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

April 28, 2025

#### CALL TO ORDER 5:00 p.m.

#### PLEDGE OF ALLEGIANCE

**<u>ROLL CALL</u>** Directors Ferons, Withers, Swan, LaMar, and President Reinhart

### PUBLIC COMMENT NOTICE

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: <u>https://irwd.webex.com/irwd/j.php?MTID=mdf87c047fc4c39e59773d21f3c94b4d6</u> Meeting Number (Access Code): 2488 589 3785 Meeting Password: NRmQaTMK328

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 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 request to speak, or 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 <u>comments@irwd.com</u> before 12:00 p.m. on Monday, April 28, 2025.

### COMMUNICATIONS TO THE BOARD

- 1. <u>Written:</u>
- 2. <u>Oral:</u>
- 3. <u>ITEMS RECEIVED TOO LATE TO BE AGENDIZED</u>

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

#### CONSENT CALENDAR, Items 4 through 8

#### 4. BOARD MEETING MINUTES

Recommendation: That the minutes of the April 14, 2025 Regular Board meeting be approved as presented.

#### 5. MARCH 2025 TREASURY REPORT

Recommendation: That the Board receive and file the Treasurer's Investment Summary Report, the Summary of Fixed and Variable Rate Debt, and the Disclosure Report of Reimbursements to Board members and staff, approve the March 2025 Summary of Payroll ACH payments in the total amount of \$2,609,279, and approve the March 2025 accounts payable disbursement summary of warrants 448122 through 448651, Workers' Compensation distributions, ACH payments, virtual card payments, wire transfers, payroll withholding distributions, and voided checks in the net total amount of \$23,556,788.

#### 6. <u>GUIDING PRINCIPLES SCORECARD</u>

Recommendation: Receive and file.

#### 7. <u>DESIGNATION OF IRWD AUTHORIZED AGENTS FOR THE</u> GOVERNOR'S OFFICE OF EMERGENCY SERVICES

Recommendation: That the Board approve the California Governor's Office of Emergency Services Form 130 (IRWD Resolution No. 2025-9), designating IRWD authorized agents for the purpose of obtaining financial assistance for any existing and future grant programs.

#### 8. IRWD 2025 SEWER SYSTEM MANAGEMENT PLAN UPDATE

Recommendation: That the Board approve the IRWD 2025 Sewer System Management Plan.

#### **ACTION CALENDAR**

#### 9. <u>IRWD NATURAL TREATMENT SYSTEM LANDSCAPE MAINTENANCE</u> <u>SERVICES CONTRACT</u>

Recommendation: That the Board authorize the General Manager to execute four, three-year contracts for landscape maintenance services, including a provision for a two-year extension, with Bemus Landscape, Inc., for a total amount of \$5,947,077.

Reso. No. 2025-9

#### **ACTION CALENDAR, continued**

#### 10. <u>ADOPTION OF 2025 ORANGE COUNTY WATER AND WASTEWATER</u> <u>MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN</u>

Recommendation: That the Board adopt resolution approving the 2025 Orange County Water and Wastewater Multi-Jurisdictional Hazard Mitigation Plan.

Reso. No. 2025-10

#### 11. <u>LAKE FOREST WOODS SEWER IMPROVEMENTS BUDGET INCREASE,</u> <u>CONSULTANT SELECTION AND CONSTRUCTION AWARD</u>

Recommendation: That the Board authorize a budget increase in the amount of \$1,707,000, from \$5,313,000 to \$7,020,000 for Project 11123; authorize the General Manager to execute a Professional Services Agreement with Woodard & Curran in the amount of \$248,903 for construction phase engineering services; and authorize the General Manager to execute a construction contract with GCI Construction, Inc. in the amount of \$4,643,784 for the Lake Forest Woods Sewer Improvements, Project 11123.

#### **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 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. Pursuant to AB 1234 and Government Code Section 53232.3(d), a written draft report of the meetings that any Board member attended on behalf of IRWD since the last Board Meeting will be available at the table near the Board Room entrance, and will be amended verbally, if necessary, during Directors' Comments.

- 12. General Manager's Report
- 13. Receive oral update(s) from District liaison(s) regarding communities within IRWD's service area and interests.
- 14. Directors' Comments and Meeting Reports
- 15. Closed Session

CONFERENCE WITH LEGAL COUNSEL – EXISTING LITIGATION Pursuant to Government Code Section 54956.9(d)(1): *BKK Working Group, et al. v. 1700 Santa Fe LTD, et al.*, <u>Central District of California</u> Case No. 2:18-cv-05810-MWF-PLA

- 16. Open Session
- 17. Adjournment

IRWD Board of Directors' Meeting April 28, 2025 Page 4

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.

April 28, 2025 Prepared and submitted by: K. Swan Approved by: Paul A. Cook

#### CONSENT CALENDAR

#### **BOARD MEETING MINUTES**

#### SUMMARY:

Provided are the minutes of the April 14, 2025 Regular Board meeting for approval.

# FISCAL IMPACTS:

None.

