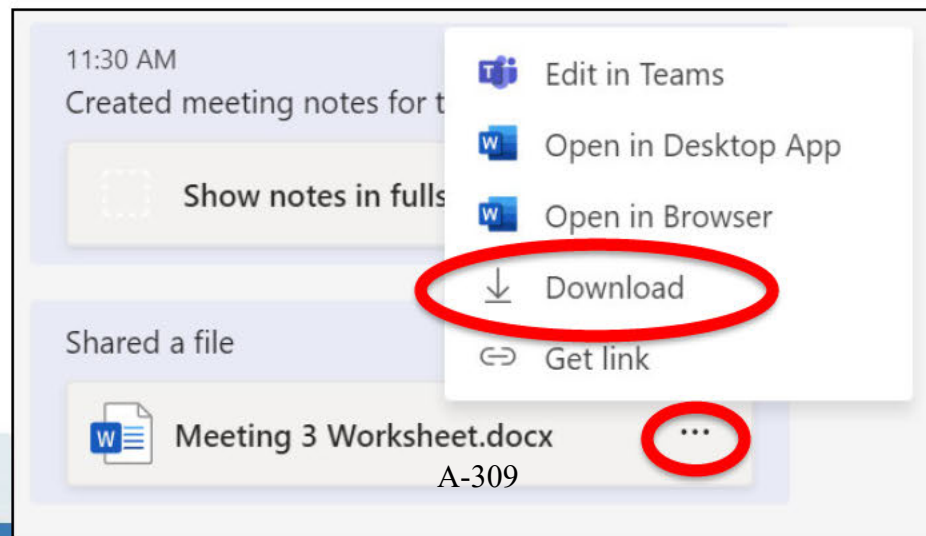
- Risk Assessment/Vulnerability Overview
- Mitigation Strategy Discussion
- Capabilities Assessment
- Public Involvement Update
- Next Steps
- Questions/Additional Discussion

Worksheet Instructions

- Download your HMP Meeting #3 Worksheet in our Microsoft Teams meeting channel



- Click the “chat” function, and download



1. Click Dots
2. Click Download

Worksheet Instructions

Participant Information:

Name:

Title:

Agency:

*** Important**

INSTRUCTIONS:

- Identify 2 – 3 issues or concerns specific to each hazard
- Use one bullet point per issue/concern on the “Concerns” column
- Identify potential mitigation measures/actions based on your concern
- Use one bullet point per mitigation action on the “Potential Mitigation” column
- NOTE: Hazards are included in the order of our presentation discussion. This worksheet is designed to accompany our discussion and is NOT intended to be post-meeting “homework”
- Post Meeting: Please upload this worksheet back into our Microsoft Teams Channel, using the instructions at the end of the document

MAPPED HAZARDS

COASTAL HAZARDS – Concerns

(Coastal Erosion, Sea Level Rise, Tsunami)

- (XX insert coastal hazard concerns here)
-
-

COASTAL HAZARDS – Potential Mitigation

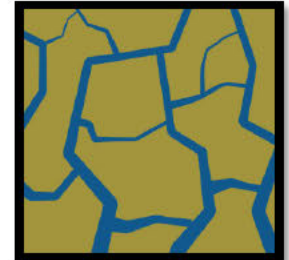
(Coastal Erosion, Sea Level Rise, Tsunami)

- (XX insert coastal hazard concerns here)
-
-

Risk Assessment/Vulnerability Overview

Hazards Profiled

- Costal Hazards
 - Coastal Erosion
 - Sea Level Rise
 - Tsunami
- Dam/Reservoir Failure
- Drought
- Flood
- Geologic Hazards
 - Expansive Soils
 - Land Subsidence
- Human Caused Hazards
 - Hazardous Materials
 - Terrorism/Sabotage (cyberattacks)
- Landslide/Mudflow
- Seismic Hazards
 - Fault Rupture
 - Ground Shaking
 - Liquefaction
- Severe Weather
 - Coastal Storm/Winter Storm
 - Windstorm (Santa Ana winds)
 - Power Outage (secondary impact)
- Wildfire



Critical Facilities

- Utilized the AWIA RR&A critical assets as a basis for developing Critical Facilities List
- Coordinated with Collections & Engineering Departments to tailor list to the HMP
 - Focused on incorporating wastewater facilities, which were excluded from AWIA process but are critical to providing services to IRWD customers
- Siphon critical facilities to be mapped early next week based on on-going discussions with Collections

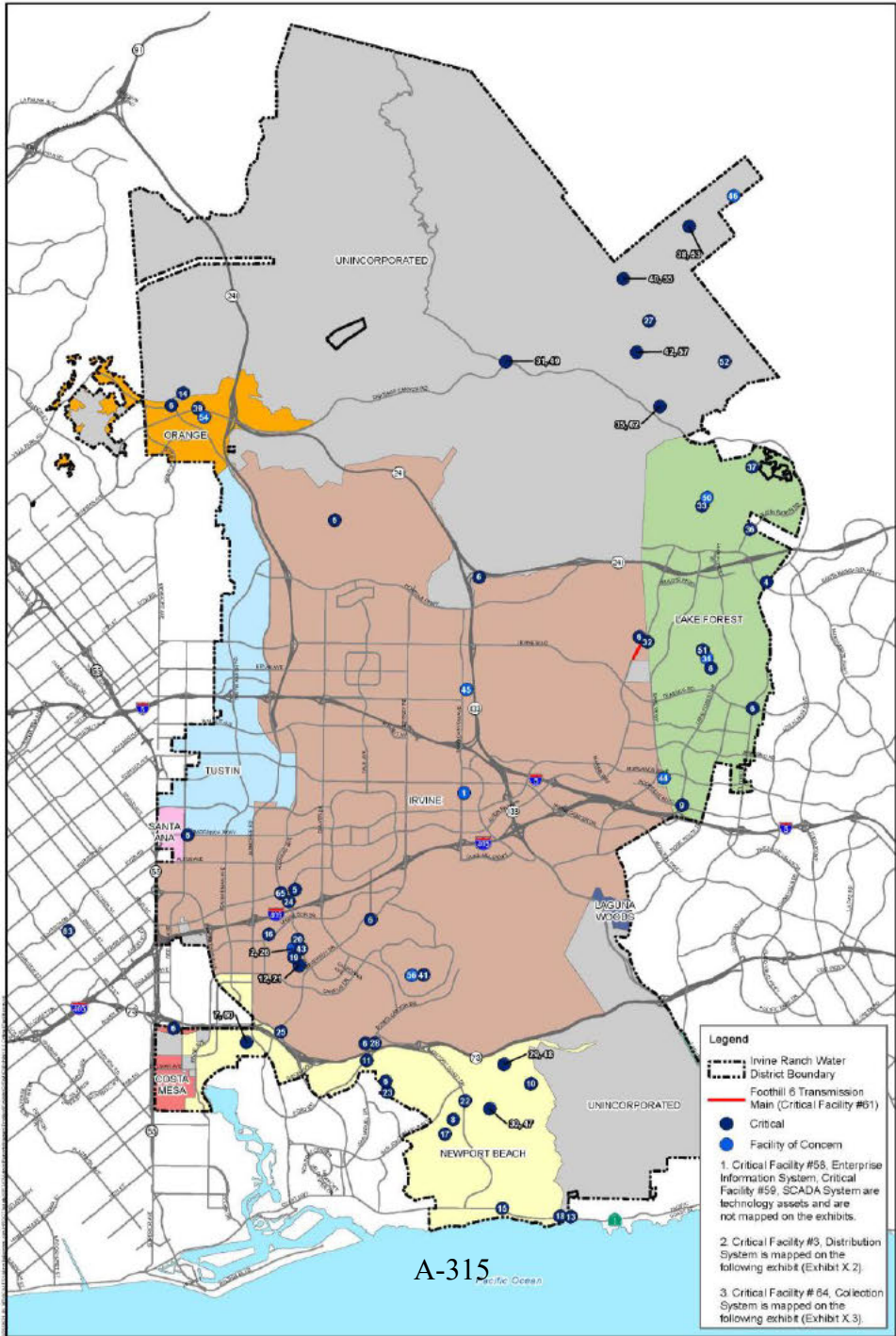
Facility Types

- **Critical Facilities**

- Facilities that are **critical** to provide potable and wastewater services to IRWD customers
- Failure of critical facilities would result in significant issues in maintaining service
- Many critical facilities are the sole source of water at their location, do not have a backup, or provide service to areas with known hazards/risk

- **Facilities of Concern**

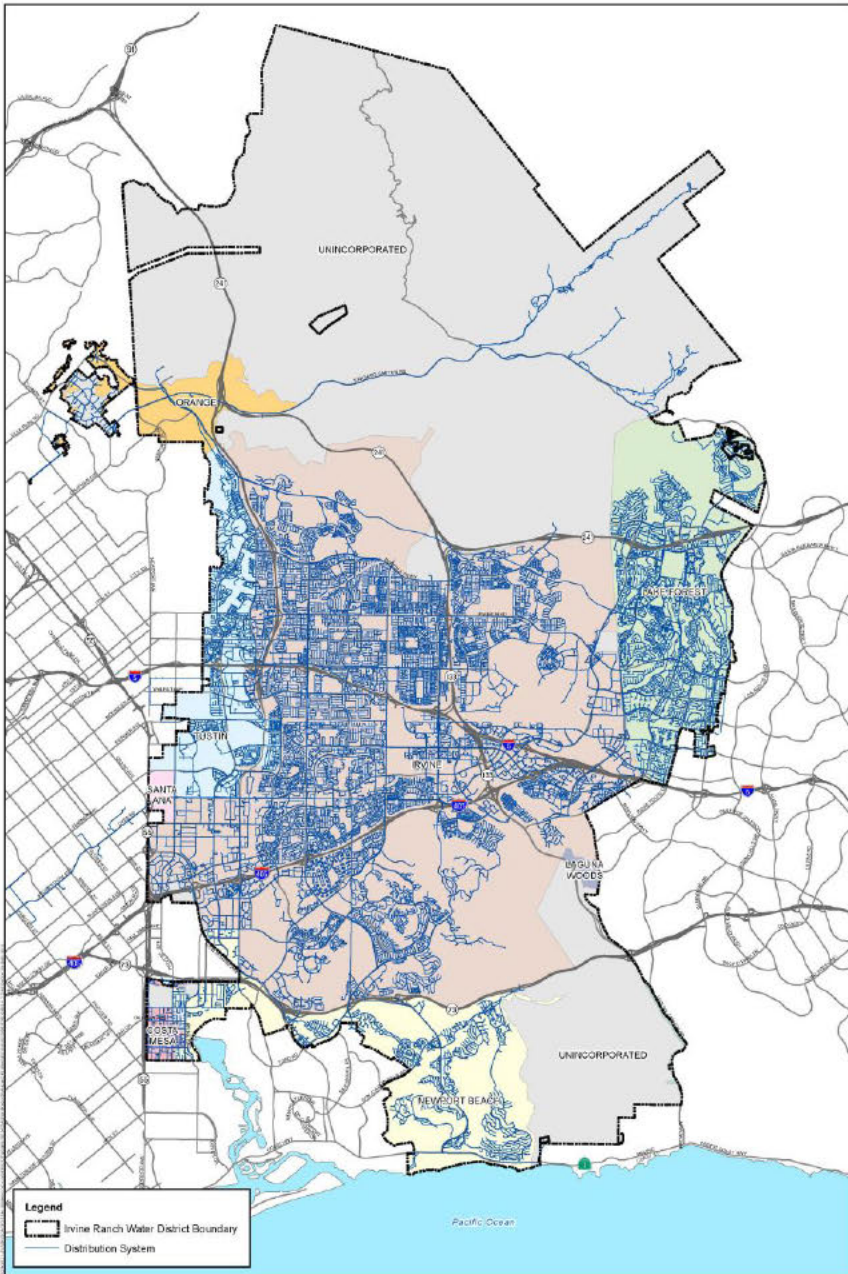
- Facilities that are **important** to provide potable and wastewater services to IRWD customers
- Failure of a facility of concern would create slow downs/challenges, but ultimately IRWD could maintain service in the short term



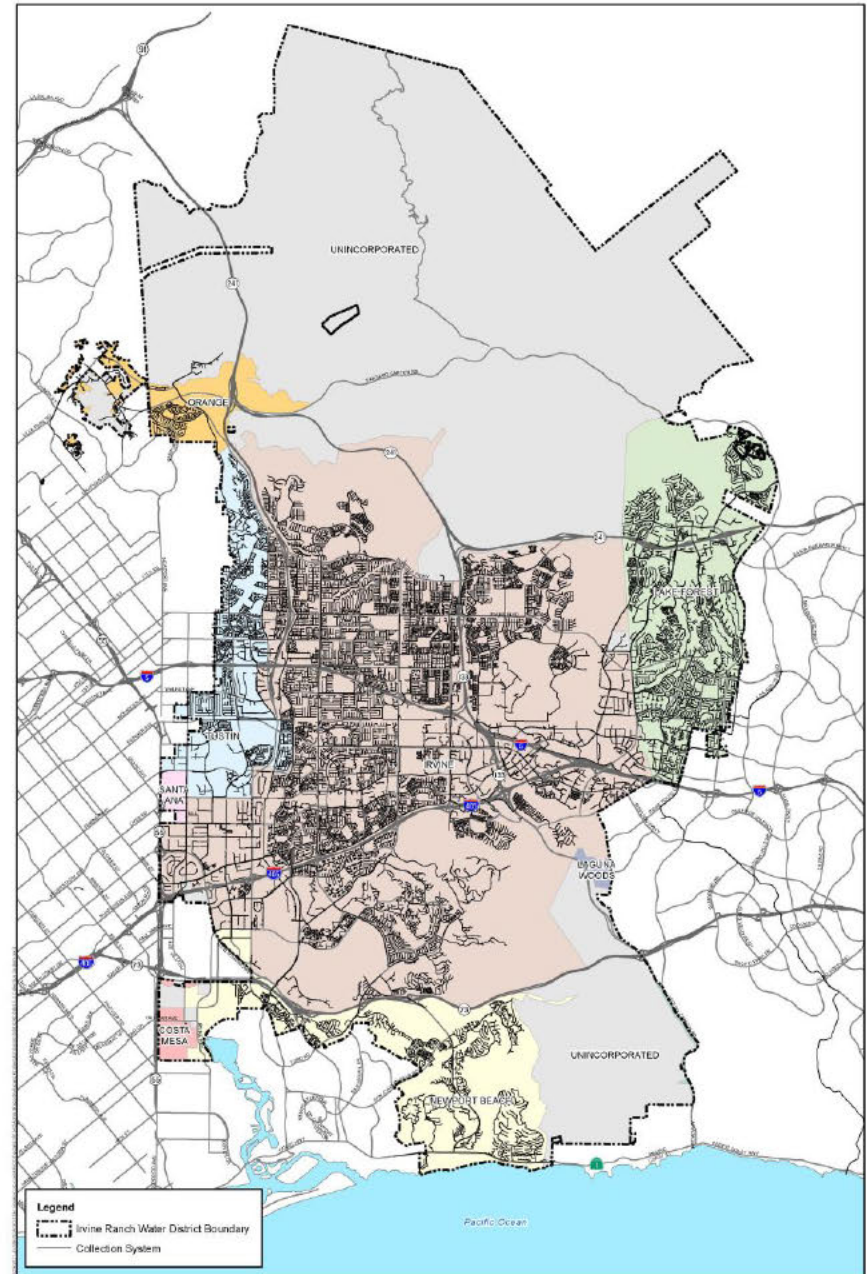
A-315
Pacific Ocean

- Legend**
- Irvine Ranch Water District Boundary
 - Foothill 6 Transmission Main (Critical Facility #61)
 - Critical
 - Facility of Concern
1. Critical Facility #58, Enterprise Information System, Critical Facility #59, SCADA System are technology assets and are not mapped on the exhibits.
 2. Critical Facility #63, Distribution System is mapped on the following exhibit (Exhibit X.2).
 3. Critical Facility #64, Collection System is mapped on the following exhibit (Exhibit X.3).





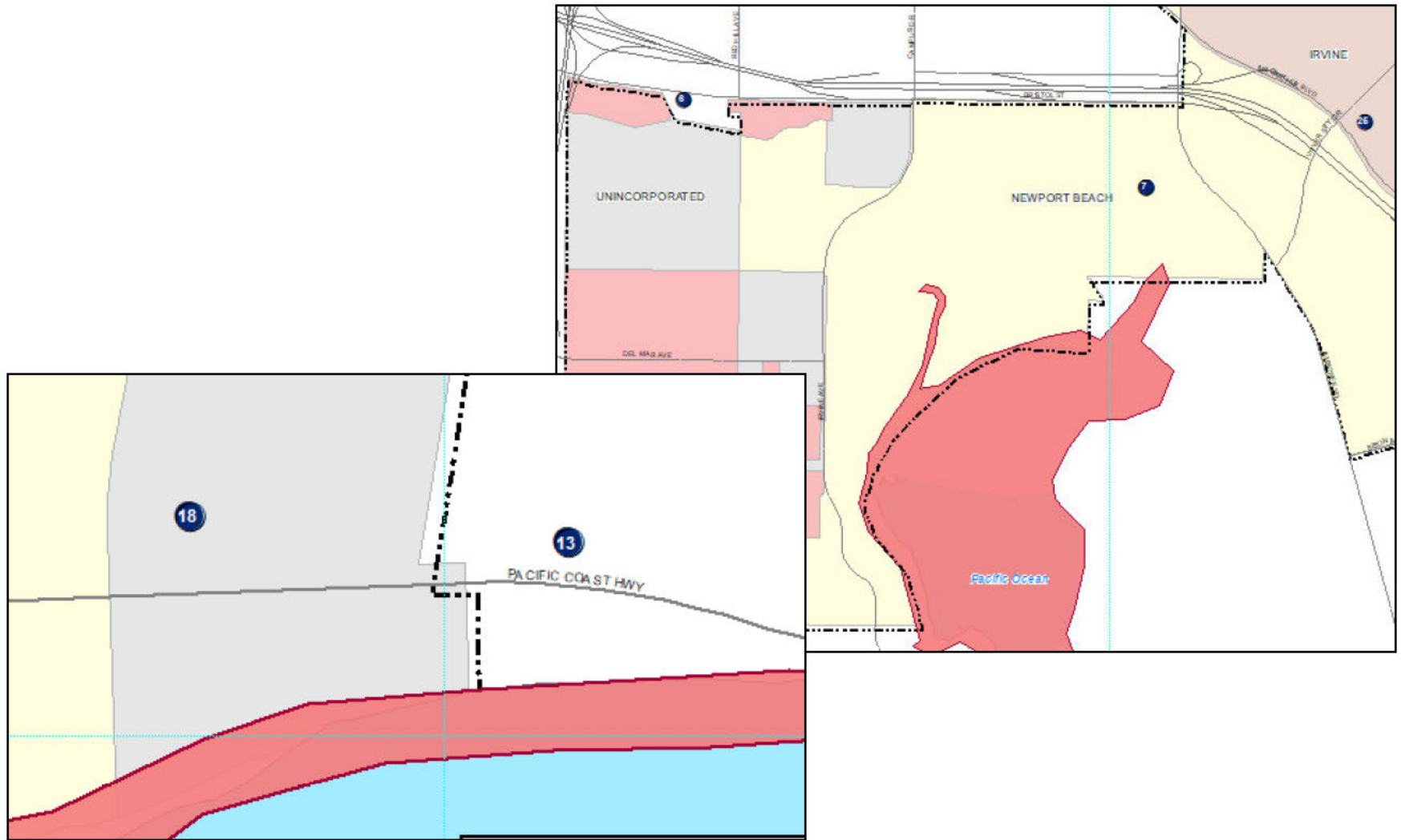
Irvine Ranch Water District Local Hazard Mitigation Plan
Distribution System
Exhibit 4.X.2



Irvine Ranch Water District Local Hazard Mitigation Plan
Collection System
Exhibit X.3

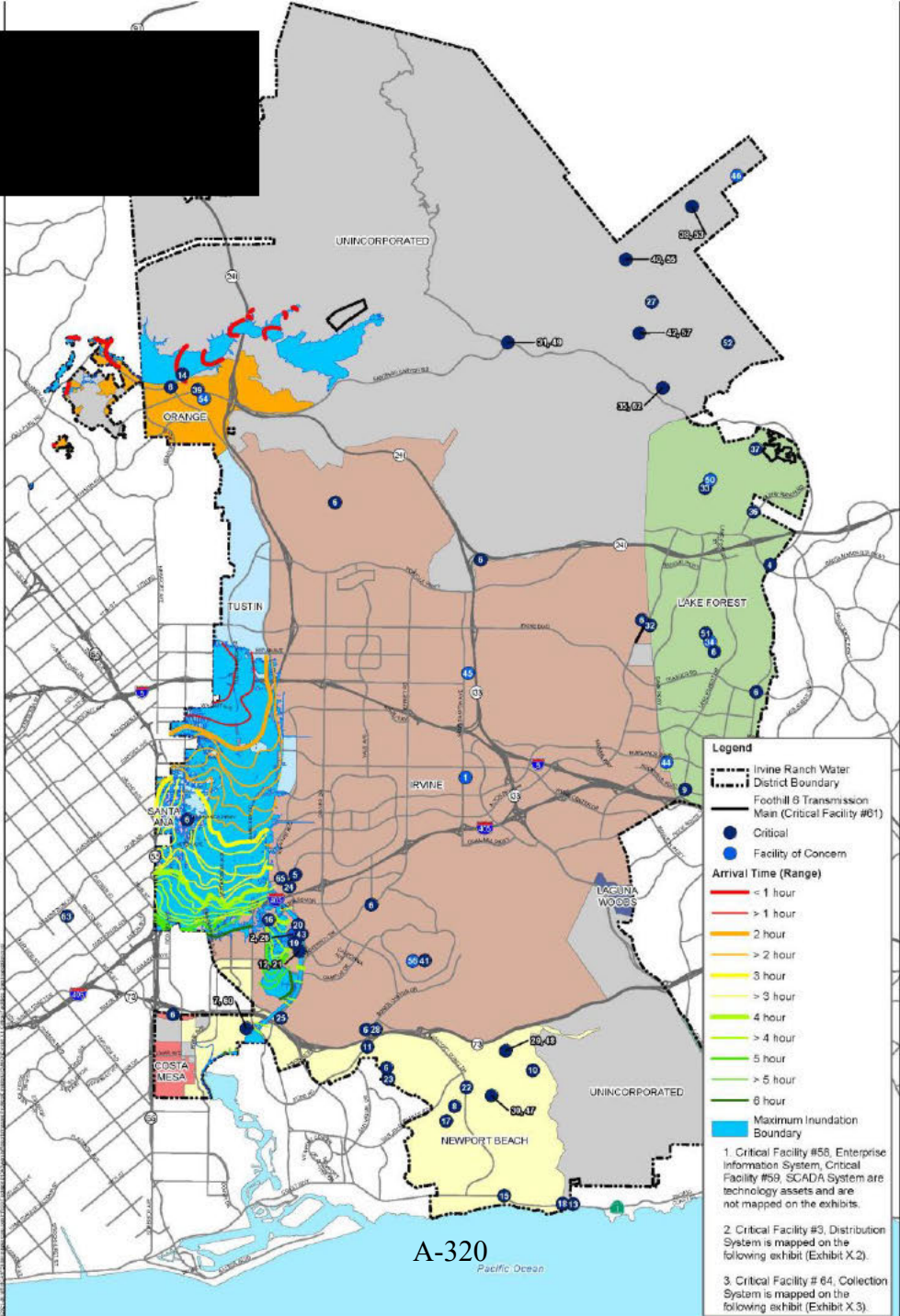
COASTAL HAZARDS

Coastal Hazards - Tsunami



DAM/RESERVOIR INUNDATION

Santiago Dam Only



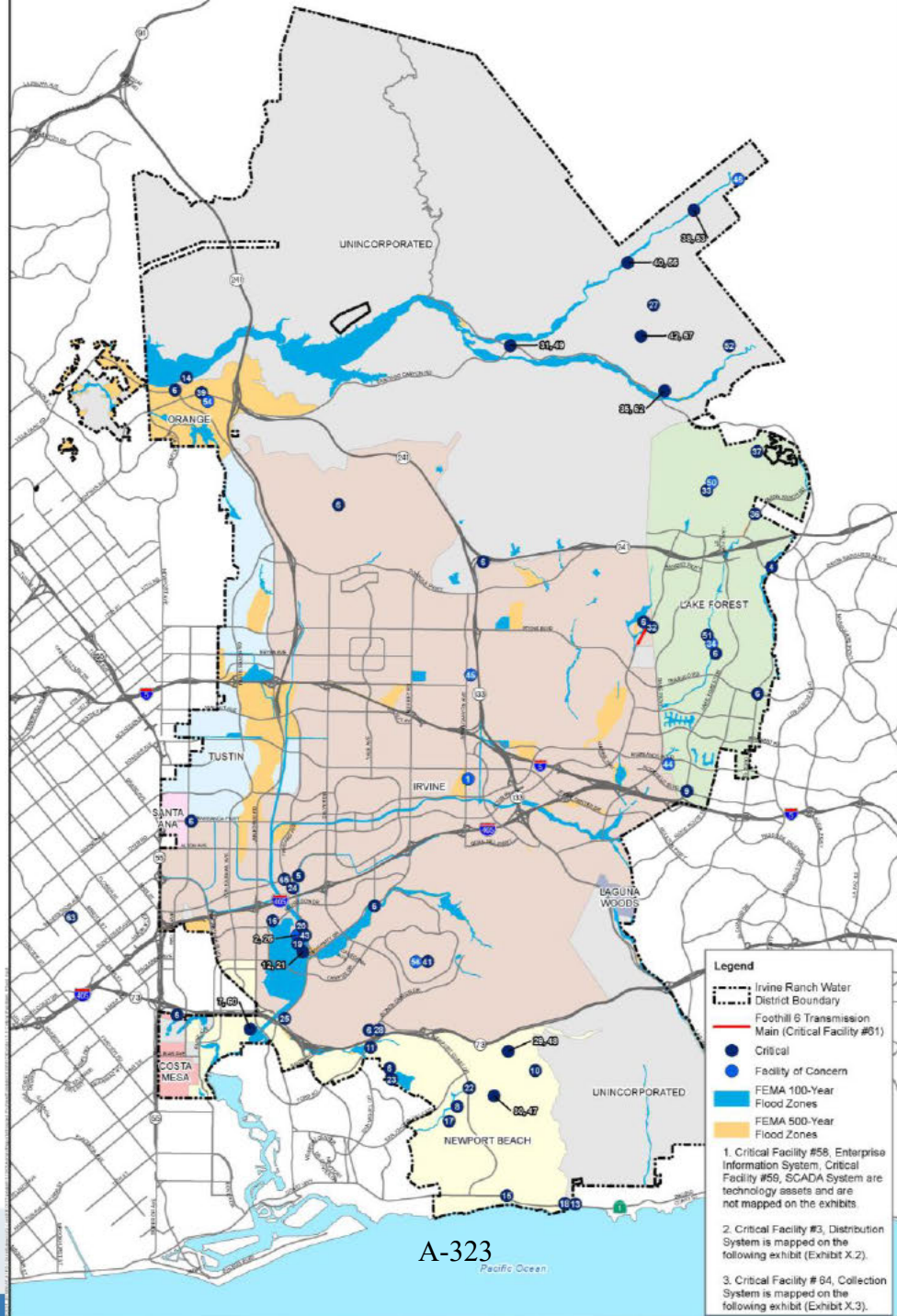
A-320
Pacific Ocean



Dam Inundation – Santiago Dam

Map ID	Name	Asset Type	Status	Location	Arrival Time
14	Irvine Park	Lift Station	Critical	1 Irvine Park Road, Irvine	Between 9 and 12 min
2	Michelson Biosolids	Biosolids Treatment	Facility of Concern	3512 Michelson Drive, Irvine, CA 92612	Between 4 hr and 4 hr 10 min
19	MWRP MPS-3	Lift Station	Critical	3512 Michelson Drive, Irvine	Between 4 hr and 4 hr 10 min
26	Michelson Operations Center	Operations Staff Offices	Facility of Concern	3512 Michelson Drive, Irvine, CA 92612	Between 4 hr and 4 hr 10 min
43	Michelson MWRP	Recycled Water	Critical	3512 Michelson Drive, Irvine, CA 92612	Between 4 hr and 4 hr 10 min
63	Deep Aquifer Treatment System (DATS)	Treatment System	Critical	1704 W. Segerstrom, Santa Ana	Between 4 hr and 4 hr 10 min

FLOOD HAZARDS



Legend

- Irvine Ranch Water District Boundary
- Foothill 6 Transmission Main (Critical Facility #01)
- Critical
- Facility of Concern
- FEMA 100-Year Flood Zones
- FEMA 500-Year Flood Zones

1. Critical Facility #56, Enterprise Information System, Critical Facility #59, SCADA System are technology assets and are not mapped on the exhibits.
2. Critical Facility #3, Distribution System is mapped on the following exhibit (Exhibit X.2).
3. Critical Facility #64, Collection System is mapped on the following exhibit (Exhibit X.3).



Flood

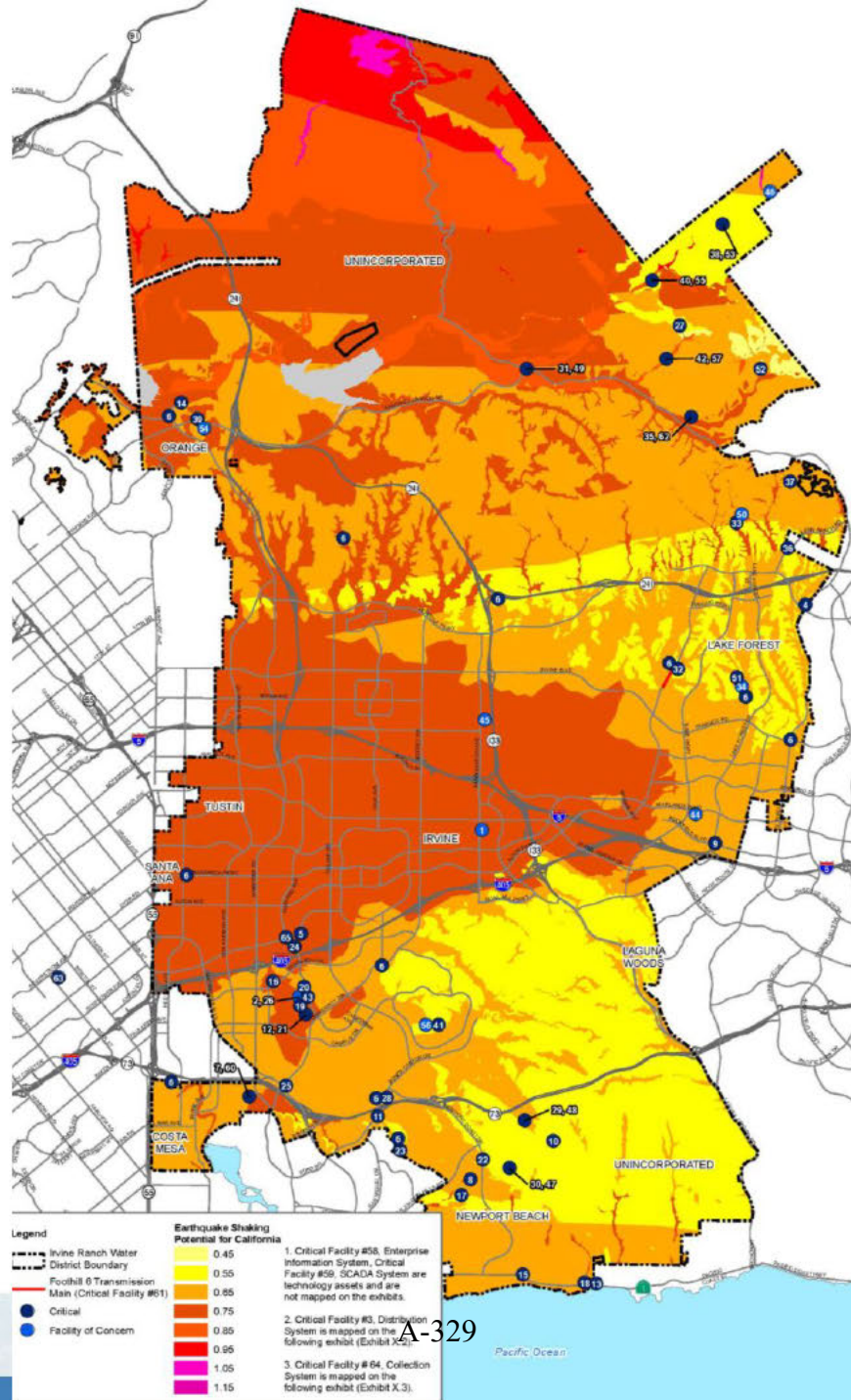
Map ID	Name	Asset Type	Status	Location
3	Distribution System	Distribution System	Critical	75.31 miles
6	Met Source Water	Intake	Critical	NA
12	Duck Club	Lift Station	Critical	3512 Michelson Drive, Irvine
14	Irvine Park	Lift Station	Critical	1 Irvine Park Road, Irvine
21	MWRP Caretaker Housing	Lift Station	Critical	3512 Michelson Drive, Irvine
40	Shaw Pump Station	Pump Station	Critical	28934 Silverado Canyon Road
53	Read Reservoir	Reservoir	Critical	30500 Silverado Canyon Rd
64	Collection System – 53 miles	Wastewater Collection System	Critical	53 miles

LANDSLIDE HAZARDS

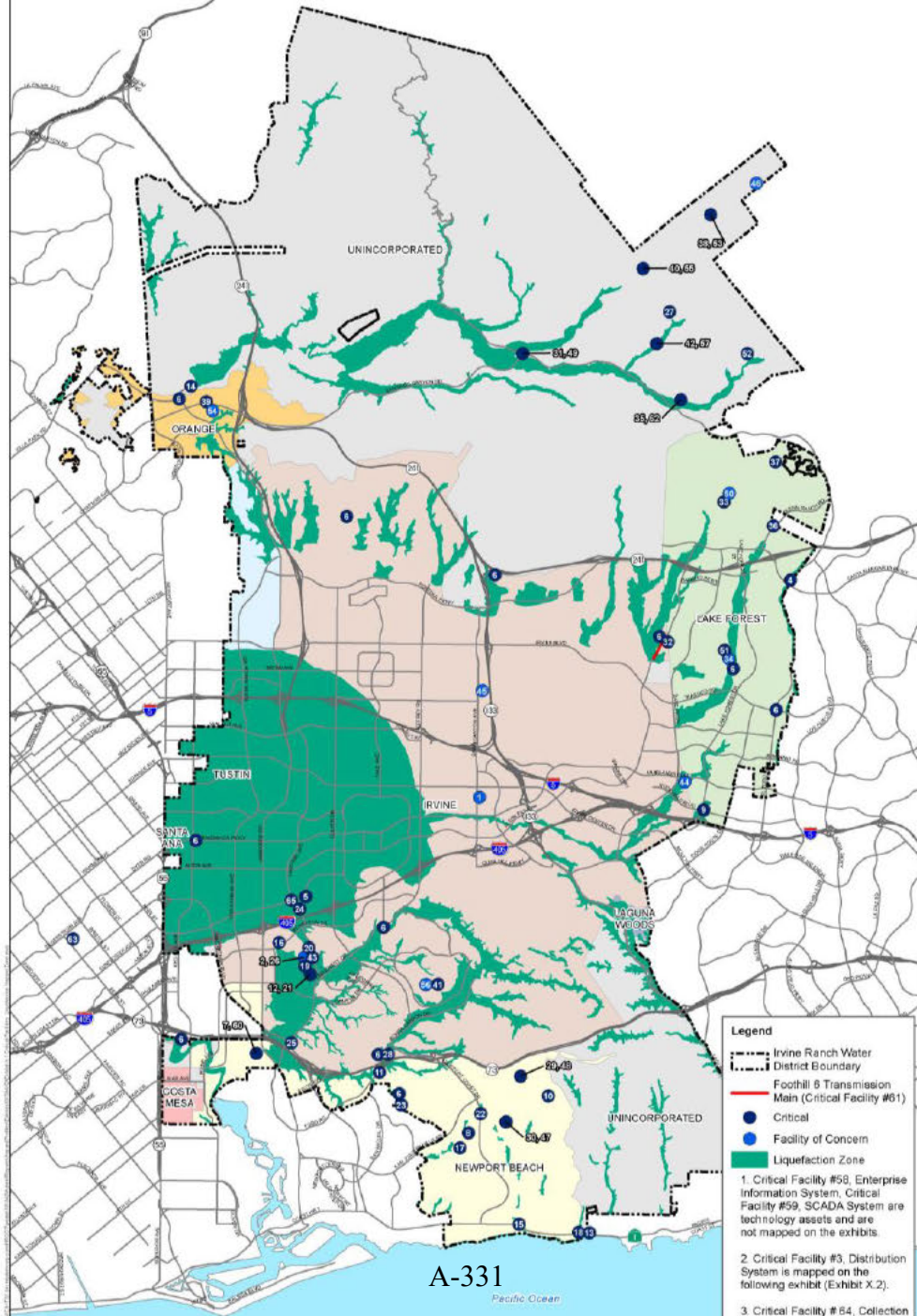
Landslide

Map ID	Name	Asset Type	Status	Location
3	Distribution System	Distribution System	Critical	40.65 miles
8	Buck Gully	Lift Station	Critical	21594 White Pine, Newport Beach
25	University	Multi-Purpose: Lift Station, Telemetry Site, Pump Station	Critical	3262 University Drive, Irvine
27	Benner Reservoir	Pump Station	Critical	28741 Williams Canyon Rd
46	Chapman Reservoir	Reservoir	Facility of Concern	14909 Mill Rd
52	Modjeska Reservoir	Reservoir	Critical	29265 Modjeska Canyon Rd
53	Read Reservoir	Reservoir	Critical	30500 Silverado Canyon Rd
57	Williams Canyon Reservoir	Reservoir	Critical	27600 Williams Canyon Rd
64	Collection System	Wastewater Collection System	Critical	31.68 miles

SEISMIC HAZARDS – GROUND SHAKING



SEISMIC HAZARDS - LIQUEFACTION



A-331

Pacific Ocean

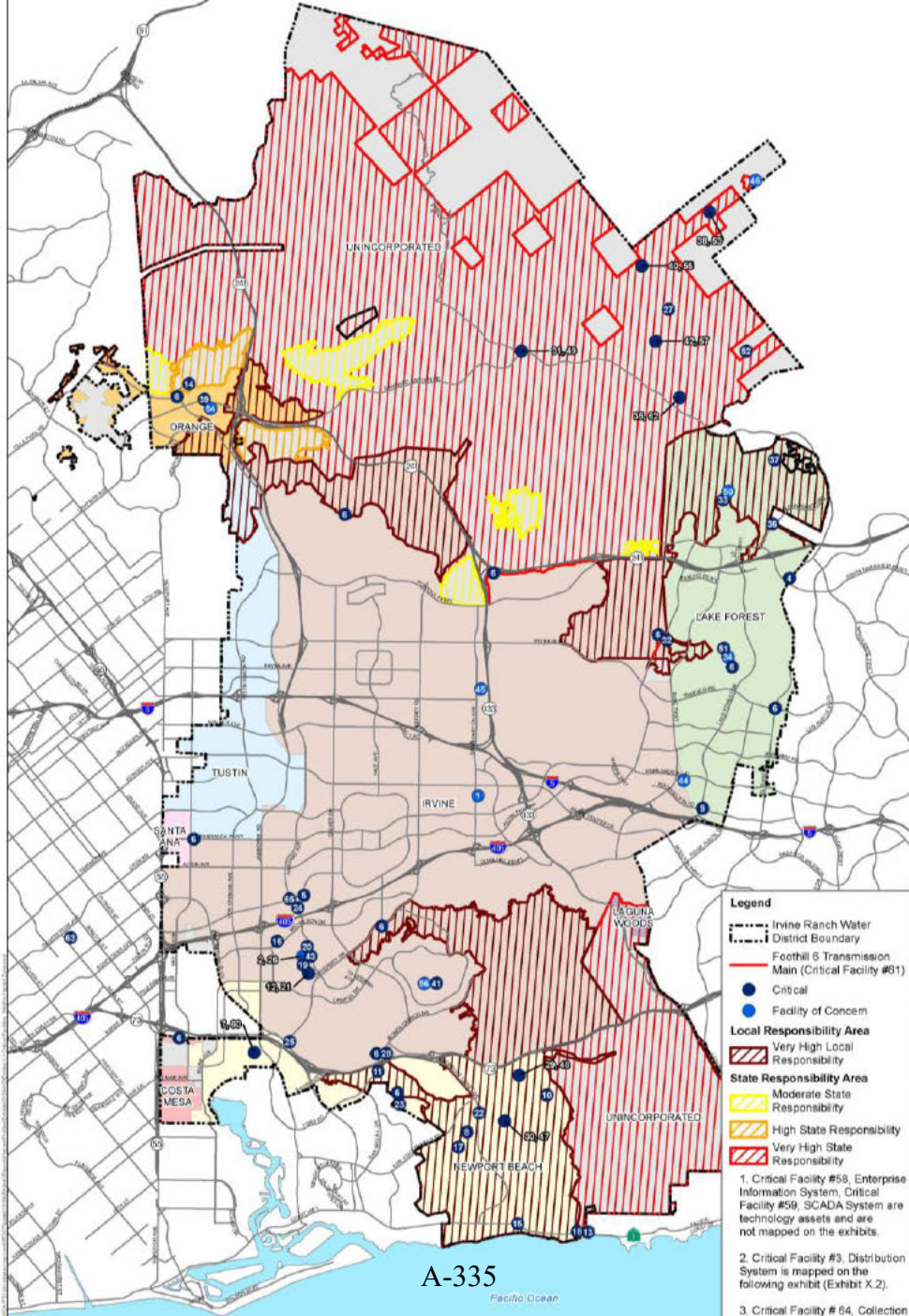
Liquefaction

Map ID	Name	Asset Type	Status	Location
2	Michelson Biosolids	Biosolids Treatment	Facility of Concern	3512 Michelson Drive, Irvine, CA 92612
3	Distribution System	Distribution System	Critical	<i>475.14 miles</i>
4	El Toro Diversion Structure	Diversion Structure	Critical	NA
5	San Mateo Diversion	Diversion Structure	Critical	103 San Mateo, Irvine
6	Met Source Water	Intake	Critical	NA
9	Canada	Lift Station	Critical	22952 Lake Forest Drive, Lake Forest
12	Duck Club	Lift Station	Critical	3512 Michelson Drive, Irvine
15	Los Trancos Low Flow	Lift Station	Critical	7303 Pacific Coast Highway, Newport Beach
18	Muddy Canyon Low Flow	Lift Station	Critical	8333 Pacific Coast Highway, Newport Beach
19	MWRP MPS-3	Lift Station	Critical	3512 Michelson Drive, Irvine
21	MWRP Caretaker Housing	Lift Station	Critical	3512 Michelson Drive, Irvine
22	Newport Coast	Lift Station	Critical	21244 Newport Coast Drive, Newport Beach
24	Harvard	Lift Station	Critical	17675.25 Harvard Avenue, Irvine

Liquefaction

Map ID	Name	Asset Type	Status	Location
26	Michelson Operations Center	Operations Staff Offices	Facility of Concern	3512 Michelson Drive, Irvine, CA 92612
28	Coastal OC 63-Zn.4 Pump Station	Pump Station	Critical	4925 1/2 Bonita Canyon Dr, Irvine 92603
42	Williams Canyon Pump Station (Benner)	Pump Station	Critical	27600 Williams Canyon Road
43	Michelson MWRP	Recycled Water	Critical	3512 Michelson Drive, Irvine, CA 92612
44	Los Alisos Water Recycling Plant (LAWRP)	Recycling Plant	Facility of Concern	22312 Muirlands Boulevard, Lake Forest
61	Foothill 6 Transmission Main	Transmission Main	Critical	
64	Collection System	Wastewater Collection System	Critical	387.35 miles
65	Harvard Area Trunk Diversion Structure (HATS)	Diversion Structure	Critical	NA

WILDFIRE



A-335

Pacific Ocean

- Legend**
- - - Irvine Ranch Water District Boundary
 - - - Foothill 6 Transmission Main (Critical Facility #81)
 - Critical
 - Facility of Concern
- Local Responsibility Area**
- Very High Local Responsibility
- State Responsibility Area**
- Moderate State Responsibility
 - High State Responsibility
 - Very High State Responsibility
1. Critical Facility #58, Enterprise Information System, Critical Facility #59, SCADA System are technology assets and are not mapped on the exhibits.
 2. Critical Facility #3, Distribution System is mapped on the following exhibit (Exhibit X.2).
 3. Critical Facility # 64, Collection System is mapped on the following exhibit (Exhibit X.3).



Wildfire

Map ID	Name	Asset Type	Status	Location
3	Distribution System	Distribution System	Critical	221.58 miles
6	Met Source Water	Intake	Critical	NA
8	Buck Gully	Lift Station	Critical	21594 White Pine, Newport Beach
10	Coastal Ridge	Lift Station	Critical	22322 Pacific Mist, Newport Beach
11	Coyote Canyon	Lift Station	Critical	3000 ½ Bonita Canyon Road, Irvine
14	Irvine Park	Lift Station	Critical	1 Irvine Park Road, Irvine
15	Los Trancos Low Flow	Lift Station	Critical	7303 Pacific Coast Highway, Newport Beach
17	Montecito	Lift Station	Critical	21 Via Burrone, Newport Beach
18	Muddy Canyon Low Flow	Lift Station	Critical	8333 Pacific Coast Highway, Newport Beach
22	Newport Coast	Lift Station	Critical	21244 Newport Coast Drive, Newport Beach
23	San Joaquin Housing	Lift Station	Critical	32 Ridgeline Drive, Newport Beach
27	Benner Reservoir	Pump Station	Critical	28741 Williams Canyon Rd
29	Coastal Zn 6-7 Pump Station	Pump Station	Critical	20783 Vista Ridge Rd, Newport Beach 92657

Wildfire

Map ID	Name	Asset Type	Status	Location
30	Coastal Zn. 4-6 Pump Station	Pump Station	Critical	21474 Vista Ridge Rd, Newport Coast 92657
31	Fleming Pump Station	Pump Station	Critical	7431 Silverado Canyon Road
32	Foothill Zn 4-6 Pump Station	Pump Station	Critical	21515 Magazine Rd, Irvine 92618/12848 1/2 Alton
33	Foothill Zn 6-6A Pump Station	Pump Station	Critical	2 Touraine Pl, Foothill Ranch 92610
35	Manning Pump Station	Pump Station	Critical	29265 Modjeska Canyon Road
36	Portola Hills Zn 6-8	Pump Station	Critical	27841 Glenn Ranch Rd, Portola hills 92610
37	Portola Hills Zn 8-9 Pump Station	Pump Station	Critical	18967 Saddleback, Trabuco 92679
38	Read Pump Station	Pump Station	Critical	30500 Silverado Canyon Road
40	Shaw Pump Station	Pump Station	Critical	28934 Silverado Canyon Road
42	Williams Canyon Pump Station (Benner)	Pump Station	Critical	27600 Williams Canyon Road
46	Chapman Reservoir	Reservoir	Facility of Concern	14909 Mill Rd
47	Coastal Zn 4 Reservoir	Reservoir	Critical	21474 Vista Ridge, Newport Beach 92657
48	Coastal Zn 6 Reservoir	Reservoir	Critical	20783 Vista Ridge Rd, Newport Beach 92657

Wildfire

Map ID	Name	Asset Type	Status	Location
49	Fleming Reservoir	Reservoir	Critical	7431 Silverado Canyon Road
50	Foothill Zn 6 Reservoir	Reservoir	Facility of Concern	2 Touraine Pl, Foothll Ranch 92610
53	Read Reservoir	Reservoir	Critical	30500 Silverado Canyon Rd
55	Shaw Reservoir	Reservoir	Critical	28914 Olive Drive
57	Williams Canyon Reservoir	Reservoir	Critical	27600 Williams Canyon Rd
61	Foothill 6 Transmission Line		Critical	
62	Manning Treatment Plant	Treatment Plant	Critical	NA
64	Collection System	Wastewater Collection System	Critical	151.26 miles

Not Mapped Hazards

- Drought
- Human Induced Hazards
 - Hazardous Materials
 - Terrorism/Sabotage (cyberattacks)
- Geologic Hazards
 - Land Subsidence
 - Expansive Soils
- Severe Weather
 - Coastal Storms/Winter Storms
 - Windstorm
 - Power Outage

Summary of Vulnerability

Map ID	Name	Coastal Hazards	Dam Failure	Drought	Flood	Geo-logic	Human-Caused	Land slide	Lique-faction	Seismic	Severe Weather	Wildfire
2	Michelson Biosolids	N	Y	Y	N	Y	Y	N	Y	Y	Y	N
3	Distribution System	N	Pending	Y	Y	Y	Y	Y	Y	Y	Y	Y
4	El Toro Diversion Structure	N	Pending	Y	N	Y	Y	N	Y	Y	Y	N
5	San Mateo Diversion	N	Pending	Y	N	Y	Y	N	Y	Y	Y	N
6	Met Source Water	N	Pending	Y	Y	Y	Y	N	Y	Y	Y	Y
8	Buck Gully	N	Pending	Y	N	Y	Y	Y	N	Y	Y	Y
9	Canada	N	Pending	Y	N	Y	Y	N	Y	Y	Y	N
10	Coastal Ridge	N	Pending	Y	N	Y	Y	N	N	Y	Y	Y
11	Coyote Canyon	N	Pending	Y	N	Y	Y	N	N	Y	Y	Y
12	Duck Club	N	Pending	Y	Y	Y	Y	N	Y	Y	Y	N
14	Irvine Park	N	Y	Y	Y	Y	Y	N	N	Y	Y	Y
15	Los Trancos Low Flow	N	Pending	Y	N	A-340 Y	Y	N	Y	Y	Y	Y

Summary of Vulnerability

Map ID	Name	Coastal Hazards	Dam Failure	Drought	Flood	Geo-logic	Human-Caused	Land slide	Lique-faction	Seismic	Severe Weather	Wildfire
17	Montecito	N	Pending	Y	N	Y	Y	N	N	Y	Y	Y
18	Muddy Canyon Low Flow	N	Pending	Y	N	Y	Y	N	Y	Y	Y	Y
19	MWRP MPS-3	N	Y	Y	N	Y	Y	N	Y	Y	Y	N
21	MWRP Caretaker Housing	N	Pending	Y	Y	Y	Y	N	Y	Y	Y	N
22	Newport Coast	N	Pending	Y	N	Y	Y	N	Y	Y	Y	Y
23	San Joaquin Housing	N	Pending	Y	N	Y	Y	N	N	Y	Y	Y
24	Harvard	N	Pending	Y	N	Y	Y	N	Y	Y	Y	N
25	University	N	Pending	Y	N	Y	Y	Y	N	Y	Y	N
26	Michelson Operations Center	N	Y	Y	N	Y	Y	N	Y	Y	Y	N
27	Benner Reservoir	N	Pending	Y	N	Y	Y	Y	N	Y	Y	Y
28	Coastal OC 63-Zn.4 Pump Station	N	Pending	Y	N	Y	Y	N	Y	Y	Y	N
29	Coastal Zn 6-7 Pump Station	N	Pending	Y	N	A-341 Y	Y	N	N	Y	Y	Y

Summary of Vulnerability

Map ID	Name	Coastal Hazards	Dam Failure	Drought	Flood	Geo-logic	Human-Caused	Land slide	Lique-faction	Seismic	Severe Weather	Wildfire
30	Coastal Zn. 4-6 Pump Station	N	Pending	Y	N	Y	Y	N	N	Y	Y	Y
31	Fleming Pump Station	N	Pending	Y	N	Y	Y	N	N	Y	Y	Y
32	Foothill Zn 4-6 Pump Station	N	Pending	Y	N	Y	Y	N	N	Y	Y	Y
33	Foothill Zn 6-6A Pump Station	N	Pending	Y	N	Y	Y	N	N	Y	Y	Y
35	Manning Pump Station	N	Pending	Y	N	Y	Y	N	N	Y	Y	Y
36	Portola Hills Zn 6-8	N	Pending	Y	N	Y	Y	N	N	Y	Y	Y
37	Portola Hills Zn 8-9 Pump Station	N	Pending	Y	N	Y	Y	N	N	Y	Y	Y
38	Read Pump Station	N	Pending	Y	N	Y	Y	N	N	Y	Y	Y
40	Shaw Pump Station	N	Pending	Y	Y	Y	Y	N	N	Y	Y	Y
42	Williams Canyon Pump Station (Benner)	N	Pending	Y	N	Y	Y	N	Y	Y	Y	Y
43	Michelson MWRP	N	Pending	Y	N	Y	Y	N	Y	Y	Y	N
44	Los Alisos Water Recycling Plant (LAWRP)	N	Y	Y	N	A-342 Y	Y	N	Y	Y	Y	N

Summary of Vulnerability

Map ID	Name	Coastal Hazards	Dam Failure	Drought	Flood	Geo-logic	Human-Caused	Land slide	Lique-faction	Seismic	Severe Weather	Wildfire
46	Chapman Reservoir	N	Pending	Y	N	Y	Y	Y	N	Y	Y	Y
47	Coastal Zn 4 Reservoir	N	Pending	Y	N	Y	Y	N	N	Y	Y	Y
48	Coastal Zn 6 Reservoir	N	Pending	Y	N	Y	Y	N	N	Y	Y	Y
49	Fleming Reservoir	N	Pending	Y	N	Y	Y	N	N	Y	Y	Y
50	Foothill Zn 6 Reservoir	N	Pending	Y	N	Y	Y	N	N	Y	Y	Y
52	Modjeska Reservoir	N	Pending	Y	N	Y	Y	Y	N	Y	Y	N
53	Read Reservoir	N	Pending	Y	Y	Y	Y	Y	N	Y	Y	Y
55	Shaw Reservoir	N	Pending	Y	N	Y	Y	N	N	Y	Y	Y
57	Williams Canyon Reservoir	N	Pending	Y	N	Y	Y	Y	N	Y	Y	Y
61	Foothill 6 Transmission Line	N	Pending	Y	N	Y	Y	N	Y	Y	Y	Y
62	Manning Treatment Plant	N	Pending	Y	N	Y	Y	N	N	Y	Y	Y

Summary of Vulnerability

Map ID	Name	Coastal Hazards	Dam Failure	Drought	Flood	Geo-logic	Human-Caused	Land slide	Lique-faction	Seismic	Severe Weather	Wildfire
63	Deep Aquifer Treatment System (DATS)	Y	N	N	N	N	N	N	N	N	N	N
64	Collection System	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
65	Harvard Area Trunk Diversion Structure (HATS)	N	Y	Y	N	Y	Y	N	Y	Y	Y	N

Mitigation Strategy Discussion

Mitigation Strategy Discussion

- Costal Hazards
 - Coastal Erosion
 - Sea Level Rise
 - Tsunami
- Dam/Reservoir Failure
- Drought
- Flood
- Geologic Hazards
 - Expansive Soils
 - Land Subsidence
- Human Caused Hazards
 - Hazardous Materials
 - Terrorism/Sabotage (cyberattacks)
- Landslide/Mudflow
- Seismic Hazards
 - Fault Rupture
 - Ground Shaking
 - Liquefaction
- Severe Weather
 - Coastal Storm/Winter Storm
 - Windstorm (Santa Ana winds)
 - Power Outage (secondary impact)
- Wildfire

Capabilities Assessment

Capabilities Assessment

- Are there opportunities to improve upon the capabilities?
 - Can a plan be used to identify hazards and implement mitigation actions?
 - How can the capabilities be expanded and improved to reduce risk?
 - Is there a missing capability that needs to be considered?
 - Is additional staff/community training needed?
 - What financial resources can be used?
 - How can partner agencies/organizations work together to inform/educate the community?