#### ENVIRONMENTAL COMPLIANCE:

Not applicable.

#### COMMITTEE STATUS:

Not applicable.

#### **RECOMMENDATION:**

# THAT THE MINUTES OF THE APRIL 14, 2025 REGULAR BOARD MEETING BE APPROVED AS PRESENTED.

#### LIST OF EXHIBITS:

Exhibit "A" - April 14, 2025 Minutes

Note: This page is intentionally left blank.

### Exhibit "A"

### MINUTES OF REGULAR MEETING - APRIL 14, 2025

The regular meeting of the Board of Directors of the Irvine Ranch Water District (IRWD) was called to order by President Reinhart at 5:11 p.m. on April 14, 2025 at the District offices, 15600 Sand Canyon Avenue, Irvine.

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

Directors Absent: Ferons.

Oral and Written Communications: None.

Items too late to be agendized: None.

Also Present: General Manager Cook, Executive Director of Finance and Administration Adly, Executive Director of Technical Services Burton, Executive Director of Water Policy Weghorst, Executive Director of Operations Chambers, Director of Water Resources Sanchez, Director of Financial Planning and Data Analytics Smithson, Director of Human Resources Mitcham, Director of Recycling Operations Zepeda, Director of Information Technology Kaneshiro, Director of Accounting and Treasury Lin, Director of Safety and Security Choi, Director of Strategic Communications & Advocacy Compton, Director of Maintenance Operations Manning, General Counsel Collins, Secretary Swan, members of the staff, and public.

### PRESENTATION

# 4. <u>SCIENCE FAIR AWARD WINNERS</u>

The Community Relations staff hosted an open house of water-related projects entered in this year's annual Irvine Unified School District Science Fair and presented awards to forty-three students.

### CONSENT CALENDAR

On <u>MOTION</u> by LaMar, seconded by Withers and unanimously carried, CONSENT CALENDAR ITEMS FIVE THROUGH TEN WERE APPROVED AS FOLLOWS:

### 5. <u>BOARD MEETING MINUTES</u>

Recommendation: That the minutes of the March 24, 2025 Regular Board meeting be approved as presented.

# 6. <u>2025 LEGISLATIVE AND REGULATORY UPDATE</u>

Recommendation: That the Board adopt a "support" position on SB 454 (McNerney), SB 496 (Hurtado), SB 599 (Caballero), SB 682 (Allen), H.R. 2296 (McClain/Mullin) and S. 1092 (Merkley/Collins); a "concerns" position on AB 93 (Papan); a "watch" position on SB 730 (Hurtado); and an "oppose unless amended" position on AB 794 (Gabriel) and AB 872 (Rubio).

# CONSENT CALENDAR (CONTINUED)

# 7. ACWA 2025 ELECTION FOR THE 2026-2027 TERM

Recommendation: That the Board designate Director Steve LaMar as IRWD's voting representative for the ACWA Presidential and Vice-Presidential election and for the election of the Region 10 Board of Directors, and authorize staff to submit the "Authorized Voting Representative Form" to ACWA designating Director LaMar as the District's authorized voting representative for the upcoming 2025 ACWA election.

#### 8. <u>WATER SUPPLY ASSESSMENT AND WATER SUPPLY VERIFICATION FOR</u> <u>THE GATEWAY RESIDENTIAL PROJECT</u>

Recommendation: That the Board approve the water supply assessment and contingent upon approval of the Water Supply Assessment, approve the Water Supply Verification for the Gateway Residential Project.

#### 9. <u>PARK PLAZA RECYCLED WATER PIPELINE REPLACEMENT CONSTRUCTION</u> <u>AWARD</u>

Recommendation: That the Board authorize the General Manager to execute a construction contract with T.E. Roberts, Inc. in the amount of \$837,634 for the Park Plaza Recycled Water Pipeline Replacement, Project 13106.

### 10. <u>UTILITY AGREEMENT BETWEEN ORANGE COUNTY TRANSPORTATION</u> <u>AUTHORITY AND IRWD FOR THE INTERSTATE 5 FREEWAY DOMESTIC</u> <u>WATER PIPELINE RELOCATION</u>

Recommendation: That the Board authorize the General Manager to execute a Utility Agreement with the Orange County Transportation Authority for the Interstate 5 freeway domestic water pipeline relocation costs, subject to non-substantive changes.

# ACTION CALENDAR

# 11. MAXIMO UPGRADE PROJECT

Using a PowerPoint presentation, Director of Maintenance Operations Manning provided an overview of the District's asset management system, Maximo, and explained how it plays a crucial role in IRWD's operation and maintenance functions. He further outlined how upgrading the software to Maximo Application Suite 9 will benefit IRWD in predictive maintenance, field crew mobility, prioritization, and enhanced integrations with other IRWD systems like SCADA.