Public Involvement Update

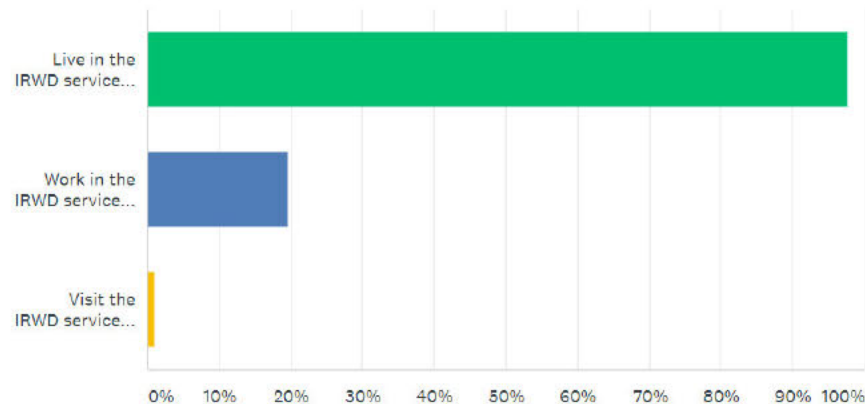
Public Involvement Update

- Survey Update
 - Over 1,700 responses!
 - Survey to close March 31, 2021 (today) COB
- Survey results – to be included as part of Meeting #4

Q1

Do you: (check all that apply)

Answered: 1,682 Skipped: 9



Next Steps

Upload Your Worksheet to Meeting Channel

- Close and save your worksheet on your desktop (making sure your name is included under the “Participant Information” section)
- Select chat function on our Meeting Channel
- Using “Type a new message” function, select the paperclip logo to upload your worksheet

Type a new message



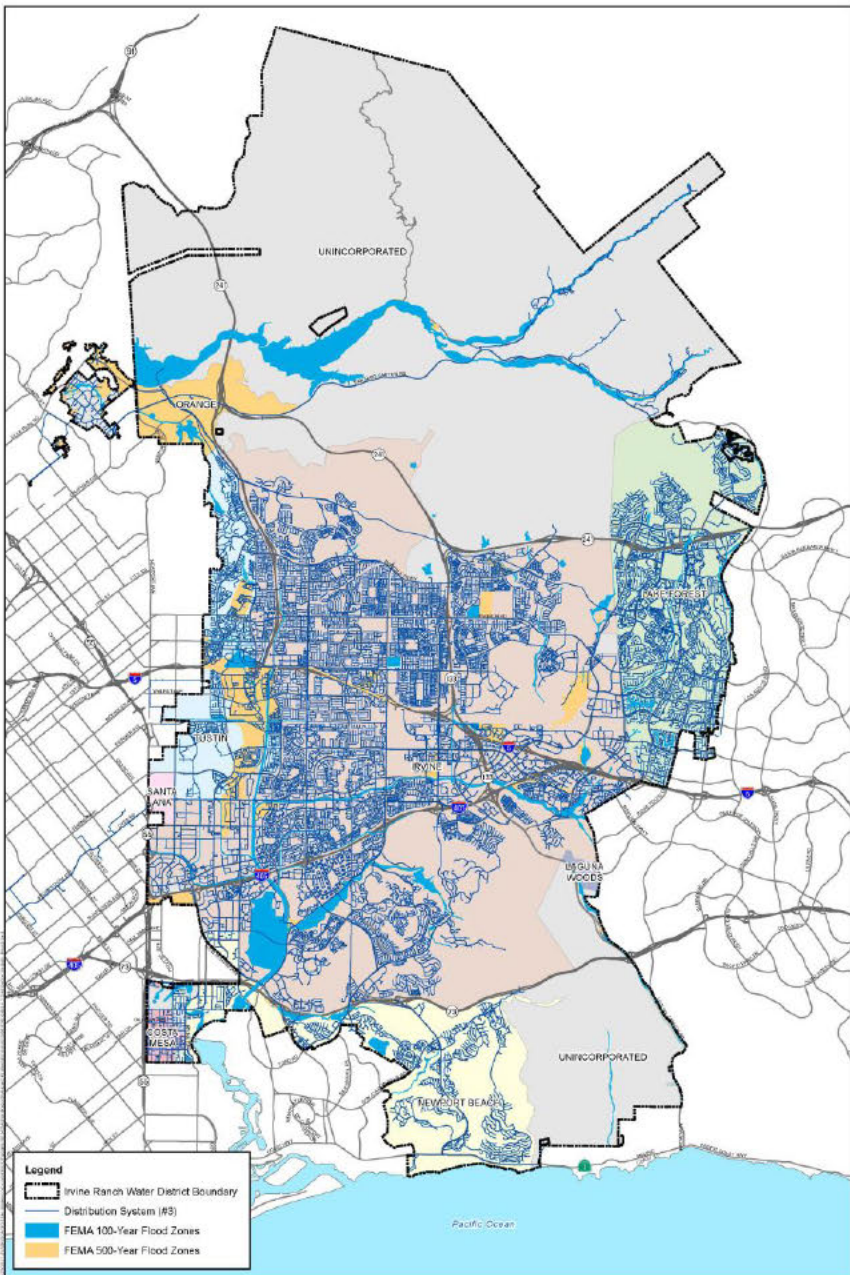
Next Steps

- Summarize survey results
- Complete vulnerability assessment
- Mitigation actions and prioritization
- Prepare draft plan components
- Attend Meeting #4
 - Date TBD, 1:30 – 3:30 PM

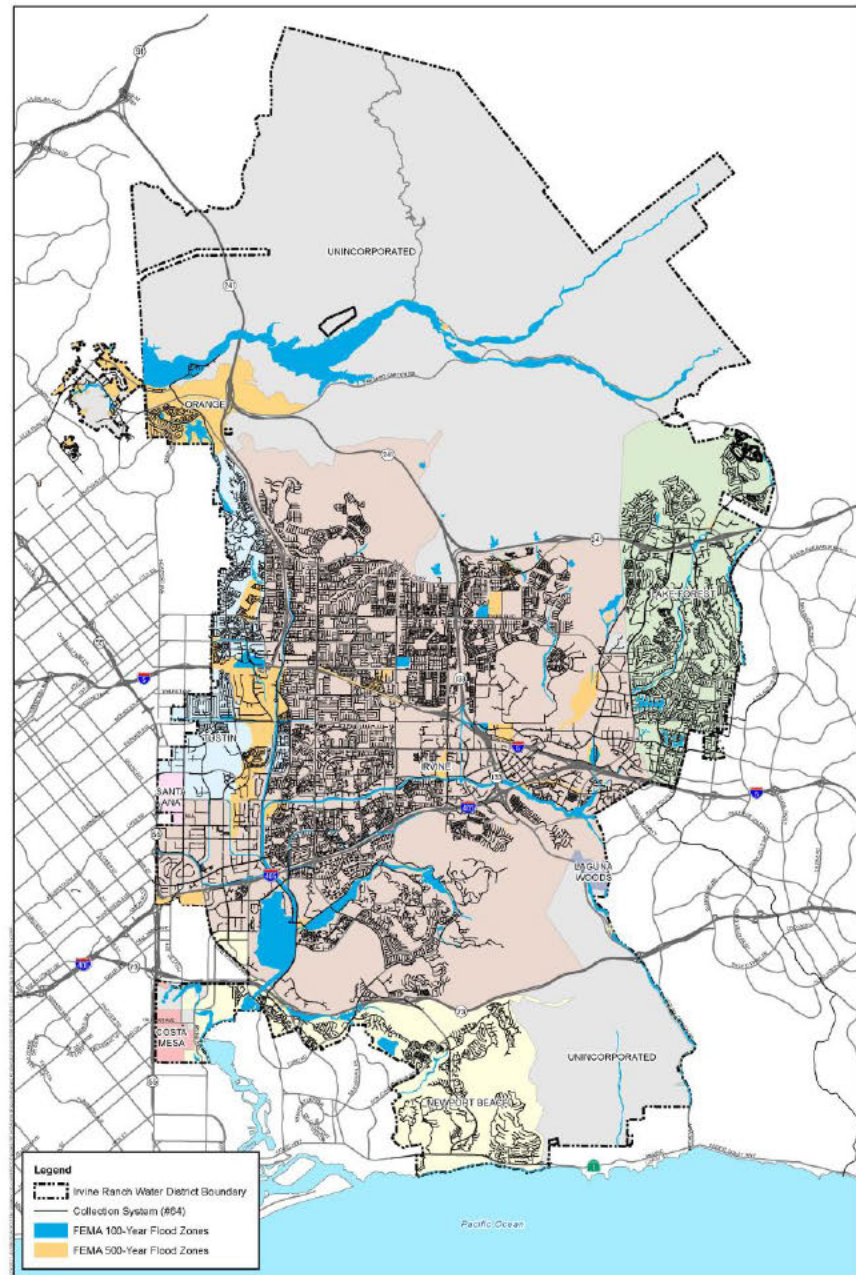
Questions/Additional Discussion?

Coastal Hazards – Sea Level Rise

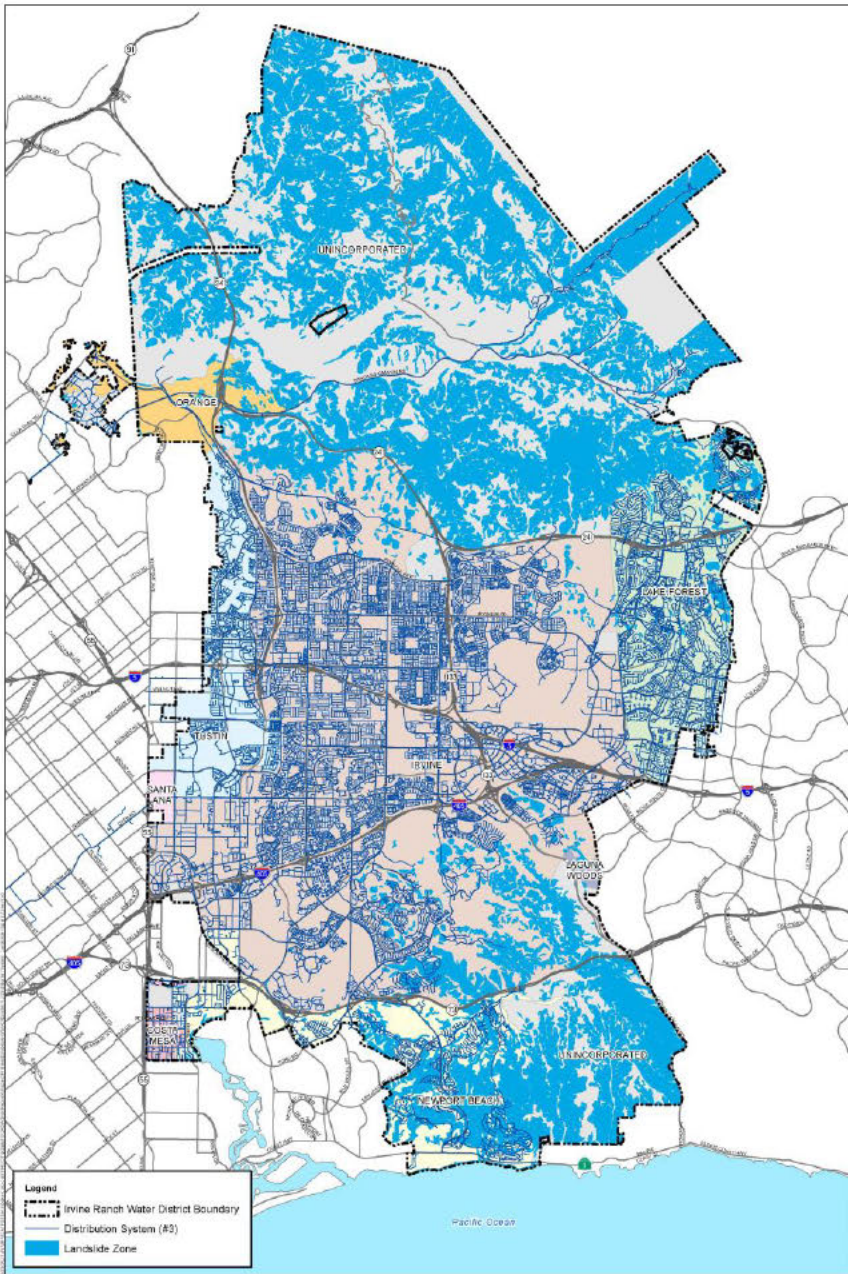




Irvine Ranch Water District Local Hazard Mitigation Plan
Flood Hazard Zone - Distribution System
Exhibit X.2



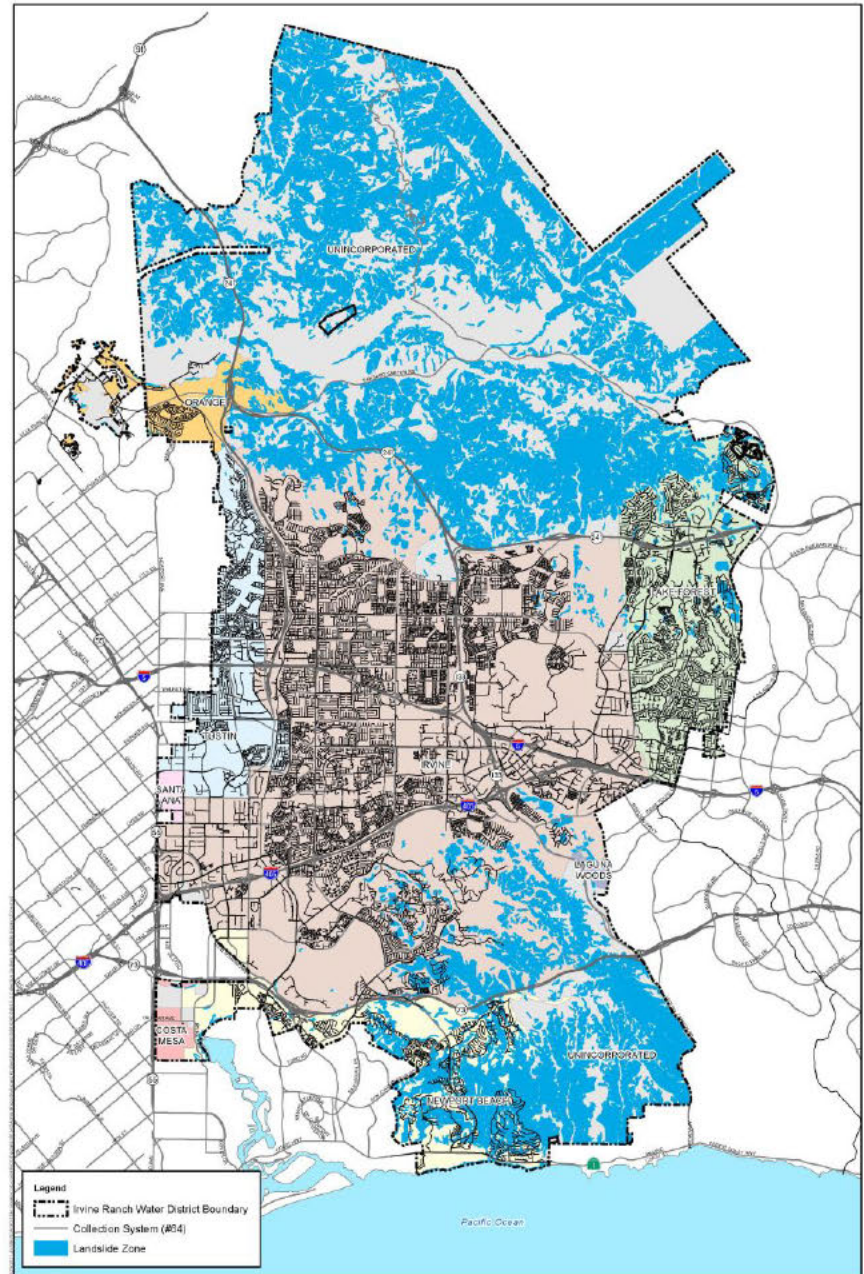
Irvine Ranch Water District Local Hazard Mitigation Plan
Flood Hazard Zone - Collection System
Exhibit X.3



Irvine Ranch Water District Local Hazard Mitigation Plan
Landslide Hazard Zone - Distribution System

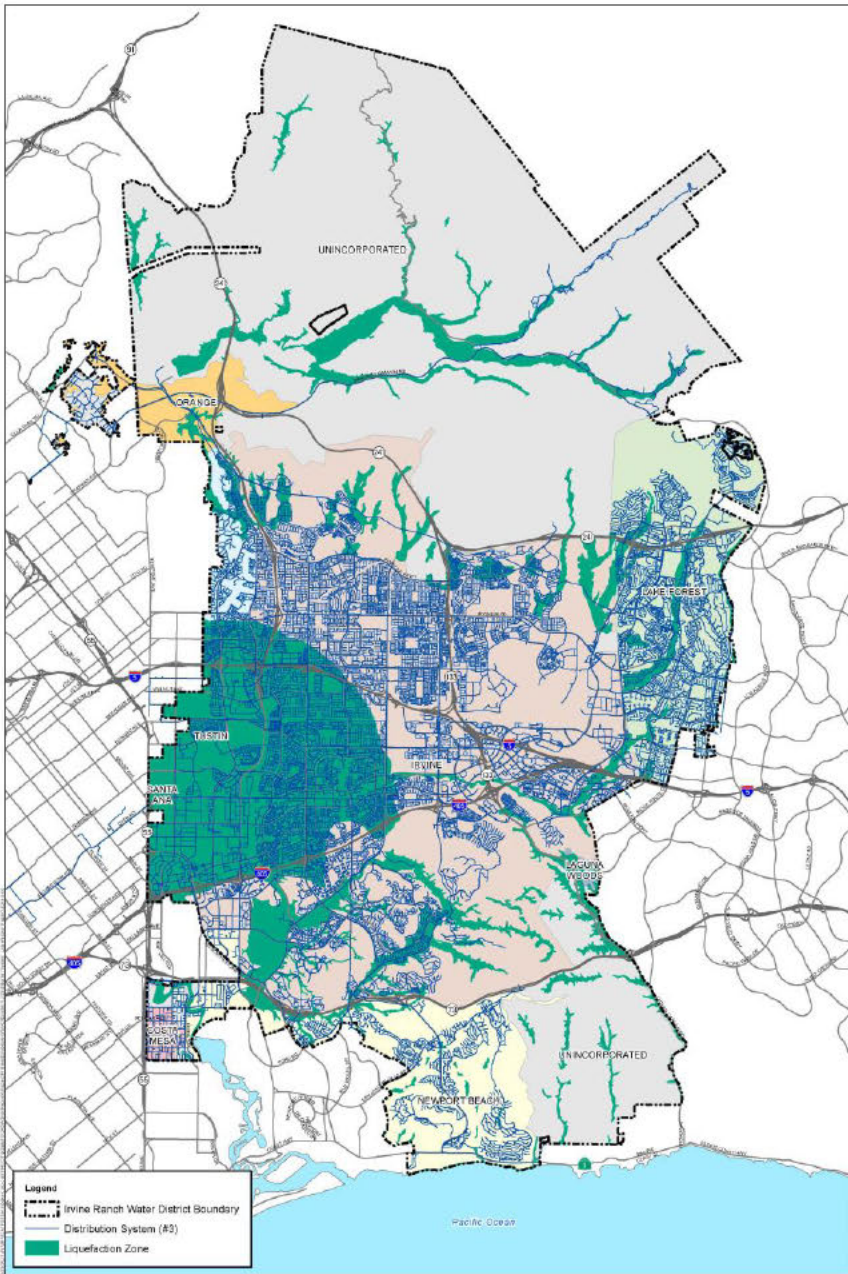
Exhibit X.2

A-358



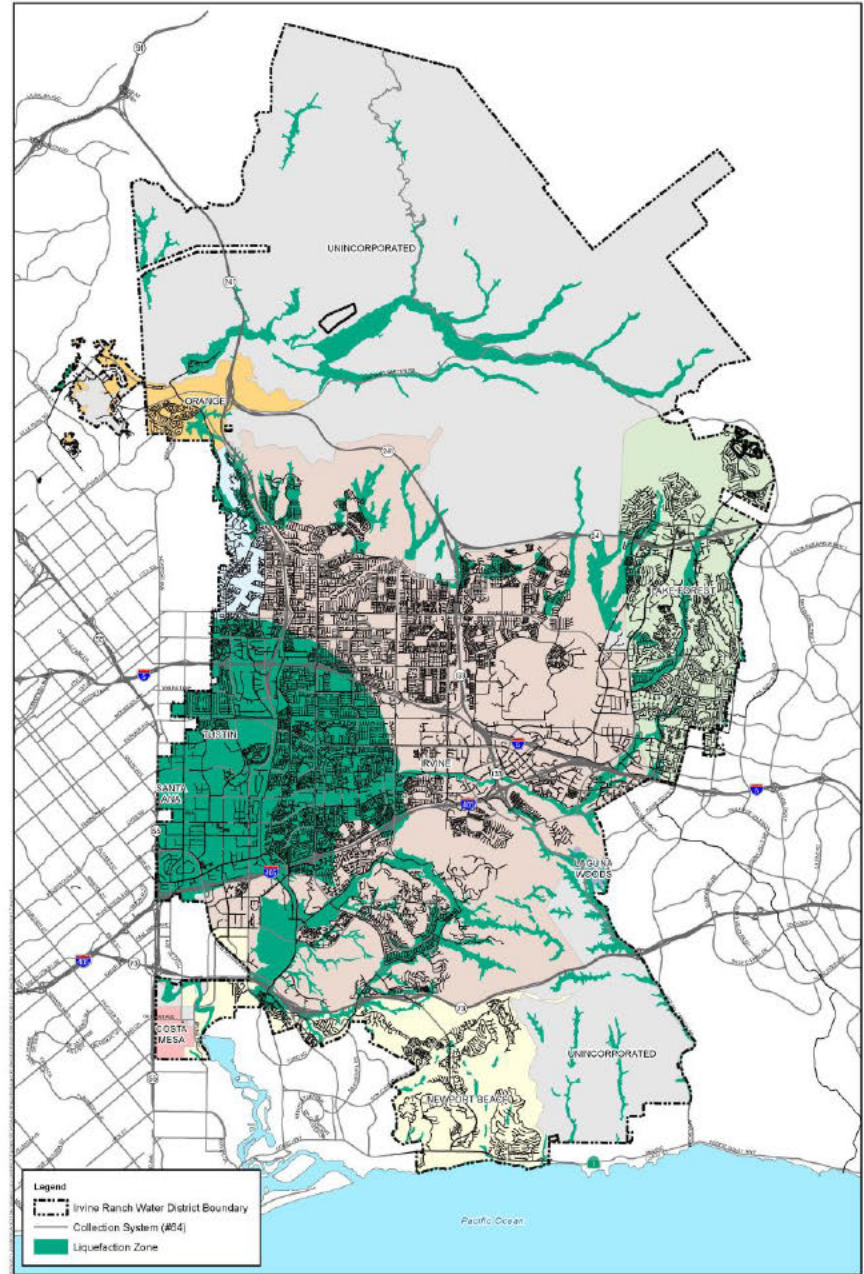
Irvine Ranch Water District Local Hazard Mitigation Plan
Landslide Hazard Zone - Collection System

Exhibit X.3



Irvine Ranch Water District Local Hazard Mitigation Plan
Liquefaction Hazard Zone - Distribution System

A-359



Irvine Ranch Water District Local Hazard Mitigation Plan
Liquefaction Hazard Zone - Collection System

Exhibit X.3



IRVINE RANCH WATER DISTRICT LOCAL HAZARD MITIGATION PLAN

PLANNING TEAM MEETING #3
Wednesday, March 31, 2021
1:30 PM – 3:30 PM – via Microsoft Teams

MEETING SUMMARY

Attendees: Refer to Sign-in Sheet

- **Introduction, brief recap**
 - *Clarification from Noelle Steele (Project Manager, Michael Baker Intl) – Dam/Reservoir Failure can also be human-caused, and there is a note in this section cross-referencing, where appropriate.*
 - *Question from Noelle Steele (Project Manager, Michael Baker Intl) – Are there any questions on Cyberterrorism?*
 - *None provided*
- **Risk Assessment/Vulnerability Overview**
 - Participation outline & request
 - Meeting #3 Worksheet, not designed to be homework
 - Critical Facilities
 - *Comment from Noelle Steele (Project Manager, Michael Baker Intl) – The building list was coordinated with Alix, engineering, and collections departments. We are currently working to incorporate siphons into the critical facilities list, with issues concerning these to be resolved by next week.*
 - *Question from Jacob Moeder (Capital Projects Senior Engineer, IRWD) – should potential for liquefaction, especially under our dams, be included as a geologic hazard?*
 - *Answer from Noelle Steele (Project Manager, Michael Baker Intl) – Liquefaction is often instigated by a seismic event, so that is why it is located there and not in geologic hazards.*
 - Facility Types – Critical Facilities vs. Facilities of Concern
 - Hazards Profiled
 - Mapped Hazards: Coastal Hazards, Flood, Geologic Hazards, Landslide/Mudflow, Seismic Hazards, Wildfire
 - Non-Mapped Hazards: Dam/Reservoir Failure, Human-Caused Hazards, Drought, Severe Weather
 - Coastal Hazards
 - Tsunami

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- *Comment from Noelle Steele (Project Manager, Michael Baker Intl) – Now, I would like to open up discussion to chat about whether mitigation actions should be developed [for Tsunamis] or should it be eliminated because it is not a significant impact to IRWD.*
 - *Response from Alix Stayton (Safety Specialist, IRWD) – I almost feel that its not a topic for concern.*
 - *Response from John Dayer (Facilities/Fleet Manager, IRWD) – If it is not a topic of concern, then its not worth dealing with.*
- **Dam/Reservoir Inundation**
 - *Comment from Noelle Steele (Project Manager, Michael Baker Intl) – We are having data sharing issues, so we currently only have Santiago Dam inundation info. There are 6 facilities that would be inundated by Santiago Dam, with the most severe at Irvine Park, which has 9 to 12 minutes before inundation.*
 - *Question from Noelle Steele (Project Manager, Michael Baker Intl) – I know there are people who have mentioned projects in the pipeline and projects to improve the spillway. Thinking on hazards and potential ways to mitigate these hazards would be very important to include on the worksheets.*
 - *Reply from Alix Stayton (Safety Specialist, IRWD) – Yes, the Santiago Spillway improvement is important and is in progress.*
 - *Reply from Jacob Moeder (Capital Projects Senior Engineer, IRWD) – The spillway and outlet power are being improved. We are also kind of proactive in doing things before physical improvements. We implemented an interim program to cap the max water surface elevation to reduce the likelihood of using that spillway because we recognized that the spillway needs to be improved.*
 - *Question from Noelle Steele (Project Manager, Michael Baker Intl) – are there any improvements or wish list items for improvements to the other 4?*
 - *Reply from Jacob Moeder (Capital Projects Senior Engineer, IRWD) – We anticipate there will be, so implement Dam Safety Program, look at potential failure modes, and trying to estimate what the risks would be and estimate the probability of the different failure modes. We anticipate the spillway at Sand Canyon will need improvement, but the evaluation is not complete.*
 - *Comment (unknown) – on this slide, in particular, there are other things that would be impacted, but it looks like this is focused on IRWD.*
 - *Response from Noelle Steele (Project Manager, Michael Baker Intl) – We are only considering within the IRWD service area, but we can potentially document that a power outage could occur in result of dam failure due to SCE infrastructure.*
 - *Question from Jacob Moeder (Capital Projects Senior Engineer, IRWD) – I thought there was sewer infrastructure along the coast, so wouldn't tsunamis cause potential problems?*
 - *Reply from Noelle Steele (Project Manager, Michael Baker Intl) – we mapped it and because the collection system is located primarily above*

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PCH, there weren't any issues due to tsunami, but we can confirm before eliminating tsunami.

- *Comment from Alix Stayton (Safety Specialist, IRWD) – I have sent all documents via email and uploaded to chat [on Teams].*
- *Question from Noelle Steele (Project Manager, Michael Baker Intl) – Did I cover everything on Dam Inundation Starla?*
 - *Reply from Starla Baker (Technical Consultant, De Novo Planning) – Yes.*
- Flood
 - *Comment from Noelle Steele (Project Manager, Michael Baker Intl) – Last time, we discussed that the Michaelson Plant should not be in the floodplain due to the upgrades and this has been confirmed as correct.*
 - *Question from Alix Stayton (Safety Specialist, IRWD) – can you go back and zoom in on the plant?*
 - *Reply from Noelle Steele (Project Manager, Michael Baker Intl) – Yes, there is a portion that is now no longer in the flood zone, but facilities located nearby are still within the flood zone.*
 - *Question from Alix Stayton (Safety Specialist, IRWD) – So we have floodgates that protect the plant and biosolids?*
 - *Reply from Noelle Steele (Project Manager, Michael Baker Intl) – Correct, and that has been reflected in the Facilities List in the Flood Section.*
 - *Question from Noelle Steele (Project Manager, Michael Baker Intl) – Do some of these [listed] facilities experience regular flooding? Hopefully this can trigger mitigations or if there is interest in doing similar to Michaelson.*
 - *Response from Gaspar Garza (Operations Manager, IRWD) – There are 50 miles that could be potentially flooded, that could result in an extreme amount of flow going into Michaelson that we may not be able to handle.*
 - *Question from Noelle Steele (Project Manager, Michael Baker Intl) – So even if the plant is not in the flood zone, there could still be a significant effect?*
 - *Reply from Gaspar Garza (Operations Manager, IRWD) – Yes.*
 - *Dorien McElroy (Collections Systems Manager, IRWD) – Good point that if 53 miles get flooded, we are getting more than we can handle.*
 - *Gaspar Garza (Operations Manager, IRWD) – This can also mean that Collections could have problems with surcharging and flow onto the streets.*
 - *Reply from Dorien McElroy (Collections Systems Manager, IRWD) – Yeah and sometimes during street flooding, police and safety officers will lift manhole covers to relieve flooding.*
 - *Question from Noelle Steele (Project Manager, Michael Baker Intl) – Is there some sort of communication that can be done to stop this?*
 - *Reply from Dorien McElroy (Collections Systems Manager, IRWD) – There is some sort of communication going on already.*

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- *Comment from Alix Stayton (Safety Specialist, IRWD) – That is something that we can do.*
- *Comment from John Dayer (Facilities/Fleet Manager, IRWD) – Yeah, but it's the 200 manholes that are under water that are causing the issue, not the one that will be lifted.*
- *Question from Alix Stayton (Safety Specialist, IRWD) – What can be done?*
- *Reply from Gaspar Garza (Operations Manager, IRWD) – Rely on Dorien to reroute?*
- *Comment from John Dayer (Facilities/Fleet Manager, IRWD) – It's hard to mitigate because we don't control the storm drains.*
- *Question from Alix Stayton (Safety Specialist, IRWD) – Is there anything that can be done Dorien?*
- *Reply from Dorien McElroy (Collections Systems Manager, IRWD) – Not really.*
- *Question from John Dayer (Facilities/Fleet Manager, IRWD) – What happens in successive flow if we just shut down lift station?*
- *Comment from Dorien McElroy (Collections Systems Manager, IRWD) – Yeah, but it will eventually flow to the lowest manhole and come out.*
- *Question from Jacob Moeder (Capital Projects Senior Engineer, IRWD) – We wouldn't even have the ability to divert to a nearby creek? If we have a flood event and more coming into the plant than we can handle, can we divert to OC San and if that is not enough then to the creek?*
- *Reply from Gaspar Garza (Operations Manager, IRWD) – Yeah, we have one side that can handle 18 and another that can possibly handle 10, but in a flood event then we are receiving way more than that and we can only divert treated water.*
- *Reply from Dorien McElroy (Collections Systems Manager, IRWD) – Yes, because the creek diversion is only for tertiary treated water.*
- *Question from Alix Stayton (Safety Specialist, IRWD) – Can we discuss with other agencies or set up something to release into storm drains?*
- *Reply from Dorien McElroy (Collections Systems Manager, IRWD) – No.*
- *Question from Jacob Moeder (Capital Projects Senior Engineer, IRWD) – If we have sewage spill, is that a hazard? Is that a part of this [the HMP]?*
- *Reply from Dorien McElroy (Collections Systems Manager, IRWD) – No, it's a consequence of something else.*
- *Follow-up from Jacob Moeder (Capital Projects Senior Engineer, IRWD) – So then it is not something that is part of this [HMP]?*
- *Comment from Alix Stayton (Safety Specialist, IRWD) – We can discuss some of this offline, but this is a worst case scenario. Is there anything around Flood that is a new thing that needs to be brought up or is this our big problem?*
- *Comment from Scott Toland (Senior Engineer, IRWD) – A possible mitigation, but probably a discussion for offline, is that we can have*

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gasketed manholes to prevent flow from coming out of the manholes. Or is it dealing with the infrastructure itself that is the issue?

- *Comment from Starla Baker (Technical Consultant, De Novo Planning) – As part of the risk assessment, we do want to discuss some of the consequences of what could happen. What does having 50 miles of distribution backing up mean? Important to note the specific secondary impacts/consequences of what can happen. If this or that happens, what could that mean? If a whole community or neighborhood that is impacted by sewage coming out onto the street, then I am sure there are protocols to address this. If this comes to your mind, bring it to us so that we can note it and incorporated it into the plan.*
- **Landslide/Mudflow**
 - *Comment from Noelle Steele (Project Manager, Michael Baker Intl) – Understanding the impacts and discussing mitigation and potential impacts for Landslides and mudflows would be good.*
 - *Question from Alix Stayton (Safety Specialist, IRWD) – I know there are specific things in Codes, but Ken, is there anything that can be done to reduce effect of earth moving around your facilities?*
 - *Question from Alix Stayton (Safety Specialist, IRWD) – This map on the screen is for landslides. All of our facilities have been built to code, but is there anything that we can be doing to protect from landslides?*
 - *Reply from Ken Pfister (Operations Manager, IRWD) – The only ones would be the ones in the canyons, nothing else really needs it.*
 - *Question from Alix Stayton (Safety Specialist, IRWD) – Is there anything in the canyons that can be done?*
 - *Reply from Ken Pfister (Operations Manager, IRWD) – Put up a wall around it, which is what we are doing at one of the stations.*
 - *Question from Noelle Steele (Project Manager, Michael Baker Intl) – Can we get a list of facilities that could have some sort of protective measure (armor, retaining walls) installed?*
 - *Question from Alix Stayton (Safety Specialist, IRWD) – Is Benner [spelling?] already on the list?*
 - *Reply from Ken Pfister (Operations Manager, IRWD) – the biggest one is the Manning [spelling?]. Is that on there?*
 - *Reply from Noelle Steele (Project Manager, Michael Baker Intl) – the maps are based on state data, but if there are facilities outside of these specific areas, then that would be good to note.*
 - *Reply from Colton Martin (Mechanical Services Manager, IRWD) – The reservoirs are all up pretty high, where I would that they would be unaffected.*
 - *Question from Alix Stayton (Safety Specialist, IRWD) – Dorien there is one lift station in the list, Buck Gully. Is there anything in the works?*
 - *Reply from Dorien McElroy (Collections Systems Manager, IRWD) – Nothing that I know of that is in the works for Buck Gully.*
 - *Comment from Alix Stayton (Safety Specialist, IRWD) – This should be another side conversation. I can talk more to Ken and Jacob.*

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- *Comment from Jacob Moeder (Capital Projects Senior Engineer, IRWD) – From an engineering perspective, they would look at the geologic features of the locations. I think what is on the map, a lot of the landslide potential would be off the site.*
- *Comment from Alix Stayton (Safety Specialist, IRWD) – An offline discussion can help us get a better idea, because we have a much more detailed knowledge of the ground.*
- *Comment from Jacob Moeder (Capital Projects Senior Engineer, IRWD) – What is not showing on here is that there was a landslide at San Joaquin Reservoir and that changed our operation of that reservoir.*
- *Question from Alix Stayton (Safety Specialist, IRWD) – Did we do something that removed the risk for that reservoir?*
- *Reply from Ken Pfister (Operations Manager, IRWD) – We fill it in the winter and when we draw it down, we have hold days at certain levels, so that we don't have saturated land that is exposed.*
- *Question from Alix Stayton (Safety Specialist, IRWD) – Does that need some sort of wall or protection?*
- *Reply from Ken Pfister (Operations Manager, IRWD) – No, that would cause more damage.*
- *Reply from Alix Stayton (Safety Specialist, IRWD) – Okay, we can have an offline call and dive a little deeper.*
- Seismic Hazards
 - *Comment from Noelle Steele (Project Manager, Michael Baker Intl) – The exhibit is showing earthquake potential for the entire service area. We are happy to discuss any facilities that are older, or haven't been retrofitted recently. If there are any facilities, maybe some that are in the higher shake potential areas, that would be very helpful [to the discussion].*
 - *Reply from Jacob Moeder (Capital Projects Senior Engineer, IRWD) – In the Canyons, there is Fleming Reservoir. That is being replaced from metal to a prestressed concrete. The impetus for the replacement is not for seismic reasons, but that is a side benefit.*
 - *Question from Noelle Steele (Project Manager, Michael Baker Intl) – Any other reservoirs that could have, what was it again?*
 - *Reply from Jacob Moeder (Capital Projects Senior Engineer, IRWD) – It is a prestressed concrete tank where they wrap it in wires. There's a few cases where we've installed this throughout the district.*
 - *Question from Noelle Steele (Project Manager, Michael Baker Intl) – We are trying to identify ones that haven't been improved in a while. Is there anything that can be improved for seismic security?*
 - *Question from Alix Stayton (Safety Specialist, IRWD) – How do you decide, Jacob, on when it gets that prestressed concrete tank?*
 - *Reply from Jacob Moeder (Capital Projects Senior Engineer, IRWD) – There is a tipping point at around 1,000,000 gallons where it becomes cheaper in the life cycle sense, that it becomes cheaper than steel tanks. There are other steel tanks in the district.*

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- *Question from Alix Stayton (Safety Specialist, IRWD) – Is there an understanding of how much steel resists damage?*
- *Reply from Jacob Moeder (Capital Projects Senior Engineer, IRWD) – Steel tanks are commonly used, and there is probably some tipping point where the size of the steel tank makes it more of a risk for damage due to seismic activity.*
- *Comment from Alix Stayton (Safety Specialist, IRWD) – I don't think we are sitting on a list of reservoirs that are at risk due to seismic activity.*
- *Comment from Noelle Steele (Project Manager, Michael Baker Intl) – The LHMP requires mitigation for any profiled hazard.*
- *Question from Alix Stayton (Safety Specialist, IRWD) – Can we develop a narrative on how we develop projects considering seismic activity?*
- *Reply from Noelle Steele (Project Manager, Michael Baker Intl) – Yes, we can mention compliance and considerations, but by having seismic activity in the profile, this means we have to include some mitigation.*
- *Question from Jacob Moeder (Capital Projects Senior Engineer, IRWD) – Can we include protocols on how to mitigate if something happens?*
- *Reply from Starla Baker (Technical Consultant, De Novo Planning) – We can mention the steps taken in the event of damage. But we are looking for more situations like the one mentioned before where the tank had to be replaced and it had the side benefit of helping with seismic reliability. So maybe a mitigation is that if changes need to be made, we will consider seismic issues in making decisions. Maybe do seismic assessment on facilities that were built before a certain date. You can identify studies as part of a mitigation action.*
- *Question from Alix Stayton (Safety Specialist, IRWD) – Malcolm, anything come to mind?*
- *Reply from Malcolm Cortez (Engineering Manager, IRWD) – No.*
- *Question from Alix Stayton (Safety Specialist, IRWD) – I know we do all kinds of things that are routine and we are always taking seismic stability into account. Is it possible that seismic isn't something that needs to be included?*
- *Reply from Noelle Steele (Project Manager, Michael Baker Intl) – I would caution against that, because it would prevent you from obtaining Seismic FEMA funding. I suggest we do a sidebar and Starla and I can pull some mitigation measures from the MWDOC so that you can see.*
- *Question from Alix Stayton (Safety Specialist, IRWD) – I can ask around about seismic studies or investigations that people might want to do in the future. Anything else from my folks?*
- *Reply from Jacob Moeder (Capital Projects Senior Engineer, IRWD) – When we do something at a facility, we often do seismic evaluations, especially if doing significant improvements.*
- *Reply from Alix Stayton (Safety Specialist, IRWD) – Right, I'll talk more about statements we can make and talk to MBI and see some examples they have from MWDOC.*
- *Comment from Noelle Steele (Project Manager, Michael Baker Intl) – Right. And as an improvement of a facility, we can mention that we will evaluate for the potential of improving seismic reliability.*

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- Liquefaction
 - *Comment from Noelle Steele (Project Manager, Michael Baker Intl) – Perhaps a mitigation approach similar to landslide and groundshaking is evaluating liquefaction mitigation improvements when facilities are otherwise being improved. From previous discussions it doesn't seem like there was much concern about liquefaction. Let's open up discussion on these facilities and any mitigation. Or, if everyone wants to write it down on the worksheets, that is fine too.*
 - *Reply from Jacob Moeder (Capital Projects Senior Engineer, IRWD) – In this same area, we do have nonpotable wells that are part of the base cleanup, so if we are unable to operate some of the wells, that is impacting control of the VOC plume.*
 - *Question from Noelle Steele (Project Manager, Michael Baker Intl) – We talked about this with Alix a while ago. Who was the point person on why the wells don't need to be considered?*
 - *Reply from Alix Stayton (Safety Specialist, IRWD) – Ken would have been the person. Can we talk about why they aren't critical?*
 - *Reply from Ken Pfister (Operations Manager, IRWD) – You brought up sites that I didn't really think were critical. If we were to lose PDF or IDF. As far as the El Toro wells, they'd have to be down for 6 months to a year before we have these impacts.*
 - *Question from Alix Stayton (Safety Specialist, IRWD) – Does that make sense Jacob?*
 - *Reply from Jacob Moeder (Capital Projects Senior Engineer, IRWD) – Yeah that makes sense, but it does take longer than 6 months to drill a well in some situations.*
 - *Comment from Noelle Steele (Project Manager, Michael Baker Intl) – A lot of Geotech Studies and mitigations for seismic can have overlaps with liquefaction.*
 - *Question from Starla Baker (Technical Consultant, De Novo Planning) – Is there anything that can be potential issues in the future? We can definitely have overlap with seismic.*
 - *Comment from Alix Stayton (Safety Specialist, IRWD) – We can discuss this then with the seismic and I can have a discussion with my people on more specifics.*
- Wildfire
 - *Comment from Noelle Steele (Project Manager, Michael Baker Intl) – I know that we were told that a facility had burned down and been rebuilt to be more resistant to fire. One thing to do is list out what you have already done, which Alix has helped us with. But things that can be mentioned would be improving all stations located in the fire hazard zones to be more fire resistant.*
 - *Question from Alix Stayton (Safety Specialist, IRWD) – Does anybody already know that they have a facility that is ancient and behind and next time we do something to it we have to do something to harden it to fire hazards?*
 - *Reply from Jacob Moeder (Capital Projects Senior Engineer, IRWD) – Anything in the Canyons I think.*

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- *Question from Alix Stayton (Safety Specialist, IRWD) – does engineering have an understanding of what should be improved for fire?*
- *Reply from Jacob Moeder (Capital Projects Senior Engineer, IRWD) – Malcolm would be better probably, but for Fleming we have hardened it and have undergrounded the wires.*
- *Reply from Malcolm Cortez (Engineering Manager, IRWD) – The other improvements on the stations recently, like Harry’s project, it was done for fire hardening.*
- *Comment from Noelle Steele (Project Manager, Michael Baker Intl) – I’m wondering if walls can serve a double purpose of protecting from landslides and hardening against fire.*
- *Reply from Malcolm Cortez (Engineering Manager, IRWD) – I’m pretty sure they are not designed to withstand landslides, but they are designed to withstand earthquakes.*
- *Comment from Colton Martin (Mechanical Services Manager, IRWD) – The fires have gone right up to the walls, but they didn’t enter the facility, though it helps that they were covered in PhosCheck.*
- *Question from Alix Stayton (Safety Specialist, IRWD) – Owen, is there anything we can do to protect your equipment from wildfires?*
- *Reply from Colton Martin (Mechanical Services Manager, IRWD) – Owen had to step away.*
- *Comment from Richard Mykitta (Director of Maintenance, IRWD) – Most of the electrical is inside the walls. The only thing that is going to be underground is the feed lines, which are outside the walls. If you have a facility without a wall, the electrical is going to be at risk, just like the rest of it.*
- *Comment from John Dayer (Facilities/Fleet Manager, IRWD) – Another thing about clearing brush and making a defensible space is that these facilities in this area are also part of the NCCP. So the vast majority of the open space in this area is part of the preserve. We can’t even remove vegetation inside our property line without mitigating that vegetation. Probably cheaper to build a cinder block wall than creating a defensible space. We are tunnel visioned on the canyons, and remove the vegetation that we can, but it is still not what anyone would say is a good defensible space.*
- *Question from Alix Stayton (Safety Specialist, IRWD) – Should we include that?*
- *Reply from Noelle Steele (Project Manager, Michael Baker Intl) – I have worked in the coastal side of things where there has been collaboration between fire department and regulatory agencies to establish a defensible space that is acceptable to everyone. So potential mitigation could be cooperation with interested parties to establish a defensible space.*
- *Comment from Alix Stayton (Safety Specialist, IRWD) – We have walls, undergrounding wires outside of the walls, etc. Is there any kind of project or assessment that we need to do or have done to keep our facilities safe from wildfires?*
- *Reply from Ken Pfister (Operations Manager, IRWD) – The only one we’ve done is Portola 9, where we got rid of the wood roofs.*

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- *Reply from Jacob Moeder (Capital Projects Senior Engineer, IRWD) – A study was done by [RRM], which was after a fire at one of our pump stations.*
- *Interjection from Ken Pfister (Operations Manager, IRWD) – Yeah at the Portola 9.*
- *Comment from Jacob Moeder (Capital Projects Senior Engineer, IRWD) – Right, right, there was a study done there by RRM.*
- *Comment from Noelle Steele (Project Manager, Michael Baker Intl) – And if there are fire studies or plans that would be helpful, then we can include this.*
- Non-Mapped Hazards
 - Drought
 - *Comment from Noelle Steele (Project Manager, Michael Baker Intl) – I wanted to give everybody a few minutes to work through the worksheet and their own thoughts. Before that, we can spend the next 15 minutes discussing the list of not-mapped hazards. We know that IRWD is doing a lot to mitigate and handle drought conditions. Is there anything else that can be put into place? Something to protect the water supply?*
 - *Reply from Ken Pfister (Operations Manager, IRWD) – That would be something to have water policy involved in. They would be the ones to talk to. Our system is already built for the drought scenario.*
 - *Comment from Noelle Steele (Project Manager, Michael Baker Intl) – Last time we talked, it was mentioned that there were policies that were put into place during the last severe drought that were continued after the drought ended and we can include these in the HMP.*
 - *Comment from Alix Stayton (Safety Specialist, IRWD) – Let me get people started thinking about wish lists and ideas of what people are wanting for this.*
 - *Comment from Richard Mykitta (Director of Maintenance, IRWD) – a lot of what water policy deals with is water supply, not as much drought though.*
 - *Comment from Ken Pfister (Operations Manager, IRWD) – What they're doing is making sure we have a set quantity. What we don't think about is when we don't have drought, we still can purchase in-lieu of where we can purchase water for recharge, so we can recharge the basin.*
 - *Question from Noelle Steele (Project Manager, Michael Baker Intl) – Would you like to seek FEMA funding to increase recharge?*
 - *Comment from Jacob Moeder (Capital Projects Senior Engineer, IRWD) – Part of the Sewage Master Plan is seeking potable reuse. We have laid out a long-term vision, but it would require a lot of capital investment.*
 - *Comment from Noelle Steele (Project Manager, Michael Baker Intl) – Those sort of big ticket items where capital investment is enormous are the sorts of things we want to encapsulate.*
 - Power Outages
 - *Comment from Noelle Steele (Project Manager, Michael Baker Intl) – Something your constituents are concerned about are power outages. I know we have discussed this, but in terms of power outages, perhaps*

Michael Baker

I N T E R N A T I O N A L

identifying those facilities that don't have backup generators at the capacity IRWD would like, or if there are facilities with a temporary backup generator that you would like to be permanent...