Director of Information Technology Kaneshiro reviewed the implementation schedule, the request for proposals process, and the staff recommendation. Following a discussion from members of the Board, on <u>MOTION</u> by LaMar, seconded by Withers, and unanimously carried, THE BOARD AUTHORIZED THE GENERAL MANAGER TO EXECUTE A PROFESSIONAL SERVICES AGREEMENT WITH TOTAL RESOURCE MANAGEMENT IN THE AMOUNT OF \$825,000 AND A TERM OF THREE YEARS FOR THE MAXIMO UPGRADE PROJECT AND THAT THE BOARD AUTHORIZED THE GENERAL MANAGER TO EXECUTE A CONTRACT WITH INTERNATIONAL BUSINESS MACHINES IN THE AMOUNT OF \$715,000 AND A TERM OF THREE YEARS FOR THE MAXIMO SOFTWARE SUBSCRIPTION FEES.

# ACTION CALENDAR (CONTINUED)

# 12. <u>COST OF SERVICE STUDY</u>

Director of Financial Planning and Data Analytics Smithson, presented the IRWD Cost of Service Study to the Board using a PowerPoint presentation. He emphasized that by performing a cost of service study, the District can achieve its goals of: (1) equity and fairness to ensure that customers are paying their fair share based on the cost of serving them; (2) regulatory compliance to meet the legal or policy requirements to justify rate structures; (3) financial stability to avoid revenue shortfalls and maintain the District's ability to invest in infrastructure and operations; and (4) transparency to provide clarity and accountability to all about how the rates are determined.

This year, IRWD took a different step by mailing the Proposition 218 notices early to comply with the newly adopted Assembly Bill 2257, allowing any customer to submit a legal objection prior to the adoption of the new rates. This will give Staff and Legal Counsel the opportunity to amend or change the rate study, and respond to those legal objections in writing prior to the June 23, 2025 Board meeting. General Counsel Collins added that anyone who fails to participate in the administrative exhaustion procedure is prevented from suing IRWD later, so it provides a measure of both notice and an opportunity for the District to cure any defects in the study.

Following discussion by the Board and District staff, THE BOARD RECEIVED AND FILED THE COST OF SERVICE STUDY.

### **OTHER BUSINESS**

13. General Manager's Report

General Manager Cook reported that following today's 5.1 earthquake centered in Julian, California all the District's dams were inspected by District staff are reported to be in good shape.

14. Receive oral update(s) from District liaison(s) regarding communities within IRWD's service area and interests.

General Manager Cook stated that Mr. Newell was unable to stay for the entire meeting, but he relayed that all is well in the Canyons.

15. Directors' Comments and Meeting Reports

Director Withers reported on his attendance at the Orange County Council of Government's Annual Conference in Yorba Linda; the ISDOC Executive Committee meeting via teleconference; and the NWRI Board of Directors' meeting.

Director Swan reported on his participation in the MWDOC Workshop Board meeting with MWD Directors; the monthly WACO meeting via teleconference; the MWDOC Administration and Finance Committee meeting; and the Water Education Foundation 2025 Water 101 Workshop in Sacramento.

Director LaMar reported on his attendance at the COAST Roadside Ignitions Subcommittee meeting; a Southern California Edison Public Safety Power Shutoff Advisory Committee meeting; Natural Communities Coalition Board meeting; the MWDOC Water Policy Dinner in Costa Mesa; an Ocean Well Demonstration Project meeting at Las Virgenes Water District; and the monthly WACO meeting via teleconference.

### OTHER BUSINESS (CONTINUED)

15. Directors' Comments and Meeting Reports (continued)

President Reinhart reported on his participation in the MWDOC Workshop Board meeting with MWD Directors; the OCWD Board meeting; the OCWD Communications and Legislative Liaison Committee meeting; the WACO monthly meeting via teleconference; the MWDOC Administration and Finance Committee meeting; the OCWD Water Issues Committee meeting; and the OCWD Administration and Finance Issues meeting.

16. ADJOURNMENT

At 6:12 p.m., President Reinhart adjourned the Board meeting.

APPROVED and SIGNED this 28<sup>th</sup> day of April 2025.

President, IRVINE RANCH WATER DISTRICT

District Secretary, IRVINE RANCH WATER DISTRICT

APPROVED AS TO FORM:

Claire Hervey Collins, General Counsel Hanson Bridgett LLP

April 28, 2025 Prepared by: J. Davis Submitted by: N. Adly Approved by: Paul A. Cook

#### CONSENT CALENDAR

#### MARCH 2025 TREASURY REPORT

#### SUMMARY:

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

- A. The March 2025 Investment Summary Report. This Investment Summary Report conforms with the 2025 Investment Policy as outlined in Exhibit "A";
- B. The Summary of Fixed and Variable Rate Debt as of March 31, 2025, as outlined in Exhibit "B";
- C. The Monthly Interest Rate Swap Summary as of March 31, 2025, as outlined in Exhibit "C";
- D. The March 31, 2025, Disbursement Summary of warrants 448122 through 448651, Workers' Compensation distributions, ACH payments, virtual card payments, wire transfers, payroll withholding distributions, and voided checks in the net total amount of \$23,556,788 as outlined in Exhibit "D";
- E. The Summary of Payroll ACH payments in the total amount of \$2,609,279 as outlined in Exhibit "E"; and
- F. The Disclosure Report of Reimbursements to Board members and staff for March 2025, detailing payments or reimbursements for individual charges of \$100 or more per transaction as outlined in Exhibit "F".