- *Comment from Alix Stayton (Safety Specialist, IRWD) – I think if Owen was here, he'd have a lot to say.*
- *Comment from Richard Mykitta (Director of Maintenance, IRWD) – The question I would ask is that we don't necessarily need new generators, but we are slowly starting to see aged generators that need to be rehabbed.*
- *Comment from Noelle Steele (Project Manager, Michael Baker Intl) – Yes, we can set up a program to seek funding for generator improvements. Not sure what those improvements would be.*
- *Reply from Richard Mykitta (Director of Maintenance, IRWD) – Well it would be replacement. The fleet will have to be replaced over the next 10 to 15 years. And Ken would probably have a few sites to add.*
- *Comment from Ken Pfister (Operations Manager, IRWD) – Yeah, all the sites have generators, but they are aging.*
- *Comment from Gaspar Garza (Operations Manager, IRWD) – At Michaelson, we have generators for a reduced capacity. But if it is a long-term outage, then we need to look into better generators.*
- *Comment from Ken Pfister (Operations Manager, IRWD) – And those generators there are natural gas.*
- *Comment from Colton Martin (Mechanical Services Manager, IRWD) – And like at Rattlesnake, there is no generation to pump water into the reservoir.*
- *Reply from Ken Pfister (Operations Manager, IRWD) – We're going through a whole pump station change there, so once it's done there will be a generator there.*
- *Comment from Noelle Steele (Project Manager, Michael Baker Intl) – I'm guessing there are issues associated with an aging generator.*
- *Reply from Richard Mykitta (Director of Maintenance, IRWD) – It is mostly on the electronics side that we have issues.*
- *Comment from Noelle Steele (Project Manager, Michael Baker Intl) – It sounds like there are going to be more of these that will require replacement over the long-term and there might be issues at Michaelson requiring generation improvement.*
- *Comment from Richard Mykitta (Director of Maintenance, IRWD) – Michaelson is the only one that needs more generation.*
- *Comment from John Dayer (Facilities/Fleet Manager, IRWD) – Is seeking replacement of a generator really in the spirit of this HMP?*
- *Reply from Noelle Steele (Project Manager, Michael Baker Intl) – We are identifying that this is a current hazard, happening now. And the power outages we are dealing with, and in terms of wildfire and severe windstorms, are unprecedented. So this would be a matter of relating these generators and other mitigation measures to the actual hazards.*

Michael Baker

I N T E R N A T I O N A L

- *Comment from Starla Baker (Technical Consultant, De Novo Planning) – Some of the grant programs they do identify generators specifically, especially when located at a critical facility. They do look at cost-benefit and if its going to be mitigating that hazard and that issue. It is still required to show the cost-benefit, but generators are something that are considered emergency equipment and are eligible for certain funding.*
- *Comment from Noelle Steele (Project Manager, Michael Baker Intl) – SCE has made it clear that planned shutoffs are going to be the norm until some of these issues are resolved. And there are new grant programs and old programs evolve all the time. So as these situations continue to evolve, I find it hard to think that these grants won't become more common in the future.*
- *Written comment submitted by Stephen Foster (no information given) – “Less costly to go through State and Federal agencies with mitigation efforts then the tail end of reimbursement which is more costly.”*
- *Comment from Alix Stayton (Safety Specialist, IRWD) – I don't know about windstorms being significant, because it is more the power outages that are associated with the windstorms than the windstorms themselves.*
- *Reply from Noelle Steele (Project Manager, Michael Baker Intl) – We incorporated power outages as a secondary to the windstorms. So power outage-associated mitigation measures would fall under the umbrella of windstorm.*
- *Comment from Jacob Moeder (Capital Projects Senior Engineer, IRWD) – That makes sense, because SCE shuts off the power to the canyons whenever there are windstorms.*
- Summary of Vulnerability
 - Table showing any overlaps in hazard vulnerability for all mapped/non-mapped hazard
- **Mitigation Strategy Discussion**
- **Capabilities Assessment**
 - Review of capabilities that we received
 - Are there opportunities to improve upon the capabilities?
 - Can a plan be used to identify hazards and implement mitigation actions?
 - How can the capabilities be expanded and improved to reduce risk?
 - Is there a missing capability that needs to be considered?
 - Is additional staff/community training needed?
 - What financial resources can be used?
 - How can partner agencies/organizations work together to inform/educate the community?
- **Public Involvement Update**
- Webpage

Michael Baker

INTERNATIONAL

- Survey
- **Next Steps**
- Summarize survey results
- Complete vulnerability assessment
- Mitigation actions and prioritization
- Prepare draft plan components
- Meeting #4 - Date TBD

Participant Information:

Name:

Title:

Agency:

INSTRUCTIONS:

- Identify 2 – 3 issues or concerns specific to each hazard
- Use one bullet point per issue/concern on the “Concerns” column
- Identify potential mitigation measures/actions based on your concern
- Use one bullet point per mitigation action on the “Potential Mitigation” column
- **NOTE:** Hazards are included in the order of our presentation discussion. This worksheet is designed to accompany our discussion and is NOT intended to be post-meeting “homework”
- **Post Meeting:** Please upload this worksheet back into our Microsoft Teams Channel, using the instructions at the end of the document

MAPPED HAZARDS

COASTAL HAZARDS – Concerns (Coastal Erosion, Sea Level Rise, Tsunami) • (XX insert coastal hazard concerns here) • •	COASTAL HAZARDS – Potential Mitigation (Coastal Erosion, Sea Level Rise, Tsunami) • (XX insert coastal hazard concerns here) • •
DAM/RESERVOIR HAZARDS - Concerns • • •	DAM/RESERVOIR HAZARDS – Potential Mitigation • • •
FLOOD HAZARDS – Concerns • • •	FLOOD HAZARDS – Potential Mitigation • • •
LANDSLIDE/MUDSLIDE HAZARDS – Concerns • • •	LANDSLIDE/MUDSLIDE HAZARDS – Potential Mitigation • • •
SEISMIC HAZARDS - Concerns (Fault Rupture, Ground Shaking, Liquefaction) • • •	SEISMIC HAZARDS – Potential Mitigation (Fault Rupture, Ground Shaking, Liquefaction) • • •
WILDFIRE HAZARDS – Concerns • • •	WILDFIRE HAZARDS – Potential Mitigation • • •

NON-MAPPED HAZARDS

<p>DROUGHT – Concerns</p> <ul style="list-style-type: none"> • • • 	<p>DROUGHT – Potential Mitigation</p> <ul style="list-style-type: none"> • • •
<p>HUMAN INDUCED HAZARDS - Concerns (Hazardous Materials, Terrorism/Sabotage, Cyber Attacks)</p> <ul style="list-style-type: none"> • • • 	<p>HUMAN INDUCED HAZARDS – Potential Mitigation (Hazardous Materials, Terrorism/Sabotage, Cyber Attacks)</p> <ul style="list-style-type: none"> • • •
<p>GEOLOGIC HAZARDS – Concerns (Expansive Soils, Land Subsidence)</p> <ul style="list-style-type: none"> • • • 	<p>GEOLOGIC HAZARDS – Potential Mitigation (Expansive Soils, Land Subsidence)</p> <ul style="list-style-type: none"> • • •
<p>SEVERE WEATHER – Concerns (Coastal Storm/Winter Storm, Windstorm, Power Outage)</p> <ul style="list-style-type: none"> • • • 	<p>SEVERE WEATHER – Potential Mitigation (Coastal Storm/Winter Storm, Windstorm, Power Outage)</p> <ul style="list-style-type: none"> • • •

Upload Instructions:

- At the end of the meeting, please close and save your worksheet (making sure your name is included under the “Participant Information” section above)
- Select the “Chat” function on our Meeting Channel
- Using the “Type a new message” function, select the paperclip logo and upload your worksheet for our facilitators to download
- **NOTE:** Please upload to the channel at the end of the meeting. Again, this worksheet is meant to document your thoughts during the meeting – not to be post-meeting “homework”



	completed	current	Name
1		X	MWRP Compressed Natural Gas and Diesel/Gasoline Fueling Station
2		X	Generator Fuel Storage Upgrades
3		X	Santiago Canyon Pump Station Improvements
4	X		Ladd Canyon Road DW Improvements
5	X		Ops Center Permanent Back-up Generator
6		X	Santiago Canyon Fleming Zone 8 Tank and Zone 8-9 BPS
7		X	Syphon Reservoir Improvements
8		X	Capital Improvement Program (CIP) Asset Management Phase 1 (Facilities)
9		X	Capital Improvement Program (CIP) Asset Management Phase 2 (Linear)
10	X		Wells 21 & 22 Treatment Plant
11	X		Baker Water Treatment Plant
12		x	Water Haulers (2,000 gal) maintained and made available due to FEMA funding
13		x	EOP - Assess permanently raising elevating watersensitive equipment and anchoring fuel tanks in flood-prone locations.
14		x	EOP - Perform checks on portable generators and auxiliary pumps.
15		x	EOP - Designate alternate area(s) for dumping residual dirt apart from Michelson yard.
16		x	Water Shortage Contingency Plan (potable)
17	x		Water Supply Reliability Study
19		x	Water Banking Program in Kern Co.
20	x		Urban Water Management Plan
22		x	Develop and maintain Specific Hazard Response Plans (SHRPs) as vulnerabilities become apparent. Include SHRPs in regular training and exercise program.
25		x	Maintain WEROC membership for communication and collaboration with other water districts and the Operational Area
26		X	EOP - Perform monthly checks on permanent, and portable backup generators. Check fuel supply.
27		X	EOP - Review periodically defensible space and weed abatement needs of all canyon water facilities. (annual)
28		X	EOP - Check and maintain radar flood level gauges located in San Diego Creek.
29		X	Large, old trees at LAWRP evaluated by arborist and questionable ones removed to prevent damage to LAWRP
30		X	Server room air conditioners are served by backup generators to protect against heat, smoke and ash
31	X		Sand Canyon spillway channel debris clearing

Type - click arrow to choose	Coastal Storm /Severe Winter Storm	Drought	Flood	Wildfire	Windstorm	Power Outage	Earthquake
project						X	
project						X	
project				X			
project				X			
project						X	
project				X			
project		X					
project	X	X	X	X	X	X	X
project	X	X	X	X	X	X	X
project		X					
project		X					
procedure		X		X		X	X
procedure			X				
procedure			X				
procedure			X				
plan		X					X
other		X					X
other		X					X
plan				x			
procedure		water interrupti on	X	X		X	X
other	X	X	X	X	X	X	X
procedure				X		X	X
procedure				X			
procedure			X				
project					X		
procedure				X			
project			X				

32	X		Moved offsite backups and redundant servers to cloudbased services, email servers on the cloud
33	X		Servers on UPS backup, and generator backup (SC and Michelson)
34		X	Server rooms in Sand Canyon and Michelson are powered by backup generators to protect against heat, smoke and ash
35		X	Cybersecurity Plan in process with consultant - Will include an IS/Network focused BCP
36		X	Increased flexibility and connectivity for alternate work sites with more mobile equipment and robust VPN capability
37		X	Oracle systems moving to cloud
38		X	MWRP and BioSolids has flood gates with annual training & exercise
39		X	Permanent generators for short-term power at Water Treatment Plants
40		X	SCADA equipment on UPS
42		X	SCADA cybersecurity projects and increased staffing underway
43		X	Lab equipment on UPS
44		X	Stage culture media and incubator at LAWRP (will be Baker soon)
48		X	Upon notification of potential generator needs, check with Michele to ensure IRWD has

project							X
project				X	X	X	
project				X			
plan							
project			X	X		X	X
project				X		X	X
other			X				
other						X	
other				X		X	X
project	X	X	X	X	X	X	X
other						X	X
procedure			X			X	X
procedure				X		X	X

	pipeline	future	Name
18		x	Recycled Water Shortage Contingency Plan
21	x		EOP - Consider implementing backup communication systems such as satellite phones and amateur radio.
23	x		Implement and maintain internal and external alert & warning systems to communicate threats quickly and effectively to staff and customers. Include this in regular training & exercise program.
24	x		Implement and maintain information sharing mechanisms for involved departments to view during disaster response. Ensure that these can be viewed on network devices and mobile devices, while maintaining data security.
41	X		Extend battery life for SCADA system UPS
45		X	Re-evaluate practicality of alternate regulatory lab reporting site certification
46		X	Consider staging Regulatory Compliance sampling materials and equipment at alternate site with Lab
47		X	Past procedure during heavy rains has been to stage Regulatory Compliance vehicles at alternate work locations. Consider including in future plan/procedure.
49		X	Consider mapping alternate routes to main facilities that avoid bridges

Type - click arrow to choose	Coastal Storm /Severe Winter Storm	Drought	Flood	Wildfire	Windstorm	Power Outage	Earthquake
plan		X		X			
procedure		X		X		X	X
procedure	X	X	X	X	X	X	X
procedure	X	X	X	X	X	X	X
project				X		X	X
project							X
procedure			X				
plan			X				
plan							X

Request control

Participants

Type a name

Share invite

Wendy Chambers
External

Others from chat (9)

- Todd Colvin
- Eric Akiyoshi
- Ian Swift
- Allen Shinbashi
- Randy Williams
- Joe Lam
- Jose Zepeda
- Cheryl Clary
- Derek Moreno

Coastal Hazards - Tsunami

UNINCORPORATED

NEWPORT BEACH

IRVINE

PACIFIC COAST HWY

IRVINE RANCH WATER DISTRICT

Steele, Noelle

+19 MC OO CM Colton Martin

Starla Barker (Guest)

Alix Stayton

Steele, Noelle

Steele, Noelle

Irvine Ranch WATER DISTRICT

Legend

- Irvine Ranch Water District Boundary
- Facility of Conception
- Facility of Collection

Service Area #1 (Light Orange)
Central Facility #10, Emergency Information System, Central Facility #10, Central System are currently under construction and not mapped on the map.

Service Area #2 (Yellow)
Central Facility #6, Information System, mapped on the Irvine Ranch Water District map.

Service Area #3 (Light Green)
Central Facility #4, Collection System, mapped on the Irvine Ranch Water District map.

Service Area #4 (Light Blue)
Central Facility #5, Collection System, mapped on the Irvine Ranch Water District map.

Service Area #5 (Light Purple)
Central Facility #3, Collection System, mapped on the Irvine Ranch Water District map.

Participants ... X

Type a name

Share invite

Others from chat (10)

- TC Todd Colvin
- EA Eric Akiyoshi
- IS Ian Swift
- AS Allen Shinbashi
- RW Randy Williams
- JL Joe Lam
- JZ Jose Zepeda
- CC Cheryl Clary
- ML Marina Lindsay
- DM Derek Moreno

+19 DM JM AS KP MC

Alix Stayton Ken Pfister Malcolm Cortez Steele, Noelle

Request control

Public Involvement Update

- Survey Update
 - Over 1,700 responses!
 - Survey to close March 31, 2021 (today) COB
- Survey results – to be included as part of Meeting #4

Q1
Do you: (check all that apply)
Answered: 1,682 Skipped: 9

Category	Percentage
Live in the IRWD service area	~95%
Work in the IRWD service area	~20%
Visit the IRWD service area	~2%

Irvine Ranch WATER DISTRICT

Steele, Noelle

Participants

Type a name

Share invite

- John Fabris (External)
- Ken Pfister (External)
- Lars Oldewage (External)
- Marina Lindsay (External)
- Natalie Palacio (External)
- Richard Mykitta (External)
- Scott Toland (External)
- Starla Barker (Guest)
- Steele, Noelle
- Thomas Malone (External)
- Wendy Chambers (External)

+15 GG RM AS JM

Steele, Noelle Alix Stayton Starla Barker (Guest) Jacob Moeder

Steele, Noelle

Subject: EXTERNAL: IRWD Local Hazard Mitigation Planning meeting #4
Location: Microsoft Teams Meeting

Start: Wed 5/5/2021 1:30 PM
End: Wed 5/5/2021 3:30 PM

Recurrence: (none)

Meeting Status: Accepted

Organizer: Alix Stayton

Fourth and final planning group call; additional data development needs will be handled through sidebar meetings or focus groups. This meeting will zero in on IRWD's mitigation overarching mitigation strategy, how the projects/actions discussed in Meeting #3 relate to the strategy, and include an analysis of identified potential future mitigation actions, among other things. An agenda will be sent before the meeting.

Microsoft Teams meeting

Join on your computer or mobile app

[Click here to join the meeting](#)

[Learn More](#) | [Meeting options](#)

Steele, Noelle

From: Alix Stayton [REDACTED]
Sent: Thursday, April 8, 2021 12:23 PM
To: Emilyn Zuniga; pfister; garza; mcelroy; Owen O'Neill; martinc; colvin; crowe; John Dayer; Malcolm Cortez; akiyoshi; swift; shinbash; williams; lam; oldewage; haney; John Fabris; Steele, Noelle; s [REDACTED] Marina Lindsay; moeder; toland
Cc: chambersw; zepeda; Richard Mykitta; burton; malone; clary; colston; [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
Subject: Stonich, Amy; Levey, Nathan; Daniel Harrison
EXTERNAL: RE: IRWD Local Hazard Mitigation Planning meeting #4

Good afternoon,

I hope this email finds everyone well. In order to accommodate our updated schedule, we need to move this meeting to Wednesday, May 5 (at the same time – 1:30p-3:30p). I apologize for the inconvenience. As previously mentioned, the meeting will focus on IRWD's overarching mitigation strategy, how the projects/actions discussed in Meeting #3 relate to the strategy, and include an analysis of identified potential future mitigation actions, among other things. Please feel free to call or email with questions or if you need more information.

As always, we appreciate your support of this project and the resultant plan. We hope to speak with you in May. I will send the formal agenda when it is available.

Best,

Alix

ALIX STAYTON
SAFETY [REDACTED]
[REDACTED]

-----Original Appointment-----

From: Alix Stayton
Sent: Monday, March 22, 2021 9:52 PM
Subject: IRWD Local Hazard Mitigation Planning meeting #4
When: Wednesday, April 21, 2021 1:30 PM-2:30 PM (UTC-08:00) Pacific Time (US & Canada).
Where: Microsoft Teams Meeting

Fourth and final planning group call; additional data development needs will be handled through sidebar meetings or focus groups. This meeting will zero in on IRWD's mitigation overarching mitigation strategy, how the projects/actions discussed in Meeting #3 relate to the strategy, and include an analysis of identified potential future mitigation actions, among other things. An agenda will be sent before the meeting.

Microsoft Teams meeting

Join on your computer or mobile app

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Steele, Noelle

From: Alix Stayton [REDACTED]
Sent: Tuesday, May 4, 2021 9:30 PM
To: Emilyn Zuniga; pfister; garza; mcelroy; Owen O'Neill; martinc; colvin; crowe; John Dayer; Malcolm Cortez; akiyoshi; swift; shinbash; williams; lam; oldewage; hane; John Fabris; Steele, Noelle; [REDACTED] Marina Lindsay; moeder; toland
Cc: chambersw; zepeda; Richard Mykitta; burton; malone; clary; colston; [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
Subject: Stonich, Amy; Levey, Nathan; Daniel Harrison
EXTERNAL: RE: IRWD Local Hazard Mitigation Planning meeting #4
Attachments: Planning Team Meeting #4 Agenda.docx

Sorry, here's the agenda.

ALIX STAYTON
SAFETY SPECIALIST
[REDACTED]

From: Alix Stayton
Sent: Tuesday, May 4, 2021 9:00 PM

Subject: IRWD Local Hazard Mitigation Planning meeting #4

Good evening,

In anticipation of our call tomorrow, I've attached the meeting agenda, and have uploaded the documents to the Teams shared files. Looking forward to speaking with everyone who can attend.

Best,

Alix

ALIX STAYTON
SAFETY SPECIALIST



3512 Michelson Drive, Irvine, California 92612
Mailing: PO Box 57000, Irvine, California 92619-7000
[REDACTED]
[REDACTED]

**Irvine Ranch Water District
Local Hazard Mitigation Plan
Planning Team Meeting #4
May 5, 2021**

Last and First Name	Title	Organization/Department	Mailing Address	E-Mail Address	Present?
Alix Stayton	Safety Specialist, Safety Department	Irvine Ranch Water District	[REDACTED]	[REDACTED]	✓
Allen Shinbashi	Manager of Risk & Contracts, Contracts & Risk Management	Irvine Ranch Water District	[REDACTED]	[REDACTED]	
Amy Stonich	Assistant Director of Community Development	City of Lake Forest	[REDACTED]	[REDACTED]	
Anisha Malik	Planner	Michael Baker International	[REDACTED]	[REDACTED]	
Ashley Melchor	Management Assistant	City of Lake Forest	[REDACTED]	[REDACTED]	
Baryic Hunter	Division Chief	Operations District 4, Orange County Fire Authority	[REDACTED]	[REDACTED]	
Colt Martin	Mechanical Services Manager, Mechanical Services – Maintenance Operations	Irvine Ranch Water District	[REDACTED]	[REDACTED]	✓
Daniel Harrison	WEROC Specialist	Metropolitan Water District of Orange County	[REDACTED]	[REDACTED]	✓
Dave Crowe	Construction Manager, Construction Services	Irvine Ranch Water District	[REDACTED]	[REDACTED]	✓

**Irvine Ranch Water District
Local Hazard Mitigation Plan
Planning Team Meeting #4
May 5, 2021**

Last and First Name	Title	Organization/Department	Mailing Address	E-Mail Address	Present?
Denien Rivenburg	Public Affairs	Irvine Ranch Water District	[REDACTED]	[REDACTED]	
Dorien McElroy	Collections Systems Manager, Collection Systems	Irvine Ranch Water District	[REDACTED]	[REDACTED]	✓
Dustin Grinstead	Admin Captain for Chief Sherwood	OC Fire	[REDACTED]	[REDACTED]	
Emilyn Zuniga	Safety Manager, Safety Department	Irvine Ranch Water District	[REDACTED]	[REDACTED]	✓
Eric Akiyoshi	Engineering Manager, Planning	Irvine Ranch Water District	[REDACTED]	[REDACTED]	
Gaspar Garza	Operations Manager, MWRP Operations/Biosolids	Irvine Ranch Water District	[REDACTED]	[REDACTED]	✓
Ian Swift	Natural Resources Manager, Natural Treatment System Operations	Irvine Ranch Water District	[REDACTED]	[REDACTED]	
Jacob Moeder	Capital Projects Senior Engineer	Irvine Ranch Water District	[REDACTED]	[REDACTED]	✓
James Colston	Director Water Quality Compliance	Irvine Ranch Water District	[REDACTED]	[REDACTED]	

**Irvine Ranch Water District
Local Hazard Mitigation Plan
Planning Team Meeting #4
May 5, 2021**

Last and First Name	Title	Organization/Department	Mailing Address	E-Mail Address	Present?
Jason Dempsey	Emergency Services Administrator	City of Costa Mesa	[REDACTED]	[REDACTED]	✓
Joe Lam	Automation Manager, Automation	Irvine Ranch Water District	[REDACTED]	[REDACTED]	✓
Joe Meyers	Emergency Management Coordinator	Tustin Police Department	[REDACTED]	[REDACTED]	
John Dayer	Facilities/Fleet Manager, Facilities Services & Fleet Services – Maintenance Operations	Irvine Ranch Water District	[REDACTED]	[REDACTED]	✓
John Fabris	Public Affairs Manager, Public Affairs	Irvine Ranch Water District	[REDACTED]	[REDACTED]	✓
Jose Zepeda	Director of Recycling Operations	Irvine Ranch Water District	[REDACTED]	[REDACTED]	
Joyce LaPointe	Lieutenant	Office of Emergency Management, Costa Mesa Police Department	[REDACTED]	[REDACTED]	
Katie Eing	Disaster Services Coordinator	Newport Beach Police Department	[REDACTED]	[REDACTED]	
Ken Pfister	Operations Manager, Water Operations	Irvine Ranch Water District	[REDACTED]	[REDACTED]	✓

**Irvine Ranch Water District
Local Hazard Mitigation Plan
Planning Team Meeting #4
May 5, 2021**

Last and First Name	Title	Organization/Department	Mailing Address	E-Mail Address	Present?
Kevin Burton	Executive Director, Technical Services	Irvine Ranch Water District	[REDACTED]	[REDACTED]	✓
Lars Oldewage	Water Quality Manager, Water Quality	Irvine Ranch Water District	[REDACTED]	[REDACTED]	
Lisa Haney	Regulatory Compliance Manager, Regulatory Compliance	Irvine Ranch Water District	[REDACTED]	[REDACTED]	✓
Malcolm Cortez	Engineering Manager, Engineering – Operations Support	Irvine Ranch Water District	[REDACTED]	[REDACTED]	✓
Marina Lindsay	Water Resources Planner, Planning	Irvine Ranch Water District	[REDACTED]	[REDACTED]	✓
Natalie Palacio	Water Resources Specialist	Irvine Ranch Water District	[REDACTED]	[REDACTED]	
Nathan Levey	Assistant Environmental Planner	Michael Baker International	[REDACTED]	[REDACTED]	✓
Noelle Steele	Project Manager	Michael Baker International	[REDACTED]	[REDACTED]	✓
Oliver Pacifico	Water – South Coast Section	State Water Resources Control Board	[REDACTED]	[REDACTED]	✓

**Irvine Ranch Water District
Local Hazard Mitigation Plan
Planning Team Meeting #4
May 5, 2021**

Last and First Name	Title	Organization/Department	Mailing Address	E-Mail Address	Present?
Owen O'Neill	Electrical & Instrumentation Manager, Electrical Services – Maintenance Operations	Irvine Ranch Water District	[REDACTED]	[REDACTED]	✓
Randy Williams	Network and Cybersecurity Manager, Information Systems	Irvine Ranch Water District	[REDACTED]	[REDACTED]	
Richard (Rick) Mykitta	Director of Maintenance	Irvine Ranch Water District	[REDACTED]	[REDACTED]	
Robert (Bobby) Simmons	Emergency Management Administrator	Office of Emergency Management, City of Irvine	[REDACTED]	[REDACTED]	
Robert Stefano	Deputy Chief of Operations	Emergency Operations Section, Orange City Fire Department	[REDACTED]	[REDACTED]	
Sarah Fetterling	Sargent	City of Tustin Police Department	[REDACTED]	[REDACTED]	
Scott Toland	Senior Engineer	Irvine Ranch Water District	[REDACTED]	[REDACTED]	✓
Shane Sherwood	Division Chief	Operations District 2, Orange County Fire Authority	[REDACTED]	[REDACTED]	
Sharlyn de la Paz	Senior Management Analyst	City of Lake Forest	[REDACTED]	[REDACTED]	

**Irvine Ranch Water District
Local Hazard Mitigation Plan
Planning Team Meeting #4
May 5, 2021**

Last and First Name	Title	Organization/Department	Mailing Address	E-Mail Address	Present?
Starla Barker	Technical Consultant	De Novo Planning	[REDACTED]	[REDACTED]	✓
Stephen Foster	Emergency Management Coordinator	City of Tustin	[REDACTED]	[REDACTED]	✓
Steve Rhyner	Emergency Operations Coordinator	Emergency Management, City of Santa Ana	[REDACTED]	[REDACTED]	
Thomas Malone	Director for Information Services	Irvine Ranch Water District	[REDACTED]	[REDACTED]	✓
Todd Colvin	Water Maintenance Supervisor, Field Services	Irvine Ranch Water District	[REDACTED]	[REDACTED]	
Vicki Osborn	Director of Emergency Management	Metropolitan Water District of Orange County	[REDACTED]	[REDACTED]	
Wendy Chambers	Executive Director of Operations	Irvine Ranch Water District	[REDACTED]	[REDACTED]	✓



IRVINE RANCH WATER DISTRICT LOCAL HAZARD MITIGATION PLAN

PLANNING TEAM MEETING #4
Wednesday, May 5, 2021
1:30 PM – 3:30 PM, Microsoft Teams

AGENDA

1) Risk Assessment/Vulnerability - Updates from Meeting #3

- Mapped Hazards: Dam inundation, Flood, Landslide, Seismic (Fault Rupture, Liquefaction), and Wildfire
- Not Mapped Hazards: Drought, Geologic Hazards, Human-Caused Hazards, Severe Weather

2) Survey Summary/Community Outreach Summary

- Summarize responses, including:
 - a) High concern/low concern hazards
 - b) Preparedness
 - c) Access
 - d) Outreach

3) Mitigation Strategy

- Mitigation Goals
- Mitigation actions
 - a) Mitigation actions – reduce or eliminate long-term risk
 - b) Different from actions to prepare or respond to an event
 - c) Mitigation activities lessen or eliminate the need for preparedness or response resources
 - d) Emphasis on the impact or vulnerabilities – not on the hazard itself
- Staple/e review & selection criteria
 - a) Social
 - b) Technical
 - c) Administrative
 - d) Political
 - e) Legal
 - f) Economic
 - g) Environmental
- Mitigation Prioritization & Timeframe

4) Capabilities Assessment

- Are there opportunities to improve upon the capabilities?

Michael Baker

INTERNATIONAL

5) Next Steps

- Complete Draft LHMP for Planning Team Review
 - May 5 – June 18, 2021
- Planning Team Review of LHMP
 - June 21 – July 2, 2021
- Revise LHMP for Public Review
- Public Review
 - July 20 – August 3, 2021



Irvine Ranch
WATER DISTRICT

IRVINE RANCH WATER DISTRICT

HAZARD MITIGATION PLAN

A-397

Michael Baker
INTERNATIONAL

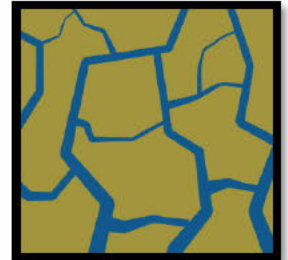
Agenda

- Risk assessment/vulnerability overview
 - Updates from Meeting #3
- Survey summary
- Mitigation strategy
- Capabilities assessment
- Next steps
- Questions/additional discussion

Risk Assessment/ Vulnerability Overview

Hazards Profiled

- Dam/Reservoir Failure
- Drought
- Flood
- Geologic Hazards
 - Expansive Soils
 - Land Subsidence
- Human Caused Hazards
 - Hazardous Materials
 - Terrorism/Sabotage (cyberattacks)
- Landslide/Mudflow
- Seismic Hazards
 - Fault Rupture
 - Ground Shaking
 - Liquefaction
- Severe Weather
 - Coastal Storm/Winter Storm
 - Windstorm (Santa Ana winds)
 - Power Outage (secondary impact)
- Wildfire



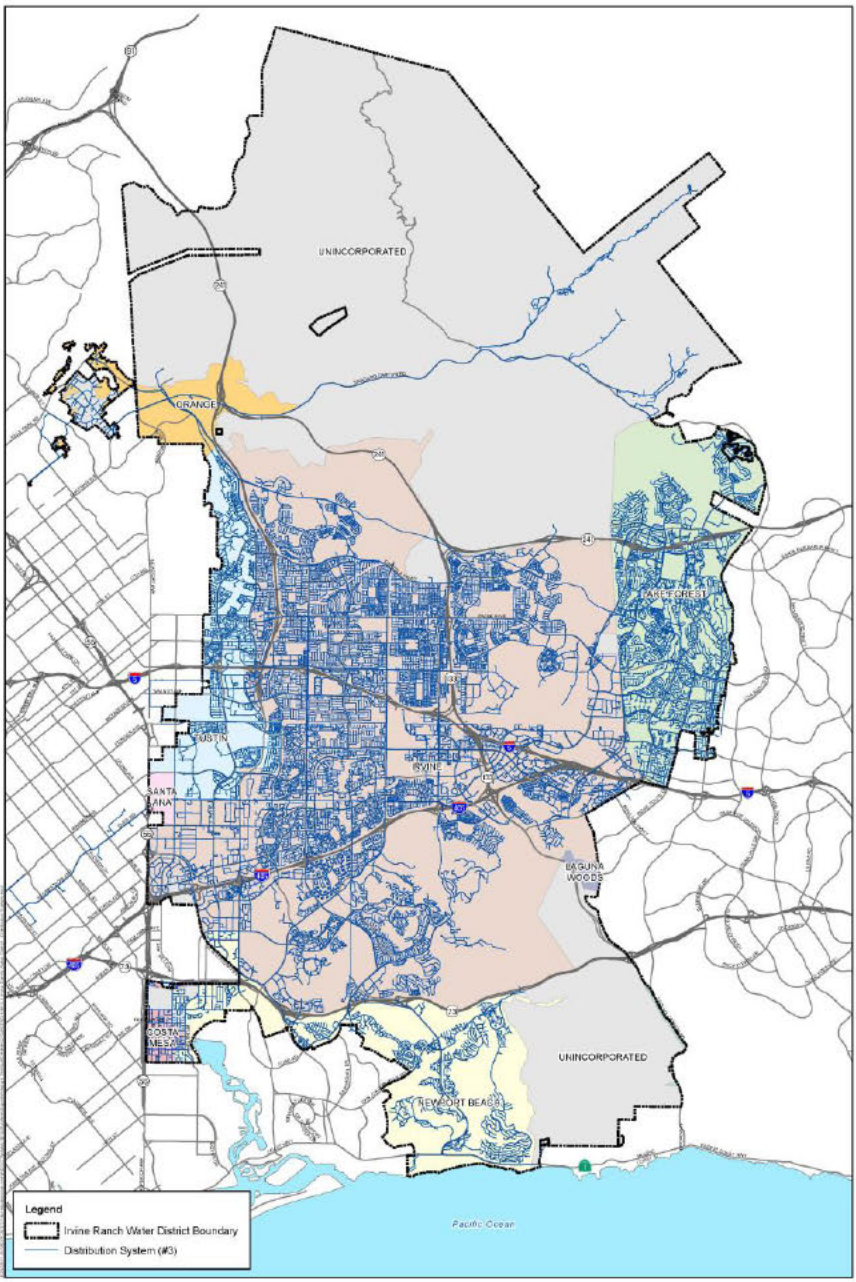
Facility Types

- **Critical Facilities**

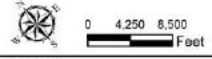
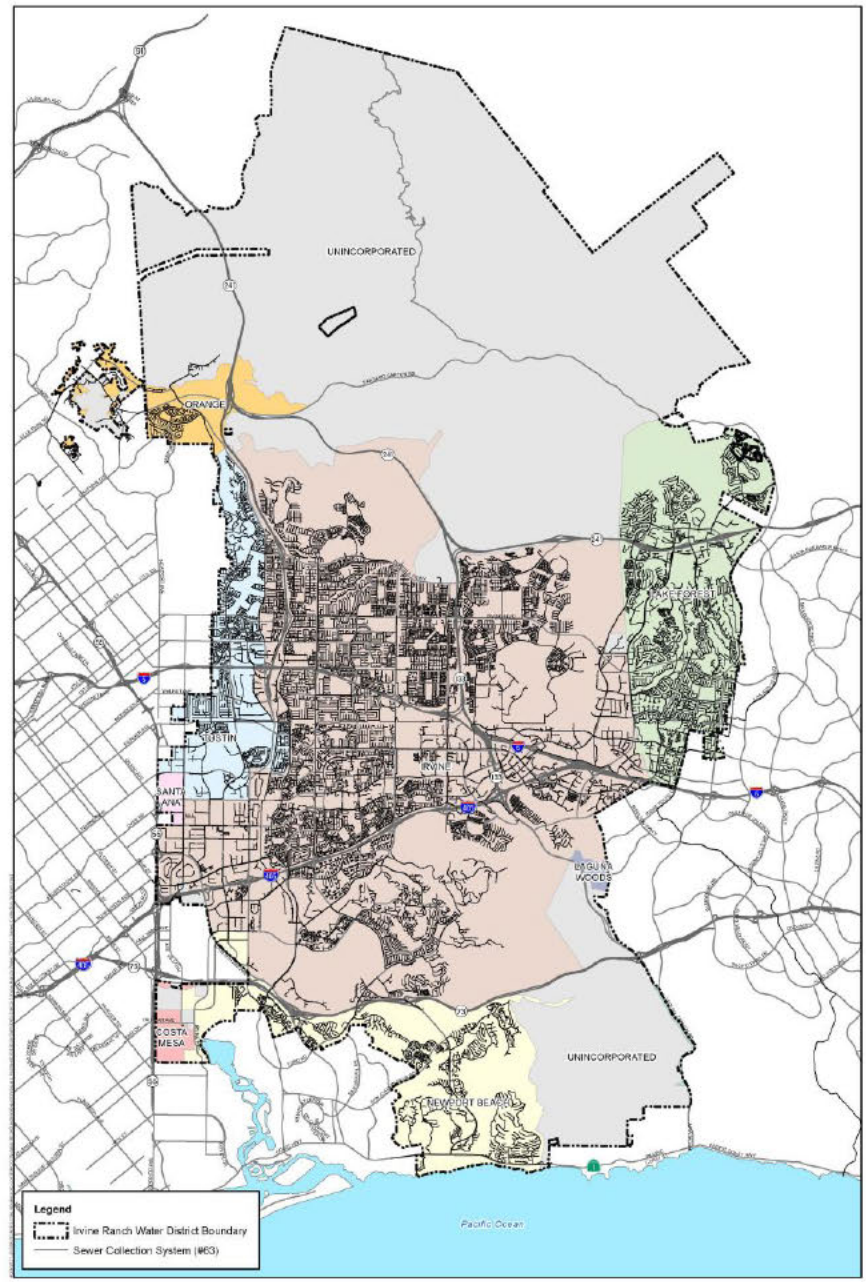
- Facilities that are **critical** to provide potable and wastewater services to IRWD customers
- Failure of critical facilities would result in significant issues in maintaining service
- Many critical facilities are the sole source of water at their location, do not have a backup, or provide service to areas with known hazards/risk

- **Facilities of Concern**

- Facilities that are **important** to provide potable and wastewater services to IRWD customers
- Failure of a facility of concern would create slow downs/challenges, but ultimately IRWD could maintain service in the short term

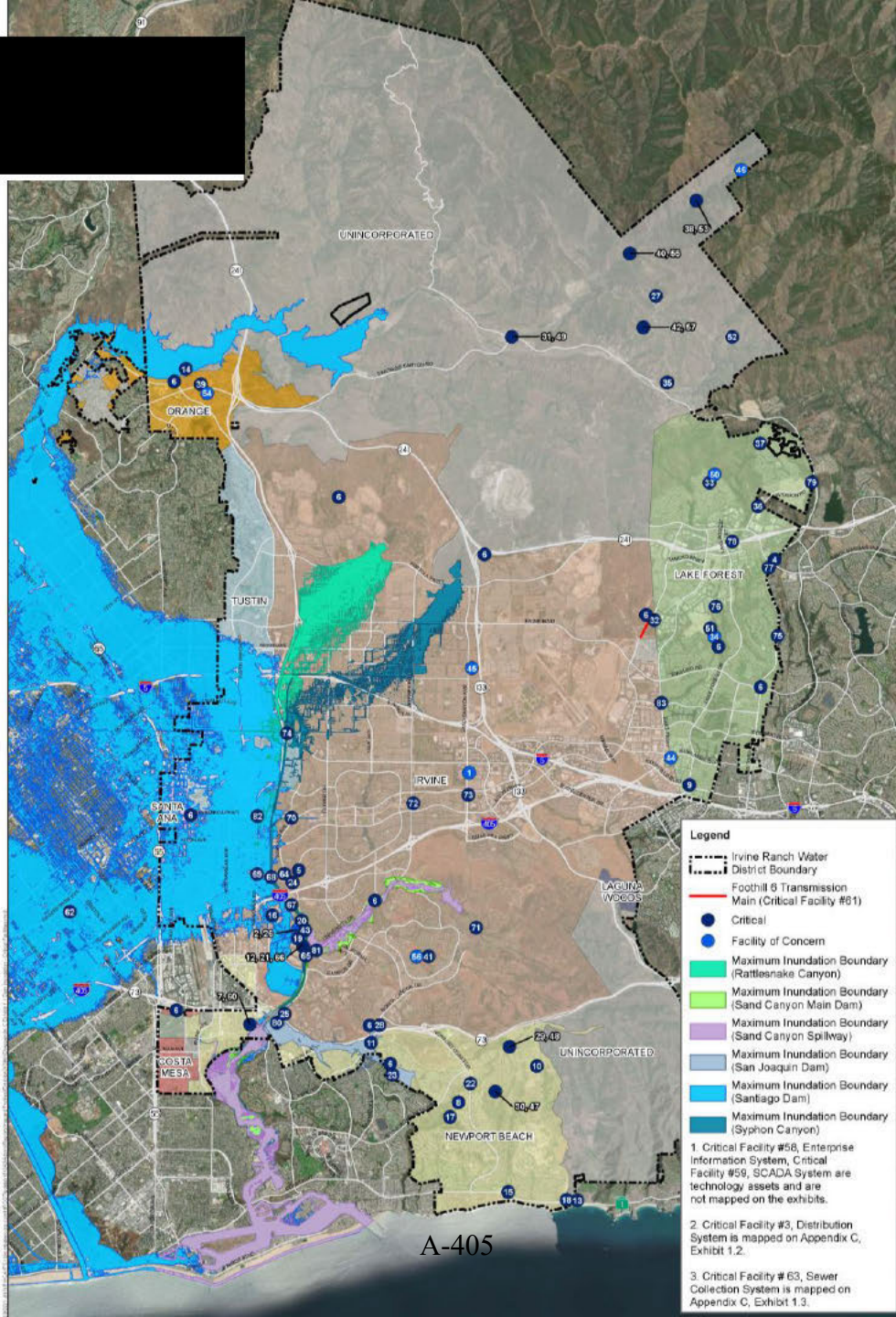


Irvine Ranch Water District Local Hazard Mitigation Plan
Irvine Ranch Water District - Distribution System
Exhibit 3-4



Irvine Ranch Water District Local Hazard Mitigation Plan
Irvine Ranch Water District - Sewer Collection System
Exhibit 3-5

DAM/RESERVOIR INUNDATION



A-405

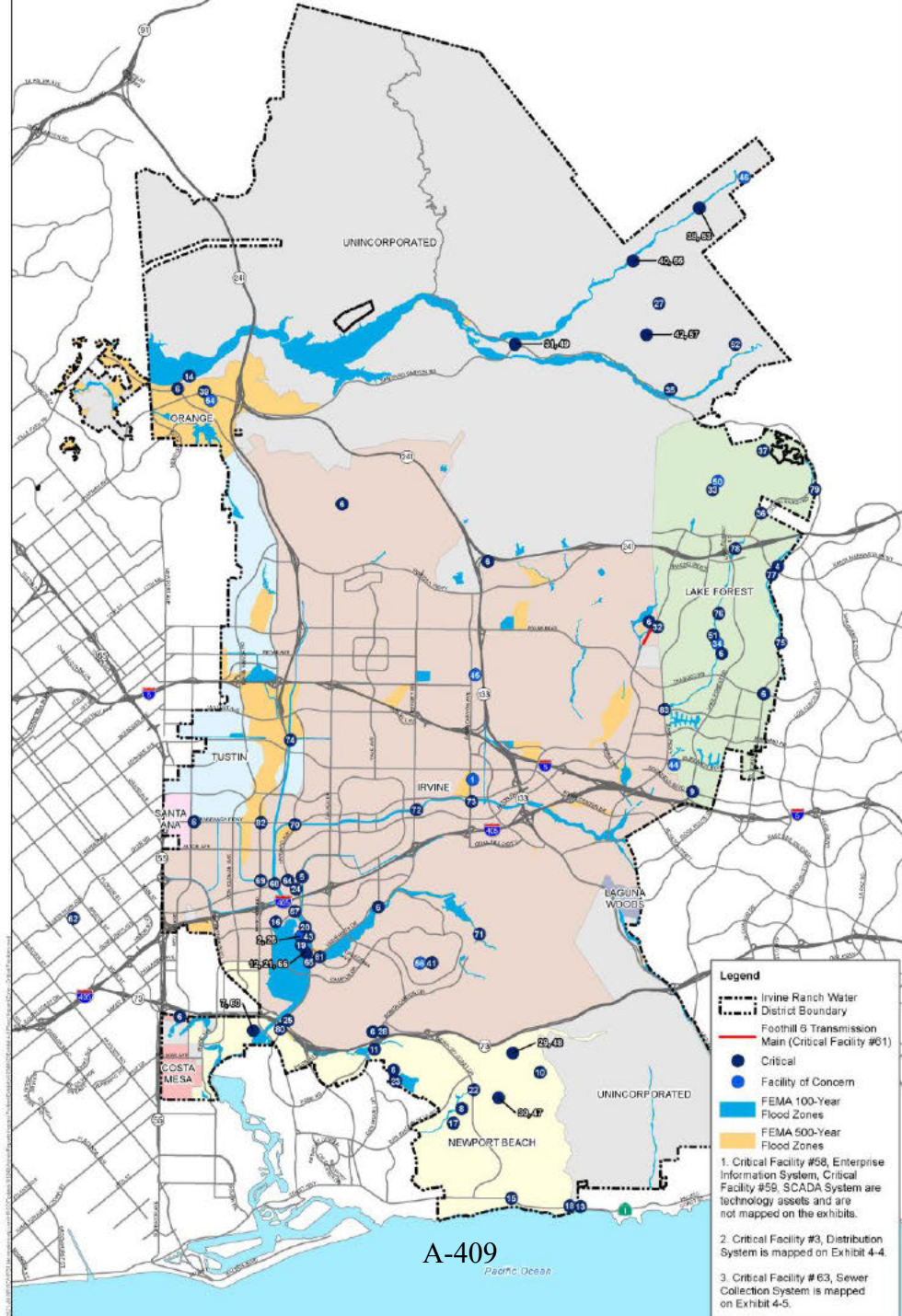
Dam Inundation – Vulnerability Matrix

Map ID	Name	Asset Type	Santiago Dam	Sand Canyon (Spillway)	Sand Canyon (Dam)	Syphon Canyon Dam	Rattlesnake Canyon Dam	San Joaquin Dam
2	Michelson Biosolids	Biosolids Treatment	Y	N	N	N	N	N
3	Distribution System	Distribution System	Y	Y	Y	Y	Y	Y
6	Met Source Water	Intake	N	Y	Y	N	N	Y
11	Coyote Canyon	Lift Station	N	N	N	N	N	Y
14	Irvine Park	Lift Station	Y	N	N	N	N	N
19	MWRP MPS-3	Non-Potable Booster Station	Y	N	N	N	N	N
25	University	Multi-Purpose: Lift Station, Telemetry Site, Pump Station	N	N	N	N	N	Y
26	Michelson Operations Center	Operations Staff Offices	Y	N	N	N	N	N
43	Michelson MWRP	Recycled Water	Y	N	N	N	N	N
62	Deep Aquifer Treatment System (DATS)	Treatment System	Y	N	N	N	N	N
63	Collection System	Wastewater Collection System	Y A-406	Y	Y	Y	Y	Y

Dam Inundation – Vulnerability Matrix

Map ID	Name	Asset Type	Santiago Dam	Sand Canyon (Spillway)	Sand Canyon (Dam)	Syphon Canyon Dam	Rattle-snake Canyon Dam	San Joaquin Dam
65	S1	Siphon	Y	Y	Y	N	Y	Y
66	S2	Siphon	Y	Y	Y	Y	Y	Y
67	S3	Siphon	Y	N	Y	Y	Y	N
68	S4	Siphon	Y	Y	Y	Y	Y	N
69	S5	Siphon	Y	N	N	N	N	N
70	S6	Siphon	Y	N	N	N	Y	N
74	S10	Siphon	Y	N	N	Y	Y	N
80	S16	Siphon	N	N	N	N	N	Y
81	S18	Siphon	N	Y	Y	N	N	N
82	S19	Siphon	Y	N	N	N	N	N

FLOOD HAZARDS



A-409

Pacific Ocean

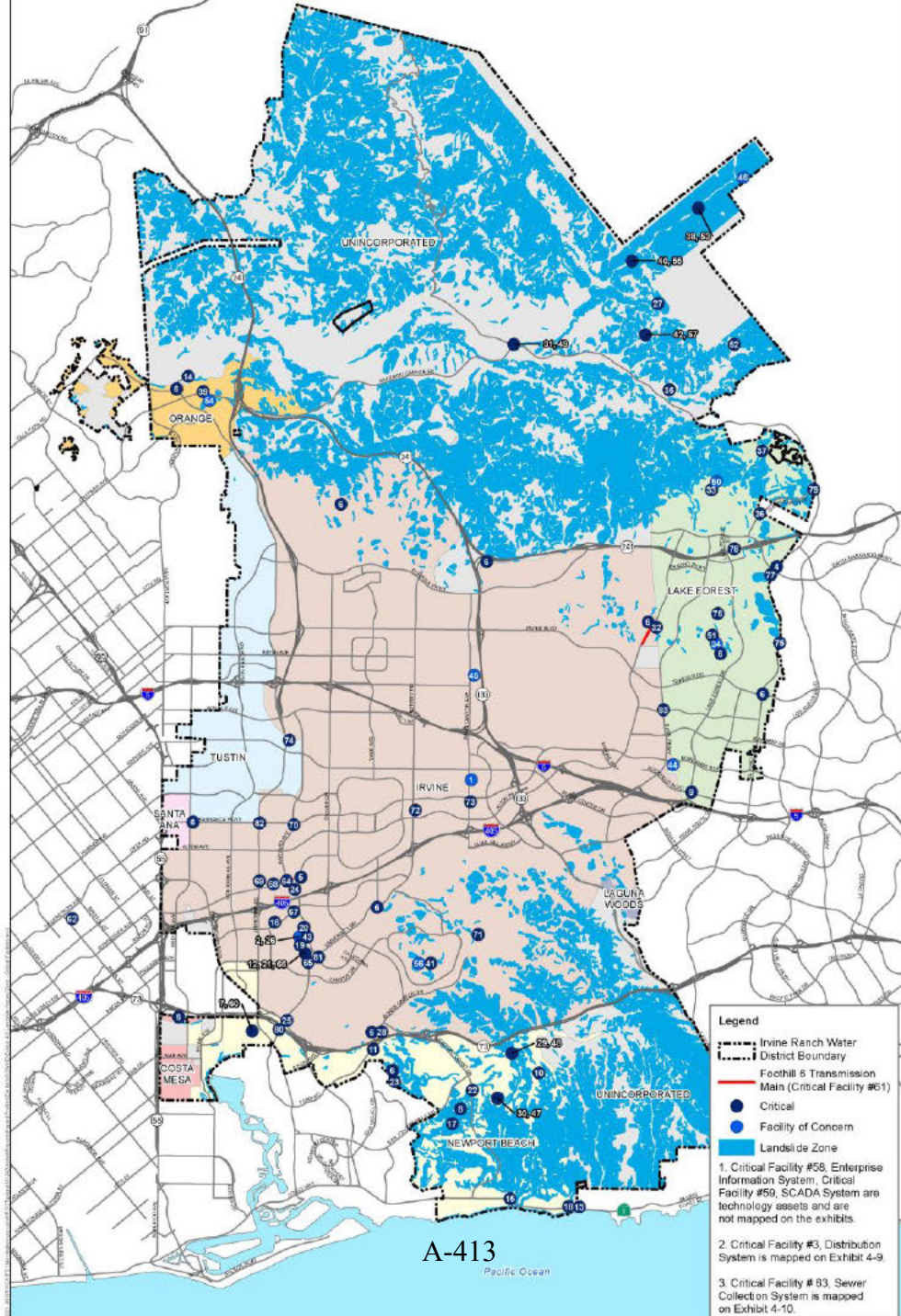
Flood

Map ID	Name	Asset Type	Status	Location	Replacement Value
3	Distribution System	Distribution System	Critical	75.31 miles	\$790,000,000.00
6	Met Source Water	Intake	Critical	NA	NA
12	Duck Club	Lift Station	Critical	3512 Michelson Drive, Irvine	\$300,000.00
14	Irvine Park	Lift Station	Critical	1 Irvine Park Road, Irvine	\$2,605,484.00
21	MWRP Caretaker Housing	Lift Station	Critical	3512 Michelson Drive, Irvine	\$300,000.00
40	Shaw Pump Station	Pump Station	Critical	28934 Silverado Canyon Road	\$1,649,200.00
53	Read Reservoir	Reservoir	Critical	30500 Silverado Canyon Rd	\$3,306,300.00
63	Collection System	Wastewater Collection System	Critical	53 miles	
65	S1	Siphon	Critical	San Diego Creek Channel/University	\$585,000.00
66	S2	Siphon	Critical	Harvard/San Diego Creek Channel	\$1,266,000.00
67	S3	Siphon	Critical	Michelson/Riparian	\$1,302,000.00
68	S4	Siphon	Critical	Main/Veneto	\$1,365,000.00
69	S5	Siphon	Critical	Jamboree/N of Main	\$222,000.00

Flood

Map ID	Name	Asset Type	Status	Location	Replacement Value
70	S6	Siphon	Critical	Harvard/Barranca	\$444,000.00
72	S8	Siphon	Critical	Jeffrey/Alton	\$807,000.00
73	S9	Siphon	Critical	Sand Canyon/Barranca	\$870,000.00
74	S10	Siphon	Critical	OCTA Metrolink/Jamboree	\$549,000.00
75	S11	Siphon	Critical	El Toro/Raintree	\$948,000.00
77	S13	Siphon	Critical	Portola/El Toro	\$1,122,000.00
78	S14	Siphon	Critical	241/Lake Forest	\$432,000.00
81	S18	Siphon	Critical	Harvard/University	\$807,000.00
83	S17	Siphon	Critical	Bake/Toledo	\$324,000.00

LANDSLIDE HAZARDS



A-413

Pacific Ocean

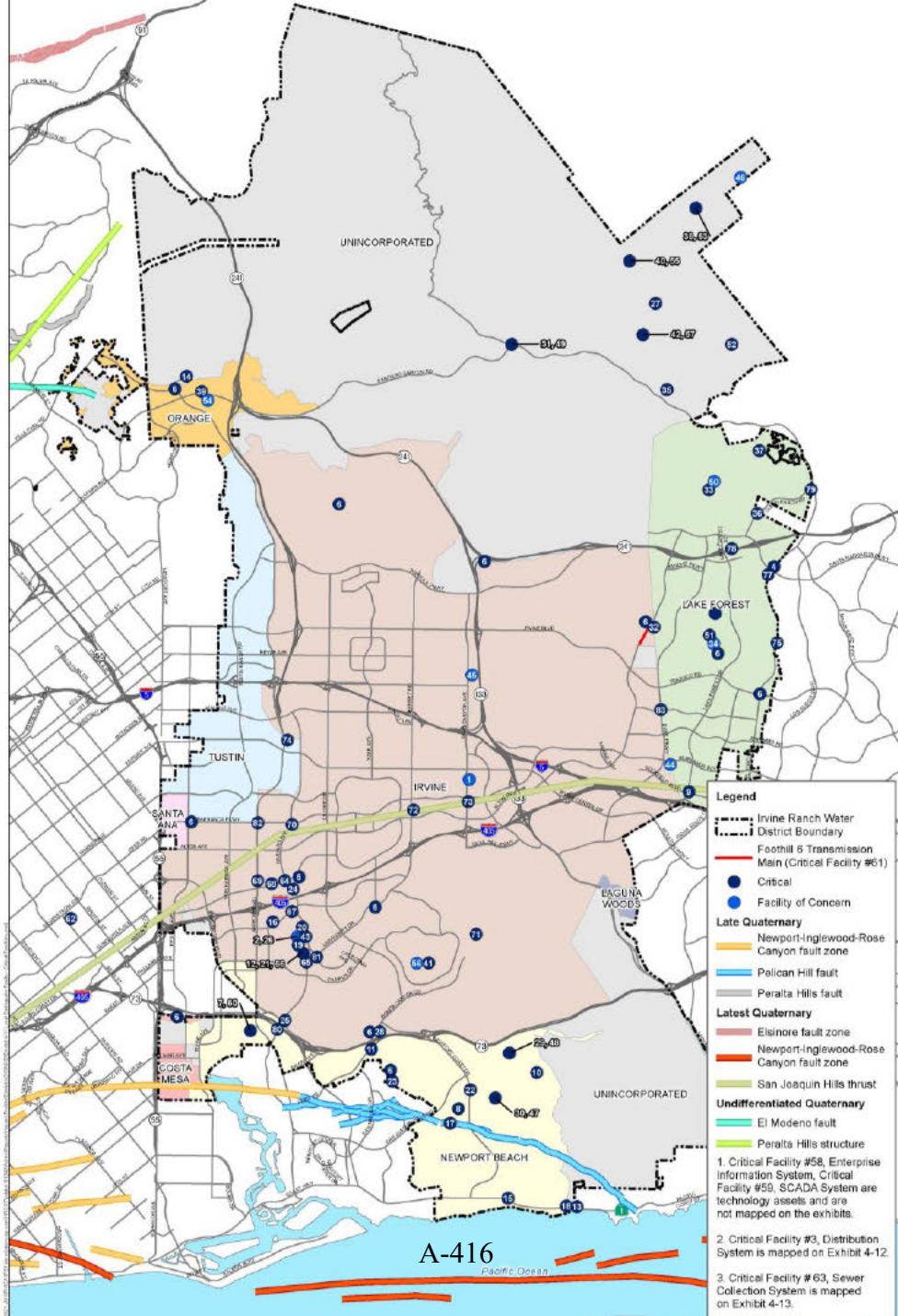
- Legend**
- Irvine Ranch Water District Boundary
 - District Boundary
 - Facility #5 Transmission Main (Critical Facility #61)
 - Critical Facility
 - Facility of Concern
 - Land de Zone
1. Critical Facility #58, Enterprise Information System, Critical Facility #59, SCADA System are technology assets and are not mapped on the exhibits.
 2. Critical Facility #3, Distribution System is mapped on Exhibit 4-9.
 3. Critical Facility #83, Sewer Collect on System is mapped on Exhibit 4-10.



Landslide

Map ID	Name	Asset Type	Status	Location	Replacement Value
3	Distribution System	Distribution System	Critical	<i>40.65 miles</i>	\$790,000,000.00
8	Buck Gully	Lift Station	Critical	21594 White Pine, Newport Beach	\$1,935,024.00
25	University	Multi-Purpose: Lift Station, Telemetry Site, Pump Station	Critical	3262 University Drive, Irvine	\$6,999,844.00
27	Benner Reservoir	Pump Station	Critical	28741 Williams Canyon Rd	\$1,138,600.00
46	Chapman Reservoir	Reservoir	Facility of Concern	14909 Mill Rd	\$1,510,400.00
52	Modjeska Reservoir	Reservoir	Critical	29265 Modjeska Canyon Rd	\$4,478,500.00
53	Read Reservoir	Reservoir	Critical	30500 Silverado Canyon Rd	\$3,306,300.00
57	Williams Canyon Reservoir	Reservoir	Critical	27600 Williams Canyon Rd	\$2,653,400.00
63	Collection System	Wastewater Collection System	Critical	<i>31.68 miles</i>	

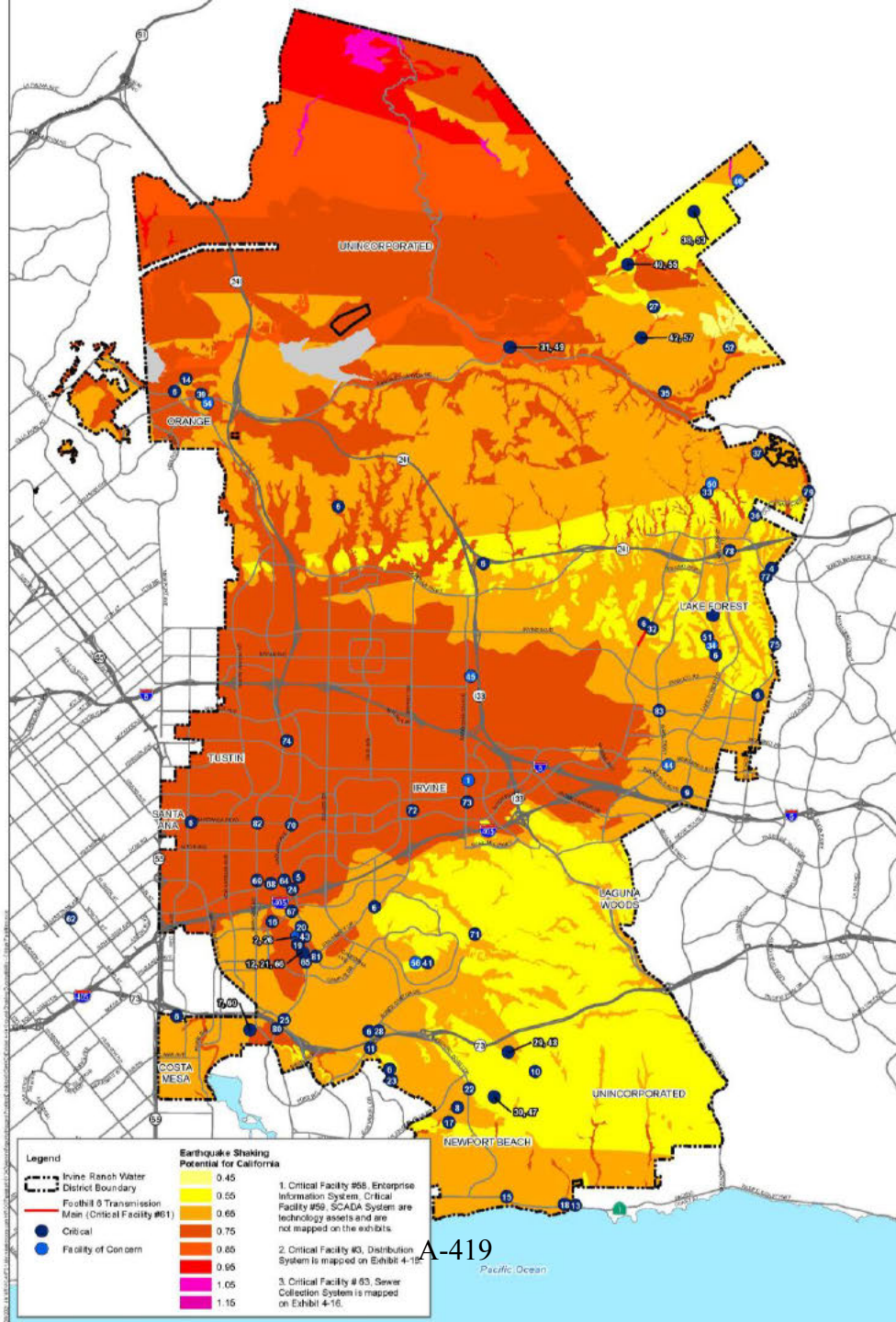
SEISMIC HAZARDS – FAULT RUPTURE



Seismic Hazards – Fault Rupture

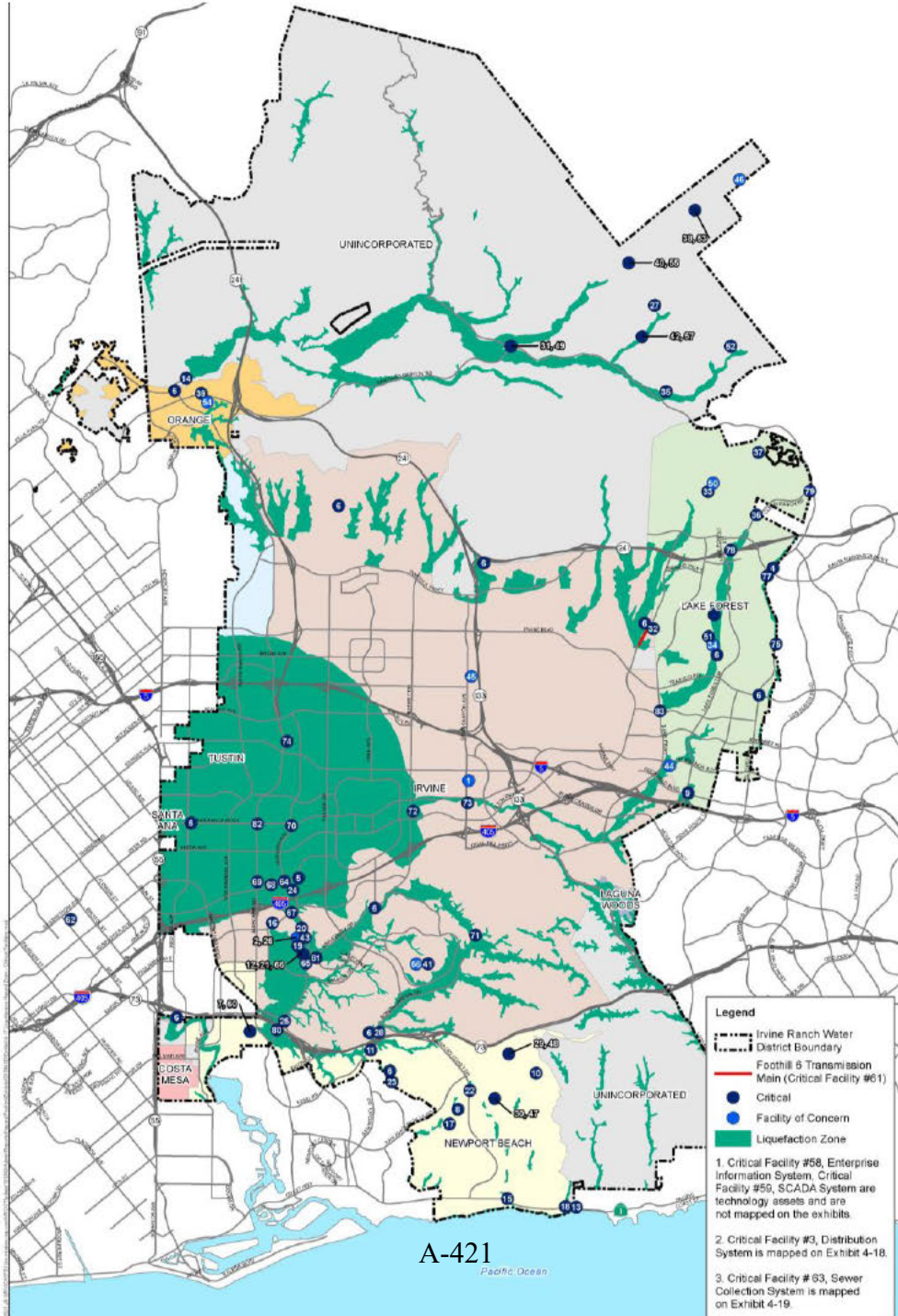
Map ID	Name	Asset Type	Status	Location	Replacement Value
3	Distribution System	Distribution System	Critical	N/A	\$790,000,000.00
17	Montecito	Lift Station	Critical	21 Via Burrone, Newport Beach	\$1,935,024.00
63	Collection System	Sewer Collection System	Critical	N/A	

SEISMIC HAZARDS – GROUND SHAKING



A-419

SEISMIC HAZARDS - LIQUEFACTION



A-421

Pacific Ocean

Liquefaction

Map ID	Name	Asset Type	Status	Location	Replacement Value
2	Michelson Biosolids	Biosolids Treatment	Facility of Concern	3512 Michelson Drive, Irvine, CA 92612	\$250,000,000.00
3	Distribution System	Distribution System	Critical	<i>475.14 miles</i>	\$790,000,000.00
4	El Toro Diversion Structure	Diversion Structure	Critical	NA	\$500,000.00
5	San Mateo Diversion	Diversion Structure	Critical	103 San Mateo, Irvine	\$500,000.00
6	Met Source Water	Intake	Critical	NA	NA
9	Canada	Lift Station	Critical	22952 Lake Forest Drive, Lake Forest	\$3,508,247.00
12	Duck Club	Lift Station	Critical	3512 Michelson Drive, Irvine	\$300,000.00
15	Los Trancos Low Flow	Lift Station	Critical	7303 Pacific Coast Highway, Newport Beach	\$1,935,024.00
18	Muddy Canyon Low Flow	Lift Station	Critical	8333 Pacific Coast Highway, Newport Beach	\$1,935,024.00
19	MWRP MPS-3	Non-Potable Booster Station	Critical	3512 Michelson Drive, Irvine	\$4,226,529.00
21	MWRP Caretaker Housing	Lift Station	Critical	3512 Michelson Drive, Irvine	\$300,000.00
22	Newport Coast	Lift Station	Critical	21244 Newport Coast Drive, Newport Beach	\$6,999,844.00
24	Harvard	Lift Station	Critical	17675.25 Harvard Avenue, Irvine	\$5,115,644.00

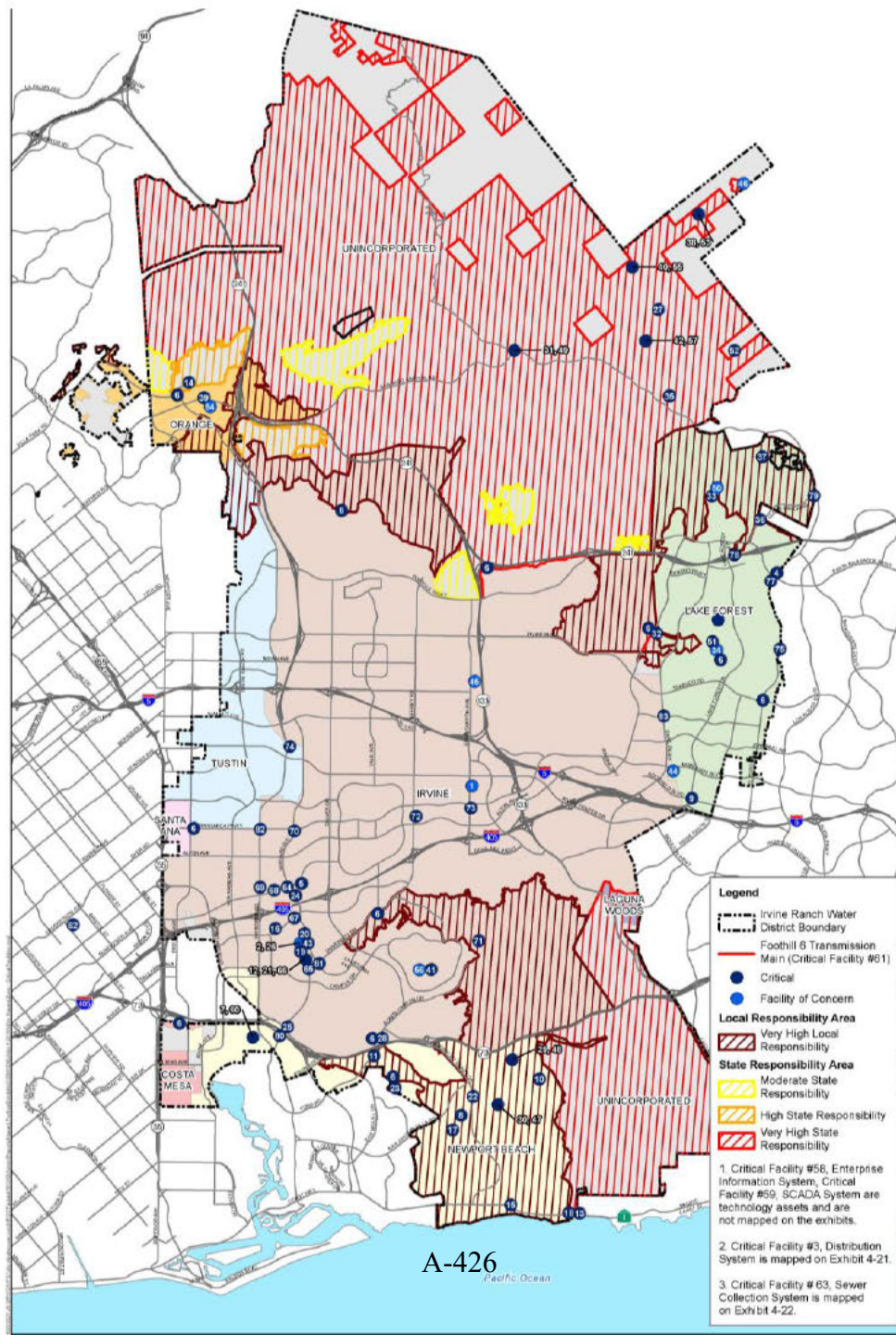
Liquefaction

Map ID	Name	Asset Type	Status	Location	Replacement Value
26	Michelson Operations Center	Operations Staff Offices	Facility of Concern	3512 Michelson Drive, Irvine, CA 92612	\$20,900,000.00
28	Coastal OC 63-Zn.4 Pump Station	Pump Station	Critical	4925 1/2 Bonita Canyon Dr, Irvine 92603	\$3,076,700.00
42	Williams Canyon Pump Station (Benner)	Pump Station	Critical	27600 Williams Canyon Road	\$1,649,200.00
43	Michelson MWRP	Recycled Water	Critical	3512 Michelson Drive, Irvine, CA 92612	\$500,000,000.00
44	Los Alisos Water Recycling Plant (LAWRP)	Recycling Plant	Facility of Concern	22312 Muirlands Boulevard, Lake Forest	\$10,185,000.00
61	Foothill 6 Transmission Main	Transmission Main	Critical	NA	\$504,104.32
63	Collection System	Sewer Collection System	Critical	387.35 miles	
65	S1	Siphon	Critical	San Diego Creek Channel/University	\$585,000.00
66	S2	Siphon	Critical	Harvard/San Diego Creek Channel	\$1,266,000.00
67	S3	Siphon	Critical	Michelson/Riparian	\$1,302,000.00
68	S4	Siphon	Critical	Main/Veneto	\$1,365,000.00
69	S5	Siphon	Critical	Jamboree/N of Main	\$222,000.00

Liquefaction

Map ID	Name	Asset Type	Status	Location	Replacement Value
70	S6	Siphon	Critical	Harvard/Barranca	\$444,000.00
71	S7	Siphon	Critical	Shady Canyon/Sage Creek	\$1,056,000.00
72	S8	Siphon	Critical	Jeffrey/Alton	\$807,000.00
73	S9	Siphon	Critical	Sand Canyon/Barranca	\$870,000.00
74	S10	Siphon	Critical	OCTA Metrolink/Jamboree	\$549,000.00
75	S11	Siphon	Critical	El Toro/Raintree	\$948,000.00
76	S12	Siphon	Critical	Prism/Linear	\$738,000.00
77	S13	Siphon	Critical	Portola/El Toro	\$1,122,000.00
78	S14	Siphon	Critical	241/Lake Forest	\$432,000.00
81	S18	Siphon	Critical	Harvard/University	\$807,000.00
82	S19	Siphon	Critical	Jamboree/Barranca	\$180,000.00

WILDFIRE



A-426
Pacific Ocean

Wildfire

Map ID	Name	Asset Type	Status	Location	Replacement Value
3	Distribution System	Distribution System	Critical	221.58 miles	\$790,000,000.00
6	Met Source Water	Intake	Critical	NA	NA
8	Buck Gully	Lift Station	Critical	21594 White Pine, Newport Beach	\$1,935,024.00
10	Coastal Ridge	Lift Station	Critical	22322 Pacific Mist, Newport Beach	\$2,605,484.00
11	Coyote Canyon	Lift Station	Critical	3000 ½ Bonita Canyon Road, Irvine	\$2,605,484.00
14	Irvine Park	Lift Station	Critical	1 Irvine Park Road, Irvine	\$2,605,484.00
15	Los Trancos Low Flow	Lift Station	Critical	7303 Pacific Coast Highway, Newport Beach	\$1,935,024.00
17	Montecito	Lift Station	Critical	21 Via Burrone, Newport Beach	\$1,935,024.00
18	Muddy Canyon Low Flow	Lift Station	Critical	8333 Pacific Coast Highway, Newport Beach	\$1,935,024.00
22	Newport Coast	Lift Station	Critical	21244 Newport Coast Drive, Newport Beach	\$6,999,844.00
23	San Joaquin Housing	Lift Station	Critical	32 Ridgeline Drive, Newport Beach	\$300,000.00
27	Benner Reservoir	Pump Station	Critical	28741 Williams Canyon Rd	\$1,138,600.00
29	Coastal Zn 6-7 Pump Station	Pump Station	Critical	20783 Vista Ridge Rd, Newport Beach 92657	\$2,671,800.00

A-427

Wildfire

Map ID	Name	Asset Type	Status	Location	Replacement Value
30	Coastal Zn. 4-6 Pump Station	Pump Station	Critical	21474 Vista Ridge Rd, Newport Coast 92657	\$2,268,700.00
31	Fleming Pump Station	Pump Station	Critical	7431 Silverado Canyon Road	\$2,268,700.00
32	Foothill Zn 4-6 Pump Station	Pump Station	Critical	21515 Magazine Rd, Irvine 92618/12848 1/2 Alton	\$3,076,700.00
33	Foothill Zn 6-6A Pump Station	Pump Station	Critical	2 Touraine Pl, Foothill Ranch 92610	\$2,671,800.00
35	Manning Pump Station	Pump Station	Critical	29265 Modjeska Canyon Road	\$1,649,200.00
36	Portola Hills Zn 6-8	Pump Station	Critical	27841 Glenn Ranch Rd, Portola hills 92610	\$3,076,700.00
37	Portola Hills Zn 8-9 Pump Station	Pump Station	Critical	18967 Saddleback, Trabuco 92679	\$3,076,700.00
38	Read Pump Station	Pump Station	Critical	30500 Silverado Canyon Road	\$1,649,200.00
40	Shaw Pump Station	Pump Station	Critical	28934 Silverado Canyon Road	\$1,649,200.00
42	Williams Canyon Pump Station	Pump Station	Critical	27600 Williams Canyon Road	\$1,649,200.00
46	Chapman Reservoir	Reservoir	Facility of Concern	14909 Mill Rd	\$1,510,400.00
47	Coastal Zn 4 Reservoir	Reservoir	Critical	21474 Vista Ridge, Newport Beach 92657	\$8,813,300.00
48	Coastal Zn 6 Reservoir	Reservoir	Critical	20783 Vista Ridge Rd, Newport Beach 92657	\$1,230,590.00

Wildfire

Map ID	Name	Asset Type	Status	Location	Replacement Value
49	Fleming Reservoir	Reservoir	Critical	7431 Silverado Canyon Road	\$1,556,800.00
50	Foothill Zn 6 Reservoir	Reservoir	Facility of Concern	2 Touraine Pl, Foothll Ranch 92610	\$7,794,900.00
53	Read Reservoir	Reservoir	Critical	30500 Silverado Canyon Rd	\$3,306,300.00
55	Shaw Reservoir	Reservoir	Critical	28914 Olive Drive	\$1,728,100.00
57	Williams Canyon Reservoir	Reservoir	Critical	27600 Williams Canyon Rd	\$2,653,400.00
61	Foothill 6 Transmission Line	Transmission Main	Critical	Foothill 4-6 to Foothill 6 Reservoir	\$504,104.32
63	Collection System	Sewer Collection System	Critical	<i>151.26 miles</i>	
71	S7	Siphon	Critical	NA	\$1,056,000.00
78	S14	Siphon	Critical	NA	\$432,000.00
79	S15	Siphon	Critical	NA	\$915,000.00

Not Mapped Hazards

- Drought
- Human Induced Hazards
 - Hazardous Materials
 - Terrorism/Sabotage (cyberattacks)
- Geologic Hazards
 - Land Subsidence
 - Expansive Soils
- Severe Weather
 - Coastal Storms/Winter Storms
 - Windstorm
 - Power Outage

Summary of Vulnerability

Map ID	Name	Dam Failure	Drought	Flood	Geologic	Human-Caused	Land slide	Liquefaction	Ground-Shaking	Fault Rupture	Severe Weather	Wildfire
2	Michelson Biosolids	Y	Y	N	Y	Y	N	Y	Y	N	Y	N
3	Distribution System	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4	El Toro Diversion Structure	N	Y	N	Y	Y	N	Y	Y	N	Y	N
5	San Mateo Diversion	N	Y	N	Y	Y	N	Y	Y	N	Y	N
6	Met Source Water	Y	Y	Y	Y	Y	N	Y	Y	N	Y	Y
8	Buck Gully	N	Y	N	Y	Y	Y	N	Y	N	Y	Y
9	Canada	N	Y	N	Y	Y	N	Y	Y	N	Y	N
10	Coastal Ridge	N	Y	N	Y	Y	N	N	Y	N	Y	Y
11	Coyote Canyon	Y	Y	N	Y	Y	N	N	Y	N	Y	Y

Summary of Vulnerability

Map ID	Name	Dam Failure	Drought	Flood	Geologic	Human-Caused	Land slide	Liquefaction	Ground-Shaking	Fault Rupture	Severe Weather	Wildfire
12	Duck Club	N	Y	Y	Y	Y	N	Y	Y	N	Y	N
14	Irvine Park	Y	Y	Y	Y	Y	N	N	Y	N	Y	Y
15	Los Trancos Low Flow	N	Y	N	Y	Y	N	Y	Y	N	Y	Y
17	Montecito	N	Y	N	Y	Y	N	N	Y	Y	Y	Y
18	Muddy Canyon Low Flow	N	Y	N	Y	Y	N	Y	Y	N	Y	Y
19	MWRP MPS-3	Y	Y	N	Y	Y	N	Y	Y	N	Y	N
21	MWRP Caretaker Housing	N	Y	Y	Y	Y	N	Y	Y	N	Y	N
22	Newport Coast	N	Y	N	Y	Y	N	Y	Y	N	Y	Y
23	San Joaquin Housing	N	Y	N	Y	Y	N	N	Y	N	Y	Y

Summary of Vulnerability

Map ID	Name	Dam Failure	Drought	Flood	Geologic	Human-Caused	Land slide	Liquefaction	Ground-Shaking	Fault Rupture	Severe Weather	Wildfire
24	Harvard	N	Y	N	Y	Y	N	Y	Y	N	Y	N
25	University	Y	Y	N	Y	Y	Y	N	Y	N	Y	N
26	Michelson Operations Center	Y	Y	N	Y	Y	N	Y	Y	N	Y	N
27	Benner Reservoir	N	Y	N	Y	Y	Y	N	Y	N	Y	Y
28	Coastal OC 63-Zn.4 Pump Station	N	Y	N	Y	Y	N	Y	Y	N	Y	N
29	Coastal Zn 6-7 Pump Station	N	Y	N	Y	Y	N	N	Y	N	Y	Y
30	Coastal Zn. 4-6 Pump Station	N	Y	N	Y	Y	N	N	Y	N	Y	Y
31	Fleming Pump Station	N	Y	N	Y	Y	N	N	Y	N	Y	Y
32	Foothill Zn 4-6 Pump Station	N	Y	N	Y	Y	N	N	Y	N	Y	Y

Summary of Vulnerability

Map ID	Name	Dam Failure	Drought	Flood	Geologic	Human-Caused	Land slide	Liquefaction	Ground-Shaking	Fault Rupture	Severe Weather	Wildfire
33	Foothill Zn 6-6A Pump Station	N	Y	N	Y	Y	N	N	Y	N	Y	Y
35	Manning Pump Station	N	Y	N	Y	Y	N	N	Y	N	Y	Y
36	Portola Hills Zn 6-8	N	Y	N	Y	Y	N	N	Y	N	Y	Y
37	Portola Hills Zn 8-9 Pump Station	N	Y	N	Y	Y	N	N	Y	N	Y	Y
38	Read Pump Station	N	Y	N	Y	Y	N	N	Y	N	Y	Y
40	Shaw Pump Station	N	Y	Y	Y	Y	N	N	Y	N	Y	Y
42	Williams Canyon Pump Station (Benner)	N	Y	N	Y	Y	N	Y	Y	N	Y	Y
43	Michelson MWRP	Y	Y	N	Y	Y	N	Y	Y	N	Y	N
44	Los Alisos Water Recycling Plant (LAWRP)	N	Y	N	Y	A-434 Y	N	Y	Y	N	Y	N

Summary of Vulnerability

Map ID	Name	Dam Failure	Drought	Flood	Geologic	Human-Caused	Land slide	Liquefaction	Ground-Shaking	Fault Rupture	Severe Weather	Wildfire
46	Chapman Reservoir	N	Y	N	Y	Y	Y	N	Y	N	Y	Y
47	Coastal Zn 4 Reservoir	N	Y	N	Y	Y	N	N	Y	N	Y	Y
48	Coastal Zn 6 Reservoir	N	Y	N	Y	Y	N	N	Y	N	Y	Y
49	Fleming Reservoir	N	Y	N	Y	Y	N	N	Y	N	Y	Y
50	Foothill Zn 6 Reservoir	N	Y	N	Y	Y	N	N	Y	N	Y	Y
52	Modjeska Reservoir	N	Y	N	Y	Y	Y	N	Y	N	Y	N
53	Read Reservoir	N	Y	Y	Y	Y	Y	N	Y	N	Y	Y
55	Shaw Reservoir	N	Y	N	Y	Y	N	N	Y	N	Y	Y
57	Williams Canyon Reservoir	N	Y	N	Y	A-435 Y	Y	N	Y	N	Y	Y

Summary of Vulnerability

Map ID	Name	Dam Failure	Drought	Flood	Geologic	Human-Caused	Land slide	Liquefaction	Ground-Shaking	Fault Rupture	Severe Weather	Wildfire
61	Foothill 6 Transmission Line	N	Y	N	Y	Y	N	Y	Y	N	Y	Y
62	Deep Aquifer Treatment System (DATS)	Y	Y	N	Y	Y	N	N	Y	N	Y	N
63	Collection System	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y
64	Harvard Area Trunk Diversion Structure (HATS)	N	Y	N	Y	Y	N	Y	Y	N	Y	N
65	S1	Y	Y	Y	Y	Y	N	Y	Y	N	Y	N
66	S2	Y	Y	Y	Y	Y	N	Y	Y	N	Y	N
67	S3	Y	Y	Y	Y	Y	N	Y	Y	N	Y	N
68	S4	Y	Y	Y	Y	Y	N	Y	Y	N	Y	N

Summary of Vulnerability

Map ID	Name	Dam Failure	Drought	Flood	Geologic	Human-Caused	Land slide	Liquefaction	Ground-Shaking	Fault Rupture	Severe Weather	Wildfire
69	S5	Y	Y	Y	Y	Y	N	Y	Y	N	Y	N
70	S6	Y	Y	Y	Y	Y	N	Y	Y	N	Y	N
71	S7	N	Y	N	Y	Y	N	Y	Y	N	Y	Y
72	S8	N	Y	Y	Y	Y	N	Y	Y	N	Y	N
73	S9	N	Y	Y	Y	Y	N	Y	Y	N	Y	N
74	S10	Y	Y	Y	Y	Y	N	Y	Y	N	Y	N
75	S11	N	Y	Y	Y	Y	N	Y	Y	N	Y	N
76	S12	N	Y	N	Y	Y	N	Y	Y	N	Y	N
77	S13	N	Y	Y	Y	Y	N	Y	Y	N	Y	N

Summary of Vulnerability

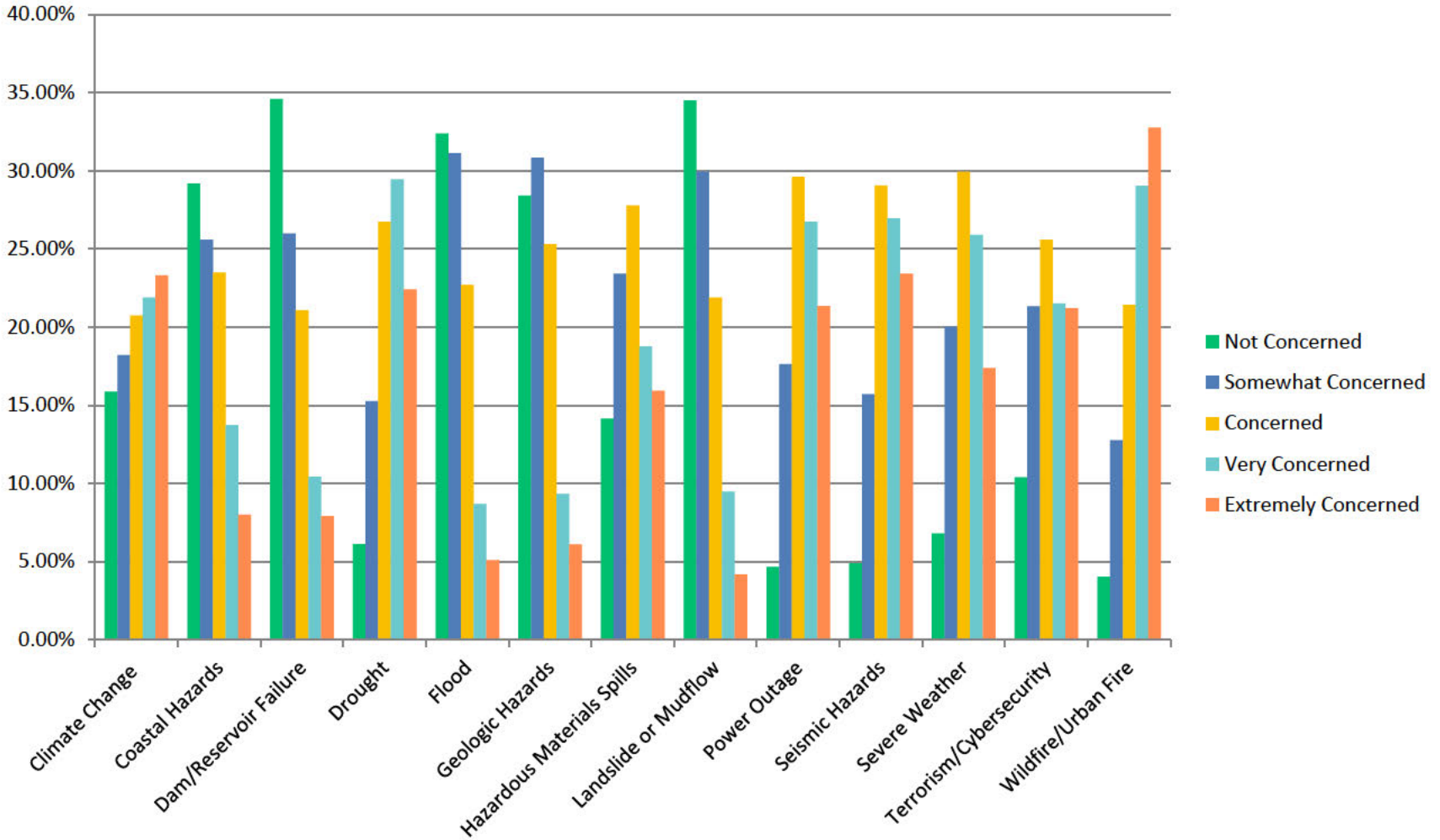
Map ID	Name	Dam Failure	Drought	Flood	Geologic	Human-Caused	Land slide	Liquefaction	Ground-Shaking	Fault Rupture	Severe Weather	Wildfire
78	S14	N	Y	N	Y	Y	N	N	Y	N	Y	Y
79	S15	N	Y	N	Y	Y	N	N	Y	N	Y	Y
80	S16	Y	Y	N	Y	Y	N	Y	Y	N	Y	N
81	S18	Y	Y	Y	Y	Y	N	Y	Y	N	Y	N
82	S19	Y	Y	N	Y	Y	N	Y	Y	N	Y	N
83	S17	N	Y	Y	Y	Y	N	N	Y	N	Y	N

Survey Summary

Survey Summary

- 1,750 responses; 98% live & 20% work in service area
- Preparedness
 - Feel somewhat prepared: 52%
 - *Common preventative actions taken: smoke/carbon monoxide detectors, anchored furniture/utilities, landscape maintenance & drought tolerant plants, ready to go kits/supplies.*
- Outreach
 - Most effective ways of receiving information:
 - *Email, direct mail, city/agency newsletters, auto-dial information, social media, TV-based media*

Survey Summary



Mitigation Strategy

Mitigation Strategy

- Mitigation goals: **general guidelines** that explain what the **community wants to achieve**
- Mitigation actions: **specific projects** and activities that help to **achieve the goals**.
- Action plan: describes **how** the actions will be **implemented** – how prioritized, administered, incorporated into existing planning mechanisms

Mitigation Goals

- **Reduce the Potential for Damage** – Reduce damage to IRWD critical assets from natural and man-made hazards;
- **Create a Decision Tool for Management** – To provide information so that IRWD may act to address vulnerabilities; and
- **Promote Compliance with State and Federal Program Requirements** – To ensure that IRWD can take full advantage of state and federal grant programs, policies, and regulations.

Mitigation Actions

- Mitigation actions – reduce or eliminate long-term risk
 - **Different from actions to prepare or respond to an event**
- Mitigation activities lessen or eliminate the need for preparedness or response resources
- Emphasis on the impact or vulnerabilities – not on the hazard itself

STAPLE/E Review and Selection Criteria

Social

- Is the proposed action socially acceptable to the jurisdiction and surrounding community?
- Are there equity issues involved that would mean that one segment of the jurisdiction and/or community is treated unfairly?
- Will the action cause social disruption?

Technical

- Will the proposed action work?
- Will it create more problems than it solves?
- Does it solve a problem or only a symptom?
- Is it the most useful action in light of other jurisdiction goals?

Administrative

- Can the jurisdiction implement the action?
- Is there someone to coordinate and lead the effort?
- Is there sufficient funding, staff, and technical support available?
- Are there ongoing administrative requirements that need to be met?

Political

- Is the action politically acceptable?
- Is there public support both to implement and to maintain the project?

STAPLE/E Review and Selection Criteria

Legal

- Is the jurisdiction authorized to implement the proposed action?
- Are there legal side effects? Could the activity be construed as a taking?
- Will the jurisdiction be liable for action or lack of action?
- Will the activity be challenged?

Economic

- What are the costs and benefits of this action?
- Do the benefits exceed the costs?
- Are initial, maintenance, and administrative costs taken into account?
- Has funding been secured for the proposed action? If not, what are the potential funding sources (public, nonprofit, and private)?
- How will this action affect the fiscal capability of the jurisdiction?
- What burden will this action place on the tax base or local economy?
- What are the budget and revenue effects of this activity?
- Does the action contribute to other jurisdiction goals?
- What benefits will the action provide?

Environmental

- How will the action affect the environment?
- Will the action need environmental regulatory approvals?
- Will it meet local and state regulatory requirements?
- Are endangered or threatened species likely to be affected?

Mitigation Prioritization & Timeframe

Category	Comments
High	Top organizational priority and is generally a well-detailed project idea. Protects population, resource or property at high risk, Uses feasible methods, techniques or technology.
Medium	A good idea that needs more information or is an action that addresses a moderate hazard.
Low	An idea that needs a lot more information or will take a lot of preliminary action to build support.

Category	Timeframe
Short-term	1-2 years
Mid-term	3-4 years
Long-term	5+ years
Ongoing	1-2 years and ongoing thereafter

Mitigation Measure Development

- Internal IRWD focus groups and discussions with specific departments to develop desired actions
- Turned feedback received in Meeting #3 into formal mitigation actions
- Michael Baker incorporated recommendations based on HMP trends and other best practices in the region

Capabilities Assessment

Capabilities Assessment

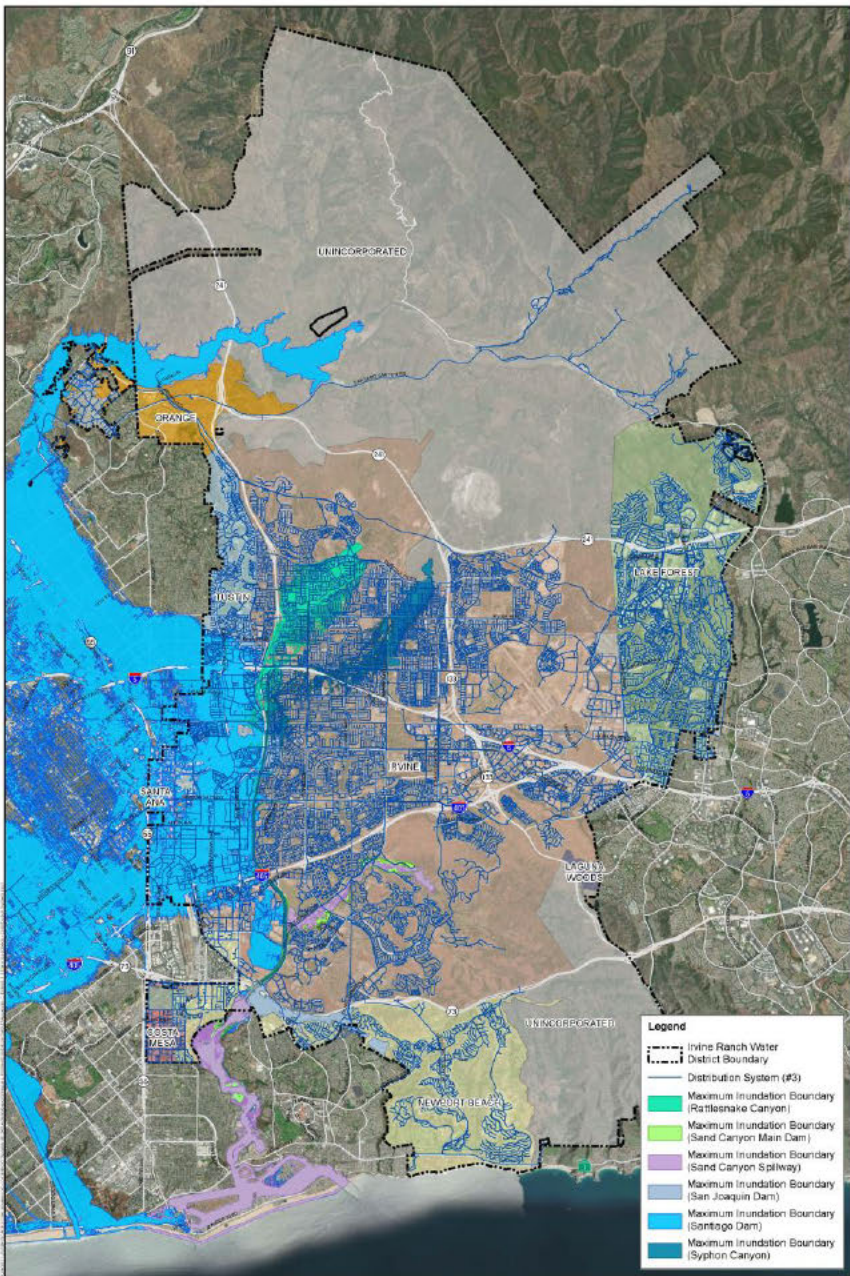
- Are there opportunities to improve upon the capabilities?
 - Can a plan be used to identify hazards and implement mitigation actions?
 - How can the capabilities be expanded and improved to reduce risk?
 - Is there a missing capability that needs to be considered?
 - Is additional staff/community training needed?
 - What financial resources can be used?
 - How can partner agencies/organizations work together to inform/educate the community?

Next Steps

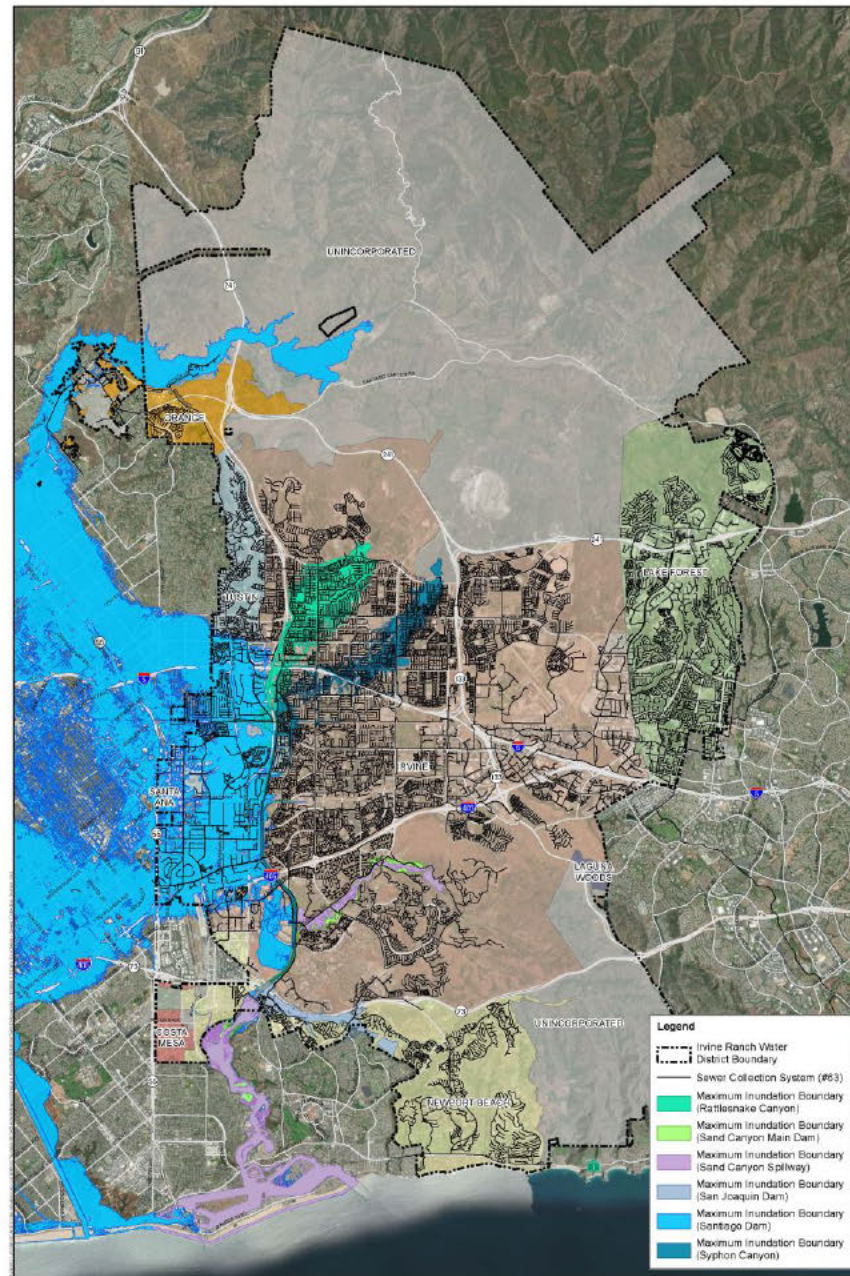
Next Steps

- **Complete Draft LHMP for Planning Team Review**
 - May 5 – June 18, 2021
- **Planning Team Review of LHMP**
 - June 21 – July 2, 2021
- **Revise LHMP for Public Review**
- **Public Review**
 - July 20 – August 3, 2021

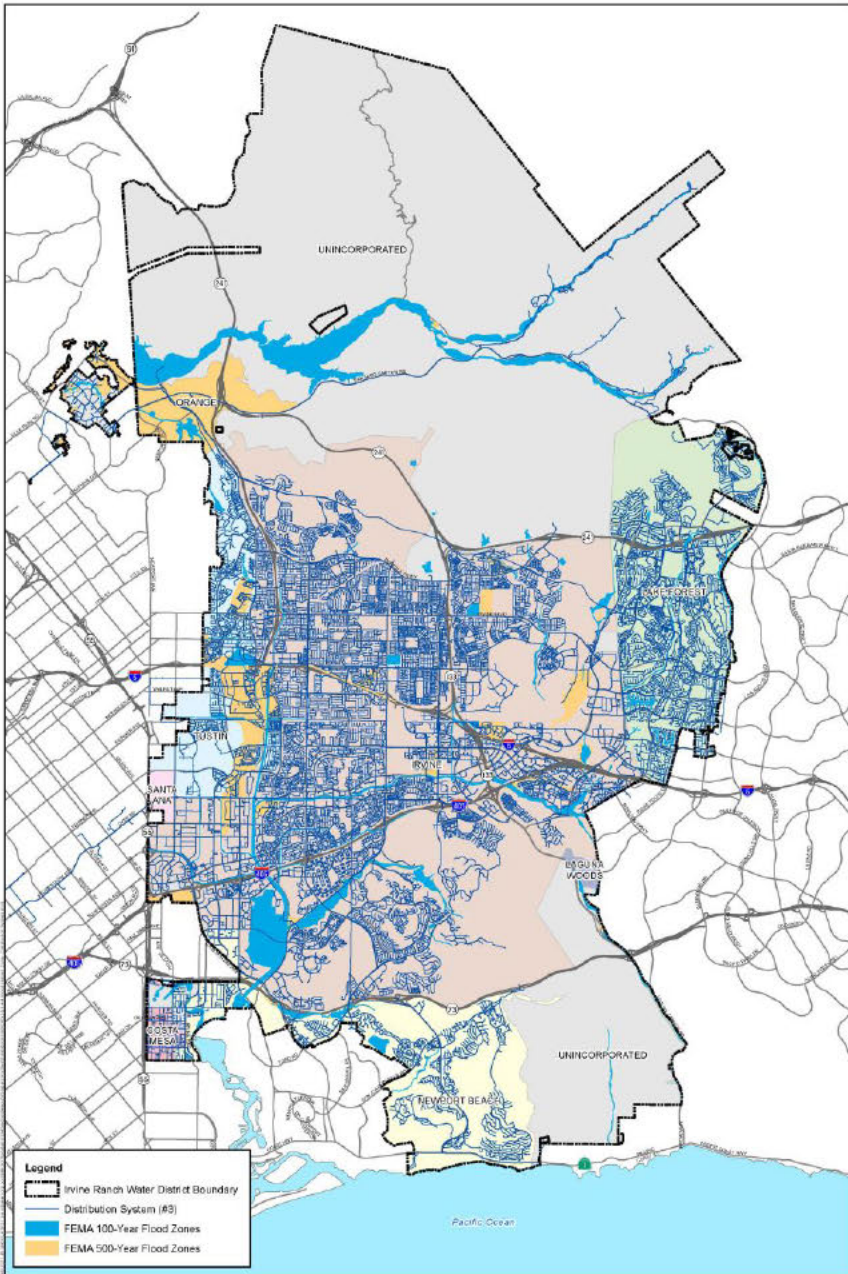
Questions/Additional Discussion?