#### FISCAL IMPACTS:

As of March 31, 2025, the book value of the investment portfolio was \$359,633,230, with a 4.42% rate of return and a market value of \$361,278,829. Based on IRWD's March 31, 2025, quarterly real estate annualized investment rate of return of 15.41%, the weighted average return for the fixed income and real estate investments was 6.84%.

As of March 31, 2025, the outstanding principal amount of fixed and variable rate debt was \$568,345,000. The monthly weighted average all-in variable rate was 2.66%. Including IRWD's weighted average fixed rate bond issues of 3.74% 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 3.49%.

Payroll ACH payments totaled \$2,609,279. Wire transfers, other ACH payments, and checks issued for debt service, accounts payable, payroll, water purchases, and voided checks for March was \$23,556,788.

Consent Calendar: March 2025 Treasury Report April 28, 2025 Page 2

#### 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:

All items in this report were not submitted to a Committee; the investment and debt reports are submitted to the Finance and Personnel Committee monthly.

#### **RECOMMENDATION:**

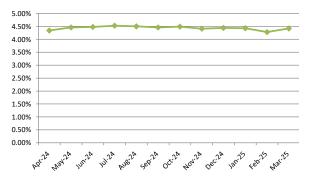
THAT THE BOARD RECEIVE AND FILE THE TREASURER'S INVESTMENT SUMMARY REPORT, THE SUMMARY OF FIXED AND VARIABLE RATE DEBT, AND THE DISCLOSURE REPORT OF REIMBURSEMENTS TO BOARD MEMBERS AND STAFF, APPROVE THE MARCH 2025 SUMMARY OF PAYROLL ACH PAYMENTS IN THE TOTAL AMOUNT OF \$2,609,279 AND APPROVE THE MARCH 2025 ACCOUNTS PAYABLE DISBURSEMENT SUMMARY OF WARRANTS 448122 THROUGH 448651, WORKERS' COMPENSATION DISTRIBUTIONS, ACH PAYMENTS, VIRTUAL CARD PAYMENTS, WIRE TRANSFERS, PAYROLL WITHHOLDING DISTRIBUTIONS, AND VOIDED CHECKS IN THE NET TOTAL AMOUNT OF \$23,556,788.

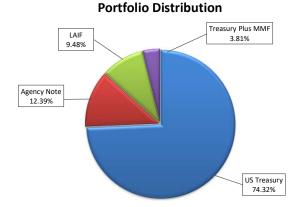
### LIST OF EXHIBITS:

- 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 March 2025

Monthly Fixed Income Yield





#### **Investment Summary**

Туре	PAR	Book Value	Market Value
US Treasury	270,000,000	266,526,484	268,151,450
Agency Note	45,000,000	44,803,422	44,794,800
LAIF	34,449,834	34,449,834	34,479,088
Treasury Plus MMF	13,853,491	13,853,491	13,853,491
Grand Total	363,303,324	359,633,230	361,278,829

#### **Top Issuers**

Issuer	PAR	% Portfolio
US Treasury	270,000,000	74.32%
State of California Tsy.	34,449,834	9.48%
Fed Farm Credit Bank	25,000,000	6.88%
Fed Home Loan Mortgage Corp	15,000,000	4.13%
Wells Fargo / Allspring	13,853,491	3.81%
Fed Home Loan Bank	5,000,000	1.38%
Grand Total	363,303,324	100.00%



#### **Maturity Distribution**

29.81%						
						19.27%
	15.14%		13.76%			
					9.63%	
		6.88%		5.51%		
0-6 Months	6-12 Months	12-18 Months	18-24 Months	24-30 Months	30-36 Months	36+ Months