Irvine Ranch Water District Local Hazard Mitigation Plan
 Dam Inundation Map - Distribution System

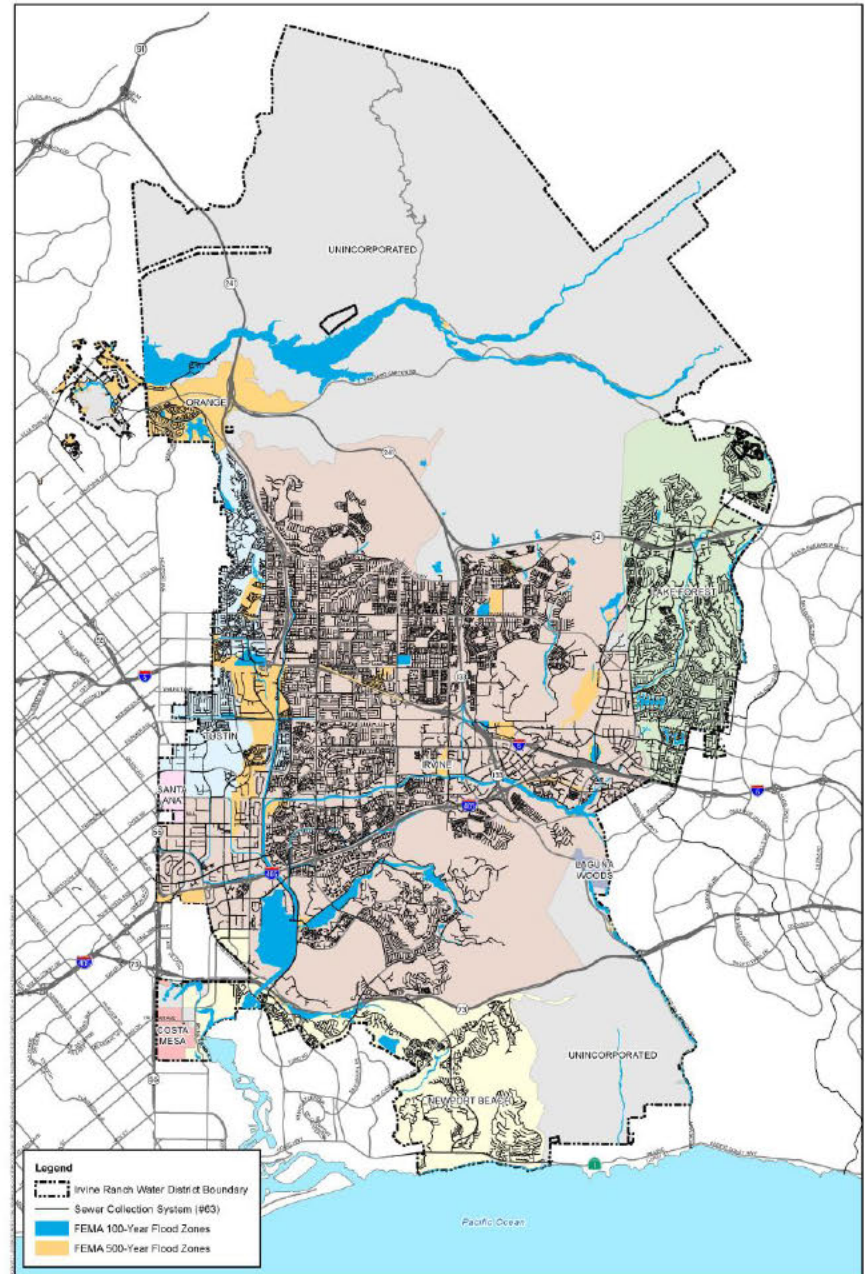


Irvine Ranch Water District Local Hazard Mitigation Plan
 Dam Inundation Map - Sewer Collection System



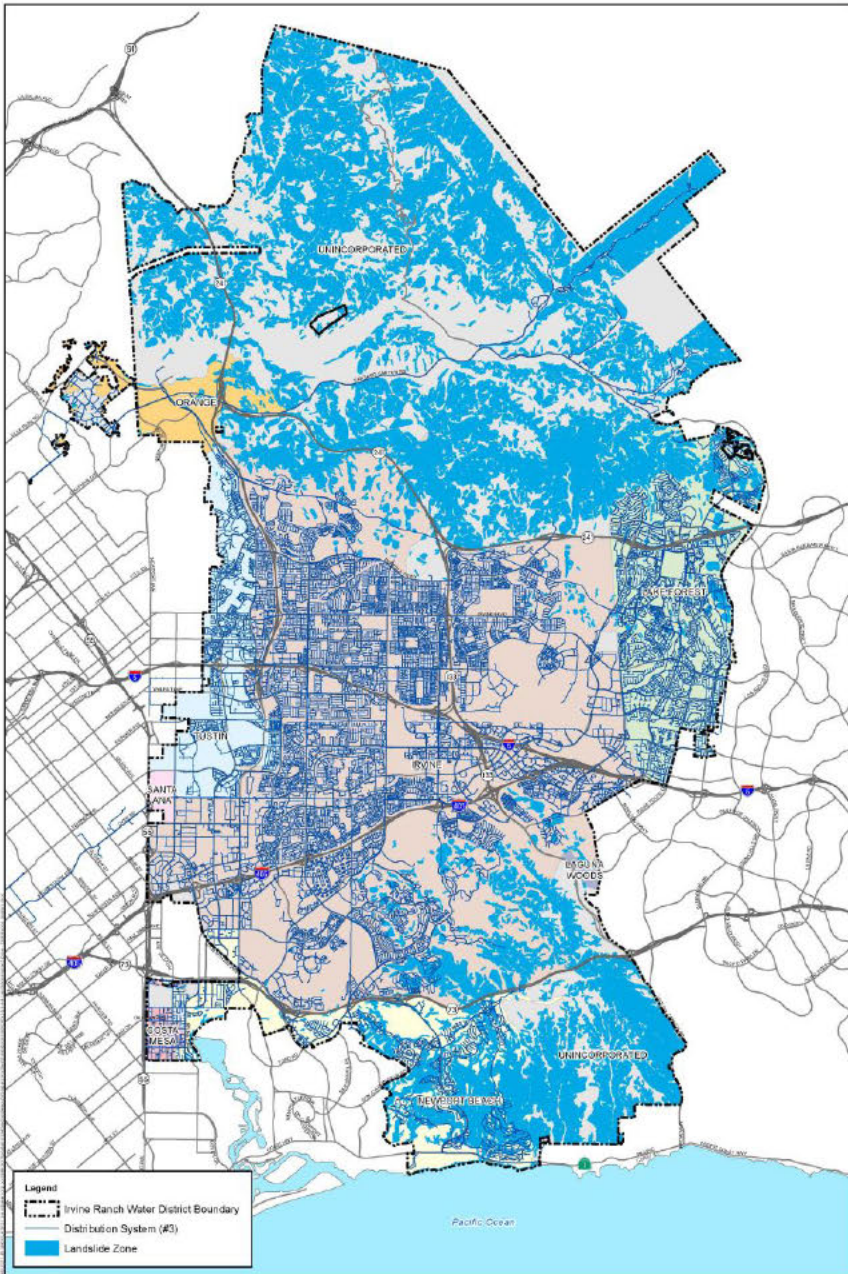
Irvine Ranch Water District Local Hazard Mitigation Plan
Flood Hazard Zone - Distribution System

Exhibit 4-4



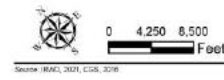
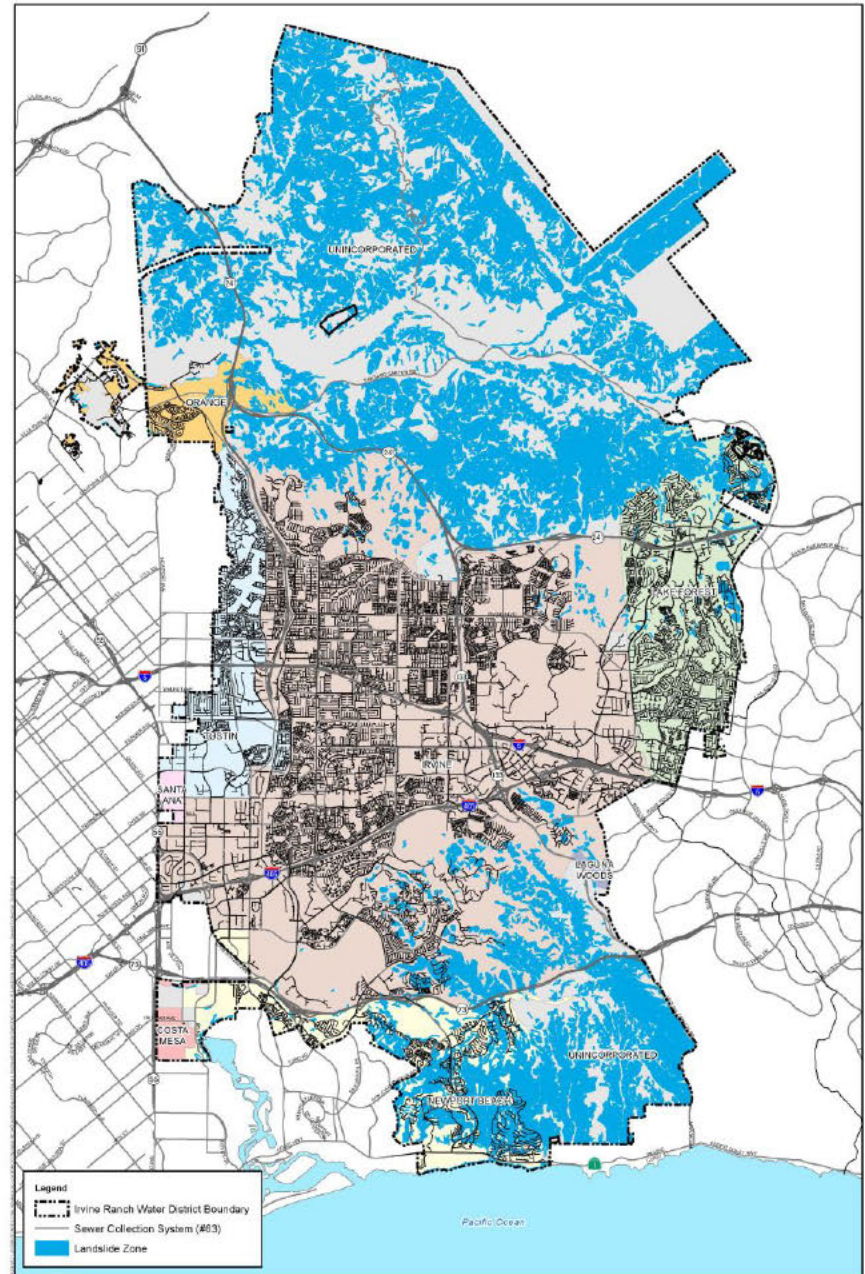
Irvine Ranch Water District Local Hazard Mitigation Plan
Flood Hazard Zone - Sewer Collection System

Exhibit 4-5



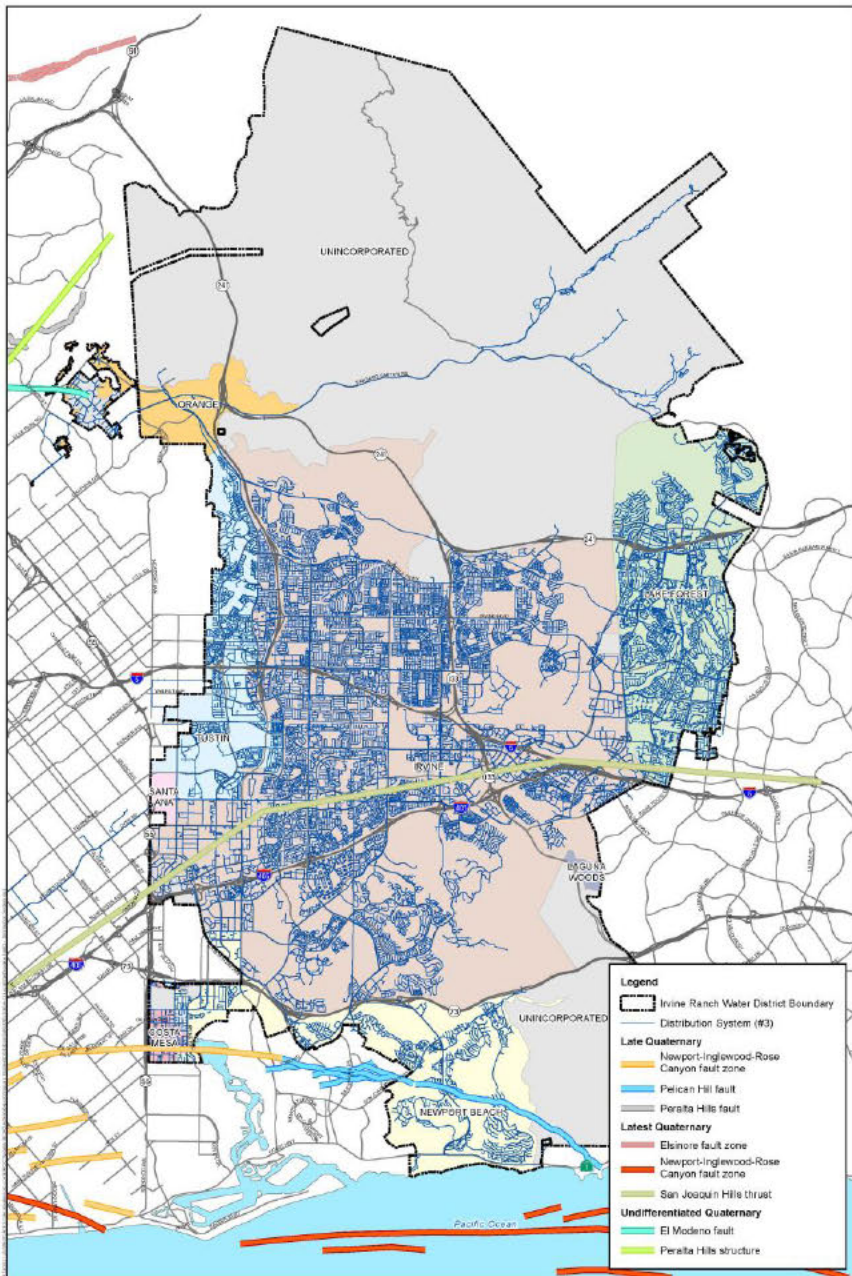
Irvine Ranch Water District Local Hazard Mitigation Plan
Landslide Hazard Zone - Distribution System

Exhibit 4-9



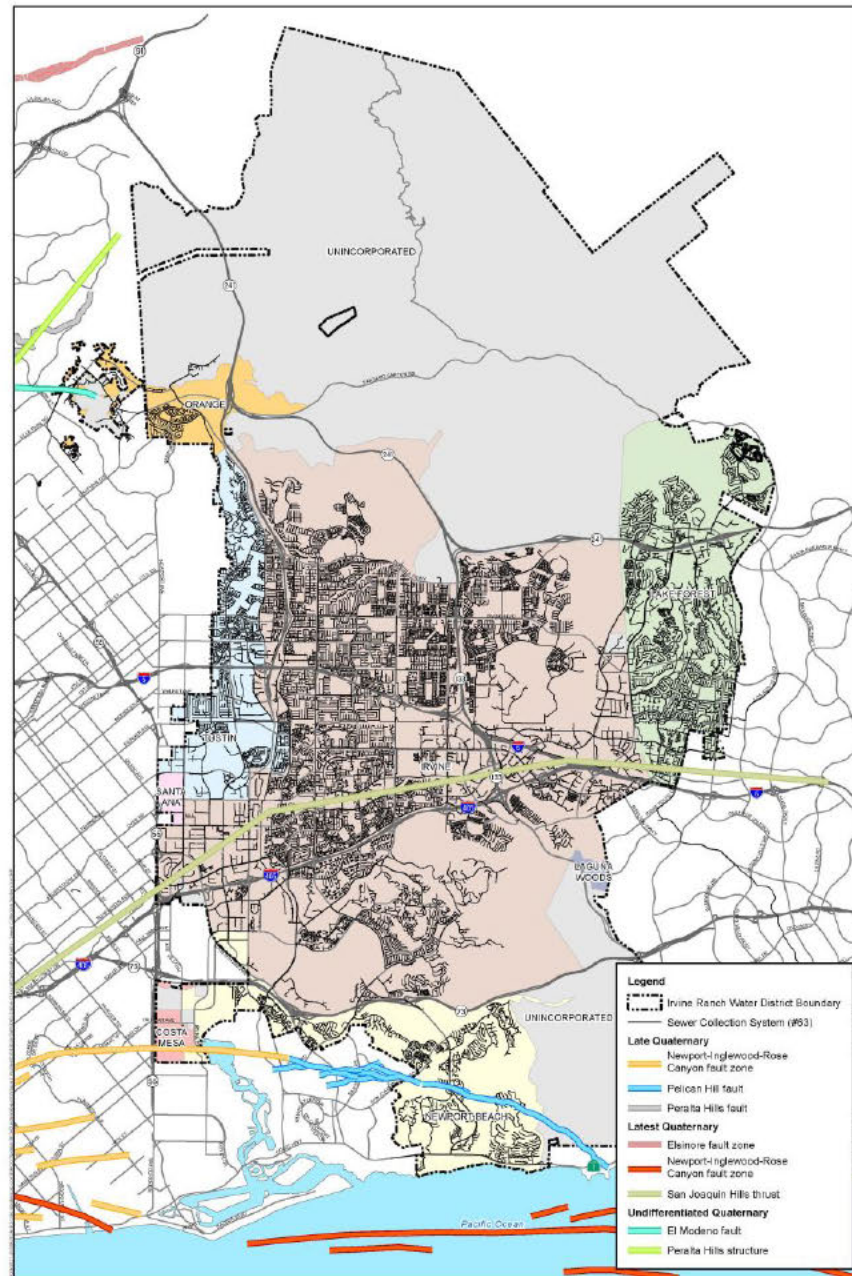
Irvine Ranch Water District Local Hazard Mitigation Plan
Landslide Hazard Zone - Sewer Collection System

Exhibit 4-10



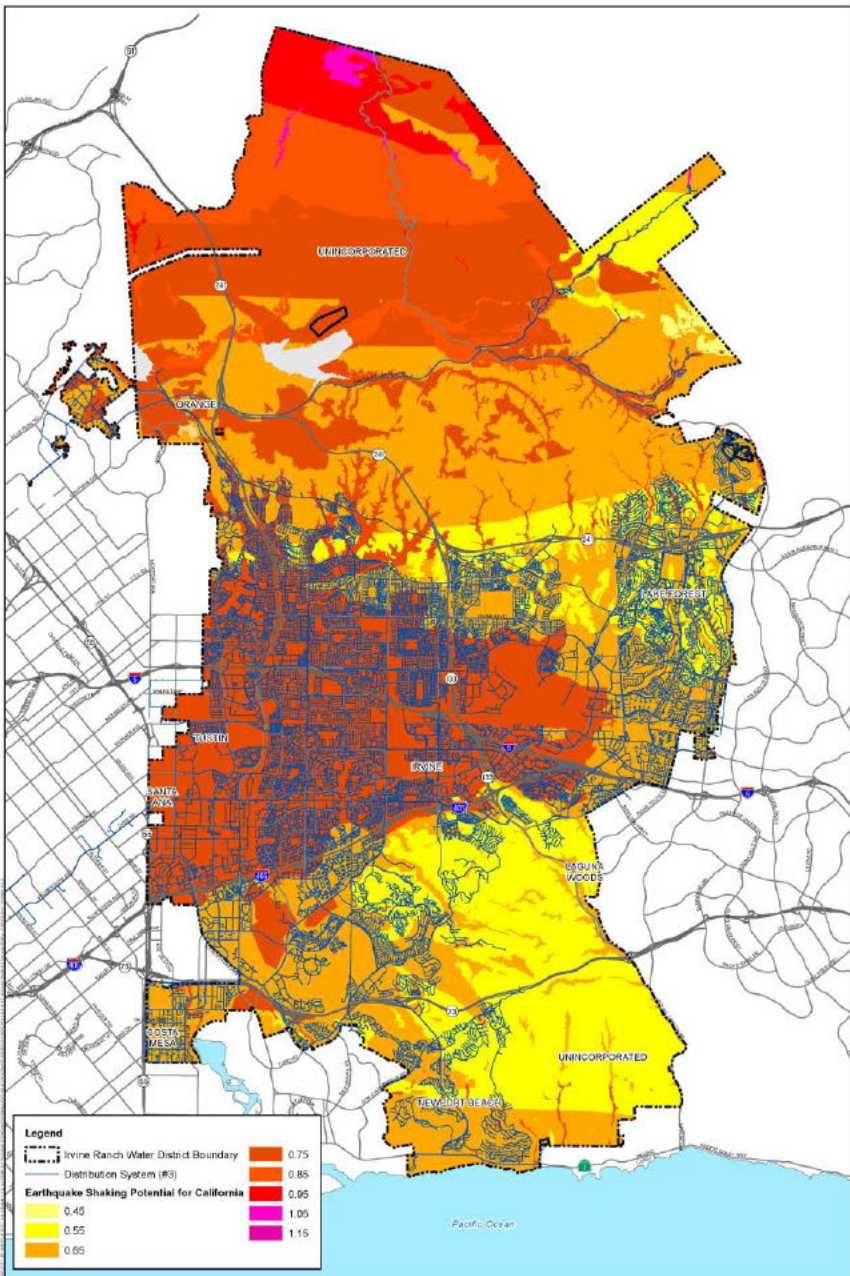
Irvine Ranch Water District Local Hazard Mitigation Plan
Local Earthquake Faults - Distribution System

A-458

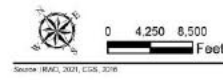
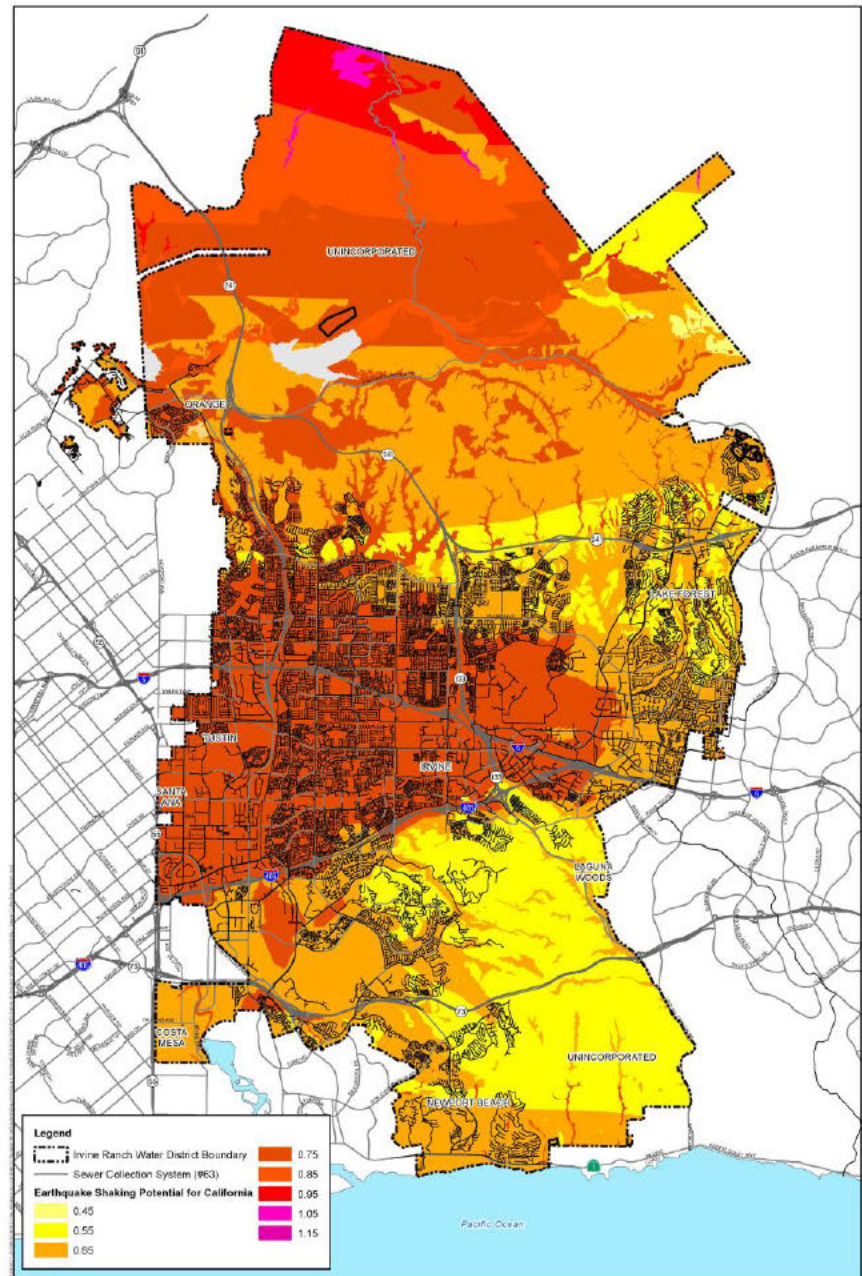


Irvine Ranch Water District Local Hazard Mitigation Plan
Local Earthquake Faults - Sewer Collection System

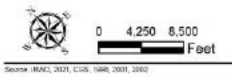
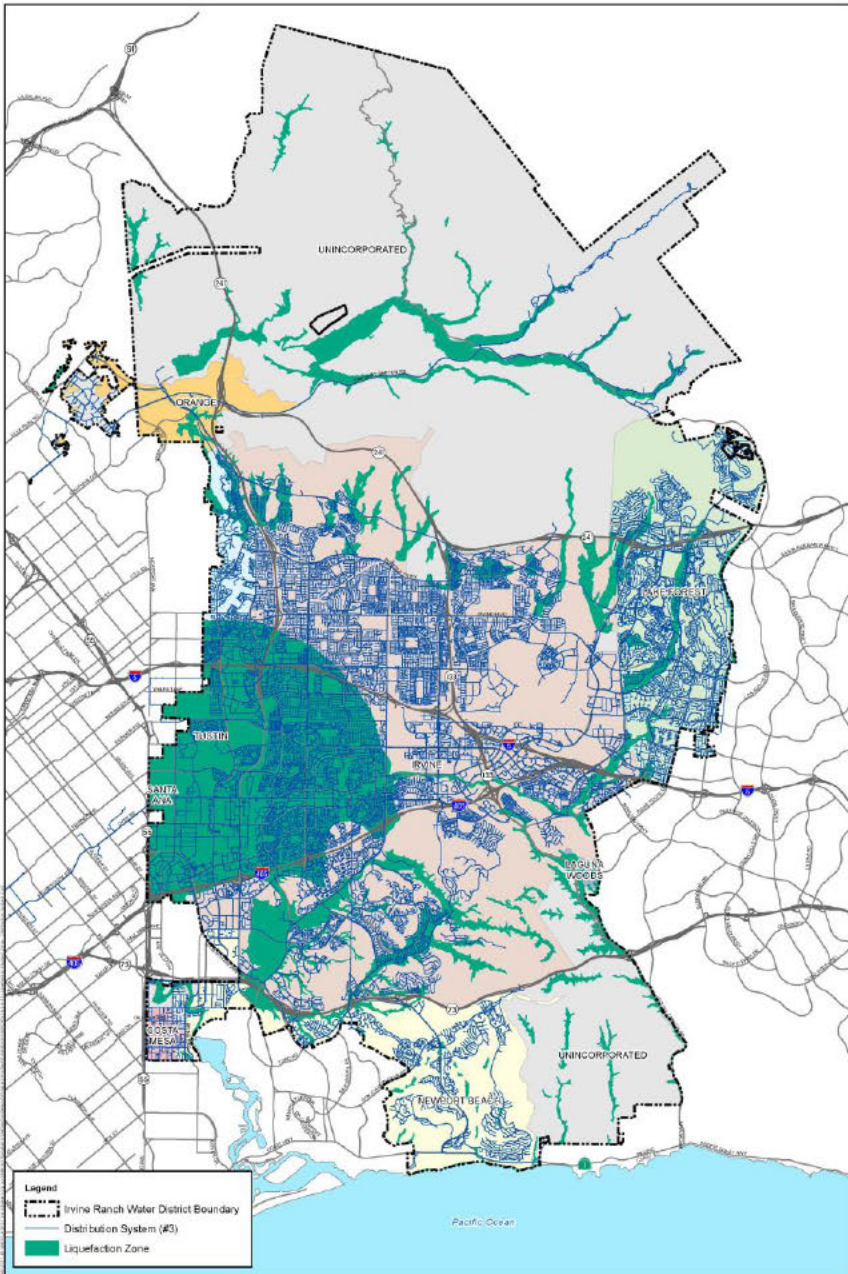
Exhibit 4-13



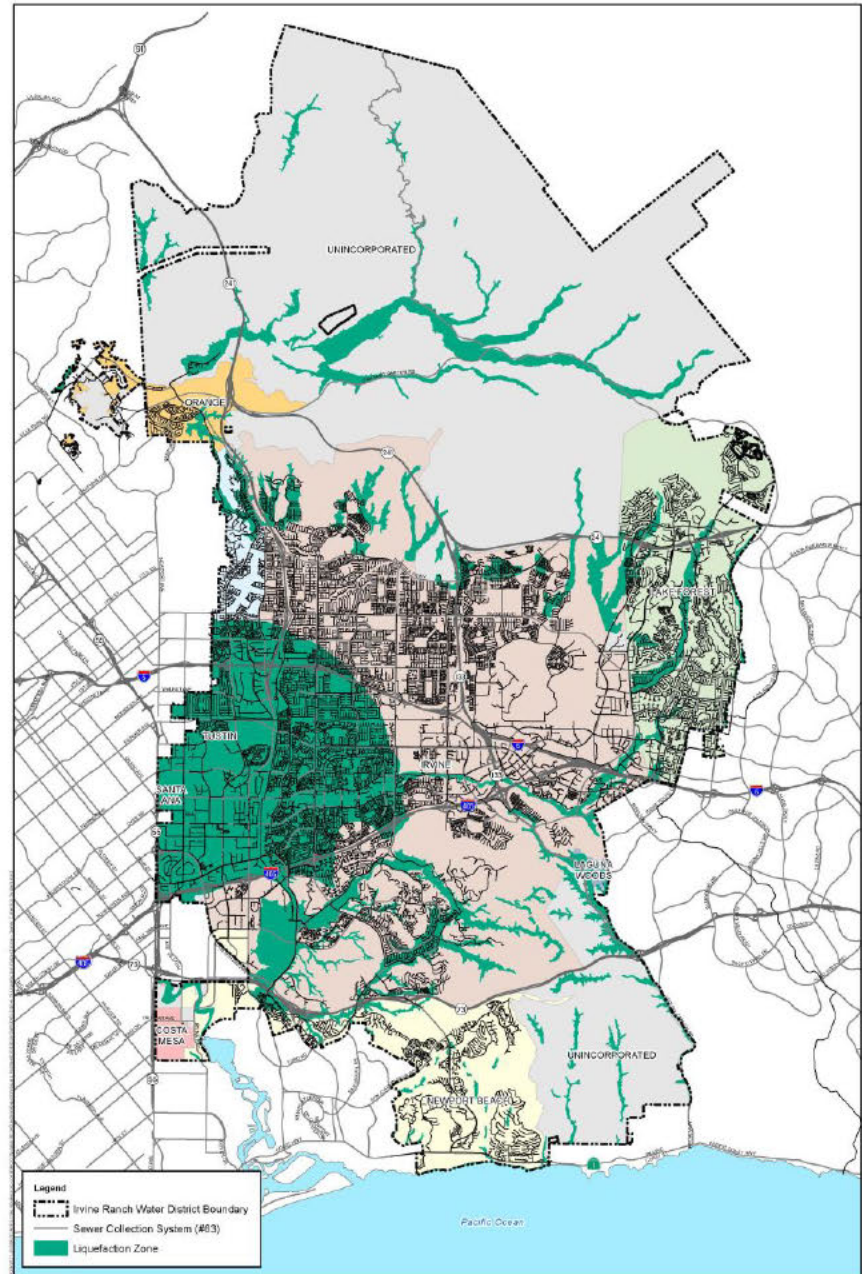
Irvine Ranch Water District Local Hazard Mitigation Plan
Ground Shaking Susceptibility - Distribution System
Exhibit 4-15



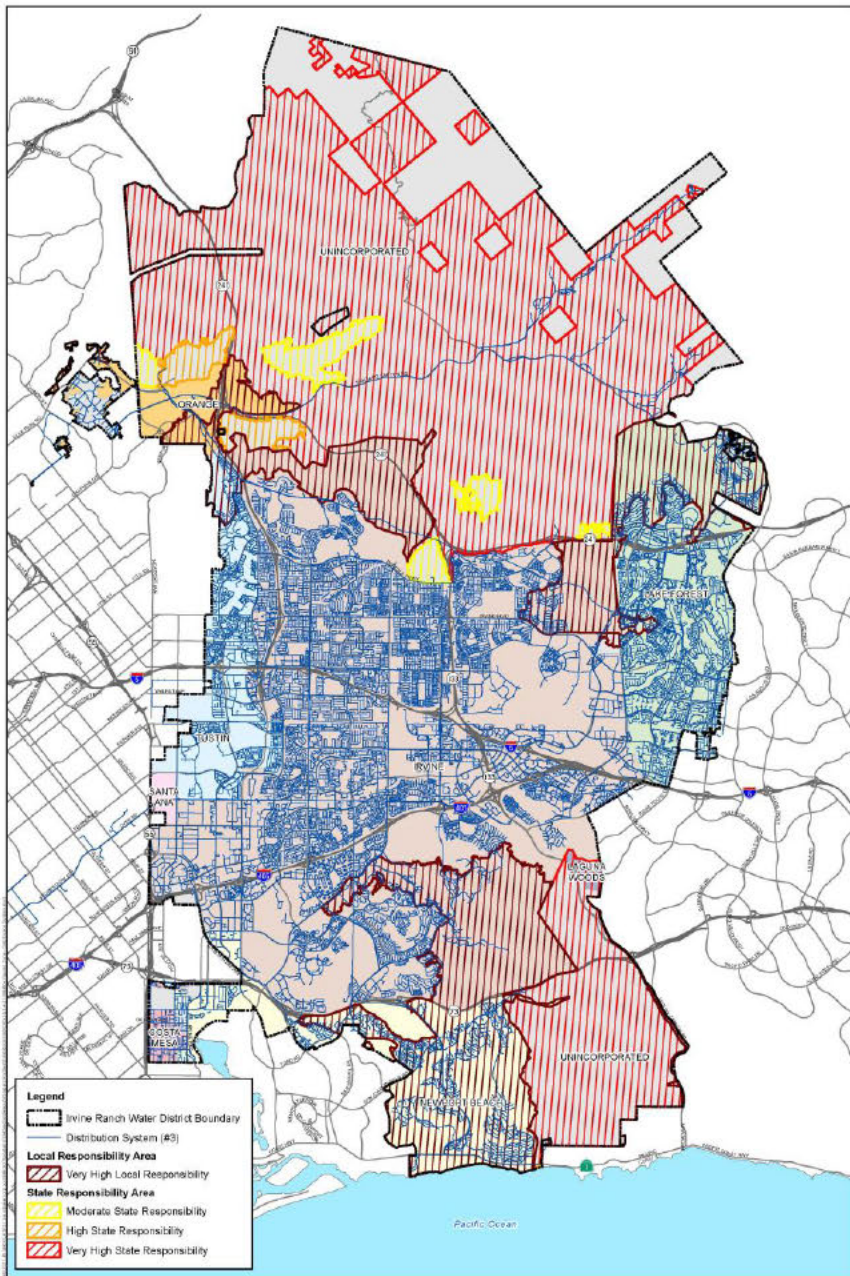
Irvine Ranch Water District Local Hazard Mitigation Plan
Ground Shaking Susceptibility - Sewer Collection System
Exhibit 4-16



Irvine Ranch Water District Local Hazard Mitigation Plan
Liquefaction Hazard Zone - Distribution System
Exhibit 4-18

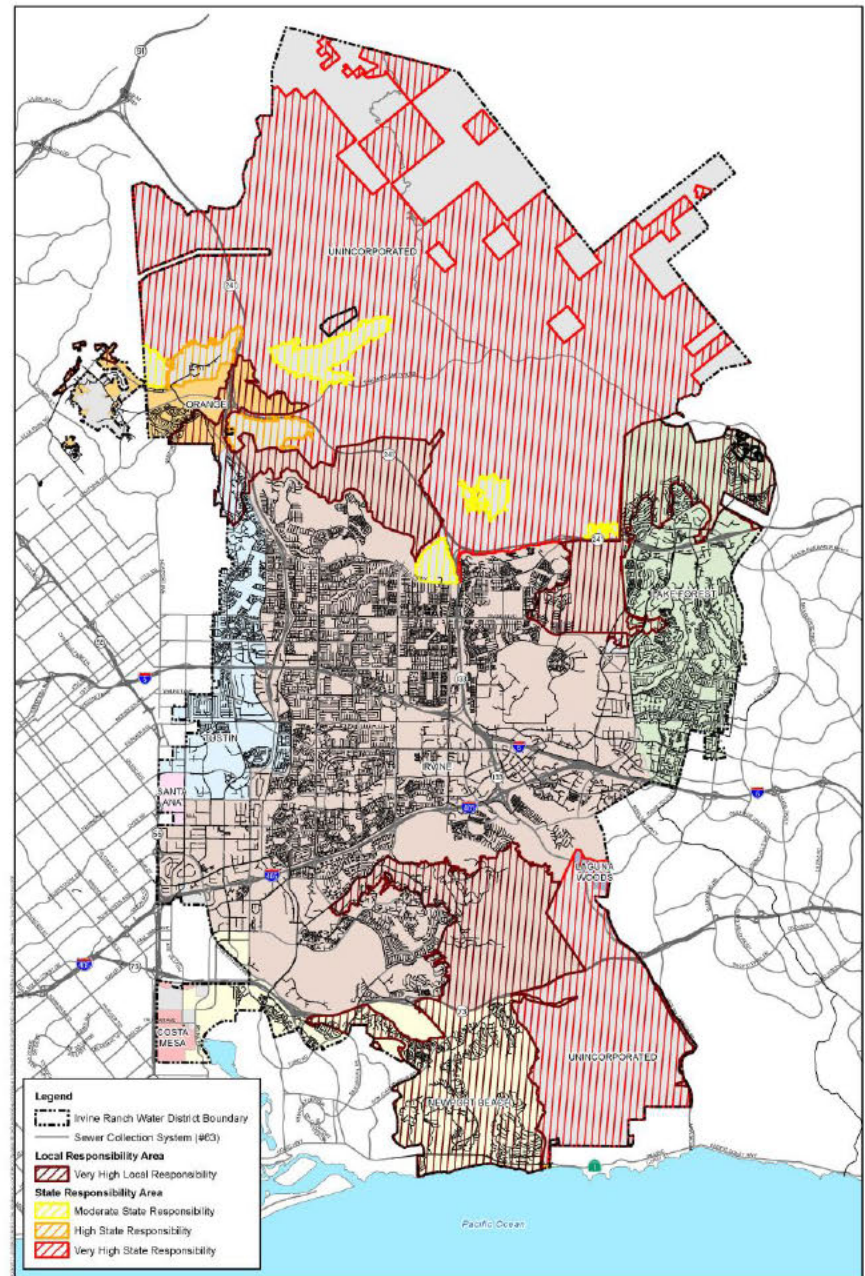


Irvine Ranch Water District Local Hazard Mitigation Plan
Liquefaction Hazard Zone - Sewer Collection System
Exhibit 4-19



Irvine Ranch Water District Local Hazard Mitigation Plan
Wildfire Hazard Zone - Distribution System

A-461



Irvine Ranch Water District Local Hazard Mitigation Plan
Wildfire Hazard Zone - Sewer Collection System

Exhibit 4-22



IRVINE RANCH WATER DISTRICT LOCAL HAZARD MITIGATION PLAN

PLANNING TEAM MEETING #4
Wednesday, May 5, 2021
1:30 PM – 3:30 PM, Microsoft Teams

MEETING SUMMARY

Attendees: Refer to Sign-in Sheet

- **Introduction, Recap**
 - *Update from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – Based on the discussions in Meeting #3, tsunami is being removed.*
- **Risk Assessment/Vulnerability - Updates from Meeting #3**
 - Facility Types
 - *Comment from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – We have our facilities list, as discussed last meeting. The critical facilities are called this because a failure at one of these facilities would cause significant issues in maintaining service. Also note that we have separated the distribution system and the collection system into separate graphics for clarity.*
 - Dam Inundation
 - *Comment from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – I know that there was interest shown in showing the inundation areas for dams outside of IRWD, but for this LHMP we are only concerned with the impacts within the IRWD jurisdiction.*
 - *Comment from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – Siphons have now been added to the graphics and lists. I'd like to open up the floor for any mitigation actions that haven't been brought up in terms of dam inundation.*
 - *Ken Pfister (Operations Manager, IRWD) – don't have any from our group.*
 - *Jacob Moeder (Capital Projects Senior Engineer, IRWD) – There is an item, all the way down [the list], is that too far down to talk about now?*
 - *Reply from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – We will be addressing that later unless you want to talk about it now.*
 - *Reply from Jacob Moeder (Capital Projects Senior Engineer, IRWD) – No, I can wait until later.*
 - *Written comment from Jacob Moeder (Capital Projects Senior Engineer, IRWD) – "Quick comment. Syphon Reservoir is spelled with a "y"."*
- Flood Hazards
 - *Comment from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – I want to open up the floor for any discussion on flood hazards.*
 - *No comment*

Michael Baker

INTERNATIONAL

- Landslides
 - *Comment from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – I want to open up the floor for any discussion on landslides.*
 - *No comment.*
- Faults
 - *Comments from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – We have multiple faults in Southern California. One of the faults in IRWD is the San Joaquin Thrust Fault. There is some debate among scientists whether this is active or not. With all of the faults in IRWD, there are very few intersections with critical facilities. I don't think, from earlier meetings, that there were any concerns with fault rupture, but if that has changed, I'm more than happy to discuss that now... If not, that's fine as we know this is something that is evaluated at the time of project initiation.*
- Groundshaking
 - *Comment from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – This hasn't changed.*
- Liquefaction
 - *Comment from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – The graphics have been updated as a lot of the siphons were located in the liquefaction zone. This is something we will consider in the mitigation action phase.*
 - *Comment from Dorien McElroy (Collections Systems Manager, IRWD) – We had a few discussions with this – Alix and Jose and I – I think we are good with this.*
- Wildfire
 - *Comment from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – No significant updates from the last time we presented this. There are a few siphons here, but they are underground and if there were any siphon failures, they would be constructed differently anyways. If there's any comments on the graphics or vulnerability tables, I'm happy to discuss this now, before we jump into the next portion of our presentation.*
- Non-Mapped Hazards
 - *Comment from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – We chose to keep Geologic Hazards as a service area wide hazard as the soils across the service area are susceptible to the same hazards.*
- **Survey Summary/Community Outreach Summary**
 - *Summary from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – We received over 1,750 responses. This is the biggest survey response I've seen in a long time. The majority of survey responders live within the service area. We did have a good amount from people who work in the area. One portion of the survey asked how prepared people feel in case of an emergency situation. The response was about average for what we see in these surveys. A lot of people said that email and direct mail were the most favored ways of receiving information. A lot of people stated their concern regarding power outages.*
 - *Comment from John Fabris (Public Affairs Manager, IRWD) – This is fascinating that with all of the outreach and the perception of negative public opinion that dam/reservoir failure is not a big concern.*

Michael Baker

I N T E R N A T I O N A L

- *Reply from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – Yes, only 7 percent of people who responded said they were extremely concerned.*
- *Summary from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – A good amount of people expressed concern about climate change as well. This is something that is incorporated into every LHMP as well. Over 800 of the survey respondents asked to be notified when the LHMP is ready for public review. We are excited for this response and for what we’ll see in terms of public involvement once we release it for public review.*
- **Mitigation Strategy**
 - *Comment from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – We will briefly go over the strategy of what we do for mitigations: mitigation goals, mitigation actions, then the action plan.*
 - Review and Discussion of mitigation goals
 - *Comment from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – I know that Alix met and discussed mitigation goals with several of you. Is there anything that we want to add or take away? I’m happy to facilitate this discussion.*
 - *Reply from John Fabris (Public Affairs Manager, IRWD) – This is more about outreach of the project again. I talked with Alix about this and we are planning to do this more in July through social media and the web.*
 - *Reply from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – Thanks John. The promotion of the survey really helped us get a great response.*
 - *Reply from Alix Stayton (Safety Specialist, IRWD) – Yeah, I’ve never seen a response this strong.*
 - *Comment from John Fabris (Public Affairs Manager, IRWD) – And we didn’t see much panic in the responses either.*
 - *Reply from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – Usually with these, we don’t see much panic, because we are taking proactive steps to avoid or mitigation.*
 - *Question from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – Alix, were there any further discussions you wanted to host internally or did we as a group think that these three goals are good for the rest of the plan?*
 - *Reply from Alix Stayton (Safety Specialist, IRWD) – If nobody has any comments, you know, we can set up a meeting, but we have had several meetings about this.*
 - Mitigation actions
 - *Comment from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – Mitigation actions are different from actions to prepare or respond to an event, which would be more in line with an EOP. This is the formal review that FEMA will use [STAPLE/E Review and Selection Criteria].*
 - Mitigation Prioritization and Timeframe
 - *Comment from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – Alix will be hosting some side meetings about establishing categories of prioritization and the timeframe, so we don’t need to get too far into the weeds on this, but just so everyone knows that this is what is on the horizon.*

Michael Baker

I N T E R N A T I O N A L

- *Comment from Alix Stayton (Safety Specialist, IRWD) – I was able to share the document, so the list I shared is what Noelle is about to go over.*
- *Comment from Jacob Moeder (Capital Projects Senior Engineer, IRWD) – For the Dam Safety Plan, we have something similar, but it is more focused on what could occur, identifying specific items, where this is more high-level. Does the Dam Safety Plan need to be coordinated with what you’re preparing or are they completely separate?*
- *Reply from Alix Stayton (Safety Specialist, IRWD) – They are completely separate. This is more about us making an internal assessment on what we should tackle first. There are no dependencies on anything in the plan. It is not connected in that way.*
- *Comment from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – remember that the mitigation actions are high level and we don’t need to get too specific. But at the same time, we want to be clear and specific enough to give people clarity down the line. It sounded like maybe we were talking about deleting dam safety from this Plan?*
 - *Reply from Alix Stayton (Safety Specialist, IRWD) – No, I don’t think so.*
 - *Reply from Jacob Moeder (Capital Projects Senior Engineer, IRWD) – I don’t know about that, but our assessment of the dam extends beyond just the dam itself. Item 12 seemed pretty specific and I didn’t know if it should be broader.*
 - *Reply from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – We can delete the “potential spillway and outlet” portion.*
 - *Reply from Jacob Moeder (Capital Projects Senior Engineer, IRWD) – and just leave the “extremely high” since that is the only category we use for these.*
- *Comment from Colton Martin (Mechanical Services Manager, IRWD) – Number 17, the responsible department for that is Electrical and Instrumentation, not Mechanical. Thank you.*
- *Comment from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – We know that Alix has held several meetings before Meeting 3 and before this meeting. Michael Baker then added in suggestions to make sure each area is covered and to add in best practices and incorporate items that we know are applicable. Item 14 is a good example of this.*
- *Question from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – Do we have any comments or suggestions on the mitigation actions in the terms of the ones that are addressed to all hazards?*
 - *Comment from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – Alix, I know we had some questions on the Regulatory Lab.*
 - *Reply from Alix Stayton (Safety Specialist, IRWD) – Lars is in an audit, Randy is in a meeting so I’ll talk to him later today. Also, this isn’t your only chance to look at this list. But we are getting close to it. Noelle, what kind of timeline would you give for when people can get this back to me?*
 - *Reply from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – I sent you an email with a timeline that had the final for you to get it to me is May 12, so maybe May 11 for them to get it to you.*
 - *Reply from Alix Stayton (Safety Specialist, IRWD) – Okay, I’m learning that the earlier the better as often we need input from multiple departments.*
 - *Written comment from Jacob Moeder (Capital Projects Senior Engineer, IRWD) – “Alix – Joe Lam might be another good resource for the two modes of communication question.”*

Michael Baker

INTERNATIONAL

- Question from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – Should we have a review of the Dam Safety Program every year?
 - Written reply from Thomas Malone (Director for Information Services, IRWD) – “I don’t think so. They should send a SOW, I think. It can be simple.”
 - Reply from Jacob Moeder (Capital Projects Senior Engineer, IRWD) – if we are saying having this broad description that covers these future studies, I don’t think we need to add anything else.
 - Question from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – Starla, should we do something else to bolster this?
 - Reply from Starla – I’m wondering if we incorporate something that is connecting the two together. I know we have evaluate dams improvements, but maybe something specific to review of the Dam Safety Program. Make sure that the studies and things like that gets wrapped back into the HMP for potential funding. Maybe we can work on a mitigation that allows for that.
 - Reply from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – Okay, so bolster what we have.
- Drought Mitigation
 - Comment from Jacob Moeder (Capital Projects Senior Engineer, IRWD) – We do have other studies that discuss potable reuse other than the Sewage Treatment Master Plan.
 - Reply from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – Do we delete the specific reference and make it general or list out each study?
 - Reply from Starla – I think we keep it general.
 - Question from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – Any other drought actions? Like maybe in terms of public awareness, education opportunities, anything in terms of a mitigation action for that hazard?
 - Reply from Jacob Moeder (Capital Projects Senior Engineer, IRWD) – Maybe John wants to chime in on that, but the last drought there was a lot of outreach, but maybe John wants to contribute on that.
 - Reply from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – John, if you’re still with us, campaign strategies, outreach strategies, etc. are all important, even though they are not part of the infrastructure.
- Flood Mitigation
 - Comment from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – We do have a good amount of hazard mitigation actions addressing flood. A question I had for the group, I know there was a lot of work getting the Michelson out of the flood area. My question in terms of mitigation actions, are there any other facilities where something similar would be good or helpful? If not, that’s okay, we’ve got the focus group meeting, and interested agencies meeting that all contributed.
 - Comment from Owen O’Neill (Electrical & Instrumentation Manager, IRWD) – On item 17, is this something we are already doing or proposing to do? Because we are already doing this.
 - Reply from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – Yes, this is something that we know you are already doing and this is for ongoing action.
 - Reply from Owen O’Neill (Electrical & Instrumentation Manager, IRWD) – Okay, thank you.