#### IRVINE RANCH WATER DISTRICT INVESTMENT SUMMARY REPORT

03/31/25
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SETTLMT	Call Schedule	Initial Call	Maturity Date	Rating	INVESTMENT TYPE	INSTITUTION / ISSUER	PAR Amount	COUPON DISCOUNT	YIELD	ORIGINAL COST	CARRY VALUE	MARKET VALUE <sup>(1)</sup> 3/31/2025	UNREALIZED <sup>(2)</sup> GAIN/(LOSS)
11/27/24			04/01/25		LAIF	State of California Tsy.	\$34,449,833.78		4.300%	\$34,449,833.78	\$34,449,833.78	34,479,088.27	29,254.49
03/31/25			04/01/25		Treasury Plus MMF	Wells Fargo / Allspring	13,853,490.65		4.215%	13,853,490.65	13,853,490.65	13,853,490.65	0.00
12/22/22	NA	NA	04/01/25	Aaa/AA+/AAA	FHLB - Note	Fed Home Loan Bank	5,000,000	4.200%	4.160%	5,004,550.00	5,000,000.00	5,000,000.00	0.00
04/18/24	NA	NA	04/15/25	Aaa/AA+/AA+	Treasury - Note	US Treasury	10,000,000		5.163%	9,757,617.18	9,990,626.08	9,985,600.00	(5,026.08)
12/08/22	Quarterly	02/12/2023	05/12/25	Aaa/AA+/AAA	FHLMC - Note	Fed Home Loan Mortgage Corp	5,000,000		4.427%	4,843,000.00	4,992,734.76	4,992,300.00	(434.76)
01/11/23	NA	NA	05/15/25	Aaa/AA+/AA+	Treasury - Note	US Treasury	5,000,000		4.148%	4,845,312.50	4,992,039.47	4,990,650.00	(1,389.47)
12/13/22	NA	NA	06/13/25	Aaa/AA+/AAA	FFCB - Note	Fed Farm Credit Bank	5,000,000		4.340%	4,989,400.00	4,999,152.46	4,998,300.00	(852.46)
12/13/22	NA	NA	06/13/25	Aaa/AA+/AAA	FFCB - Note	Fed Farm Credit Bank	5,000,000	4.250%	4.352%	4,988,000.00	4,999,040.53	4,998,300.00	(740.53)
08/01/23	NA	NA	07/15/25	Aaa/AA+/AA+	Treasury - Note	US Treasury	10,000,000	3.000%	4.917%	9,646,875.00	9,948,069.85	9,962,300.00	14,230.15
04/24/23	NA	NA	07/24/25	Aaa/AA+/AAA	FFCB - Note	Fed Farm Credit Bank	10,000,000		4.253%	10,000,000.00	10,000,000.00	9,996,700.00	(3,300.00)
11/15/24	NA	NA	08/31/25	Aaa/AA+/AA+	Treasury - Note	US Treasury	5,000,000	5.000%	4.452%	5,020,703.13	5,010,888.84	5,014,200.00	3,311.16
04/21/23	NA	NA	09/23/25	Aaa/AA+/AAA	FHLMC - Note	Fed Home Loan Mortgage Corp	10,000,000	0.375%	4.127%	9,143,400.00	9,830,807.00	9,813,900.00	(16,907.00)
12/01/22	NA	NA	10/15/25	Aaa/AA+/AA+	Treasury - Note	US Treasury	5,000,000	4.250%	4.298%	4,993,359.38	4,998,752.91	5,001,150.00	2,397.09
12/01/23	NA	NA	11/15/25	Aaa/AA+/AA+	Treasury - Note	US Treasury	10,000,000		4.719%	9,543,750.00	9,854,510.49	9,885,600.00	31,089.51
12/01/22	Continuous after	9/12/2023	12/12/25	Aaa/AA+/AAA	FFCB - Note	Fed Farm Credit Bank	5,000,000	4.125%	4.694%	4,920,500.00	4,981,686.99	4,995,300.00	13,613.01
04/18/24	NA	NA	01/15/26	Aaa/AA+/AA+	Treasury - Note	US Treasury	10,000,000	3.875%	5.033%	9,808,593.75	9,913,161.06	9,983,100.00	69,938.94
02/21/24	NA	NA	02/15/26	Aaa/AA+/AA+	Treasury - Note	US Treasury	15,000,000	4.000%	4.553%	14,844,140.63	14,931,206.90	14,982,300.00	51,093.10
04/30/24	NA	NA	03/31/26	Aaa/AA+/AA+	Treasury - Note	US Treasury	5,000,000	4.500%	5.017%	4,953,125,00	4,975,625.00	5,020,200.00	44,575.00
07/06/23	NA	NA	06/15/26	Aaa/AA+/AA+	Treasury - Note	US Treasury	15,000,000		4.566%	14,819,531.25	14,926,133.72	15,019,350.00	93,216.28
06/03/24	NA	NA	07/15/26	Aaa/AA+/AA+	Treasury - Note	US Treasury	5,000,000		4.843%	4,965,625.00	4,979,072.22	5,030,100.00	51,027.78
09/27/23	NA	NA	09/15/26	Aaa/AA+/AA+	Treasury - Note	US Treasury	10,000,000		4.846%	9,939,453.13	9,970,285.12	10,091,000.00	120,714.88
11/03/23	NA	NA	10/15/26	Aaa/AA+/AA+	Treasury - Note	US Treasury	10,000,000		4.784%	9,956,640.63	9,977,374.22	10,096,500.00	119,125.78
12/28/23	NA	NA	12/15/26	Aaa/AA+/AA+	Treasury - Note	US Treasury	10,000,000		4.020%	10,098,046.88	10,056,401.85	10,067,200.00	10,798.15
01/31/24	NA	NA	01/15/27	Aaa/AA+/AA+	Treasury - Note	US Treasury	10,000,000		4.171%	9,952,734.38	9,971,378.04	10,007,000.00	35,621.96
12/19/24	NA	NA	02/28/27	Aaa/AA+/AA+	Treasury - Note	US Treasury	10,000,000		4.303%	9,496,093.75	9,560,890.68	9,623,400.00	62,509.32
11/18/24	NA	NA	03/15/27	Aaa/AA+/AA+	Treasury - Note	US Treasury	5,000,000		4.289%	4,995,507.81	4,996,218.50	5,029,500.00	33,281.50
02/05/25	NA	NA	06/15/27	Aaa/AA+/AA+	Treasury - Note	US Treasury	5,000,000		4.218%	5,044,921.88	5,042,048.97	5,074,400.00	32,351.03
11/08/24	NA	NA	07/15/27	Aaa/AA+/AA+	Treasury - Note	US Treasury	5,000,000		4.156%	5,027,343.75	5,023,321.79	5,049,050.00	25,728.21
01/09/25	NA	NA	08/31/27	Aaa/AA+/AA+	Treasury - Note	US Treasury	5,000,000		4.301%	4,854,687.50	4,867,048.11	4,908,400.00	41,351.89
03/11/24	NA	NA	09/30/27	Aaa/AA+/AA+	Treasury - Note	US Treasury	10,000,000		4.195%	9,976,953.13	9,983,806.82	10,052,300.00	68,493.18
01/07/25	NA	NA	10/15/27	Aaa/AA+/AA+	Treasury - Note	US Treasury	5,000,000		4.311%	4,943,359.38	4,948,065.43	4,994,550.00	46,484.57
05/24/24	NA	NA	01/31/28	Aaa/AA+/AA+	Treasury - Note	US Treasury	10,000,000		4.621%	9,623,437.50	9,710,659.10	9,888,700.00	178,040.90
12/19/24	NA	NA	01/31/28	Aaa/AA+/AA+	-	US Treasury			4.021%	9,567,187.50	9,605,851.58	9,888,700.00	80,848.42
07/18/24	NA	NA	02/13/28	Aaa/AA+/AA+ Aaa/AA+/AA+	Treasury - Note Treasury - Note	US Treasury	10,000,000 5,000,000		4.228%	4,496,484.38	4,590,119.34	4,616,400.00	26,280.66
01/07/25	NA	NA	04/30/28	Aaa/AA+/AA+ Aaa/AA+/AA+		2	5,000,000		4.132%	4,496,484.38		4,605,850.00	59,233.31
06/27/24	NA	NA	03/31/28	Aaa/AA+/AA+ Aaa/AA+/AA+	Treasury - Note	US Treasury	10,000,000		4.303%	9,900,000.00	4,546,616.69 9,918,595.32	10,062,100.00	143,504.68
08/16/24	NA	NA	07/31/28	Aaa/AA+/AA+ Aaa/AA+/AA+	Treasury - Note	US Treasury			4.394% 3.854%	4,820,312.50			
					Treasury - Note	US Treasury	5,000,000				4,848,373.29	4,834,200.00	(14,173.29)
08/09/24	NA	NA	09/30/28	Aaa/AA+/AA+	Treasury - Note	US Treasury	10,000,000	1.250%	3.863%	9,008,593.75	9,162,579.52	9,128,500.00	(34,079.52)
11/28/23	NA	NA	10/31/28	Aaa/AA+/AA+	Treasury - Note	US Treasury	10,000,000	4.875%	4.464%	10,179,687.50	10,130,745.38	10,309,400.00	178,654.62
12/15/23	NA	NA	11/30/28	Aaa/AA+/AA+	Treasury - Note	US Treasury	15,000,000	4.375%	3.897%	15,319,921.88	15,236,410.26	15,219,750.00	(16,660.26)
12/13/24	NA	NA	12/31/28	Aaa/AA+/AA+	Treasury - Note	US Treasury	10,000,000	3.750%	4.160%	9,848,437.50	9,859,607.42	9,932,000.00	72,392.58
SUB-TOTAL							\$363,303,324	-		\$356,954,283,86	\$359.633.230.13	\$361,278,828.92	\$1,645,598.78
SSE TOTAL							#505,505,52 <del>4</del>	=		\$556,754,205.00	\$337,033,230.13	\$501,270,020.72	\$1,010,000.70