Michael Baker

I N T E R N A T I O N A L

- *Comment from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – and if there are other things that you are actively doing for mitigation, let us know because we can incorporate them here.*
- **Geologic Hazards Mitigation**
 - *Comment from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – We only have one mitigation action for this hazard. Are there any other actions that are either ongoing or wishlist items to protect against subsidence and/or expansive soil?*
 - *Reply from Jacob Moeder (Capital Projects Senior Engineer, IRWD) – That’s kind of project by project, not a global study.*
 - *Reply from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – Yeah and from our research it doesn’t seem like there is any ongoing or lingering concerns.*
- **Human-Caused Hazards Mitigation**
 - *Comment from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – We received one developed by Alix’s focus group for developing a cybersecurity plan. Our team has identified two additional mitigation actions. I know that IRWD does a lot in understanding and maintaining your certifications and best practices. Is there anything else we want to add?*
 - *Reply from Alix Stayton (Safety Specialist, IRWD) – I guess in terms of terrorism and vandalism, I can go back to Alan and see if there is anything we want to add. Because we have security and of course they do a lot to prevent vandalism.*
 - *Reply from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – Good, and we’d be happy to bolster with HazMat mitigations.*
- **Landslide and Mudflow Mitigation**
 - *Comment from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – We’ve got four actions outlined here. One of them is tied to wildfire events. Are there any location specific actions we want to incorporate for this known hazard? If so, we are happy to do so now.*
 - *Reply from Malcolm Cortez (Engineering Manager, IRWD) – No others.*
- **Multiple Hazards Mitigation**
 - *Comment from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – A lot of these relate to communications and communications processes, location of storing generators. Power outage is a big concern from the responses we received to the survey and we can see in the mitigation actions that this is reflected here with a lot of these addressing power outage issues. Anything we should add? Should we be more specific or more general?*
 - *Reply from Owen O’Neill (Electrical & Instrumentation Manager, IRWD) – Looks fine to me, but could you scroll down a little bit?*
 - *Reply from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – to Item 32?*
 - *Reply from Owen O’Neill (Electrical & Instrumentation Manager, IRWD) – So would they be portable generators instead of permanent?*
 - *Reply from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – this is something from Alix’s meeting, but maybe something got lost in translation*
 - *Reply from Owen O’Neill (Electrical & Instrumentation Manager, IRWD) – and we want to make Responsible Department Mechanical as well as Electrical.*
 - *Comment from Jacob Moeder (Capital Projects Senior Engineer, IRWD) – Do we want to not say portable or permanent so we can decide later?*

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- *Reply from Owen O’Neill (Electrical & Instrumentation Manager, IRWD) – Yeah, that’s good.*
- *Comment from Colton Martin (Mechanical Services Manager, IRWD) – Item 31, should be Mechanical as well there.*
 - *Reply from Alix Stayton (Safety Specialist, IRWD) – That was designed specifically for Reg Comp, so do we want to broaden the language?*
 - *Reply from Colton Martin (Mechanical Services Manager, IRWD) – This would be for FEMA trailers and things like that?*
 - *Reply from Alix Stayton (Safety Specialist, IRWD) – let’s change it to District instead of Reg Compliance.*
 - *Comment from Dave Crowe (Construction Manager, IRWD) – And we should say equipment instead of vehicles because there’s a lot more than just vehicles.*
 - *Comment from Alix Stayton (Safety Specialist, IRWD) – I learned that its really important for the Reg Compliance vehicles to be staged where they can still move, so we might want to leave the word vehicle.*
- *Jacob Moeder (Capital Projects Senior Engineer, IRWD) – We talked about hazards, we are talking about replacing the entire Sewage Treatment Plant at Los Alisos. As part of that project, we might replace the fuel station there. I don’t know if tehre’s value in identifying something in relation to a fueling station.*
 - *Question from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – is that the LARP facility?*
 - *Question from Alix Stayton (Safety Specialist, IRWD) – Should we be saying something about fueling? We have more than one fueling location.*
 - *Comment from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – Now that I’m thinking about it, we have these generators, especially the portable ones, we can add something about it. Are you feeling that the fueling stations are adequately spaced out?*
 - *Reply from John Dayer (Facilities/Fleet Manager, IRWD)– they are pretty spaced out, but we did identify a vulnerability and that was a sufficient amount of fuel. We ran some studies and we have a capital project in the works to increase the fuel capacity.*
 - *Written comment from Lisa Haney (Regulatory Compliance Manager, IRWD) – “Thanks for bringing this up John. CNG and different fuel types also.”*
 - *Reply from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – We can fold this in as a multiple hazard into this section right here.*
 - *Comment from Alix Stayton (Safety Specialist, IRWD) – Speaking of fuel, I don’t think fuel is mentioned as a hazardous material at all. I can look more into that to see if it is worth adding it in here.*
 - *Comment from John Dayer (Facilities/Fleet Manager, IRWD)– we have mitigation actions that depend on generators. So if we have these generators then it wouldn’t be good to have them all empty. So this fuel mitigation would be in support of other mitigation actions.*
 - *Written comment from Lisa Haney (Regulatory Compliance Manager, IRWD) – “There are regulations to move fleet towards electric, so this will be an increasing need in a hazard situation for the future. Access to charging vehicles during an emergency. We have plenty of time on the horizon for this, just wanted to put it on the radar.”*

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- *Question from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – Is there any expansion or anything that needs to be added in terms of access to your facilities in terms of wildfire or any other hazards?*
 - *Reply from John Dayer (Facilities/Fleet Manager, IRWD)– We talked about this at a meeting with Colt and Alix*
 - *Reply from Alix Stayton (Safety Specialist, IRWD) – Yes, that’s why Noelle brought it up. We know this surfaced for Mechanical and Electrical. Are there any other groups that have access issues? If there are, let us know.*
 - *Reply from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – or like we were talking about earlier, getting the vehicles out of Michelson before the flood gates close, things like that are good to note.*
- **Seismic Mitigation**
 - *Comment from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – We have a lot of generalized actions for this one. Unless there’s any other earthquake, seismic thoughts, I think we can leave it.*
 - *Comment from Alix Stayton (Safety Specialist, IRWD) – No, I don’t have anything additional.*
- **Wildfire Mitigation**
 - *Comment from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – Our last one in terms of addressing hazard is wildfire. We have some good ones we developed during meeting 3. We’ve got a study to assess canyon facilities. We have another that circles back to that access issue. Are there any others to add?*
 - *Comment from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – Like we were saying earlier, Alix is going to be meeting with some of the focus groups. Just a reminder we will be coordinating with you in defining the categories for prioritization and timeframe. It is acceptable to include actions and studies that will be in the long-term, even though these HMPs last 5 years. So keep that in mind.*
 - *Reply from Jacob Moeder (Capital Projects Senior Engineer, IRWD) – for the drought, was there any discussion with water resources about our water banking? Or is that not included?*
 - *Reply from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – that would be something good to add.*
 - *Reply from Alix Stayton (Safety Specialist, IRWD) – Yeah, let me circle back to Kelly because that would be something good.*
 - *Reply from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – Yeah and that would help bolster the drought mitigations as well.*
- **Capabilities Assessment**
 - *Comment from Noelle Steele (PROJECT MANAGER, MICHAEL BAKER INTL) – Alix has been coordinating and we will incorporate this. We will be contacting some of you for details.*
- **Next Steps**
 - Complete Draft LHMP for Planning Team Review
 - May 5 – June 18, 2021
 - Planning Team Review of LHMP
 - June 21 – July 2, 2021

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- Revise LHMP for Public Review
- Public Review
 - July 20 – August 3, 2021

**Irvine Ranch Water District LHMP – Draft Mitigation Actions
Planning Team Meeting – May 5, 2021**

#	Mitigation Action	Hazard(s) Addressed	Responsible Department(s)	Internal Notes
1	Provide redundant underground communication systems for critical facilities to insure reliability of operating systems.	All Hazards	Automation, Information Systems, Facilities	From Alix focus group prior to Meeting #4
2	Build redundancy into the wastewater collection, treatment, disposal and non-potable distribution system to mitigate major structural defects.	All Hazards	Recycling Operations, Engineering	From Alix focus group prior to Meeting #4
3	Identify additional back-up communication systems (such as satellite phones or radio) for purchase, to utilize if primary communication systems become unavailable. Ensure that coverage includes the entirety of the IRWD service area. Include annual training opportunities.	All Hazards	Safety, Information Services, Facilities/Fleet	From Alix's Focus Group prior to Meeting #3
4	Develop a technical communications plan to build redundancy and evaluate the cost/benefit and feasibility of different communications systems .	All Hazards	Safety, Information Services, Facilities/Fleet	Discussion with Alix prior to Meeting #4
5	Implement and maintain both internal and external alert/warning systems to effectively communicate hazard threats to staff and customers. Include alert/warning system in a regular training program.	All Hazards	Customer Service, Safety, Public Affairs	From Alix's Focus Group prior to Meeting #3
6	Implement and maintain information sharing mechanisms/platforms for involved departments to utilize during a disaster response. Ensure the platform can be viewed on network devices and mobile devices, while maintaining data security.	All Hazards	Safety, Information Services	From Alix's Focus Group prior to Meeting #3
7	Evaluate and study the practicality of alternate regulatory lab reporting site certification, in the case of failure at Michelson. Consider the feasibility of locating and certifying an alternative regulatory lab reporting site at LARP.	All Hazards	Water Quality	From Alix's Focus Group prior to Meeting #3
8	Develop and maintain Specific Hazard Response Plans (SHRPs) as vulnerabilities become apparent. Include SHRPS in regular training and exercise programs.	All Hazards	Safety, related departments	From Alix's Focus Group prior to Meeting #3
9	Maintain Water Emergency Response Organization of Orange County (WEROC) membership for communication and collaboration opportunities with regional water districts, including identification and implementation of mitigation actions with shared benefits.	All Hazards	Safety	From Alix's Focus Group prior to Meeting #3
10	Enhance flexibility and connectivity for alternative work on-campus sites, with more mobile cell phone equipment and robust VPN capability.	All Hazards	Information Services	From Alix's Focus Group prior to Meeting #3
11	Establish alternate route mapping for critical facilities that avoid bridges, and fold into the IRWD EOP once complete.	All Hazards	Engineering, Water Operations, Recycling Operations, Safety	From Alix's Focus Group prior to Meeting #3

Commented [SN1]: Add in additional coms capabilities project – coordinating with County of Orange to see if communication space on tower could be given to IRWD. Would need same brand of equipment, same radio frequency. Would allow for SCADA radio communications only.

#	Mitigation Action	Hazard(s) Addressed	Responsible Department(s)	Internal Notes
12	Evaluate dams, potential spillway and outlet improvements for “extremely high” and “high” hazard dam/reservoirs to increase resiliency, in coordination accordance with the Dam Safety Program.	Dam/Reservoir Failure	Engineering	Developed during Meeting #3
13	Seek funding opportunities to further study, plan and implement the IRWD potable reuse program, as identified in the Sewage Treatment Master Plan (January 2021).	Drought	Water Resources	Developed during Meeting #3
14	Continue to proactively monitor drought conditions or water conservation warnings issued by state agencies or regional water authorities.	Drought	Water Resources	MBI suggested action
15	Prepare a Recycled Water Shortage Contingency Plan. Consider seeking funding to prepare.	Drought	Water Resources	From Alix’s Focus Group prior to Meeting #3
16	Assess permanently elevating water-sensitive equipment and anchoring fuel tanks in flood-prone locations. Consider seeking funding to assess and/or implementation.	Flood	Engineering	From Alix’s Focus Group prior to Meeting #3
17	Regularly check and maintain radar flood level gauges located in San Diego Creek.	Flood	Electrical and Instrumentation Mechanical	From Alix’s Focus Group prior to Meeting #3
18	Designate alternative locations for residual dirt and fill storage, away from the Michelson Yard.	Flood	Construction, Facilities	From Alix’s Focus Group prior to Meeting #3
19	Continue coordination with police and public safety agencies for IRWD-preferred response actions during localized flooding incidents, to prevent increased flood waters impacting IRWD facilities associated with the lifting of manhole covers.	Flood	Safety, WEROC, Recycling Operations	Developed during Meeting #3
20	Continue to coordinate with customer cities and the County to ensure proper storm drain maintenance, to prevent against localized flooding due to sediment or debris in the drainage system.	Flood	Safety, WEROC, Recycling Operations	Developed during Meeting #3
21	Conduct inflow & infiltration study to determine where 50 year and 100 year flood waters would collect. Study outcomes should include the following: <ul style="list-style-type: none"> • What assets, including the collections conveyance system, would be affected? • What facilities or equipment would need rehabilitation or replacement after a 50 year or 100 year flood? How should that work be prioritized? • What would be the cost of the necessary temporary equipment to get the service area up and running, during the replacement/rehabilitation project? • How would these impacts on the wastewater affect potable water operations? Will they contaminate storage wells? • How would this affect IRWD’s recycled water business? 	Flood	Engineering, Recycling Operations	From Alix focus group prior to Meeting #4

- Commented [SN2]: Double check as a capability.
- Commented [SN3R2]: Dam Safety implementation plan.
- Commented [SN4]: Additional capabilities.

#	Mitigation Action	Hazard(s) Addressed	Responsible Department(s)	Internal Notes
	<ul style="list-style-type: none"> What measures could IRWD take to prevent or mitigate any of the identified damage? Consider seeking funding for plan preparation.			
22	Continue to conduct geotechnical studies for geologic hazards on new construction projects when appropriate, to evaluate vulnerabilities for land subsidence and expansive soils.	Geologic Hazards (Land Subsidence, Expansive Soil)	Engineering	MBI suggested action
23	Continue to support customer cities and the County in community outreach actions regarding the proper handling, storage and disposal of hazardous materials.	Human-Caused Hazards (Hazardous Materials)	Safety, Public Affairs	MBI suggested action
24	Continue to monitor and track regulatory requirements and updates as they relate to hazardous materials storage and response actions.	Human-Caused Hazards (Hazardous Materials)	Safety	MBI suggested action
25	Develop a Cybersecurity Plan in coordination with a consultant and include an IS/Network focused Business Continuity Plan (BCP). Consider seeking funding to prepare plan.	Human-Caused Hazards (Terrorism/Sabotage, Cyberattacks)	Information Services	From Alix's Focus Group prior to Meeting #3
26	Evaluate and study critical facilities and facilities of concern that could benefit from protective retaining wall installation.	Landslide/Mudflow	Engineering	Developed during Meeting #3
27	Following wildfire events, continue to partner with Cal Fire, Orange County Office of Emergency Preparedness, Orange County Fire Authority, and Orange County Sheriff's Department, to identify the potential and location for landslide and/or mudflow events associated with heavy rainfall.	Landslide/Mudflow	Engineering, Safety, WEROC	MBI suggested action
28	Consider development of a project utilizing the recent hyper-local landslide study and resulting report (2021 WERT report) in combination with assessment of canyon facilities to determine potential for additional mitigation projects protecting against debris flow.	Landslide/Mudflow	Operational Area partners, WEROC, Water Operations, Recycling Operations, Facilities, Engineering	From Alix focus group prior to Meeting #4
29	Continue to conduct geotechnical studies for onsite landslide on any new construction project.	Landslide/Mudflow	Engineering	From Alix focus group prior to Meeting #4
30	Assess the communications resilience in canyon areas; address capacity of canyon facilities to communicate with each other (some are linked and dependent), as well as sending communications back to IRWD staff in other locations monitoring facility status.	Multiple Hazards – Flood, Landslide/Mudflow, Severe Weather (Coastal Storm/Winter Storm, Windstorm/Santa Ana Winds, Power Outage), Wildfire	Automation, Information Systems, Facilities	From Alix focus group prior to Meeting #4
31	Establish procedures for staging District Regulatory Compliance vehicles, materials, and equipment at alternative work locations prior to significant storm events.	Multiple Hazards – Flood, Severe Weather (Coastal Storm/Winter Storm)	Regulatory Compliance <u>and</u> <u>Mechanical</u>	From Alix's Focus Group prior to Meeting #3

Commented [SN5]: Hazmat plan

#	Mitigation Action	Hazard(s) Addressed	Responsible Department(s)	Internal Notes
32	Continue to locate permanent electrical generators at Water Treatment Plants for short-term power solutions.	Multiple Hazards – Severe Weather (Coastal Storm/Winter Storm, Windstorm/Santa Ana Winds, Power Outage), Wildfire	Electrical <u>and Mechanical</u>	<i>From Alix's Focus Group prior to Meeting #3</i>
33	Perform monthly maintenance checks on permanent and portable back-up generators, and check fuel supply.	Multiple Hazards – Severe Weather (Coastal Storm/Winter Storm, Windstorm/Santa Ana Winds, Power Outage), Wildfire	Mechanical	<i>From Alix's Focus Group prior to Meeting #3</i>
34	Seek funding opportunities to rehabilitate or replace aging generators in order to maintain critical water and wastewater operations during power outages.	Multiple Hazards – Severe Weather (Coastal Storm/Winter Storm, Windstorm/Santa Ana Winds, Power Outage), Wildfire	Electrical, Engineering, Safety	<i>Developed during Meeting #3</i>
35	Coordinate with Southern California Edison prior to any planned power outage to ensure generator capacity and provide time to pre-position supplies as applicable.	Multiple Hazards – Severe Weather (Coastal Storm/Winter Storm, Windstorm/Santa Ana Winds, Power Outage), Wildfire	Electrical, Safety, WEROC	<i>MBI suggested action</i>
36	Establish a communication plan with Southern California Edison for use during an unplanned power outage to assess the potential duration and extent of the power outage, and associated need for generators and supplies.	Multiple Hazards – Severe Weather (Coastal Storm/Winter Storm, Windstorm/Santa Ana Winds, Power Outage), Wildfire	Electrical, Safety, WEROC	<i>MBI suggested action</i>
37	Utilize data from ongoing generator replacement project to develop further wildfire and power outage mitigation projects, once above study results become available.	Multiple Hazards – Severe Weather (Coastal Storm/Winter Storm, Windstorm/Santa Ana Winds, Power Outage), Wildfire	Engineering, Water Operations, Recycling Operations, Maintenance	<i>From Alix focus group prior to Meeting #4</i>

#	Mitigation Action	Hazard(s) Addressed	Responsible Department(s)	Internal Notes
38	The necessity for fire agency escorts into fire-affected areas has complicated physical access to facilities for refueling. Increase the capacity of current portable fueling equipment to allow better access to affected facilities with fewer trips during active fire activity. This project will also increase efficiency during power outages that do not involve wildfires.	Multiple Hazards – Severe Weather (Windstorm/Santa Ana Winds, Power Outage), Wildfire	Fleet, Maintenance	From Alix focus group prior to Meeting #4
39	Extend battery life for the Supervisory Control and Data Acquisition (SCADA) system by purchasing uninterruptible power supply (UPS) to prevent outages in canyon facilities. Evaluate which locations would benefit from the additional UPS.	Multiple Hazards - Wildfire, Windstorm (Power Outage)	Automation	From Alix's Focus Group prior to Meeting #3
40	Monitor changes/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.	Seismic Hazards (Fault Rupture, Ground Shaking, Liquefaction)	Engineering	MBI suggested action
41	If any IRWD-owned critical facility is determined to be seismically vulnerable, identify a plan to conduct structural retrofitting, including funding sources.	Seismic Hazards (Fault Rupture, Ground Shaking, Liquefaction)	Engineering	MBI suggested action
42	As repair and rehabilitation needs are identified in vertical structural facilities, consider options that increase seismic stability and resiliency as needed. Make improvements in accordance with current codes.	Seismic Hazards (Fault Rupture, Ground Shaking, Liquefaction)	Engineering	From Alix focus group prior to Meeting #4
43	Consider developing and seeking funding for an evaluation program to determine the seismic vulnerability of critical assets.	Seismic Hazards (Fault Rupture, Ground Shaking, Liquefaction)	Engineering	From Alix focus group prior to Meeting #4
44	Include assessment and mitigation of potential liquefaction conditions in the scope of any new building or infrastructure project.	Seismic Hazards (Liquefaction)	Engineering	From Alix focus group prior to Meeting #4
45	Annually review defensible space, brush clearing and weed abatement needs for all canyon water facilities.	Wildfire	Facilities	From Alix's Focus Group prior to Meeting #3
46	Collaborate with the California Department of Fish and Wildlife (CDFW), CalFIRE, and local firefighting agencies to establish a defensible space strategy in compliance with existing plans and policies that provides IRWD the ability to maintain/remove vegetation around critical facilities in the wildfire hazard zone.	Wildfire	Facilities, Safety, WEROC	Developed during Meeting #3
47	Evaluate opportunities to enhance infrastructure hardscape (including protective walls) and undergrounding utility lines as appropriate.	Wildfire	Engineering	Developed during Meeting #3
48	Conduct a study to assess canyon facilities: <ul style="list-style-type: none"> Which are in the fire field historically? With increased fire activity, is that area growing? Which could be further fire hardened or have protective retaining walls added? 	Wildfire	Engineering, Water Operations, Recycling Operations, Maintenance	From Alix focus group prior to Meeting #4

#	Mitigation Action	Hazard(s) Addressed	Responsible Department(s)	Internal Notes
	<ul style="list-style-type: none"> How should IRWD prioritize any mitigation measures planned? Consider seeking funding for assessment.			
49	Develop measures to improve access to canyon facilities for fueling and maintenance during wildfires. Collaboration with fire agencies and pre-planning with WEROC are two possibilities.	Wildfire	Safety, Water Operations, Recycling Operations, Maintenance	<i>From Alix focus group prior to Meeting #4</i>

B.2
Community Outreach

IRVINE RANCH WATER DISTRICT LOCAL HAZARD MITIGATION PLAN

Survey Summary

April 14, 2021

As part of the outreach for the Local Hazard Mitigation Plan (LHMP), the Irvine Ranch Water District (IRWD) administered a survey to community members to help gauge the level of knowledge the community has about natural disaster issues and to obtain input about areas in IRWD's Service Area that may be vulnerable to various types of natural disasters. The information gained from the survey will help IRWD identify and coordinate projects focused on reducing the risk of injury or damage to property from future hazard events (e.g., earthquakes, heavy rains, drought).

The survey was available from February 9 to March 30, 2021 and received 1,750 responses. It included multiple choice questions with the opportunity to provide comments, and covered demographic information, types of disasters and threats the community might anticipate, how community members would respond, how governing agencies should respond, and community members' readiness in the event of a disaster. The results of the survey are summarized below. Detailed graphs and on each question can be found in [Appendix A](#). Raw data from the survey questions is located within [Appendix B](#).

Summary of Input

Key issues:

Approximately 98 percent of survey respondents live within the IRWD service area, and approximately 20 percent of respondents work within the IRWD service area. Severe weather, power outage, wildfire and drought were noted as key concerns for survey participants. Many IRWD customers reported previously experiencing these hazard events. Seismic hazards and climate change were also noted as key hazards of concern. Items of lesser concern include flood, landslide/mudflow, and dam/reservoir failure.

Preparedness:

In terms of preparedness, respondents indicated that they feel somewhat prepared for a natural hazard. Preparedness actions primarily focused on the following: smoke/carbon monoxide detectors, anchored furniture/utilities, landscape maintenance, earthquake kits, and security measures.

Outreach:

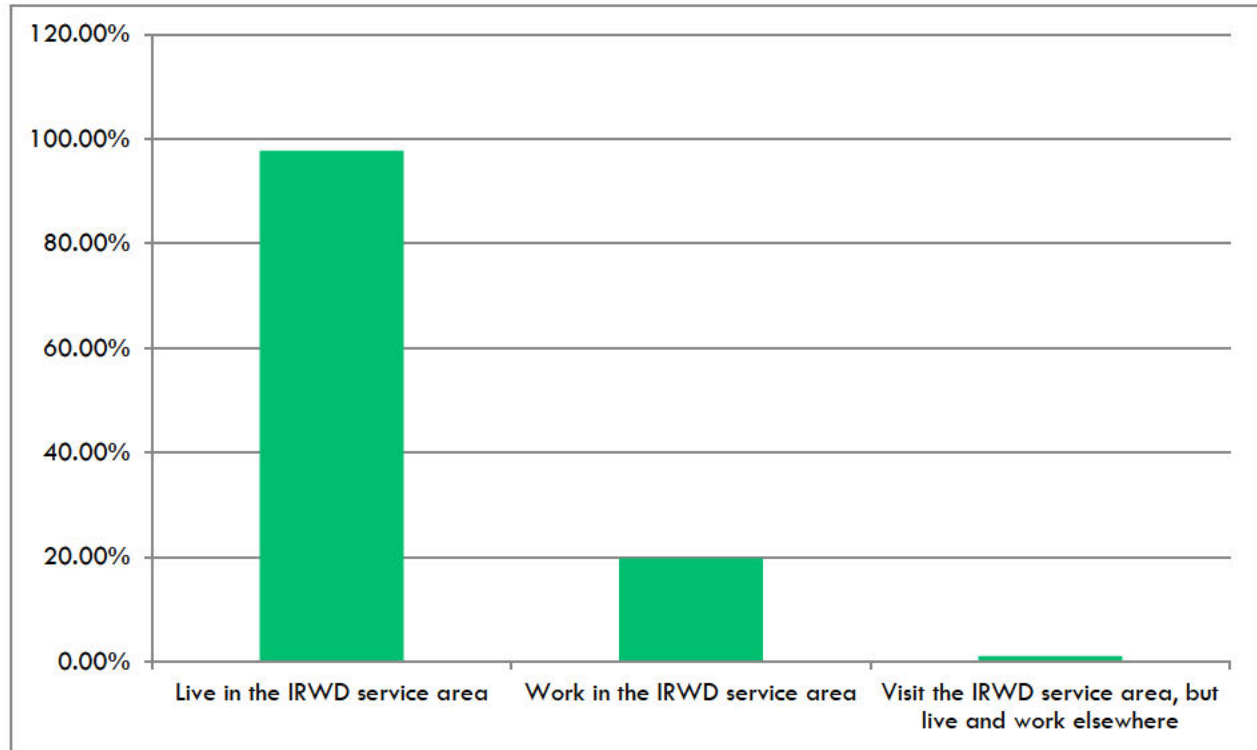
Responses to the most effective ways that respondents would like to receive information was fairly dispersed between the options provided, with Email being the most preferred option. The following are the ten most highly ranked options:

- | | |
|----------------------------|---|
| 1. Email | 7. Community Emergency Response Training (CERT) |
| 2. Direct mail | 8. National Weather Service website |
| 3. City/Agency newsletters | 9. Fire department |
| 4. Emergency hotline | 10. Public awareness campaigns |
| 5. Social media | |
| 6. TV-based media | |

Appendix A: Survey Responses Summary

Question 1: Do you – Check all that apply

Almost 98 percent of respondents live in IRWD service area, and almost 20 percent work within the service area. Only 1.09 percent of respondents visit the IRWD Service Area, but live and work elsewhere.



Question 2: What is your Zip Code?

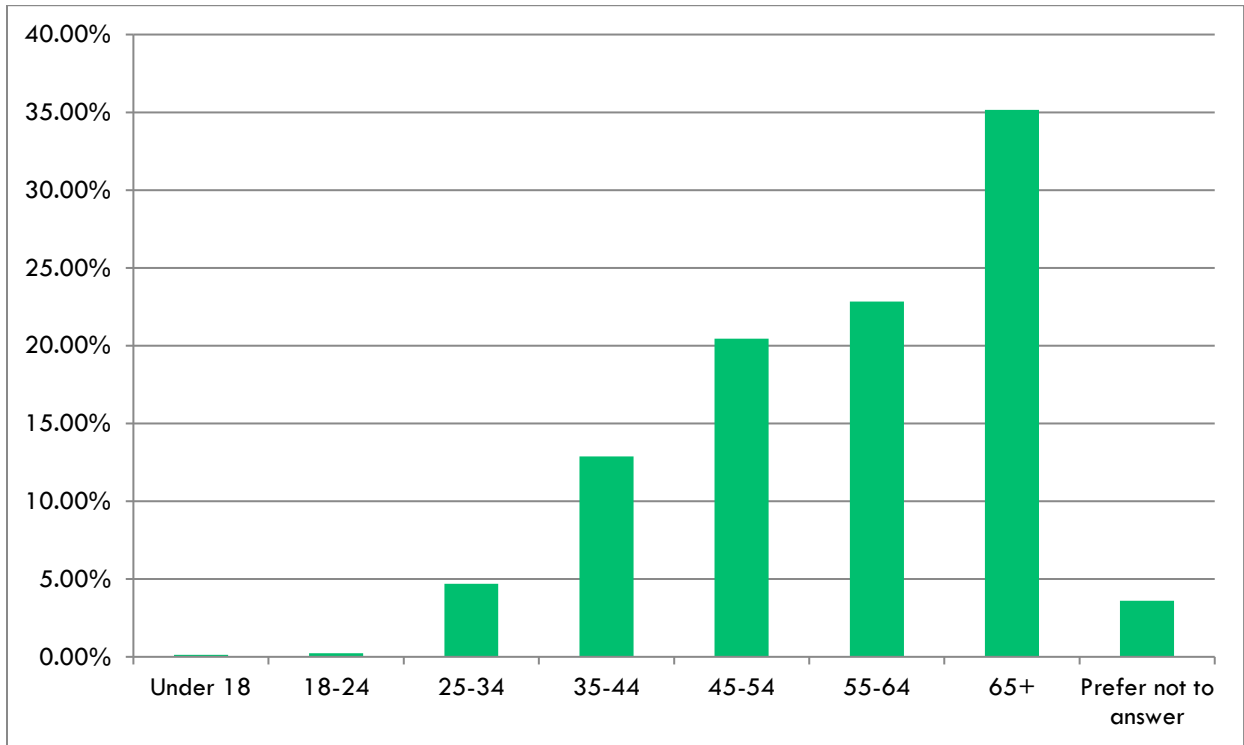
The majority of survey respondents live in the following zip codes: 92630 (Lake Forest), 92620 (Irvine), 92604 (Irvine), 92618 (Irvine), 92614 (Irvine) and 92603 (Irvine/Newport Beach). Additional zip codes are listed in the table below.

Zip Code	Total Respondents	Zip Code	Total Respondents	Zip Code	Total Respondents
92630	243	92780	18	92625	1
92620	210	92869	15	92617	1
92604	173	92677	3	92551	1
92618	151	96825	1	92530	1
92614	130	95620	1	92503	1
92603	116	94614	1	92404	1
92606	98	93630	1	92360	1
92782	96	92865	1	90755	1
92602	93	92833	1	90631	1
92612	89	92705	1	90505	1
92610	82	92704	1	90403	1
92657	55	92692	1	90010	1
92679	31	92688	1	85204	1
92627	30	92663	1	75229	1
92676	29	92656	1	40509	1
92660	26	92626	1		

Appendix A: Survey Responses Summary

Question 3: What is your Age?

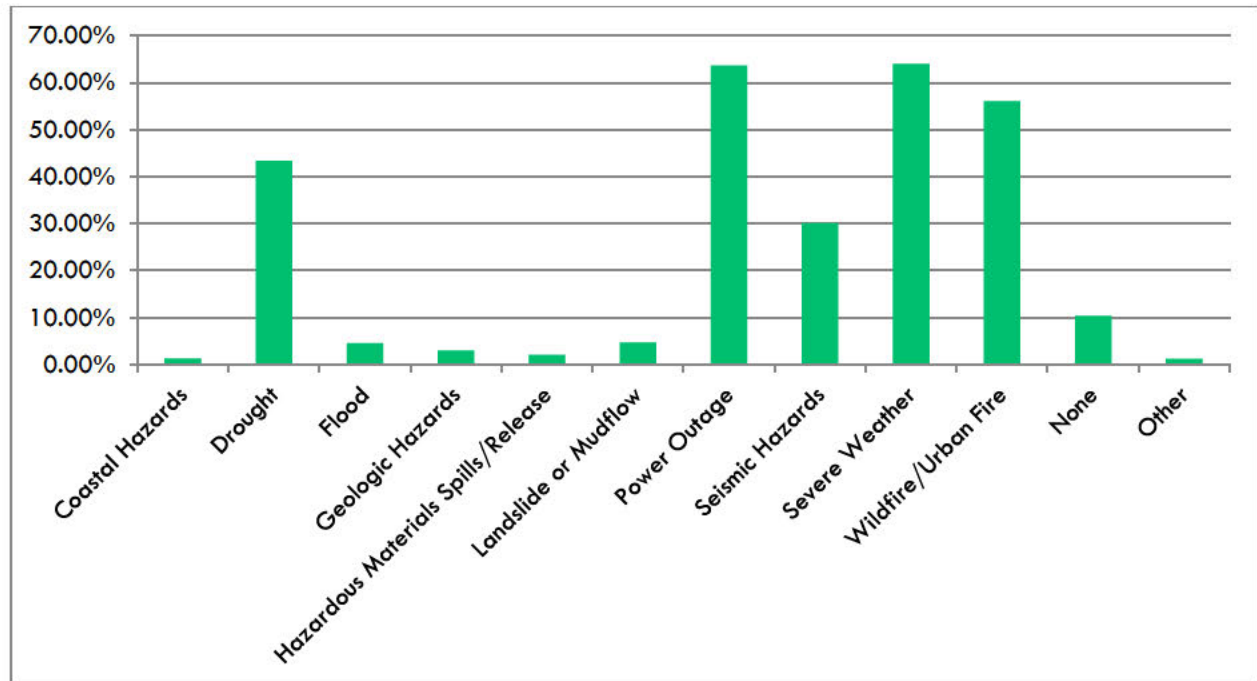
Over half of survey respondents were between the ages of 55 – 64 and 65+ (57.99 percent). Only two respondents were under the age of 18, and four respondents were between the ages 18 – 24.



Appendix A: Survey Responses Summary

Question 4: Which of the following types of natural disasters have you or someone in your household experienced while residing and/or working within the IRWD service area?

Most survey respondents have experienced severe weather (i.e., winter storms and high winds) and power outages. Over half of the survey respondents have also experienced wildfire/urban fire hazards, and approximately 43 percent have experienced drought.



Additional Comments¹

- Access wrong in back of property is serious fire hazard IRWD access road!
- Breaks in main water lines under the streets.
- Earthquake.
- Edison Power Shutoffs due to their lack of maintenance for >20 years.
- El Toro Air Base, Tustin Air base Contamination.
- La Nina.
- Mosquitoes*
- One time stay out of the house in 2020 for fire, it is ok.
- Pipes burst requiring rerouting water pipes.
- There is a large landslide above our neighborhood, that could come down the hill and damage many homes.
- Superfund site for toxic waste disposal.
- Windstorms.

¹ Comments unrelated to the survey topic were not included in this summary, but can be viewed in [Appendix B](#).

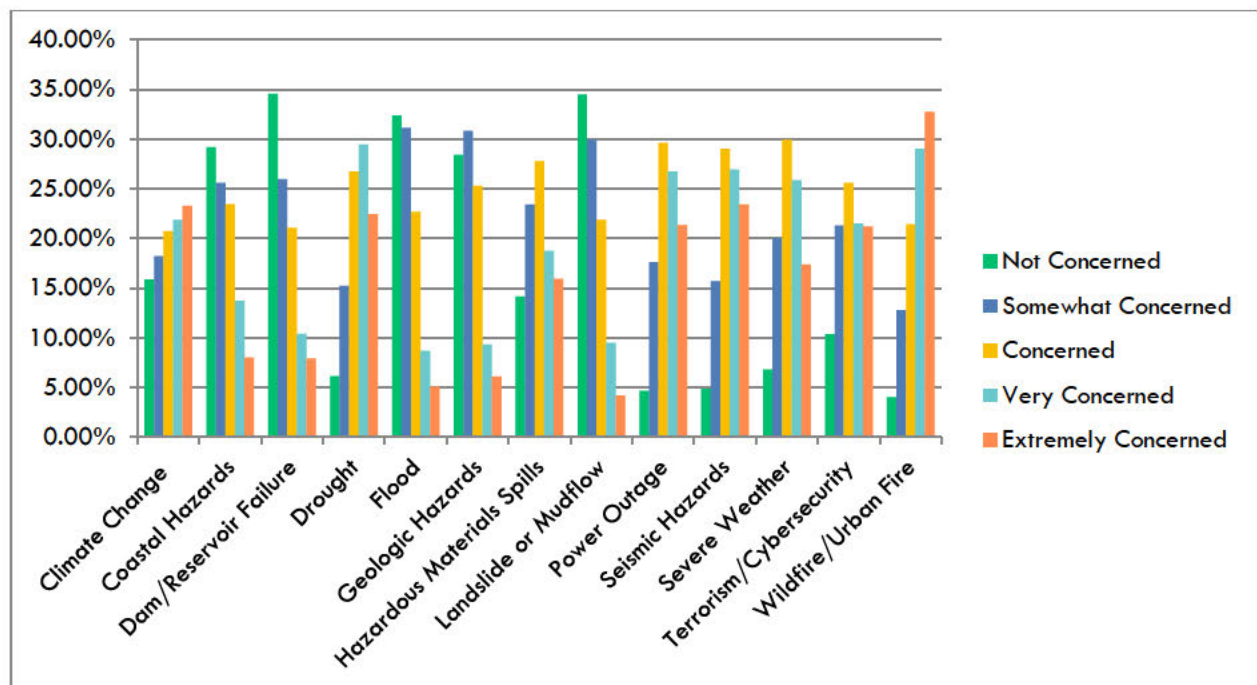
Appendix A: Survey Responses Summary

- 125 Degrees Heat Wave.

**repetitive comments were consolidated*

Question 5: The following hazards could potentially impact IRWD and may be addressed in the Local Hazard Mitigation Plan. Please indicate the level of concern you perceive for each hazard that may affect you and IRWD’s critical water and wastewater facilities and infrastructure. (Please check ONE response for each hazard)

Question 5 determines which hazards that could potentially impact IRWD are considered to be primary concerns for residents within the IRWD service area. Wildfire/urban fire, climate change, and seismic hazards were ranked as most concern (“Extremely Concerned”) for respondents. Hazards that are of least concern (“Not Concerned”) include dam/reservoir failure, landslide incidents, and flooding.



Additional Comments²

- Access road weeds and wild growth not cleared is a big concern during fire season
- Disruption and/or damage to safe drinking water delivery
- El Toro Contamination
- EMP natural or man made
- Failure of infrastructure due to aging (rusting pipes, etc.)
- Fire during Santa Ana winds and July 4th Holiday FIREWORKS

² Comments unrelated to the survey topic were not included in this summary, but can be viewed in [Appendix B](#).

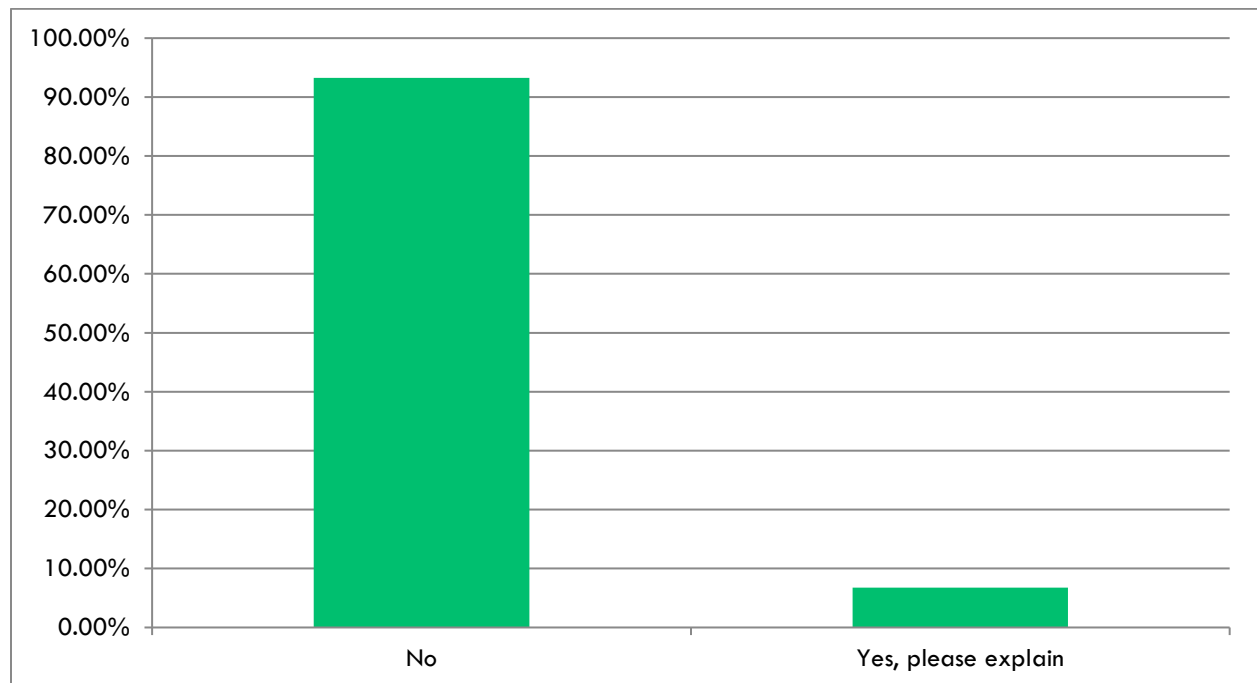
Appendix A: Survey Responses Summary

- I think everyone should worry about terrorism and cybersecurity. This is a universal problem potentially. It housed be made so safe that no one will attempt anything damaging. Thanks.
- Infrastructure and contamination (like Flint)
- Lack of an area desalinization plant in case of drought
- Most of these are normal in Southern California, just a fact of life
- None*
- Other*
- Potable water supply ongoing.
- Safety and integrity of city water pipes or IRWD water system over time.
- Sheriffs denying access to home: biggest concern.
- storage capacity, Alternate water supply
- water purification chemicals used by IRWD that corrode cooper, and implementation of water pressure gauges to control water pressure.
- Water quality safety re: el toro

**repetitive comments were consolidated*

Question 6: Do you have information on specific hazard issues or problem areas (localized flooding, power outages) that the planning committee should be aware of (please provide as much detail as possible, including location and type of hazard)?

The majority of respondents answered “No” to having information on specific hazard issues or problem areas.



Appendix A: Survey Responses Summary

Additional Comments³

- 1) A major earthquake is inevitably going to hit along the southern San Andreas fault, 2) cyberterrorism threats and risks to the electric grid and other utility infrastructures.
- All of the new houses built at the new Civic Center has drainage directed into Serrano creek. We live at 20945 Sharmila backing up to the creek which has had excessive erosion in the past 10 years, now more erosion will occur due to the runoff of 300 + houses being directed to this creek
- Being denied access to home during emergencies
- Buck Gully used to have low brush and now has dead wood trees etc. that should be removed
- Canyon communities have unique needs/hazards for OC.
- Chemicals used for water purification that lessen life copper piping and use of water gauges to prevent pressure breaking pipes.
- concerned about safety of strawberry farms earth dam
- concerned about supply system risks (aqueducts, wells, open storage lakes) vulnerable to terrorist activity (poison, bomb, etc.): general concern, no specific knowledge
- Different agencies need to communicate.
- Dry areas along 241 and 131 may catch wildfire
- During heavy rains, street drainage does not seem adequate.
- Education to the public to prevent wildfire from happening.
- Electrical poles are major hazard when it comes to wildfires and should be underground instead, especially along the Silverado Road.
- Existing pipeline capacity during fire and disruption
- Failure of underground water storage tanks on Signal Peak directly above my home presents a flood and mudslide risk
- Fires around Orchard Hills
- Flooding now that Irvine has lost a lot of open ground to soak up water.. land is now all asphalt and concrete. Run off will be bad now
- Flow of traffic if evacuated.
- Fluoride in the water
- Foothills area with mud and flood due to wildfire.
- future readiness for wildfires, possible power outages and evacuations
- Handy Creek
- Has there been mitigation completed to improve the flood control capacity of San Diego Creek that over-flowed between Culver and Jeffrey (adjacent to Barranca Pkwy.) during the 1980's?
- Have seen several fires and floods over a 40 year span
- I have heard Woodbridge has subsidence. I believe this to be true. Every now and then you step into spaces on grass that have sunk a bit.

³ Comments unrelated to the survey topic were not included in this summary, but can be viewed in [Appendix B](#).

Appendix A: Survey Responses Summary

- I have read Irvine is a superfund site and that cleaning chemicals for the airplanes have seeped into our water.
- I know SCE shuts off our power for high winds. We've also had two fires (Silverado, Bond) and the recent mudslides in Silverado with mandatory evacuations in Silverado and Modjeska
- I see (when traveling throughout Lake Forest and other southern California cities hillsides, valleys etc. that are covered with 3 ft. high dried brush/grass. This is such a fire hazard and I see it in a lot of places. I think there should be a plan put in place to remove that kind of dry kindle before it turns into a major fire starter. Thank you
- It seems that Syphon Canyon Dam is constructed on liquefiable alluvium. As a result of a strong earthquake on the San Joaquin Hills blind thrust, Elsinore fault or others the dam could breach, resulting in flooding of downstream Crean Lutheran school children and Irvine residents.
- July 4 Holiday extreme illegal use of fireworks & potential fires
- Lack of irrigation in areas subject to high winds and heat
- Lack of unified communication during incidents like the recent wildfires. It was difficult to get accurate information because there was no single source of truth. Extremely concerned about aging dam and likelihood of impending failure. Flood path includes my neighborhood
- Landslide
- Liquefaction
- Mountain lion, coyotes, eating our pets (potentiality us!)
- My backyard has flooded and "emptied" into my garage once in 26 years
- My residence was evacuated Twice from the local wildfires just last year alone, this year after having much less rain greatly concerns me that wilder & dangerous animals will be exploring the nearby Whiting Ranch trails and of course more wildfires will be happening!!!
- No off-grid power alternatives permitted.
- Nuclear accident at San Onofre
- Periodic power outages*
- Please think about people who are not good at English.
- Power Transformer in the driveway side.
- Reduction of Colorado River allocation
- Reservoir whose failure could destroy my house
- Same access road gets flooded out during heavy rains. Washing out sections of road
- San Diego Creek has sewage lines going along the creek. Water flow is causing erosion. Potential for sewage spills or damage.
- Santa Ana wind
- Seems we are in dire need of modernizing infrastructure
- Seniors are dependent on power and need to have companies use backup generators.
- Silverado canyon road has had multiple 2ft+ mudflows since the Bond Fire
- Some evenings I could smell organic solvent/fume in the backyard
- Syphon Reservoir Improvement Project. Prefer to improve the safety of the infrastructure for the current water capacity, not to increase the water capacity at this location.

Appendix A: Survey Responses Summary

- The burn area of the late 2020 fires in and around Silverado Canyon and the mudslides in the area due to heavy rains
- The canyon areas seem to be the primary location where fires start
- The localized extended power outages caused a lot of neighbors to get generators.
- The low end of my street floods every time we experience heavy rain
- The neutron fusion pile in the basement needs constant attention.
- The trees touch the electrical wires along Santa Ana avenue and Mesa drive. The poles need to be put underground in the Santa Ana heights neighborhood! They are a hazard.
- The underground plume of trichloroethane under Woodbridge in Irvine from the El Toro Superfund site.
- The water duct alongside the 133 toll road needs severe improvements and could cause damage to the toll road which may impact housing alongside Portola Springs.
- There are areas where the drainage is insufficient and it causes the road to be made impassable by mudflow
- There is a partial landslide above the neighborhood, just above our neighborhood. The back side of the hill has slid into the canyon, creating a very large mound, which could be triggered as a slide if we get a substantial amount of rain. The slide is up above the northern end of Calle Cabrillo. I don't think most people know of this, but I've hiked there, and the slide could cause major damage.
- Toxic soil and potential aquifer toxification hazard at decommissioned El Toro Marine Base
- Turtle Rock has a lot of dry brush mid-summer. We had a fire near Concordia and at Quail Hill area that could have been major fires.
- Unsecured power and communication lines during high wind
- use solar panels with home batteries to prevent power outages
- Water bug infestations
- water quality
- We are in general, long-term drought.
- We had wildfire last year, very close to our community
- We have experienced earthquakes as well as having to move out of our home because of wildfire. We participate in summer power conservation where the Edison cuts off power for limited intervals.
- We have regular alerts from SCE regarding possible power outages during Santa Ana wind events and summertime
- We live next to the Serrano Creek. We are very concerned about the dead trees being a fire hazard.
- When SCE shuts off power to canyon areas; we have no way to get help. No cell phones, no land lines. During the Bond Fire, the homeowner had to drive to the nearest Fire Station (unmanned) and wait for help to arrive. It took 45 minutes for help to arrive at Bond Way. By that time, their home was gone.
- Why are there serious mosquito problems?

Appendix A: Survey Responses Summary

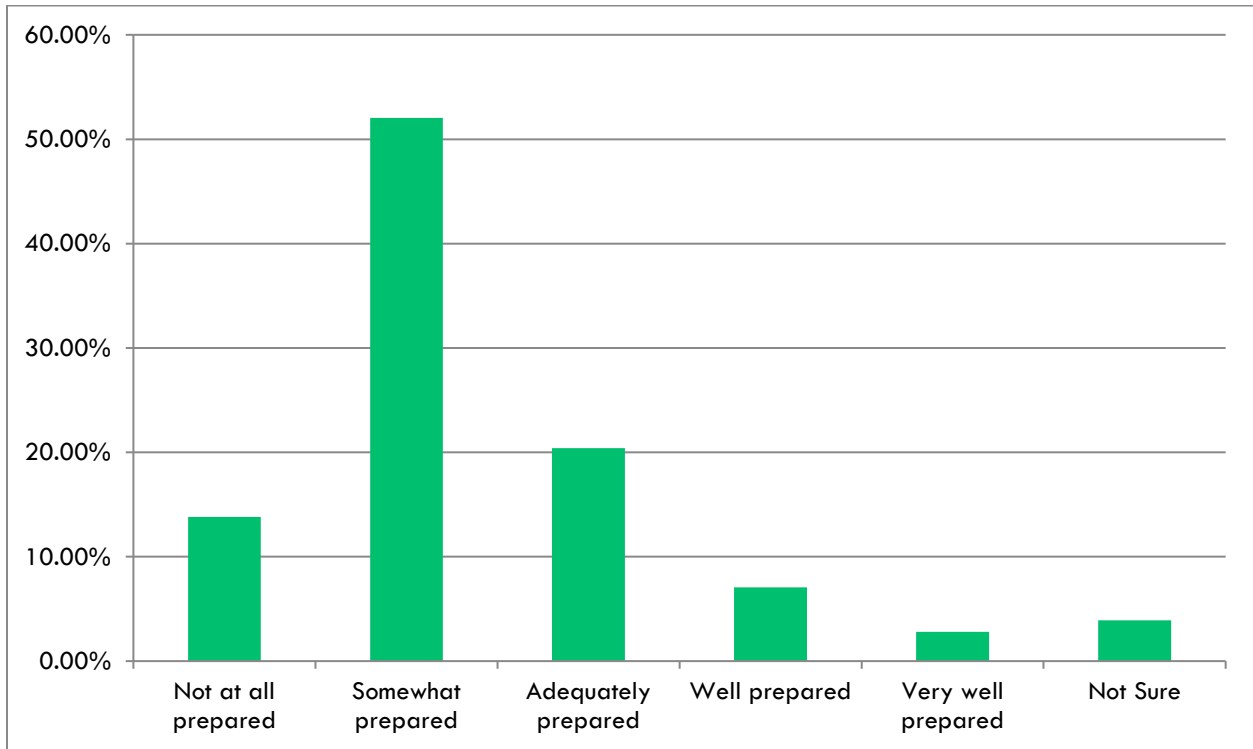
- Wildfire, Santa Ana winds seasonal & power outages because of wind*
- Wildfire burn areas subject to mud and debris flow during rain

**repetitive comments were consolidated*

Appendix A: Survey Responses Summary

Question 7: How prepared is your household to deal with a natural hazard event likely to occur in the IRWD service area and/or the surrounding area??

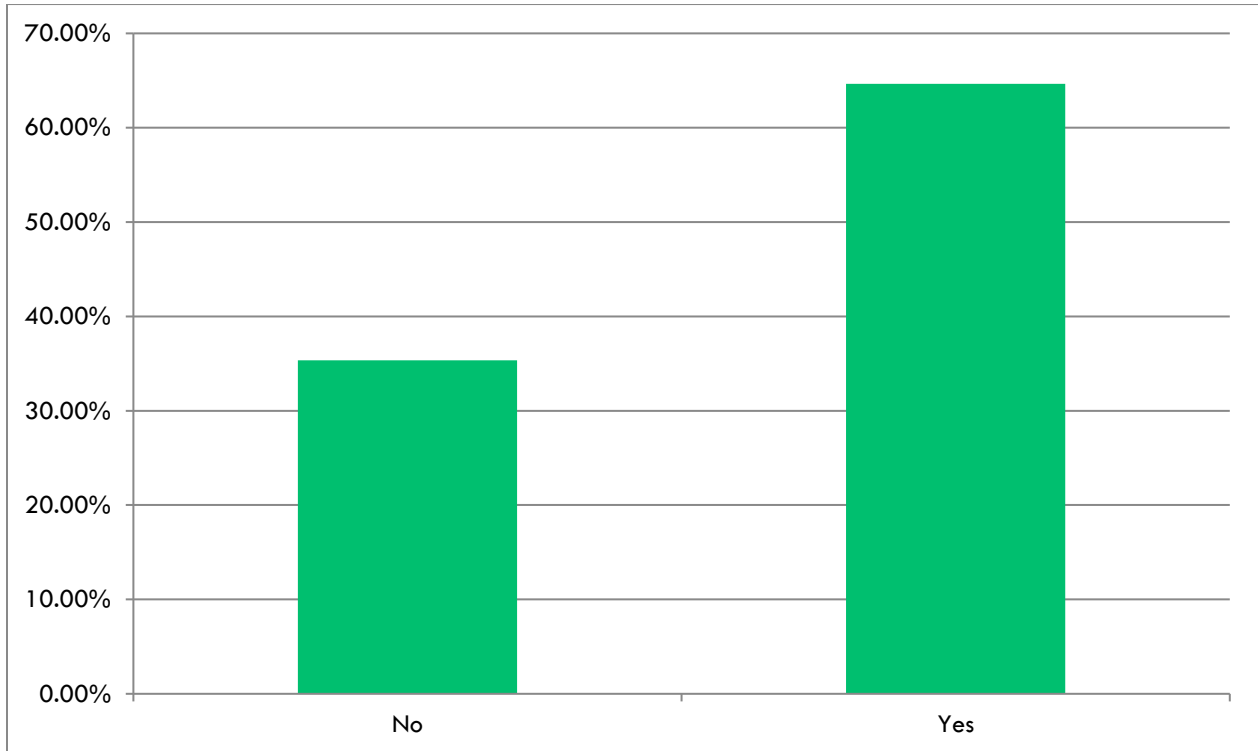
Approximately 2.8 percent of survey respondents stated that they felt “Very well prepared” for natural hazard event likely to occur in the IRWD service area and/or the surrounding area. Approximately 13.8 percent of respondent stated that they felt “Not at all prepared”, and the majority of respondents stated that they felt “Somewhat prepared”.



Appendix A: Survey Responses Summary

Question 8: Have you taken actions to make your home, business, or neighborhood more resistant to hazards (such as anchored furniture and service utilities, functioning smoke detectors, regularly trimmed trees, etc.)?

A majority of respondents indicated that they had taken actions to make their home, business, or neighborhood more resistant to hazards.



Additional Comments⁴

- Additional beam supports, gasometer auto shut off valve
- Air Purifier
- All of the above*
- Anchored furniture*
- Carbon monoxide detectors
- CERT Training
- Drought-tolerant landscaping*
- Earthquake kit
- Evacuation Plan
- Emergency supplies*
- Emergency shutoff valves
- Fire and CO² Sensors

⁴ Comments unrelated to the survey topic were not included in this summary, but can be viewed in [Appendix B](#).