TOTAL INVESTMENTS

\$363,303,324

\$356,954,283.86 \$359,633,230.13

\$361,278,828.92

\$1,645,598.78

#### IRVINE RANCH WATER DISTRICT INVESTMENT SUMMARY REPORT

					03/31/25							
SETTLMT	Call Schedule	Initial Call	Maturity Date	Rating	INVESTMENT TYPE	INSTITUTION / ISSUER	PAR Amount	COUPON DISCOUNT YIEI	ORIGINAL .D COST	CARRY VALUE	MARKET VALUE <sup>(1)</sup> 3/31/2025	UNREALIZED <sup>(2)</sup> GAIN/(LOSS)
					Petty Cash Ck Balance Ck Balance	Bank of America Wells Fargo	EC		600.00 1,093,083.38 0.00	5)		
									\$358,047,967.24			
<sup>(1)</sup> LAIF market value is as of the n								Outstanding Variable				\$202,300,000
Security market values are determined and/or broker dealer pricing.	ned using Bank of New	York ("Tradir	ng Prices"), Bloon	nberg				Net Outstanding Var Investment Balance:	iable Rate Debt (Less \$60 mill	ion fixed-payer swaps	)	\$142,300,000 \$358,047,967
(2) Gain (loss) calculated against ca	ry value using the trad	ing value provi	ded by Bank of N	ew York/or Brokers				Investment to Variab	le Rate Debt Ratio:			252%
<sup>(3)</sup> Real estate rate of return is base	l on most recent quarte	r end return.						Portfolio - Average N	Number of Days To Maturity			
<sup>(4)</sup> Original Cost updated to reflect of of capital tenant improvements during of capital tenant improvements during		ents added for	Fiscal Year 2023									
(5) Cash balance in this account are	funds that are pending	purchase into t	he current money	market fund.						Investment	Real Estate <sup>(3)(4)</sup>	Weighted Avg.
*S - Step up										Portfolio	Portfolio	Return
This Investment Summary Report									March	4.42%	15.41%	6.84%
and provides sufficient liquidity to	meet the next six month	ns estimated ex	penditures.						February	4.28%	14.11%	6.39%
									Change	0.14%	1.30%	0.45%

# IRVINE RANCH WATER DISTRICT SUMMARY OF MATURITIES

# 03/31/25

DATE	TOTAL	%	LAIF	Agency Notes	Agency Discount	Municipal Bonds	U
					Notes		
3/25	48,303,324	13.30%	\$34,449,834				
4/25	15,000,000	4.13%		5,000,000			
5/25	10,000,000	2.75%		5,000,000			
6/25	10,000,000	2.75%		10,000,000			
7/25	20,000,000	5.51%		10,000,000			
8/25	5,000,000	1.38%					
9/25	10,000,000	2.75%		10,000,000			
10/25	5,000,000	1.38%					
11/25	10,000,000	2.75%					
12/25	5,000,000	1.38%		5,000,000			
1/26	10,000,000	2.75%					
2/26	15,000,000	4.13%					
SUB-TOTAL	\$163,303,324	44.95%	\$34,449,834	\$45,000,000			

13 MONTHS - 3+ YEARS						
03/01/2026 - 05/31/2026	\$5,000,000	1.38%				
06/01/2026 - 08/31/2026	\$20,000,000	5.51%				
09/01/2026 - 11/30/2026	\$20,000,000	5.51%				
12/01/2026 - 2/28/2027	\$30,000,000	8.26%				
03/01/2027 - 05/31/2027	\$5,000,000	1.38%				
06/01/2027 - 08/31/2027	\$15,000,000	4.13%				
09/01/2027 - 11/30/2027	\$15,000,000	4.13%				
12/01/2027 - 2/28/2028	\$20,000,000	5.51%				
03/01/2028 - 05/31/2028	\$10,000,000	2.75%				
06/01/2028 - 08/31/2028	\$15,000,000	4.13%				
09/01/2028 - 11/30/2028	\$35,000,000	9.63%				
12/01/2028 +	\$10,000,000	2.75%				
SUB-TOTAL	\$200,000,000	55.05%				
TOTALS	\$363,303,324	100.00%	\$34,449,834	\$45,000,000		

% OF PORTFOLIO

9.48% 12.39%

A - 4

	-
US Treasury	Investment
	Sweep
	13,853,491
10,000,000	
5,000,000	
10,000,000	
5,000,000	
5,000,000	
10,000,000	
10,000,000	
15,000,000	
\$70,000,000	\$13,853,491
5,000,000	
20,000,000	
20,000,000	
30,000,000	
5,000,000	
15,000,000	
15,000,000	
20,000,000	
10,000,000	
15,000,000	
35,000,000	
10,000,000	
\$200,000,000	
\$270,000,000	\$13,853,491

74.32%

3.81%

#### Irvine Ranch Water District Summary of Real Estate - Income Producing Investments 3/31/2025

	ACQUISITION DATE	PROPERTY TYPE	OWNERSHIP INTEREST	 ORIGINAL COST	MA	RKET VALUE 6/30/2024	ANNUALIZED RATE OF RETURN QUARTER ENDED 3/31/2025
Sycamore Canyon	Dec-92	Apartments	Fee Simple	\$ 45,457,369	\$	220,000,000	24.99%
Wood Canyon Villas	Jun-91	Apartments	Limited Partner	\$ 6,000,000	\$	38,420,894	8.61%
ITC (230 Commerce)	Jul-03	Office Building	Fee Simple	\$ 5,568,747	\$	10,000,000	10.55%
Waterworks Business Pk.	Nov-08	Research & Dev.	Fee Simple	\$ 8,983,395	\$	13,500,000	9.09%
Sand Canyon Professional Center - Medical Office	Jul-12	Medical Office	Fee Simple	\$ 8,715,929	\$	12,000,000	8.22%
Sand Canyon Professional Center - General Office <sup>(1)</sup>	Sep-20	Office Building	Fee Simple	\$ 31,404,103	\$	32,000,000	7.49%
Total - Income Properties				\$ 106,129,543	\$	325,920,894	15.41%

(1) Original Cost updated to reflect capital tenant improvements added for Fiscal Year 2023.