Appendix A: Survey Responses Summary

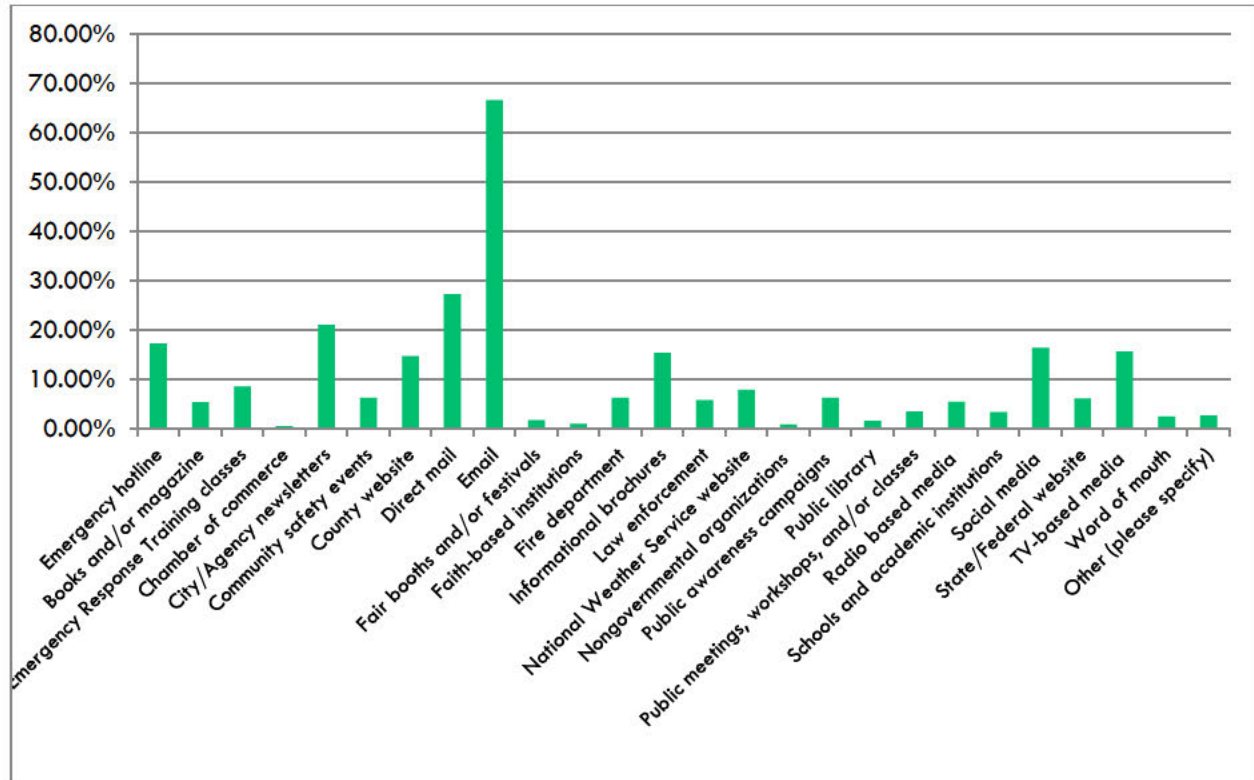
- Fire Extinguishers
- Fire fuel modification, generator, some hardening of structure
- Flood and erosion control measures
- HOA keeping up with main items*
- Home sprinkler system
- Maintain fire distance at 100 feet
- Oil lanterns, propane cooking stove
- Precautions to minimize fire risk and high winds
- Prune Trees*
- Ready-to-go kits/bags
- Removal of excess water
- Residential Solar Battery
- Smoke Detectors*
- Solar Lights and power*
- Store food/water supplies
- Store potable water
- Strapping water heater*
- Supply of food and water for a disaster*
- Water heater anchored*
- Yard Maintenance*

**repetitive comments were consolidated*

Appendix A: Survey Responses Summary

Question 9: Choose the top 3 ways you prefer to receive information about how to make your home and neighborhood more resistant to hazards? (Select a maximum of 3)

Approximately 66 percent of respondents listed Emailing as one of their top three ways to receive information on making their homes safe.



Additional Comments⁵

- Agency website (ex. Water)*
- An app that provides natural hazard events warning, status, and data
- Irvine Disaster Emergency Communications group affiliated with Irvine Police Department
- Fire Safe Councils
- Homeowner's and Neighborhood Associations
- Mobile phone notifications*
- Newspapers
- Not sure which is most effective.
- Notify by text directly to cell phone.
- Opt-in text links.
- Social media notifications*
- Specific Information available 24/7 via video

⁵ Comments unrelated to the survey topic were not included in this summary, but can be viewed in [Appendix B](#).

Appendix A: Survey Responses Summary

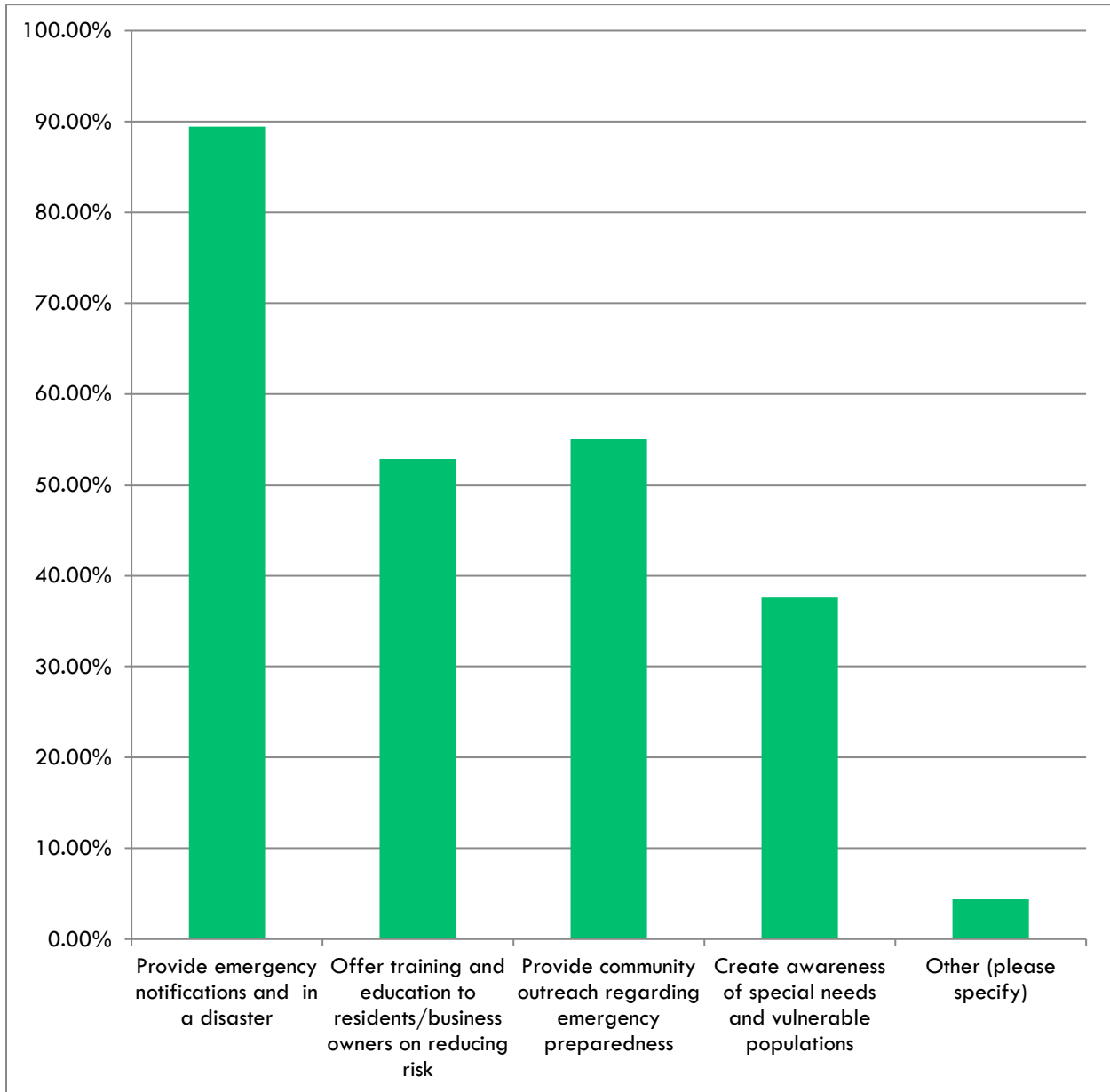
- Snail Mail*
- Talk radio
- Text notifications*
- Utility websites
- YouTube city channel

**repetitive comments were consolidated*

Appendix A: Survey Responses Summary

Question 10: How can IRWD and its partners help you become better prepared for a disaster? Choose all that apply.?

Almost 90 percent of respondents indicated that providing emergency notifications in a disaster would be the best way for IRWD and its partners to prepare residents for a natural disaster.



Additional Comments⁶

- Coordination with FEMA
- Create user-friendly web-based data and information that residents can access with questions.

⁶ Comments unrelated to the survey topic were not included in this summary, but can be viewed in [Appendix B](#).

Appendix A: Survey Responses Summary

- Early (timely) warning system
- Each Community provide a contact to get information out.
- Education for natural disasters preparedness*
- Effective evacuation planning for each neighborhood
- Emergency preventative notifications prior to a disastrous event.
- Fortify the water delivery infrastructure against seismic events.
- Give first aid kits to households as school children. Mail people fillable emergency contact info cards w their city services pre-printed.
- Improvements to solar energy generation
- Indicate liquefaction possibility by zip code
- Info about flood zones around Dam by Peters Canyon on flyer with bill.
- Keep IRWD facilities, equipment and lines in top condition and repair.
- Lower the cost of the water.
- Maintain clean and efficient potable water
- Notifications via Nixel? There are so many false notifications and emails - it needs to be SHORT with a link to read more. Like contaminated water at local beach - good to know I won't go there. But if the hill above me is slipping I can read more for just my area.
- Offer cost effective options to prepare for disaster.
- Partner with community's CERT program.*
- Prepare for an event and manage expectations in advance.
- Aid elderly homeowners with the tree pruning.
- Provide free or subsidized safety tools or kits.
- Providing first-aid kits to members of the community.
- Prudent back-ups across for system wide resiliency. Tankless water heaters are in bad idea if there's ever a water main disaster
- Public outreach to children in schools as well, and have kids share information with their household and extended family.
- Transparency from the agency.*
- Send equipment to clean up the creek to prevent further disasters.
- SMS text messages
- Stop turning off the power to canyon communities.
- US Mail

**repetitive comments were consolidated*

Appendix A: Survey Responses Summary

Question 11: Please utilize the space below to provide any additional comments regarding local natural hazards, disasters, and preparedness.

Comments received on Question 12 are provided in their entirety, below: ⁷

- Access road is shared with Metropolitan water district and Serrano Creek association but none of the 3 agencies take responsibility. Please assist weed abatement and road continued maintenance
- Adequate back up water supplies in case of main supply disruption, Backup generators to run main and distribution pumps. Back up IRWD personnel to inspect & repair damaged supply lines
- Alarm system
- Alert systems, quick updates, good communication system for public to access. emergency ham radio broadcast channel for use to let public get latest hazard updates/broadcasts
- All of our current problems go back to Edison turning off the power for days at a time. Now Edison refuses to do anything to remedy what they started. They stopped turning off our power in high winds and there are no bad consequences which means they never should have done this
- All programs that are in operation need to be put into public awareness for everyone to take the responsibility of the outcomes. The geoengineering programs need to be brought further into our discussion in view of droughts and water management.
- Always be ready
- An analysis of the hazards and risks facing IRWD and the areas it serves. Would like to see the issues addressed at schools as well. So many students seem to have no concern about preparedness and how important this topic is.
- An emergency packet for residents that is either mailed or download format to new residents and updated every 5 years online for emergency planning.
- Answer phone calls
- Be reasonable and honest about problems and solutions*
- Because emergencies can come up at any time, I would definitely need we provided information from governmental entities regarding local natural hazards, disasters, and preparedness.
- Better communication
- Better dissemination of flood and other hazards to residents. Most people do not know how to search for these on the internet and use it when choosing a place to purchase or make improvements to their property.
- Better information by App, mail, or email
- Better information where to seek shelter, better communication needed
- Better outlets to access freeways duration evacuation*
- Build more Dams and Power plants
- Can use app like nextdoor to fill the information blackholes during emergency
- Centers to find loved ones. First Aid centers to provide care and medical supplies.
- CERT training is very good, local community events such as National night out where PD and Fire come to local parks it would benefit IRWD to be there for Emergency Preparedness.*
- Clear booklet with checklists for emergency events would be great. For example, "In the event of an earthquake, follow these steps (1) if you hear or smell gas leaking from anywhere in or

⁷ Comments unrelated to the survey topic were not included in this summary, but can be viewed in [Appendix B](#).

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around the house, use the gas shutoff wrench to shut the gas off at the meter (see illustration) ... Follow these steps to check around the house and up and down the streets for evidence of water leaking () broken water pipes inside the house () clothes washer hoses ()check your swimming pool for cracks or leaks () if your house is on a terraced lot lower than another lot that has a swimming pool, check for cracks and leaks cover fires, hailstorm, power outage, main water leak or break, home leak, gas leak, sewer rupture, include 911 and emergency local or regional numbers Be Prepared lists of items to have on hand, such as 5 gallons of distilled water for each resident, etc.,.

- Collect and remove the dry weeds nearby a community neighborhood.
- Communication is the most important aspect of knowing there is a disaster and we often lose power or cell phone coverage, leaving us literally in the dark.
- Community website.
- Concerned about the use “round up” that Baldwin bros use on. New development in Portola Hill-groundwater contamination.
- Concerned regarding water and gas supply outages. Also concerned regarding contamination of fresh water supply and emergency water supply availability. Frequent power outages is pending concern due to political machinations of the single source supply power to Irvine.
- Coordinate with local (very local) organizations: OCFA, Firesafe Council, Intercanyon League. All are involved in the same issues.
- Costs of what it would take to considered properly “prepared”, checklist, rotation schedule for preparation materials, etc. would be great.
- Create emergency awareness and provide community outreach regarding emergency preparedness.
- Direct communication to each resident is the most important factor in a disaster - rather than getting information from the media which one can no longer believe is providing true facts.
- Disaster preparedness.
- Divert/Involve community to clear the brush. Work/partner with local NGOs to adopt and clear the wild brush in certain sensitive areas. Provide volunteer hours for high schools and engage them in helping them involved with communities.
- Do not use this survey to increase the price.
- doing a great job
- Drought among other climate change impacts are manmade and we can and should do a better job mitigating.
- During last year's wildfires, we had no evacuation route and there was quite a bit of chaos within the Great Park community trying to exit the area. We need more information before it gets to be fire weather again.
- During the pandemic, zoom presentation is one of the useful ways to inform and educate public.
- Earthquake and flood preparedness are important.
- Educate people about reducing their carbon, CO2 and methane footprint so that Mother Earth can slowly but surely recover from global warming effects. Global warming is to blame for natural disasters, excluding earthquakes. Promote the concept of "Reduce, reuse, recycle" and overall make people to reduce their consumerist mentality because America is the top resource consuming nation per capita.
- Effective emergency notifications and helps before, during and after the disaster are greatly appreciated.
- Email and phone notification.

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- Emergency response plans and chemical inventory audits on an annual basis to ensure regulated business' compliance with the community right-to-know rules and regulations.
- Evacuation Resources are a concern.
- Extended loss of electric grid and its dependent utility services are a major concern.
- Fire Authority and Sheriffs have to allow residents in to secure their homes. I'll sign a waiver absolving them of any responsibility. They are more of a nuisance than help.
- Fire department local branch has email notifications in emergency matters, in addition to road and weather concerns.
- Fires and earthquakes are the biggest risks.
- Fires are my most concern.
- Fluoride is hazardous material and doesn't belong in our water. Bring awareness to safely disposing pharmaceuticals.
- For each hazard, it would be nice to have a simple checklist that covers the most important points and is easy to remember. Periodically sending out the checklists would help keep people informed. Having access to additional resources on the checklist makes it easy for people to follow up if they have additional questions.
- For the good communication, use more SNS and message.
- For us, it is the prospect of earthquake and also wildfire. I have lived here 45 years and been evacuated four times, three of those times last year. Climate change is making things worse.
- forecast by email
- Have a standard training for average citizens to help in specific areas coordinated by fire/police departments. Can't be done just by emergency crews.
- Have list of things need to be prepared to provide to community.
- Having been evacuated a couple times last year, one thing that was very disturbing to me was that when you get an evacuation notice and you start calling hotels to book a room (because we have no family close) the hotels give you a much higher price than what is listed online. When I asked the hotel manager why we were charged so much, she admitted that when there is high demand they raise their prices. I understand that in a normal busy season (spring break etc..) BUT to do that to people who don't have anywhere to go is terrible. We should pass legislation or something to prevent hotels from being able to do this to people who are homeless due to natural disasters.
- Help homeowners understand how far away from their homes combustible organic material such as leaves, dry bushes and trees must be cut back so that wildfire will not burn their house.
- Hope we can prepare for any disaster.
- Hope we do not have any serious problems!
- Houses with most vulnerable should be listed, such as families with infants or elder people who cannot react fast to emergency.
- How to prepare better for high winds.
- I am appalled that there is still a plan to develop a reservoir in a spot that if it failed would destroy my house.
- I am concerned about Fire hazards
- I am concerned that there may be shortage of water. So, converting sea water into usable water should be the approach.
- I appreciate IRWD's pioneering accomplishments in recycled water. Rather than sending excess into the sea, can it be injected into the ground or allowed to infiltrate in old gravel pits or the rivers?

Appendix A: Survey Responses Summary

- I feel safe but it would be helpful for our whole community to know what safety measures are best to take.
- I feel that information is provided to our community already
- I have lived in this area for over 10 years and truly wonder if our city is truly ready for an emergency???
- I have no idea how vulnerable we are to tsunami; I see the signs but have no idea other than that. Have no idea what a best estimation of rising sea level in our area, have no idea what is being done and what we should be doing EDUCATION, EDUCATION, EDUCATION, EDUCATE please !
- I have no specific knowledge of how we are to protect ourselves in the situations you mention.
- I have no suggestions
- I just have some worry about the wildfire. why should we take some pre-action to avoid the wildfire?
- I live near a flood control channel. During heavy rain it is flowing with lots of water. Can that water be captured, recycled, and reused? Or does it just drain to the ocean as it states on the storm drains? Seems like lots of free water available if it can be treated properly.
- I never seem to have enough time and money to be fully prepared like I read I should be. I don't know if I could shut off gas/power/water in a major earthquake. I don't know how to communicate with others in a big disaster if power/internet/cell phones are down. I wanted to keep a plain old copper wired analog home line with phone line powered equipment, but AT&T makes that near impossible to afford anymore/going all digital, and most all home phones need AC power. Both Cox and AT&T have AC powered equipment to have a home phone line now, and how many homeowners want or can afford battery backup systems always humming and buzzing in the background? They really let the ball drop on the public good in an earthquake-prone and wildfire-prone area, by dropping support for analog, phone line powered systems.
- I selected our house location based on disaster avoidance: 1. Flat, level ground with reduced risk of liquefaction and mudslide. 2. Ground elevated enough above sea-level so as to minimize tsunami risk. 3. Away from the underground El Toro hazardous plume that is encroaching on Woodbridge. 4. South enough of Long Beach to avoid an accidental release of airborne hazardous chemicals. 5. Not in the flood plain subject to Prado Dam flooding. 6. In a city that takes disaster planning seriously and can afford it. 7. Not at the edge of city/wilderness boundaries so as to reduce wildfire risk. 8. CERT trained 9. I try to stay informed of local issues and problems.
- I think Irvine is well prepared for a natural disaster and making sure we will have clean water is top of the list for surviving a natural disaster.
- I think my answers suffice.
- I think the city should trim resident's trees that are over 30 feet tall.
- I think we have covered it all...
- I walk in Newport Coast every day. The amount of trash (clothing, empty cases of glass liquor bottles and food containers) shows me homeless, teens or whatever take over at night. My biggest concern is a careless fire starting in the hills above my home.
- I will bet most people in Irvine are not prepared any kind of an emergency as well of most of Southern California. All people wait till after the problem to do anything Too Late
- I wish to receive information about emergency hotline contact numbers.
- I wish you could've used some examples of these types of disasters so I can imagine what it would be like to prepare for it.

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- I worry about storm drains becoming clogged with debris and flooding my neighborhood. I would like to see some information / awareness about this potential issue.
- I worry about the people on the Newport peninsula in the event of a local earthquake that would generate a tsunami for which there would be no warning time. There would be a traffic jam, I'm afraid with results similar to the one in the South Pacific in 1998 (I can't remember which country but there was a long peninsula where many died.) I don't know what the answer is except for each resident to perhaps build something well anchored in the ground in which they could climb upward. Also, in all coastal areas, people need to be educated about tsunamis. I like the signs for tsunami evacuation although the ones I've seen are placed in areas that are already safe. They need to show directions out of areas not safe, especially Corona Del Mar Beach. People there need to know that you don't wait for a warning. The ground shaking is your warning to run up the cliff immediately! Places like Laguna and Huntington, you'll just have to run inland fast, and people should know to do that if the ground shakes. Also, education is important re: the water receding prior to a tsunami as many often go out to look, not realizing that is a sign they should be going the other way. They should also know to observe their animals as animals know it makes sense to be distressed in such a situation.
- I would like information on charging cell phones during extended power outages and on storage batteries for our 16-panel solar power array. Also, for all-electric vehicles if that is currently possible; we have a BOLT.
- I would like to know how the revenue of the IRWD are spent for the natural hazards, disasters, and preparedness if applicable to ask.
- I would like to see fire abatement in the form of pre-fire application of retardant on red flag warning periods in foothills near residential communities!
- I would like to see what plans are made if all electronics devices fail (phones, internet, vehicles and etc.) how will emergency services make notifications and how will they respond.
- I would love a "checklist" for each type of disaster.
- I've lived in this area for over 15 years and it's been a wonderful experience so far. Keep doing what you do!!
- I'd recommend visual scenarios in the hands of residents, both email and physical mail, that people could identify themselves... like a family in a house staring at dark smartphones "What would you do you?" or a shaking house with gas and/or power disruption "What would you do? ... Most don't *think* about it... so for them to see it and think "OH! I don't know! What would I do?" .. this would be the win.
- If not already, maximize use and development of local water reservoirs for water storage.
- If this program is serious, then training sessions at local schools or local library would be a good place to get started.
- I'm grateful that you are working on this. Climate change seems to be affecting our area greatly. Winds and rising temperatures are more frequent, and we never seem to have enough rain.
- I'm more concerned for industrial/government pollution of our water. Natural hazards/disasters don't cover the whole 'picture'.
- I'm new to the Canyons and have heard that floods typically come after fires, and that there's a certain cycle to these things. It would be in the best interest of Canyon residents if we can be informed of the natural hazards that are most pertinent to the current season and provide some sort of training/class to help us be prepared.
- Immediate concern is fire
- Information on a county website dedicated to disaster & preparedness.
- Links to Emergency phone centers & updates during events

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- Information regarding natural hazards, disasters and preparedness can be provided along with water conservation tips.
- Irvine did a great job contacting us during the recent fires. Made us think of being prepared
- I sure hope that your secure from Cyber-attacks and other types of attacks.
- IRWD communication on Fire danger is important
- IRWD has done a great job of hardening their system in my area.
- IRWD is doing a good job*
- Is anything being done about the El Toro plume?
- Is it best to have a regular water heater rather than tankless in our residence should there be a water disruption?
- It would be great to have a check off sheet with a list of things you can do to be prepared for a disaster.
- It would be helpful to receive step by step guideline on specific items (the bare minimum) that a family should have on hand for different disasters
- It's nice to have a list of items/recommendations to keep handy in case of different disasters
- Join CERT Volunteer program
- Just as neighborhoods once had "Block Parents" who were screened and trained, it would be good to have something akin to "Prepared Persons" for the neighborhoods who could be a close by contact for information and guidance in case of a natural hazard, disaster or needed preparedness guidance for neighbors in times of need.
- Just follow-up on evacuation zones and could someone please address seasonal flooding issues on my street?
- Just give us as much forewarning as possible.
- Keep residents informed the disaster relief plan.
- Keep the hills and forests free of dry brush, maintained, safe for residents.
- Keeping everyone in the loop is awesome
- Kids education activities can help our community and IRWD Keep the water flowing please.
- Less confusing information
- limited cell phone service in my neighborhood constrains rapid communication of information - evacuation notices and similar alerts.
- Liquefaction
- List (map) areas of possible impact in case of dam failure
- Living in canyon means being prepared and living through disasters. Especially important that water pressure/delivery systems are resilient.
- Looking forward to hearing back on what steps she will take moving forward. Appreciate your proactivity in these regards to keep us safe.
- Looking forward to your information
- Lots of wildfire. I was forced to evacuate due to it this year.
- Lower the cost of the water
- Mail a brochure with emergency kit list and important phone numbers
- Maintain currency on local, state, and federal guidelines
- Make information easier to access.
- Make sure dry weeds are addressed
- Make sure people moving to Irvine know about the El Toro Superfund site and how it affects
- Make sure the IRWD has sufficient capacity and contract for more water.
- Make sure you have solar and battery backup to counter power outage.

Appendix A: Survey Responses Summary

- Many very old people still live in their homes. They should be identified so they can be checked on if there is an emergency.
- Maybe IRWD can sell disaster kits
- Maybe the county EOC provide input to your newsletter about wildfire & landslide prone areas.
- Monthly forecasts.
- Most concerns for Irvine are wildfire hazards & water contamination.
- My area is not prone to flooding, but we all must be prepared for earthquakes.
- Need earlier detection of wildfires and quicker response
- Need more reservoirs to provide back-up water supplies for periods of extended droughts.
- Need to know how much danger we are really in given our location.
- New homeowners/ renters new to CA should be notified by HOA about the natural hazards, disasters, and preparedness
- No additional comments at this time.*
- No additional comments. I appreciate the consistent communications I receive from IRWD.
- Notification by text
- Offer extension courses for CERT members.
- Offer More information to us.*
- Offer training and education to residents and business owners to learn how to reduce risk.
- Our biggest concern is wildfires (having evacuated twice last year within two weeks). The second concern would be earthquakes which could disrupt water, electricity and natural gas services as well as make roads impassable.
- Our city and or county should be proactive regarding wildfires, protecting residential areas, and creating barriers between the brush and houses. Fires have burned right up to Irvine's housing developments numerous times. These are wake up calls. Something needs to be done.
- Our density is increasing, and our issues appear to be more frequent. The best we can do right now is education and planning for the short-term while policy changes to address the long-term solutions.
- Pamphlets distributed to homeowners.
- People moving into this area forget that this is a semi-arid area with little natural water yet build where the land will slide when it does rain and plant as if there is abundant water. City of Irvine boasts of 1,000,000 trees s if that is an accomplishment. Makes it tough to avoid disasters.
- People must be prepared and must be aware what they have to do in case of hazard. It must be practiced frequently in order to be an automatic reaction when hazard happens.
- Perhaps send Email or Text to let us know?
- Please cut public trees and brushes regularly. Please keep adequate amount of water at slopes.
- Please have the information available in multiple languages. Perhaps working with local cultural groups to disseminate the information.
- Please keep us informed and train us periodically.
- Please keep working on prevention education through all media channels necessary. Our society always reacts to disasters but we are never prepared and prevent.
- Please patrol mountain safety near residential areas.
- Please release water contaminant measurements in an easy to see place and replace responsible infrastructure
- Please think about senior people more. It is hard for them to deal with the natural hazards.
- Please, be aware that we likely do not have power during an emergency. No power = no cell = no internet.

Appendix A: Survey Responses Summary

- Power and water availability likely to be the two greatest risks in a serious natural disaster.
- Pre-COVID-19 I taught an in-person ESL class and we had presentations from the IPD about safety. I also had annual info for earthquake preparedness... having a speaker or appropriate (easy to understand) info available for disaster preparedness for our language learners would be GREAT. There are many other ESL classes locally.
- Pre-packed emergency belongings
- Prepare areas by clearing overgrown brush and trees at the appropriate timing to help prevent or mitigate potential fire areas and flooding.
- Prevent Wildfires, avoid wasteful water
- Primarily concerned about wildfires and windstorms
- Provide any information on seismic proofing the water systems such as water lines and treatment plants.
- Provide emergency phone number to IRWD for water related problems.
- Provide information and knowledge focusing on preparedness for drought and wildfire hazards.
- Provide information on the kind of effects some of the hazards will have on the Services offered by IRWD.
- Provide information to areas with higher risk.
- Provide list and resources to develop household rations for food, water, first aide, in case of an emergency.
- Provide on-line, cloud-based tutorial for emergency situations
- Provide procedures to connect emergency power to residential housing.
- Provide regular updates at least once a year on how to best prepare for disasters over the internet allowing people to log on at their own convenience to access the information Push notification through OC Alert is very helpful.
- Providing the checklist for residents do regular inspection on natural hazard disasters around the community.
- Really concerned about earthquake safety and fire hazards in our community. Would like to know what steps are being taken to avoid wildfire spread.
- Recommend a survey of home-bound seniors or invalids to reference if a catastrophic disaster strikes.
- Regular mailing to neighborhood to educate resident would be good too.
- Residence is in Orangetree neighborhood of Irvine. Day to day vehicle access is via only one point (Orangetree) with one locked emergency exit on Bright Hollow without dissemination of how the emergency exit will be opened.
- Recycled water and make sure the water delivered to residents is safe.
- Residence should involve in this planning by offering their help and work with you.
- SCE shutting off power in high winds leaves us without any ability to call 911 in the event of an emergency.
- Send info with bill
- Send text message in an emergency event. Should decide evacuation sites according the city population size. Shortage and route. I think you can avoid congestion if you decide on them in advance. This opinion is in my experience when Silverado fire in November 2020. Evacuation sites were not enough, and we got caught in a traffic jam.
- Simply offer website information availability and periodic notices to update personal preparation

Appendix A: Survey Responses Summary

- Since our area is prone to more fires now, need to make people (school kids also) aware of dangers of starting fires (bonfires, etc.) e.g. during summer months and why. People (kid included) need to be educated and responsible. Climate is different now and we have more dry months. Schools need to include these in their curriculum.
- Since the district is a high population density, relocation of people from hazard-affected areas should be considered (e.g., signage for tsunami evacuation; identified alternative traffic routes for fire areas -- especially those with limited ingress/egress).
- Sirens maybe.
- Start verifying backflow protection.
- Starting at the top, we need to address climate change. Republicans need to help Biden.
- Steps should be taken to learn from the December 2020 fires in Silverado- namely the breakdowns in communications between fire officials and residents of the canyons. During the fires, residents found that they were not being communicated with.
- Storm drains contamination.
- Street water runoff should be captured for reuse instead of going to ocean.
- Suggest you focus on how we prepare for water or sewer interruptions.
- Text messages alerts regarding local disasters would be helpful*
- Text messages. How do I apply to CERT
- The ability of IRWD to continue operations during an emergency is critically important. Please carefully consider and implement redundant systems to enhance facility reliability
- The city should turn on the sprinklers when/where there are fires.
- The emergency response system is very effective
- The hill erosion on Canada near Birendra is a concern, the hill is constantly falling off into the street, the hill is not maintained and has wild vegetation unkempt and fire prone
- The Irvine Water District is, by far, the most responsible of all the agencies we have to deal with.
- The IRWD newsletter (the one that comes with the bill) is very informative and I enjoy reading it. Hopefully for people who pay online, they have easy access to it.
- The OC County FD and city emergency preparedness team should conduct random business
- The text messages and robot calls during the recent fires were very effective and reassuring
- The utilities like SCE shutting down the power grid during wildfires is more of a health and safety hazard than the wildfires themselves. Had SCE paid more attention to cutting down or replacing overgrown trees with cactus plants and the like, the likelihood a Santa Ana Wind condition would "ignite a fire" by knocking down a powerline unto dry trees would be mitigated against and risk reduced.
- There is a major fault under us - what are the projections?
- To inform in advance the Local natural hazards using advanced Techni also to Cell Phones.
- To received text message on regard matter.
- Too many people you run into problems no food no water no supplies.
- Training and education on continuous basis
- Tustin Ranch, having been developed recently, is better prepared for most hazards than other areas. My wife works for the County and is assisting in improving security against flooding. That doesn't happen often but there have been a few serious episodes over the past decades.
- Two evacuations within a few months in 2020. We need more announcements by officials as to where we can go with our pets quickly even if it's just parking in our car but, have safety measures implemented.

Appendix A: Survey Responses Summary

- Update storage and distribution capacity and increase availability of reclaimed water for use during disruptions or fire
- Utilize monetary/gift/raffle incentives for members to actually read through material.
- Very concerned about drought/fire. Would like to get the hillside behind my home planted in succulents.
- Very concerned about groundwater contamination. What is being done about the toxic plume under Woodbridge. How did it get there? If it traveled from the great park area then which other areas of Irvine are contaminated?
- Very concerned about the contamination of our water due to industrial pollutants, i.e. upstream flame-retardant manufacturer, asphalt factory, and the like.
- Water district needs to build more water storage facilities including lakes, reservoirs, water tanks. Also, more hydroelectric dams are needed for s growing number of electric vehicles. All electric wires to undergrounded, even long distance, high voltage, transmission lines.
- Water districts should test for all potential toxins, including MBTA, Perchlorate, and include it in their water quality reports.
- Water is life, if we face weeks of failed infrastructure after a major quake IRWD should be at the forefront of helping their customers acquire safe water and or purifying methods.
- Water security is going to be a bigger and bigger issue in the West due to global warming. IRWD should be on the forefront of efforts to mitigate the impact on its members and also offer training on water conservation, water catchment and storage.
- We applaud FEMA and IRWD for giving attention to VERY IMPORTANT SECURITY concerns that at present may not seem urgent.
- We appreciate the attention placed on this subject. Earthquake is our biggest concern.
- We appreciate the free or low price services offered by IRWD and other utilities, such as the irrigation controller and thermostat. We would probably respond quickly to similar offers of emergency preparedness items.
- We are a rural canyon area with needs quite different than most of suburban Orange County
- We are in a condo, so we are both more protected and less able to impact our surroundings
- We are woefully unprepared.
- We can never be prepared enough in these times. This must be an ongoing effort by the city of Irvine and public utilities such as IRWD and other important offices keeping the public informed and urging the public and homeowners to become involved. Disasters are becoming worse all over the USA and here in California. Everyone should become more involved and careful and alert.
- We do what we can to be prepared.
- We have drought resistant landscaping, so just make sure the water quality is excellent and the water keeps running.
- We have excellent notifications that are sent out during natural hazards, disasters, and preparedness for the same. Hope it will continue the same way.
- We live in the Forest part of lake forest and our concern is fire and what would be in place to stop the eucalyptus from fire and possible explosion?
- We must prevent wildfires. No one is prepared for earthquakes.
- We need better escape routes from the Portola Springs area. This was proven during the last fire evacuation. Opening the gate at the south end of Native Springs will help.
- We need better water and stable internet

Appendix A: Survey Responses Summary

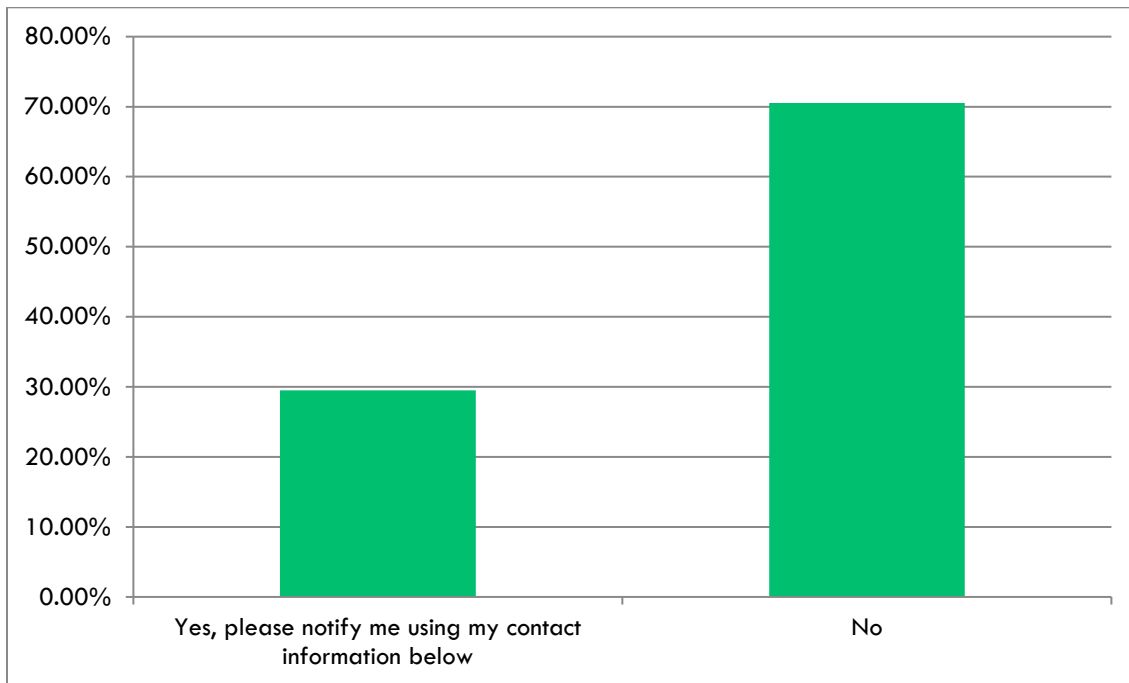
- We need to Have water ready for after a super Earthquake! We need More emergency Wells with pumping equipment and fuel on standby!! Because we can't survive without water and we can't escape Southern California!! This is the only Security risk IRWD should be worried about or after an earthquake we'll all be dead. I repeat we'll all be dead!! We can't walk out of here.
- We own a second home in the area addressed and can use information about the natural hazards of the area and what to expect.
- We should have a dedicated helicopter to respond to fires with water drops on short notice. I saw the Bond fire start, and it didn't spread off the property for at least 20 minutes. It could have been contained with one or two water drops.
- We should have Communication centers for local loved ones, hospitals, and emergency room
- We use solar during the day but need better info on battery availability in our area to mitigate power outages
- Webinar, workshop
- What channel on the emergency radio should we use to hear about our local emergency updates?
- When providing information, please also include a sense of the likelihood and severity of any given disaster occurring.
- When the fires occurred, we turned to the city website for information and updates. The site is useless There needs to be a program in place on trimming tree/landscapes and it needs to be enforced. Same with creating and enforcing laws against illegal fireworks; with notices and warnings going out months prior to holidays. Each year, firework use gets worse and last year it was a war zone...houses will burn during the dry and windy days and yet, we have no programs in place to educate the public (as we do about conserving water, water irrigation, conserving energy). Nothing will matter when 1 of our communities goes up in flames and yet we've experienced 2-3 evacuations already. When will the fire commissioner put something in place for preventive matters vs. after the fact?
- Where to purchase viable products to put into a home "Go Bag" in case of an earthquake, fire, or flood.
- Wildfires seem to be getting closer and more frequent. What steps are we taking to reduce the impact?
- Will need a fast responsive monitoring system to monitor the natural hazards, like wildfire, in early stage, so we can either be good prepared or contain it before it spreads out.
- Wind and fire concern are high on my list. I would like to see trees and vegetation maintained to prepare for natural hazards.
- With so many people living in community associations, is there outreach efforts for these institutions?
- With the vaccine, perhaps reaching out to hold workshops at the L.F. Community center for seniors.
- Without these services communication with the outside world would not be possible.
- Work with HOAs to incentivize emergency preparedness in their communities. They already work as a team and in the best interest of their communities.
- Work with other authorities to form a unified communication plan for disasters.
- workshop or checklist would be nice.
- Would like to know state of waste dump and water storage facilities this area.
- Would like to know what possible natural hazards are in my area other than earthquakes & high winds. Would we be subject to a tsunami in my area?

Appendix A: Survey Responses Summary

- Would like to receive notification on emergencies and how to prepare for it.
- Would love to be more involved in disaster response planning and community outreach, but I haven't found the effective entry point into that sort of community service yet.

**repetitive comments were consolidated*

Question 12: Would you like to review and comment on the draft of the IRWD Local Hazard Mitigation Plan?



Question 13: If you would like to be notified of future opportunities to participate in hazard mitigation and resiliency planning, please provide your name and contact info

Names and contact information of responses are included under a separate cover.



Irvine Ranch Water District

February 18 · 🌐



Local governments, including water districts, are required to have an approved local hazard mitigation plan to be eligible for FEMA hazard mitigation funds. Please take 10 minutes to submit answers to a survey on what is important to you and how you would like to see the District become more resilient. Visit IRWD.com/lhmp.



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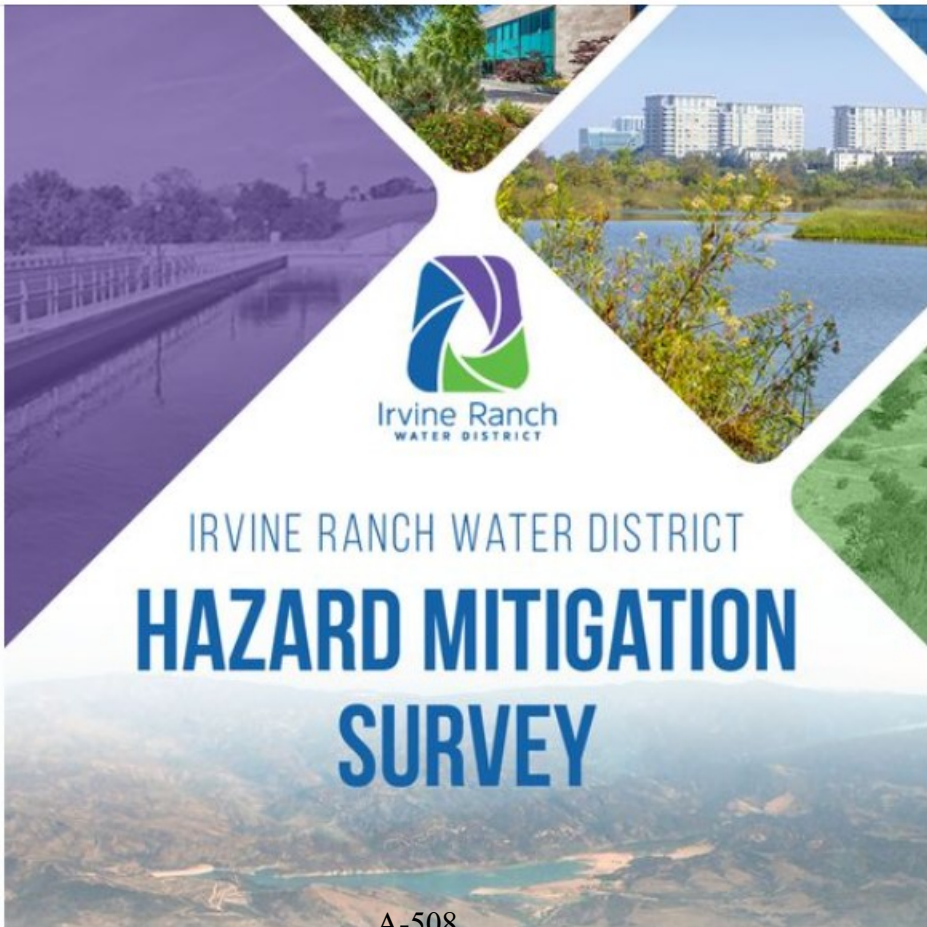


Irvine Ranch Water District

March 4 at 9:26 AM · 🌐



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A-508





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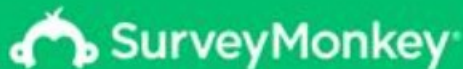


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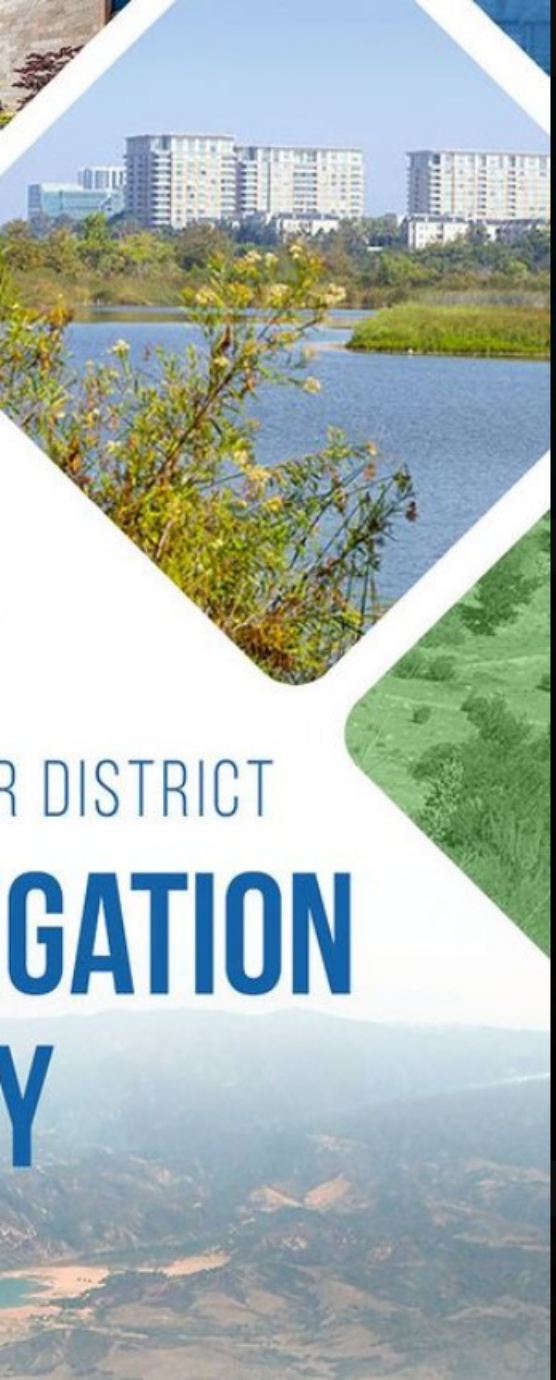
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PUBLISHED: FEB 02, 2021 | 17:05 PM



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City of Lake Forest - Government - The Irvine Ranch Water District Local Hazard Mitigat...

City of Lake Forest - Government

The Irvine Ranch Water District Local Hazard Mitigation Plan needs your input! Please take a moment to fill out this survey IRWD.com/lhmp to provide input for the Local Hazard Mitigation Plan. #irvineranchwaterdistrict

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Top Fan

Rich Parker

Don't even get me started with IRWD crap. How I wish the Los Alisos WD was still in control. Thumbs down

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Steele, Noelle

From: [REDACTED]
Sent: Monday, March 15, 2021 5:57 PM
To: [REDACTED]
[REDACTED]
[REDACTED]
Cc: Emilyn Zuniga; Steele, Noelle
Subject: EXTERNAL: IRWD Local Hazard Mitigation Plan community survey request

Good afternoon community partners,

Thank you for your continued support of our Local Hazard Mitigation Planning process. We are seeking public participation in a pre-planning disaster survey, and we would like to ask for your help in getting the word out. The survey can be found here: IRWD.com/lhmp

If you are able and willing to post to your website, social media, or other outreach channels, we'll have the survey open through the end of March. I'll be sending out the next planning meeting agenda shortly, so you can preview the discussion topics and bring any of your own hazard mitigation project information to the meeting that you would like to share. We appreciate your help and remain available for questions if you have them.

Best regards,

Alix

ALIX STAYTON
SAFETY SPECIALIST



3512 Michelson Drive, Irvine, California 92612
Main Office: 949-251-7000, Irvine, California 92619-7000

Steele, Noelle

From: Alix Stayton [REDACTED]
[REDACTED]
To: Emilyn Zuniga; Ken Pfister; Gaspar Garza; Dorien McElroy; Owen O'Neill; Colton Martin; Todd Colvin; Dave Crowe; John Dayer; Malcolm Cortez; Eric Akiyoshi; Ian Swift; Allen Shinbashi; Randy Williams; Joe Lam; Lars Oldewage; Lisa Haney; John Fabris
Cc: Wendy Chambers; Jose Zepeda; Richard Mykitta; Kevin Burton; Thomas Malone; Cheryl Clary; James Colston; Marina Lindsay; Deniene Rivenburg; Steele, Noelle
Subject: EXTERNAL: Hazard Mitigation Plan update
Attachments: HMP Meeting #1.pdf

Good afternoon,

Please find attached the slide deck that was presented during the first Hazard Mitigation Plan working group meeting. Since then, the Public Affairs department has facilitated distribution of the public engagement survey, and a small group of us got together and finished the hazard prioritization chart that we worked on in the first call. You can view the survey here: IRWD.com/lhmp.

Next steps will be to continue to gather information for inclusion in the plan such as our list of critical assets and GIS data. If anyone has data, analyses, reports or plans that can give the consulting team more perspective on our experience of disasters, send them along and I will forward. Thank you to everybody who has already been helping with these tasks.

Our next call will focus on ensuring our initial prioritization work makes sense as a whole; today we talked about how, even though we scored the individual hazards fairly, the list doesn't yet reflect our District disaster priorities (too many "medium-impact" hazards). The consultants will facilitate the process of shaping the list to show what's important to us, and help us work on a couple of the hazards that seemed difficult to score. We will also be talking about the hazard profiles, which comprise a large portion of the Plan that FEMA will be reviewing. We'll discuss historical incidents and the programs, procedures, and other protective measures we already have in place to minimize disaster impacts. Meetings will continue to include community partners like the City of Irvine, WEROC and the State Water Resources Control Board.

As a reminder, the Hazard Mitigation Plan is a FEMA process for gaining grant eligibility and may differ from our very recent AWIA experience, which was an EPA process for ensuring compliance. We provided the MBI team with a lot of background material on IRWD, including the AWIA plan, and they take it into account whenever they are able to reduce the amount of duplicate work we have to do. Thanks to everyone for their patience and participation with this process.

As always, if you have questions or need more information, I'm happy to help or go find answers. Call, text or email anytime.

Best,

Alix

ALIX STAYTON
SAFETY SPECIALIST



3512 Michelson Drive, Irvine, California 92612
Mailing: PO Box 57000, Irvine, California 92619-7000





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PUBLISHED: JUL 27, 2021 | 16:38 PM



IRWD Local Hazard Mitigation Plan available for public comment

Irvine Ranch Water District has initiated development of a Local Hazard Mitigation Plan (LHMP). The LHMP will provide a framework for IRWD to reduce its vulnerability to the impacts of natural and human-induced events such as earthquakes, flooding, and spills. The plan will identify opportunities for IRWD to make its water and sewer infrastructure even more resilient to hazards in the future.

Draft Documents Available for Review

Starting July 27, 2021, the LHMP is available for a two-week public review period. Please see the following draft document: [IRWD LHMP Public Review with Appendix \(/images/pdf/liquid-news/irwd_lhmp_public_review_with_appendix.pdf\)](https://www.irwd.com/images/pdf/liquid-news/irwd_lhmp_public_review_with_appendix.pdf).

How to Comment

IRWD welcomes your comments and questions. Please submit them [here \(/component/rsform/form/28-local-hazard-mitigation-plan-feedback?lang=en\)](https://www.irwd.com/component/rsform/form/28-local-hazard-mitigation-plan-feedback?lang=en), by 6 p.m. Aug. 10, 2021.

FREQUENTLY ASKED QUESTIONS

What is a Hazard Mitigation Plan?

A Hazard Mitigation Plan is a framework that guides decision making and policy development to reduce or eliminate risks in our community. The plan identifies the types of hazards that may exist, evaluates our community's vulnerability to those threats, and outlines a strategy to reduce or eliminate the risk.

Why is the LHMP important?

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The Federal Disaster Mitigation Act of 2000 requires state and local governments, including special districts, to have an approved Hazard Mitigation Plan to be eligible to apply for and receive hazard mitigation funds from the Federal Emergency Management Agency (FEMA). IRWD is committed to reducing impacts and maintaining eligibility for FEMA funds for implementation of mitigation programs.

How is a Local Hazard Mitigation Plan developed?

The goal of an LHMP is to identify and address hazards specific to the IRWD service area, identify mitigation actions to reduce the severity and impact of each hazard, and achieve certification by FEMA for mitigation funding. The LHMP primarily consists of three components:

- Hazard profiles: type, location, extent, previous occurrences, probability of future events.
- Vulnerability assessment: impacts of hazards, vulnerability to each hazard, repetitive loss, potential dollar losses.
- Mitigation strategies: overarching goals, specific actions, and prioritization.

The LHMP is developed through a process-oriented approach, using the experience of IRWD community partners such as the Orange County Sheriff’s Department, the Orange County Fire Authority, service-area cities, and the Water Emergency Response Organization of Orange County. The IRWD community partners provide key stakeholder input on the hazard profiles, vulnerability assessment and mitigation strategies. This participation is documented and incorporated into the LHMP. Additionally, the LHMP will identify how the plan will be monitored, evaluated, and updated within a five-year cycle.

Once completed, the LHMP is submitted to the California Governor’s Office of Emergency Services (Cal OES) and FEMA for review and comment. Once conditional approval is received from Cal OES and FEMA, the LHMP will be submitted for approval locally by the IRWD Board of Directors.

How can the public become involved in the Hazard Mitigation Planning process?

Public participation is important because it helps raise awareness of potential hazards and any actions to mitigate those hazards. By participating in the process, you will be taking time to consider the priority those actions should take. That will help IRWD reduce risk exposure, thereby reducing the need to expend resources on recovery from hazards. IRWD will consider your comments, questions, ideas, and concerns and integrate your input into the plan where appropriate.

CONTACT IRWD

- If you would like to comment or ask a question as part of the LHMP review process, please fill out this [form](/component/rsform/form/28-local-hazard-mitigation-plan-feedback?lang=en).
- You also can email IRWD at Info@IRWD.com. Please use “IRWD Local Hazard Mitigation Plan feedback” as the subject line.

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Steele, Noelle

From: Alix Stayton <stayton@irwd.com>
Sent: Tuesday, July 27, 2021 6:28 PM
To: Steele, Noelle
Subject: EXTERNAL: Fwd: [EXTERNAL] IRWD Local Hazard Mitigation Plan feedback

Follow Up Flag: Follow up
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And we're off!

ALIX STAYTON
SAFETY SPECIALIST
[\(626\) 598.1627](tel:(626)598.1627) cell

From: Paul Cook, IRWD General Manager <info@irwd.com>
Sent: Tuesday, July 27, 2021 6:19:06 PM
To: Alix Stayton <stayton@irwd.com>
Subject: [EXTERNAL] IRWD Local Hazard Mitigation Plan feedback

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Dear Community Stakeholder,

I am writing because you provided your contact information as part of Irvine Ranch Water District's recent Local Hazard Mitigation Plan survey.

The plan's draft documents are now available for a two-week public review period, from July 27 to Aug. 10. We welcome your comments and questions.

Please visit the [IRWD website](#) to review the documents and read answers to frequently asked questions about hazard mitigation planning.

Please [click here](#) to submit your comments. You also may comment by replying to this email.

The safety and well-being of the community are IRWD's highest priorities, so I thank you for your interest.

Sincerely,

Paul Cook, P.E.

General Manager

Irvine Ranch Water District



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Our mailing address is:

IRWD
15600 Sand Canyon Ave
Irvine, CA 92618-3100

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Local Hazard Mitigation Plan Fe

Date	First Name	Last Name	Email	Comments
				<p>Thank you for the opportunity to comment on the draft LHMP. The draft LHMP is a fine product and covers many important areas of risk identification, assessments, and mitigation. However, because I am not privy to sensitive/confidential information that cannot be made public, my comments are provided below to bring to your attention a few important concerns that I still carry from my previous job.</p> <p>My primary focus is on hazardous material releases by accident or by an act of terrorism. Chemicals used in the treatment of drinking water or waste water including ammonia (anhydrous or aqueous), chloramine, and chlorine can cause a significant inhalation hazard due to their toxicity. I am wondering whether the IRWD had perform a detailed study of the impact of the release to the surrounding community when the chemicals are released. If needed, I urge staff to conduct a worst-case chemical release simulation using an air dispersion modeling (e.g., CAMEO) to predict the plume footprint. The USEPA has a few softwares designed for this specific purpose in conjunction with a mapping software from the US Census (e.g., LAND USE/MAPLOT) to identify and quantify the population within the footprint. This modeling exercise is quite easy, the modeler just needs to input chemical properties, volume released, and meteorological data from John Wayne Airport or Long Beach Airport. Your LHMP is not complete if this modeling is not performed, unless a risk management professional deems the facility chemical inventory does not warrant it.</p> <p>It does not matter the resulting footprint/impact radius is within or outside an IRWD facility, it must be communicated to key staff within the facility for employee safety reason. If the chemical plume footprint exceeds a facility boundary, it must also be shared with the nearest local OC fire station for appropriate and speedy response including notification to nearby homeowners and vulnerable communities including daycares, schools, nursing homes. It is part of the federal, state, and local community right-to-know mandates. In addition, if the facility chemical inventory is big enough to result in a hazardous offsite impact in case of a release, a facility should conduct an annual spill drill in coordination with a local fire department. Believe me, this is critical for a facility to have an effective response to the releases. It does not matter how well a risk management plan is developed, facility management and employees tend to forget how to act in emergencies due to the lack of familiarity with the plan and preparedness!</p> <p>My last concern is the potential lack of backup generators for lift stations and pump stations in case of a power outage, localized or widespread. I briefly reviewed staff meeting agenda and reports and noticed one comment related to not having a capability to bring fuel to an emergency backup generators.</p> <p>This issue is very serious, please investigate further and make sure that a critical facility must have a sufficient power backup generator to maintain its functions during an outage. In addition, there must be a fuel tank large enough to run a generator at least 24 hours continuously and the generator must be tested every month to make sure it will run in case of emergency. This also is an important community life and fire safety matter. A fire hydrant must have enough water pressure to fight fire. What good is it if there is no pump, no pressure in the water line?</p>
2021-08-03 20:04:31	Dat	Quach	datquach03@yahoo.com	<p>That is all I can think of at this moment. The LHMP is a living document and is revised every 5 years, please include a section on management of change at the beginning for future updates. Please do not hesitate to contact me if you have any questions. Sincerely, Dat Quach</p>
2021-07-28 16:11:01	Roger	Sievers	rogersievers@sbcglobal.net	<p>The report is thorough and comprehensive. Several observations struck me while reading it.</p> <ol style="list-style-type: none"> 1). No mention was seen regarding water quality in the IRWD controlled water sources. News reports of wells being closed due to "forever" chemicals should be discussed and scoped for materiality. 2). While cybersecurity was mentioned, ransomware and hostile controlling of chemicals in water sources has been reported recently. My sense is IRWD is significantly exposed to risks from a bad actor. This risk should get greater attention with real actions to avoid them. 3). No mention was made of long-term water sources after very severe drought which is likely in years ahead. Can IRWD be water-independent in the future if that is needed? Will that allow for planned growth? As farms dry up nationally, should IRWD plan for greater agricultural use?
2021-07-28 13:35:08	Katharine	Poullai	bobbyalwaysgotbills@gmail.com	<p>please don't increase the rate on people daily water consumption. I should be able to wash my hand each time tripped to the restroom !! I should be able to take shower at least every 3 days !! I should be able to flush out after i using the bathroom !! you see. Sincerely your Katharine Poullai.</p>

Local Hazard Mitigation Plan Fe

2021-07-28 11:18:10	Nancy	O'Donnell	muzzyo46@hotmail.com	While I appreciate your transparency, 531 pages is not necessary for me. I actually stopped at page 31. A simple description of the plan would be preferable. (One page !!)
2021-07-28 08:19:12	Debra	Bryan	Oceanclose777@gmail.com	Still hoping IRWD pays attention to access road that continues to be neglected on both sides with weeds and snake holes hiding beneath.
2021-07-28 08:18:54	Debra	Bryan	Oceanclose777@gmail.com	Still hoping IRWD pays attention to access road that continues to be neglected on both sides with weeds and snake holes hiding beneath.
2021-07-27 21:47:14	Joy	Barker	garjoba@gmail.com	Very impressive points about climate change and being more prepared with ways to use recycled water at golf courses, etc.
2021-07-27 19:04:51	Bob	Holtzclaw	Lakeforestbob@hotmail.com	In Lake Forest there is a sewer line that maybe a hazard in the near future along the San Diego creek. The creek has washed a lot of the support ground around the sewer line. If an earthquake or heavy rain next fall could wash away the earth around the sewer line it could rupture.

APPENDIX C: DAM/RESERVOIR FAILURE VULNERABILITY ASSESSMENT

C.1 DAM/RESERVOIR FAILURE VULNERABILITY OVERVIEW

IRWD owns and operates five dams classified by the Division of Safety of Dams as “extremely high hazard” within the IRWD service area: Rattlesnake Canyon Dam, Syphon Canyon Dam, San Joaquin Dam, Santiago Dam, and Sand Canyon Dam. DSOD is responsible for assigning each jurisdictional dam a downstream hazard classification. This classification is based only on potential downstream impacts to life and property, in the unlikely event that the dam should fail when operating with a full reservoir. This hazard status is not related to the condition of the dam or the likelihood of the dam to fail in either the short or long-term future. Inundation mapping and Emergency Action Plans (EAPs) have been prepared and approved by FEMA and DSOD and are included in this Appendix for reference.

Critical facilities and facilities of concern were mapped against each inundation zone. As all five dam inundation zones ultimately reach San Diego Creek and Upper Newport Bay, there is some overlap of the dam inundation zones. Table C-1, *Dam/Reservoir Failure Vulnerability*, below, summarizes the critical facilities and facilities of concern that are located within at least one dam inundation zone. Tables C-2, *Facilities in the Santiago Dam Inundation Zone* to C-7, *Facilities in the San Joaquin Dam Inundation Zone*, identify the specific inundation vulnerabilities associated with each “extremely high hazard” dam. Refer to Appendix C, Exhibit 1.1, *Dam Inundation Map – Critical Facilities*, Appendix C Exhibit 1.2, *Dam Inundation Map – Distribution Map*, and Appendix C Exhibit 1.3, *Dam Inundation Map, Sewer Collection System*, for illustrations of all five inundation zones.

**Table C-1
Dam/Reservoir Failure Vulnerability**

Map ID	Name	Asset Type	Santiago Dam	Sand Canyon (Spillway)	Sand Canyon (Dam)	Syphon Canyon Dam	Rattlesnake Canyon Dam	San Joaquin Dam	Total Loss Potential
2	Michelson Biosolids	Biosolids Treatment	Y	N	N	N	N	N	\$250,000,000.00
3	Distribution System	Distribution System	Y	Y	Y	Y	Y	Y	\$790,000,000.00
6	Met Source Water	Intake	N	Y	Y	N	N	Y	N/A
11	Coyote Canyon	Lift Station	N	N	N	N	N	Y	\$2,605,484.00
14	Irvine Park	Lift Station	Y	N	N	N	N	N	\$2,605,484.00
19	MWRP MPS-3	Lift Station	Y	N	N	N	N	N	\$4,226,529.00
25	University	Multi-Purpose: Lift Station, Telemetry Site, Pump Station	N	N	N	N	N	Y	\$6,999,844.00
26	Michelson Operations Center	Operations Staff Offices	Y	N	N	N	N	N	\$20,900,000.00
43	Michelson MWRP	Recycled Water	Y	N	N	N	N	N	\$500,000,000.00
62	Deep Aquifer Treatment System (DATS)	Treatment System	Y	N	N	N	N	N	\$20,000,000.00
63	Collection System	Wastewater Collection System	Y	Y	Y	Y	Y	Y	\$781,131,700.00
65	S1	Siphon	Y	Y	Y	N	Y	Y	\$585,000.00
66	S2	Siphon	Y	Y	Y	Y	Y	Y	\$1,266,000.00
67	S3	Siphon	Y	N	Y	Y	Y	N	\$1,302,000.00
68	S4	Siphon	Y	Y	Y	Y	Y	N	\$1,365,000.00
69	S5	Siphon	Y	N	N	N	N	N	\$222,000.00
70	S6	Siphon	Y	N	N	N	Y	N	\$444,000.00
74	S10	Siphon	Y	N	N	Y	Y	N	\$549,000.00
80	S16	Siphon	N	N	N	N	N	Y	\$951,000.00
81	S18	Siphon	N	Y	Y	N	N	N	\$807,000.00
82	S19	Siphon	Y	N	N	N	N	N	\$180,000.00

C.1.1 Santiago Dam

Santiago Dam (Irvine Lake, also known as Santiago Creek Reservoir), located in Santiago Canyon, stores water for non-drinking uses and operates as a source water for the Baker Water Treatment Plant. Capacity for Santiago Dam is 25,000 acre-feet. Failure of Santiago Creek Reservoir would result in inundation for low-lying portions of south Orange, Villa Park, Santa Ana, North Tustin, Tustin, Fountain Valley, Garden Grove, Costa Mesa, Irvine, Huntington Beach, and Newport Beach. Portions of the state highway system could be inundated, including Interstate 5 (I-5), I-405, State Route (SR) 22, SR-55, SR-57, and SR-261 (toll road). Many surface streets would also be inundated. High flows and flooding are expected in Santiago Creek, Santa Ana River, Peters Canyon Wash, San Diego Creek, and Upper Newport Bay.

As this is the largest dam in the IRWD service area, inundation from dam failure would be the most significant. Several critical facilities and one facility of concern would potentially be inundated; refer to [Table C-2, *Facilities in the Santiago Dam Inundation Zone*](#).

**Table C-2
Facilities in the Santiago Dam Inundation Zone**

Map ID	Name	Asset Type	Arrival Time	Total Loss Potential
Critical Facilities				
2	Michelson Biosolids	Biosolids Treatment	Between 4 hr and 4 hr 10 min	\$250,000,000.00
3	Distribution System	Distribution System	Between 12 min and 15 min	\$790,000,000.00 ¹
14	Irvine Park	Lift Station	Between 9 and 12 min	\$2,605,484.00
19	MWRP MPS-3	Lift Station	Between 4 hr and 4 hr 10 min	\$4,226,529.00
43	Michelson MWRP	Recycled Water	Between 4 hr and 4 hr 10 min	\$500,000,000.00
62	Deep Aquifer Treatment System (DATS)	Treatment System	Between 4 hr and 4 hr 10 min	\$20,000,000.00
63	Collection System	Wastewater Collection System	Between 6 min and 9 min	\$781,131,700.00 ²
65	S1	Siphon	Between 3 hr 50 min and 4 hr	\$585,000.00
66	S2	Siphon	Between 3 hr 40 min and 3 hr 50 min	\$1,266,000.00
67	S3	Siphon	Between 3 hr 20 min and 3 hr 30 min	\$1,302,000.00
68	S4	Siphon	Between 3 hr 40 min and 3 hr 50 min	\$1,365,000.00
69	S5	Siphon	Between 3 hr 40 min and 3 hr 50 min	\$222,000.00
70	S6	Siphon	Between 3 hr and 3 hr 10 min	\$444,000.00
74	S10	Siphon	Between 2 hr 10 min and 2 hr 20 min	\$549,000.00
82	S19	Siphon	Between 2 hr 40 min and 2 hr 50 min	\$180,000.00
Facilities of Concern				
26	Michelson Operations Center	Operations Staff Offices	Between 4 hr and 4 hr 10 min	\$20,900,000.00
1. Replacement cost for Critical Facility #3, Distribution System, is labeled as replacement for a "significant portion" of the system.				
2. Replacement cost for Critical Facility #63, Sewer Collection System, is labeled as replacement for a "significant portion" of the system.				

C.1.2 Sand Canyon Dam

Sand Canyon Dam is located in the City of Irvine and serves as recycled water storage for IRWD. Capacity for Sand Canyon Dam is 768 acre-feet. Failure of Sand Canyon Dam would result in the inundation of Strawberry Farms Golf Course, along with low-lying portions of Sand Canyon Creek and San Diego Creek along Strawberry Farm Road, the University Drive and Michelson Drive intersection, and adjacent areas. University Drive from I-405 to Campus Drive would likely be unusable in the event of inundation. High flows could be expected in San Diego Creek to Newport Bay. The flood wave caused by a failure of Sand Canyon Dam could take approximately 8 hours to subside.

Failure of the Sand Canyon Dam Spillway (designated critical appurtenant structure) would result in a less significant inundation footprint when compared to Sand Canyon Dam. The Sand Canyon

Dam Spillway failure would result in partial inundation of the Strawberry Farms Gold club, but would mostly be confined to Sand Canyon Wash. The flood waves would continue to Sand Canyon Creek. The flood wave would take approximately 10 hours to subside.

As the inundation footprint for Sand Canyon Dam Failure and Spillway Failure are slightly different, the vulnerabilities for each scenario vary. Critical facilities within the inundation zone for spillway failure are outlined below in Table C-3, *Facilities in the Sand Canyon (Spillway) Inundation Zone*. Critical facilities within the inundation zone for dam failure are outlined in Table C-4, *Facilities in the Sand Canyon (Dam) Inundation Zone*. No facilities of concern are located within either inundation zone.

**Table C-3
Facilities in the Sand Canyon (Spillway) Inundation Zone**

Map ID	Name	Asset Type	Arrival Time	Total Loss Potential
3	Distribution System	Distribution System	3 min	\$790,000,000.00 ¹
6	Met Source Water	Intake	Between 48 min and 54 min	N/A
63	Collection System	Wastewater Collection System	3 min	\$781,131,700.00 ²
65	S1	Siphon	Between 2 hr 6 min and 2 hr 12 min	\$585,000.00
66	S2	Siphon	no arrival contour	\$1,266,000.00
68	S4	Siphon	no arrival contour	\$1,365,000.00
81	S18	Siphon	Between 2 hr 12 min and 2 hr 18 min	\$807,000.00
1. Replacement cost for Critical Facility #3, Distribution System, is labeled as replacement for a "significant portion" of the system.				
2. Replacement cost for Critical Facility #63, Sewer Collection System, is labeled as replacement for a "significant portion" of the system.				

**Table C-4
Facilities in the Sand Canyon (Dam) Inundation Zone**

Map ID	Name	Asset Type	Arrival Time	Total Loss Potential
3	Distribution System	Distribution System	3 min	\$790,000,000.00 ¹
6	Met Source Water	Intake	Between 15 min and 18 min	N/A
63	Collection System	Wastewater Collection System	3 min	\$781,131,700.00 ²
65	S1	Siphon	Between 48 min and 54 min	\$585,000.00
66	S2	Siphon	Between 48 min and 54 min	\$1,266,000.00
67	S3	Siphon	Between 1 hr 6 min and 1 hr 12 min	\$1,302,000.00
68	S4	Siphon	Between 1 hr 48 min and 1 hr 54 min	\$1,365,000.00
81	S18	Siphon	Between 36 min and 42 min	\$807,000.00
1. Replacement cost for Critical Facility #3, Distribution System, is labeled as replacement for a "significant portion" of the system.				
2. Replacement cost for Critical Facility #63, Sewer Collection System, is labeled as replacement for a "significant portion" of the system.				

C.1.3 Syphon Canyon Dam

Syphon Canyon is located in the City of Irvine and serves as recycled water storage for IRWD. Capacity for Syphon Canyon Dam is 535 acre-feet. Failure of Syphon Canyon Dam could result in low-lying areas of the Stonegate/Woodbury neighborhoods, Irvine Boulevard, Jeffery Road below Boulevard, and Jeffery Open Space to be inundated. Portions of I-5 between Culver Drive and Jeffery Road could be impacted by inundation at Syphon Canyon Dam. Portions of Portola Road, Irvine Boulevard, Jeffery Road, Trabuco Road, Walnut Road, Harvard Road, and Edinger Avenue would potentially be closed due to partial inundation.

Critical facilities within the Syphon Canyon Dam inundation zone are identified in Table C-5, *Facilities in the Syphon Canyon Dam Inundation Zone*. No facilities of concern are located within the Syphon Canyon Dam inundation zone.

**Table C-5
Facilities in the Syphon Canyon Dam Inundation Zone**

Map ID	Name	Asset Type	Arrival Time	Total Loss Potential
3	Distribution System	Distribution System	3 min	\$790,000,000.00 ¹
63	Collection System	Wastewater Collection System	3 min	\$781,131,700.00 ²
66	S2	Siphon	4 hr	\$1,266,000.00
67	S3	Siphon	4 hr	\$1,302,000.00
68	S4	Siphon	Between 3 hr 54 min and 4 hr	\$1,365,000.00
74	S10	Siphon	Between 2 hr and 2 hr 6 min	\$549,000.00
1. Replacement cost for Critical Facility #3, Distribution System, is labeled as replacement for a "significant portion" of the system. 2. Replacement cost for Critical Facility #63, Sewer Collection System, is labeled as replacement for a "significant portion" of the system.				

C.1.4 Rattlesnake Canyon Dam

Rattlesnake Canyon Dam is located in the City of Irvine and serves as recycled water storage for IRWD. Capacity for Rattlesnake Canyon Dam is 1,480 acre-feet. Failure of Rattlesnake Canyon Dam would inundate the low-lying portions of the Northwood neighborhood (Irvine), Portola Parkway, Culver Drive, and adjacent surface streets. Portions of I-5 between Jamboree Road/261 and Culver Drive could be impacted as well. However, I-405 would not be impacted, as the flood would be confined to San Diego Creek.

Critical facilities within the Rattlesnake Canyon Dam inundation zone are listed within [Table C-6](#), below. No facilities of concern are located within the Rattlesnake Canyon Dam inundation zone.

**Table C-6
Facilities in the Rattlesnake Canyon Dam Inundation Zone**

Map ID	Name	Asset Type	Arrival Time	Total Loss Potential
3	Distribution System	Distribution System	Between 3 min and 6 min	\$790,000,000.00 ¹
63	Collection System	Wastewater Collection System	Between 3 min hr and 6 min	\$781,131,700.00 ²
65	S1	Siphon	Between 2 hr 6 min and 2 hr 12 min	\$585,000.00
66	S2	Siphon	Between 2 hr and 2 hr 6 min	\$1,266,000.00
67	S3	Siphon	Between 1 hr 30 min and 1 hr 36 min	\$1,302,000.00
68	S4	Siphon	Between 1 hr 18 min and 1 hr 24 min	\$1,365,000.00
70	S6	Siphon	1 hr 12 min	\$444,000.00
74	S10	Siphon	Between 30 min and 36 min	\$549,000.00
1. Replacement cost for Critical Facility #3, Distribution System, is labeled as replacement for a "significant portion" of the system. 2. Replacement cost for Critical Facility #63, Sewer Collection System, is labeled as replacement for a "significant portion" of the system.				

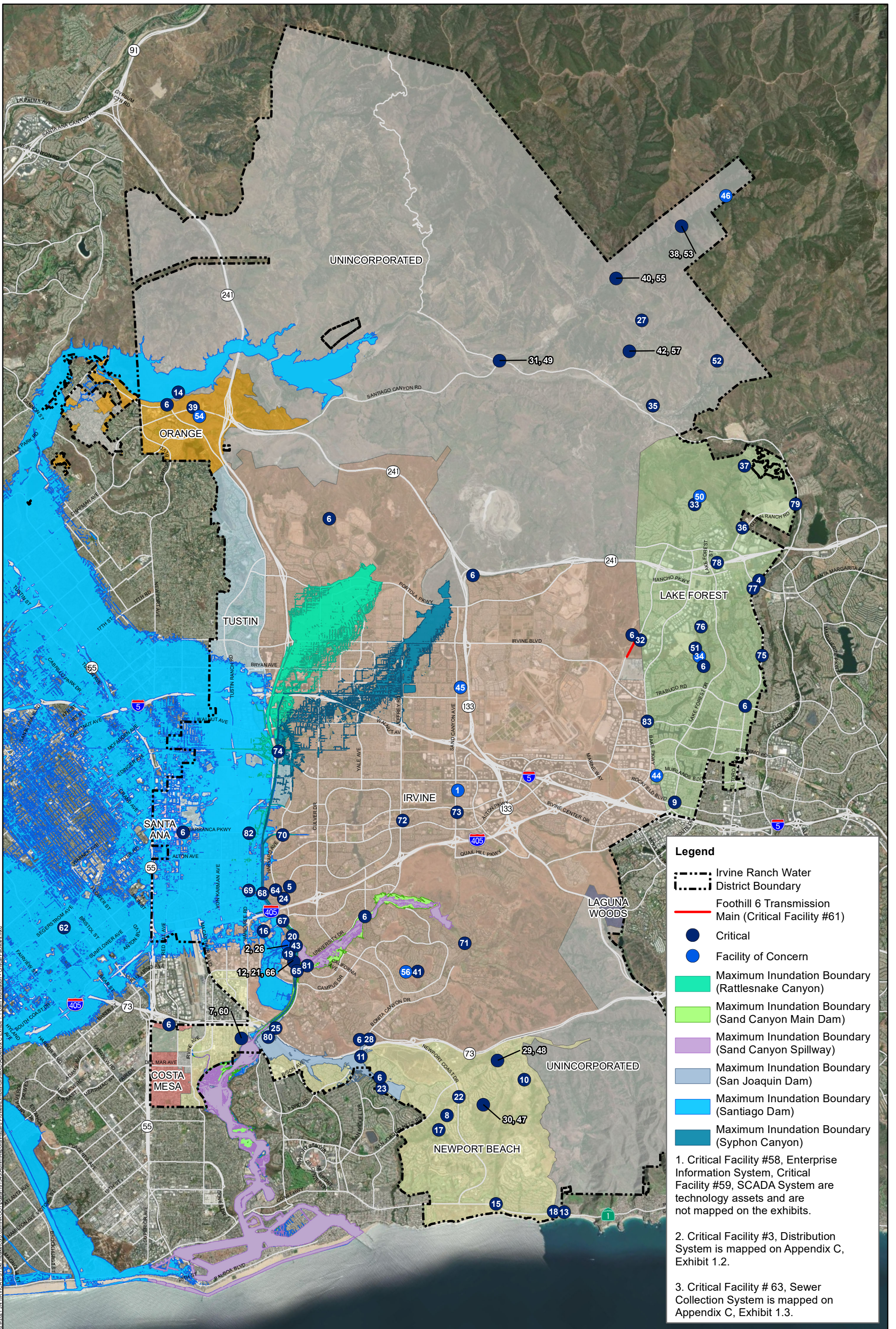
C.1.5 San Joaquin Dam

San Joaquin Dam is located in the City of Newport Beach and serves as recycled water storage for IRWD. Capacity for San Joaquin Dam is 3,080 acre-feet. Failure of San Joaquin Dam would result in inundation of the Newport North, Newport Canyon, and Baypoint neighborhoods (Newport Beach). Bonita Canyon Drive, Jamboree Road, University Drive, and State Route 73 near Bison Avenue would be inundated and could be closed. I-405 would not be impacted, as the flood would be confined to San Diego Creek.

Critical facilities within the San Joaquin Dam inundation zone are listed in [Table C-7, *Facilities in the San Joaquin Dam Inundation Zone*](#). No facilities of concern are located within the San Joaquin Dam inundation zone.

**Table C-7
Facilities in the San Joaquin Dam Inundation Zone**

Map ID	Name	Asset Type	Arrival Time	Total Loss Potential
3	Distribution System	Distribution System	3 min	\$790,000,000.00 ¹
6	Met Source Water	Intake	3 min	N/A
11	Coyote Canyon	Lift Station	Between 3 min and 6 min	\$2,605,484.00
25	University	Multi-Purpose: Lift Station, Telemetry Site, Pump Station	Between 15 min and 18 min	\$6,999,844.00
63	Collection System	Wastewater Collection System	Between 3 min and 6 min	\$781,131,700.00 ²
65	S1	Siphon	Between 36 min and 42 min	\$585,000.00
66	S2	Siphon	Between 36 min and 42 min	\$1,266,000.00
80	S16	Siphon	Between 12 min and 15 min	\$951,000.00
1. Replacement cost for Critical Facility #3, Distribution System, is labeled as replacement for a "significant portion" of the system. 2. Replacement cost for Critical Facility #63, Sewer Collection System, is labeled as replacement for a "significant portion" of the system.				



Legend

- Irvine Ranch Water District Boundary
- Foothill 6 Transmission Main (Critical Facility #61)
- Critical
- Facility of Concern
- Maximum Inundation Boundary (Rattlesnake Canyon)
- Maximum Inundation Boundary (Sand Canyon Main Dam)
- Maximum Inundation Boundary (Sand Canyon Spillway)
- Maximum Inundation Boundary (San Joaquin Dam)
- Maximum Inundation Boundary (Santiago Dam)
- Maximum Inundation Boundary (Syphon Canyon)

1. Critical Facility #58, Enterprise Information System, Critical Facility #59, SCADA System are technology assets and are not mapped on the exhibits.

2. Critical Facility #3, Distribution System is mapped on Appendix C, Exhibit 1.2.

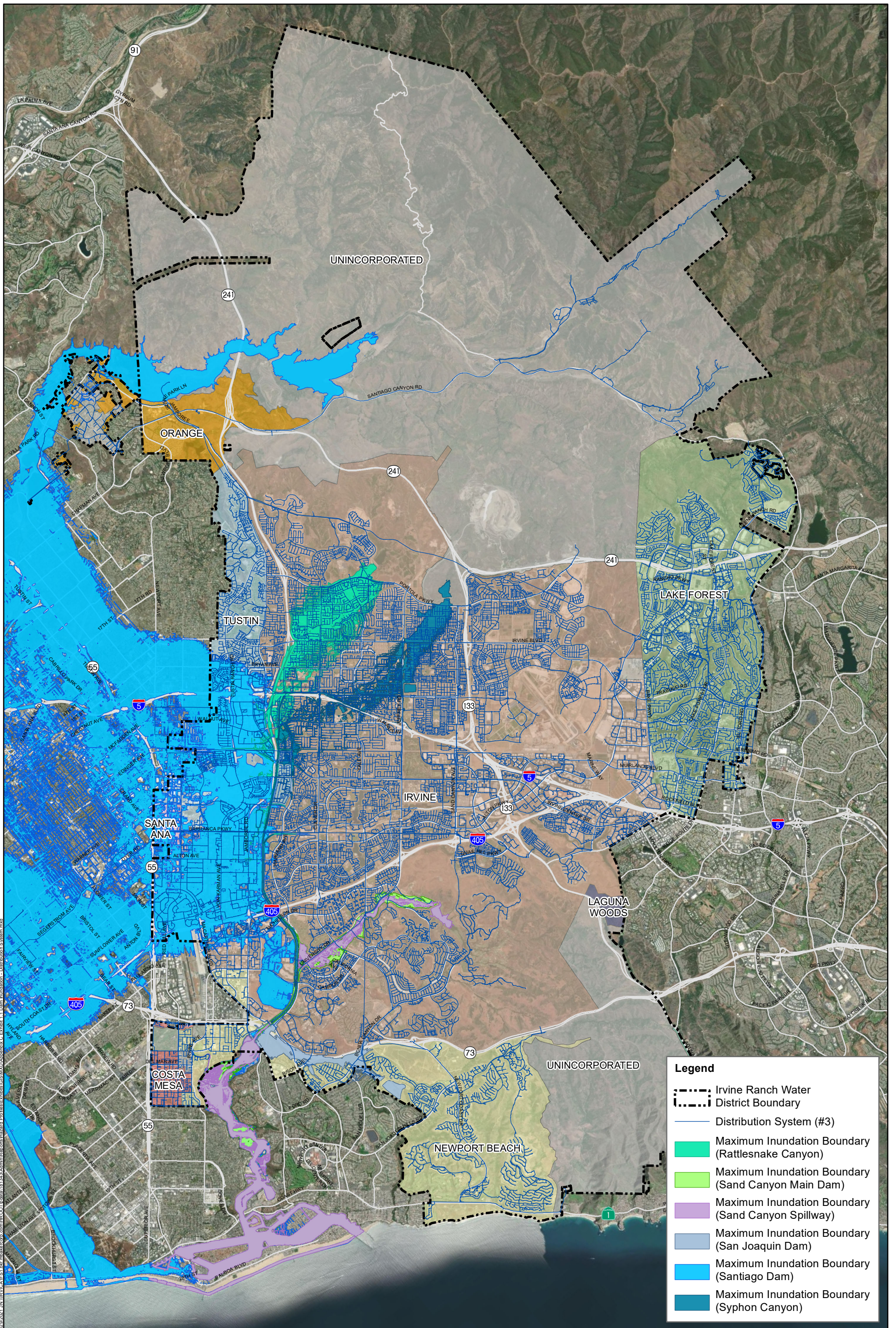
3. Critical Facility #63, Sewer Collection System is mapped on Appendix C, Exhibit 1.3.



0 4,250 8,500 Feet

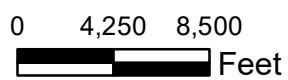
Irvine Ranch Water District Local Hazard Mitigation Plan Dam Inundation Map - Critical Facilities

Data Source: ESRI, 2020, IRWD, 2021, Stetson Engineering, Inc., 2018

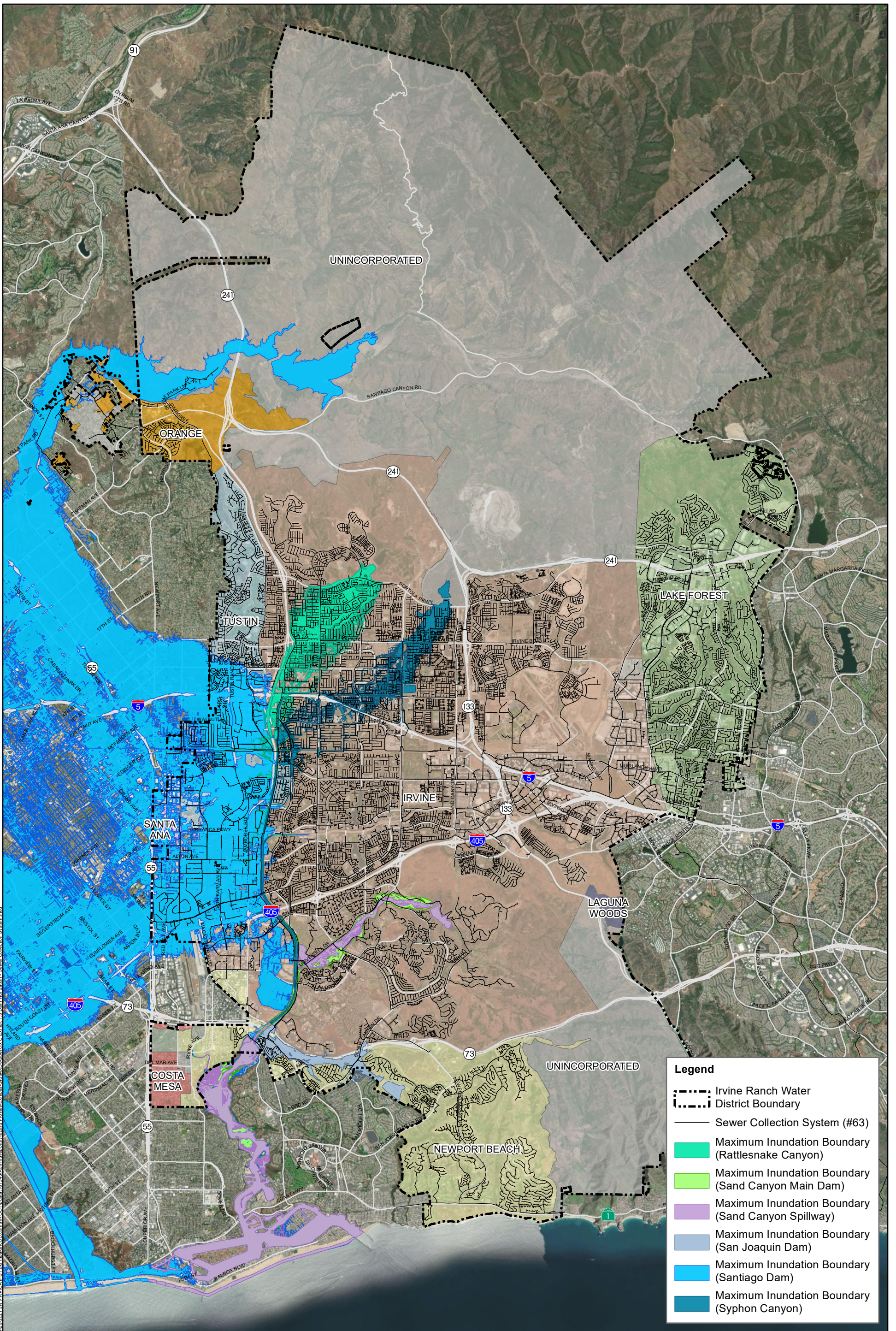


Legend

- Irvine Ranch Water District Boundary
- Distribution System (#3)
- Maximum Inundation Boundary (Rattlesnake Canyon)
- Maximum Inundation Boundary (Sand Canyon Main Dam)
- Maximum Inundation Boundary (Sand Canyon Spillway)
- Maximum Inundation Boundary (San Joaquin Dam)
- Maximum Inundation Boundary (Santiago Dam)
- Maximum Inundation Boundary (Syphon Canyon)



Irvine Ranch Water District Local Hazard Mitigation Plan Dam Inundation Map - Distribution System



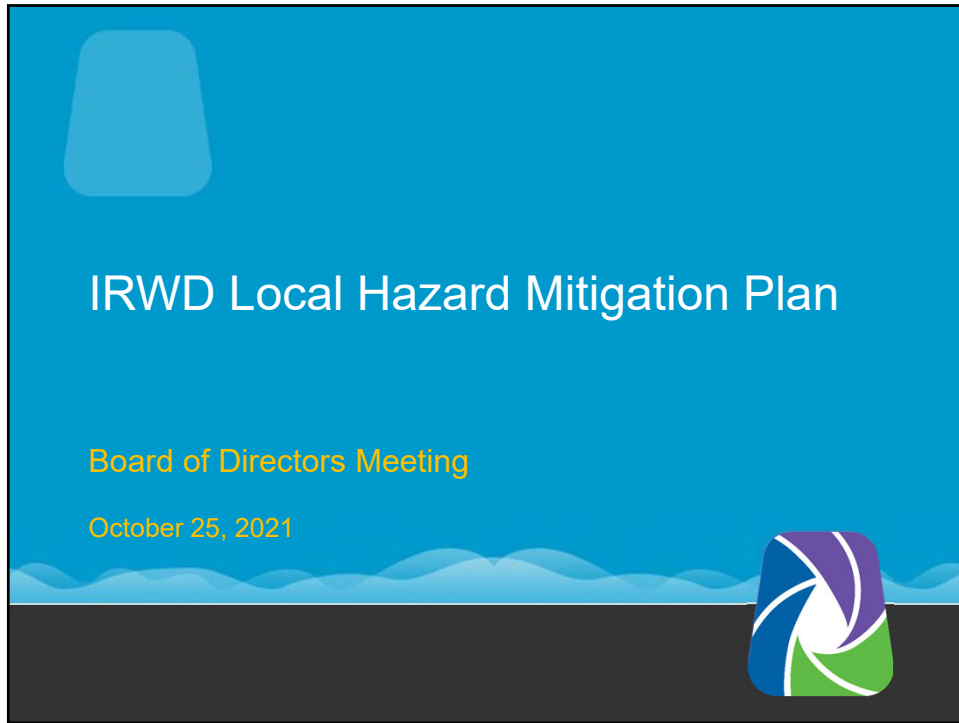
4/23/2021 10:11:00 AM C:\Users\jw\Documents\Irvine\GIS\MapDocs\Appendix C Exhibit 1.3 Dam Inundation - Sewer Collection System.mxd



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Irvine Ranch Water District Local Hazard Mitigation Plan Dam Inundation Map - Sewer Collection System


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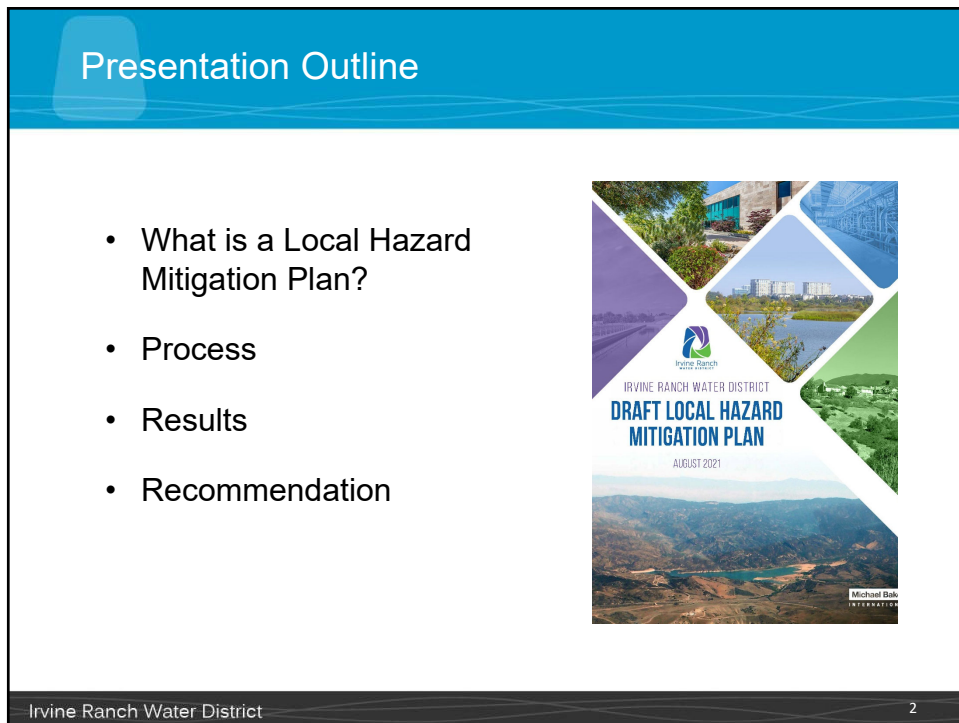
IRWD Local Hazard Mitigation Plan

Board of Directors Meeting

October 25, 2021




1



Presentation Outline

- What is a Local Hazard Mitigation Plan?
- Process
- Results
- Recommendation



IRVINE RANCH WATER DISTRICT
DRAFT LOCAL HAZARD MITIGATION PLAN
AUGUST 2021

Michael Bak INTERNATIONAL

Irvine Ranch Water District

2

Local Hazard Mitigation Plan (LHMP)

The purpose of the LHMP is to provide IRWD with clear direction for hazard mitigation action planning:

- Identifies natural and human-induced hazards that threaten IRWD infrastructure and operations; and
- Provides resources, information, and strategies to reduce threats and risk.

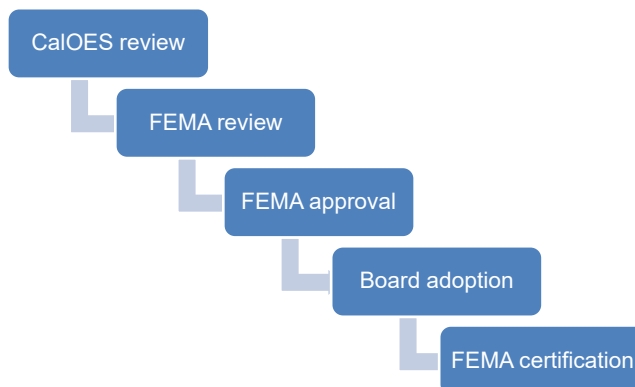
Additionally, the LHMP:

- Satisfies a requirement of the Urban Water Management Plan (UWMP); and
- Assists when seeking federal funding of mitigation and other projects.

3

Process

Process for initial certification and re-certification every five years:



Annual update of the plan is required.

4

Results

- Detailed capabilities assessment by department.
- List of potential hazard mitigation projects.
- Inter-departmental coordination.
- Community participation and collaboration.
- Additional analysis of the risk and resilience assessment (RRA) from the 2019 America's Water Infrastructure Act (AWIA) process.

5

Recommendation

That the Board approve and adopt the IRWD Local Hazard Mitigation Plan subject to non-substantive changes.

6

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October 25, 2021
 Prepared by: F. Sanchez / C. Compton
 Submitted by: C. Clary / P. Weghorst
 Approved by: Paul A. Cook *P.A.C.*

ACTION CALENDAR

**WATER SHORTAGE CONTINGENCY PLAN SHORTAGE LEVEL IMPACTS AND
ASSUMPTIONS FOR WATER BUDGET ALLOCATIONS**

SUMMARY:

The IRWD Board of Directors adopted an updated Water Shortage Contingency Plan (WSCP) in June 2021. The WSCP includes a “toolbox” of potential strategies for responding to each level of water shortage. One of the potential strategies included within each water shortage level is adjustments to water budgets as a means to achieve the savings needed to respond to a prescribed level of water shortage. Staff recommends the Board approve maximum water shortage water budget adjustments for each level of water shortage.

Before any change would be made to a customer’s water budget, the change would need to be adopted as part of an IRWD ratemaking proceeding following Proposition 218’s requirements.

BACKGROUND:

IRWD’s WSCP, adopted in June 2021, allows the District to strategically reduce water use through a number of potential actions that are staged dependent upon the severity of water shortages. The WSCP incorporates six standard water shortage levels corresponding to progressive ranges of up to 10%, 20%, 30%, 40%, 50%, and greater shortages. For each level or shortage, the WSCP includes a list of voluntary measures, non-rate response measures, and potential cost-of-service based rate response strategies.

IRWD’s WSCP also outlines how the District will reduce water demands or augment supplies if it were to experience a water shortage within each of the ranges noted above. The following are the shortage amounts that the District would need to either reduce or makeup via supply augmentation:

WSCP Augmentation or Demand Reduction Need

Water Shortage Contingency Plan Stage	Range of Shortage Within the Stage	Needed Augmentation or Reduction at Mid-Point of the Stage
1	0-10%	2,500 AF
2	11-20%	7,700 AF
3	21-30%	12,800 AF
4	31-40%	18,000 AF
5	41-50%	23,000 AF
6	51% +	28,200 AF

Customer Water Budgets at IRWD:

IRWD's water budget-based rate structure is a cost-of-service based rate structure that provides revenue stability in both non-shortage and water shortage periods. Additionally, it allocates the water – and the associated costs with its use – based on the monthly water budget assigned to each customer providing the lowest cost of water for efficient use and higher cost water for uses beyond efficient use. The monthly water budget assigned to each customer provides them with a sufficient amount of water within their budget to cover reasonable and efficient water use.

When IRWD experiences a water shortage, it may have less water or different costs of water than in normal times. If the District has less water, its WSCP outlines the strategies it will use to reduce demands. Adjustments to customer water budgets are a key response measure in the WSCP that are implemented by equitably reducing water budget allocations based on what is reasonable and efficient water use under the water shortage circumstances under each level.

Such changes would be implemented at the discretion of IRWD's Board of Directors. If this strategy or tool is used, any changes in rates would be set using cost-of-service principles and would not exceed the District's cost of providing water service to each customer. Additionally, prior to setting the water budget allocated to each customer and adopting any rates impacted by those changes, the District would undertake the full Proposition 218 public notice, protest, and hearing process.

IRWD initially would rely on public outreach and non-rate response measures during a declared shortage. In order to have water budget allocations as a tool available to use in the event of a shortage, staff has developed recommended maximum adjustments to the water budget allocations that can be used as response measures that correspond to each level of shortage in the WSCP. These proposed maximum adjustments are described below.

Proposed Maximum Water Budget Adjustments:

Staff has modeled maximum water budget allocation adjustments that are designed as response measures to target a percentage reduction from 2020 demands for each of the six WSCP shortage levels. The mid-point of the water savings goal for each WSCP level was used. For example, a Level 1 shortage ranges from 0% to 10%, so the reduction target used is 5%. The proposed maximum water budget adjustments, provided as Exhibit "B", follow the WSCP by first targeting discretionary outdoor potable uses, then indoor uses, and finally commercial, industrial, and institutional (CII) indoor uses as the shortage levels increase in severity. For each water shortage level, staff carefully considered the feasibility and impacts of the proposed water budget adjustments to IRWD customers.

Water budget adjustments measures are integral to the implementation of IRWD's WSCP. Staff recommends the Board approve the recommended water budget adjustment measures, which will be used to finalize proposed associated water shortage rates, and publicly notice customers through the Proposition 218 process of those rates. While IRWD does not currently have a water shortage, this will allow the Board to utilize water budget adjustments should they be needed in the event of a water shortage or required demand reduction.

FISCAL IMPACTS:

None.

ENVIRONMENTAL COMPLIANCE:

To the extent the Water Shortage Contingency Plan serves as the basis for the urban water shortage contingency analysis required under Water Code Section 10631 and is incorporated into the IRWD Urban Water Management Plan, its preparation, adoption, and implementation are statutorily exempt from CEQA, as set forth in Water Code Section 10652.

COMMITTEE STATUS:

This item was reviewed by the Water Resources, Policy and Communications Committee on October 19, 2021.

RECOMMENDATION:

THAT THE BOARD APPROVE MAXIMUM WATER SHORTAGE WATER BUDGET ADJUSTMENTS ASSOCIATED WITH LEVELS OF SHORTAGE IN IRWD'S WATER SHORTAGE CONTINGENCY PLAN.

LIST OF EXHIBITS:

Exhibit "A" – Water Shortage Contingency Plan

Exhibit "B" – Water Shortage Maximum Water Budget Adjustments

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Exhibit "A"

2020 Water Shortage Contingency Plan

Adopted June 28, 2021



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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 Shortage Warning (up to 10%)	300 to 3,000
Colorado River Shortage		
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%

WSCP - 13

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 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 LAWRP 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.

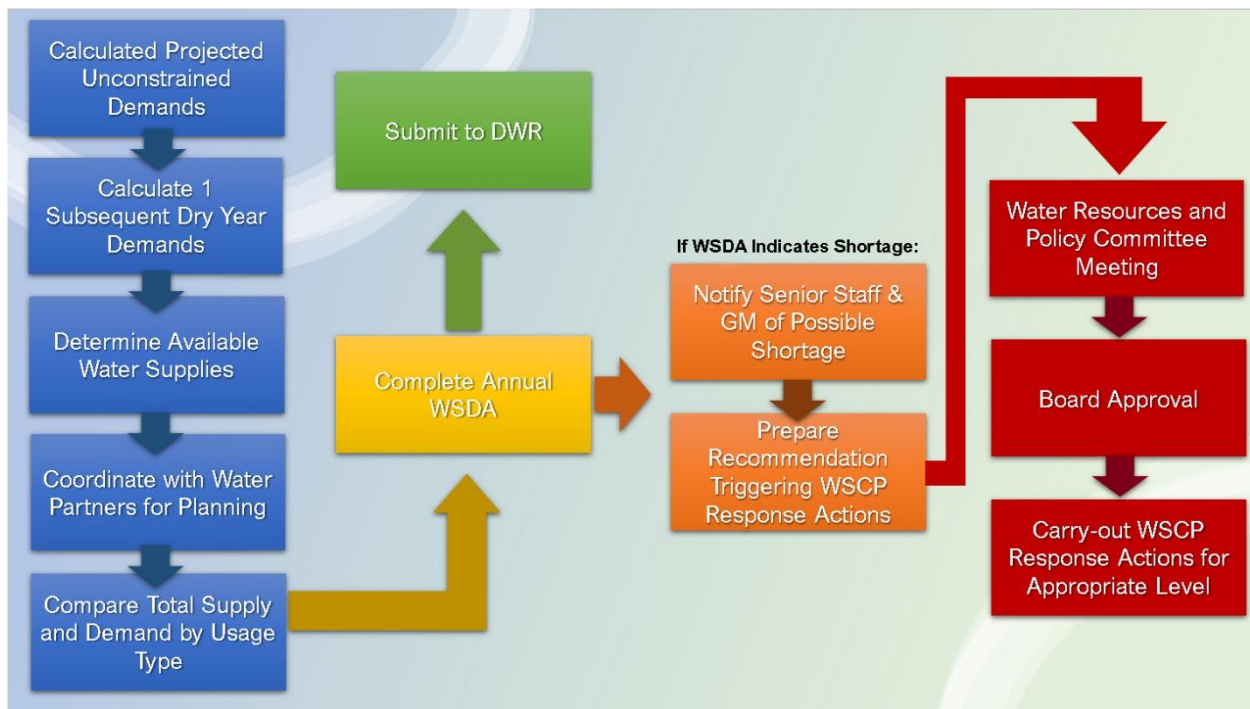


Figure 2 - 1. Decision Making Chart

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 4	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	31% - 40%
	Voluntary	Implement direct install programs to retrofit inefficient devices and landscape equipment	
	End Use Prohibitions	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

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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

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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

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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.

In accordance with Government Code 6066, on June 6 and June 13, 2021, IRWD published a notice in the Orange County Register regarding a public hearing on IRWD's 2020 WSCP. IRWD held a public hearing to adopt the 2020 WSCP on Monday, June 28, 2021. The public hearing provided an opportunity for the public to provide input to the plan before it was adopted. No comments were received from the public. The adoption of the 2020 WSCP was combined with the public hearing. Following the public hearing, IRWD's Board of Directors adopted the 2020 WSCP by Resolution No. 2021-11. IRWD's signed adoption resolution is included under **Appendix J**.

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.

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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>).

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

[Accessibility \(http://www.epa.gov/accessibility/statement.htm\)](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.

Exhibit “B”

Water Shortage Contingency Plan: Maximum Water Budget Adjustments for Each Level of Water Shortage

Water Shortage Contingency Plan Level	Target Reduction at Mid-Point of the Stage	Prohibitions on Wasteful Use in Effect	Messaging and Outreach	Impacts and Outdoor Water Budgets for Potable Landscape Includes Residential, Dedicated Irrigation and CII Outdoor	Indoor Gallons Per Capita	Commercial, Industrial and Institutional (CII) Percent Indoor Reduction
None	0% 0 AF	✓	Water Efficiency Programs and Outreach	40% Drought Tolerant Plants	50	
LEVEL 1 0-10 %	5% 2,500 AF	✓	Drought Messaging and Targeted Outreach	40% Drought Tolerant Plants	50	
LEVEL 2 11-20 %	15% 7,700 AF	✓	Expanded Drought Messaging and Outreach	No Turf 100% Drought Tolerant Plants	50	
LEVEL 3 21-30 %	25% 12,800 AF	✓	Expanded Drought Messaging and Outreach	No Turf Tree Health Impacted 75% Native Plants 25% Drought Tolerant	40	
LEVEL 4 31-40 %	35% 18,000 AF	✓	Expanded Drought Messaging and Outreach	No Turf Tree Health Impacted 100% Native Plants Only	32.5	10%
LEVEL 5 41-50 %	45% 23,000 AF	✓	Expanded Drought Messaging and Outreach	No landscape	30	20%
LEVEL 6 51% +	55% 28,200 AF	✓	Expanded Drought Messaging and Outreach	No landscape	Basic Needs Only 20	30%

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