#### IRVINE RANCH WATER DISTRICT INVESTMENT SUMMARY REPORT INVESTMENT ACTIVITY<sup>(1)</sup> Mar-25

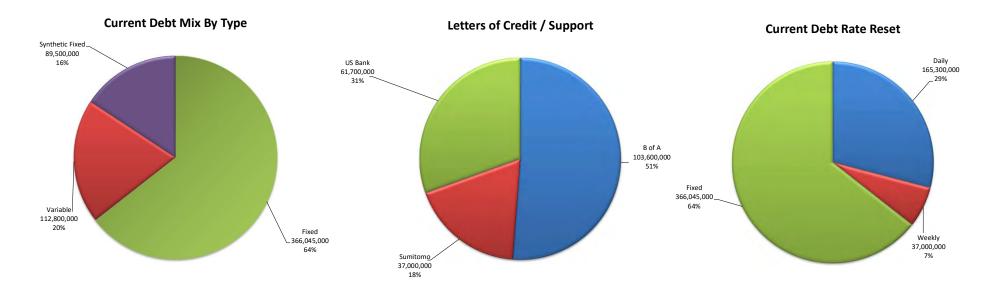
#### MATURITIES/SALES/CALLS

PURCHASES

DATE	SECURITY TYPE	PAR	YIELD	Settlement Date	Maturity Date	SECURITY TYPE	PAR	YIELD TO MATURITY
3/14/2025	FHLB - Note	\$5,000,000	4.52%					
3/15/2025	Treasury - Note	\$5,000,000	4.33%					
3/31/2025	Treasury - Note	\$20,000,000	4.07%					

(1) Italicized entries indicate securities that are scheduled but not yet matured, sold, called, or purchased. There may be additional investment purchases if there are pending maturities for the month.

# Exhibit "B" Irvine Ranch Water District Summary of Fixed and Variable Rate Debt March 2025



#### **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	\$19,200,000	3.38%	US Bank	BAML	Variable	Daily
Series 2008-A Refunding	04/24/08	07/01/35	\$37,000,000	6.51%	Sumitomo	BAML	Variable	Weekly
Series 2011-A-1 Refunding	04/15/11	10/01/37	\$36,660,000	6.45%	B of A	Goldman	Variable	Daily
Series 2011-A-2 Refunding	04/15/11	10/01/37	\$24,440,000	4.30%	B of A	Goldman	Variable	Daily
Series 2009 - A	06/04/09	10/01/41	\$42,500,000	7.48%	US Bank	US Bank	Variable	Daily
Series 2009 - B	06/04/09	10/01/41	\$42,500,000	7.48%	B of A	Goldman	Variable	Daily
2016 COPS	09/01/16	03/01/46	\$96,935,000	17.06%	N/A	N/A	Fixed	Fixed
2010 Build America Taxable Bond	12/16/10	05/01/40	\$175,000,000	30.79%	N/A	N/A	Fixed	Fixed
Series 2016	10/12/16	02/01/46	\$94,110,000	16.56%	N/A	N/A	Fixed	Fixed
Total			\$568,345,000	100.00%				

#### IRVINE RANCH WATER DISTRICT

#### SUMMARY OF FIXED & VARIABLE RATE DEBT

#### March-25

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	Reimbursment Agreement Date			MOODYS	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	\$19,200,000	US BANK	05/07/15	05/01/25		Aa3/VMIG1	AA-/A-1+	N/R	\$19,458,805	0.3000%	\$58,376	BAML	DAILY	0.10%	\$19,200	BANK OF NY
SERIES 2008-A Refunding	04/24/08	07/01/35	Jul 1	5th Bus. Day	\$60,215,000	\$37,000,000	SUMITOMO	04/01/11	05/28/25		A1/P-1	A/A-1	A/F1	\$37,547,397	0.3150%	\$118,274	BAML	WED	0.07%	\$25,900	BANK OF NY
SERIES 2011-A-1 Refunding	04/15/11	10/01/37	Oct 1	1st Bus. Day	\$60,545,000	\$36,660,000	B of A	02/01/24	02/08/27		Aa1/VMIG1	A+/A-1	AAA/F1+	\$37,069,788	0.3200%	\$118,623	Goldman	DAILY	0.07%	\$25,662	BANK OF NY
SERIES 2011-A-2 Refunding	04/15/11	10/01/37	Oct 1	1st Bus. Day	\$40,370,000	\$24,440,000	B of A	02/01/24	02/08/27		Aa1/VMIG1	A+/A-1	AAA/F1+	\$24,713,192	0.3200%	\$79,082	Goldman	DAILY	0.07%	\$17,108	BANK OF NY
SERIES 2009 - A	06/04/09	10/01/41	Oct 1	1st Bus. Day	\$75,000,000	\$42,500,000	US BANK	04/01/11	05/01/25		Aa2/VMIG 1	AA-/A-1+	AA/F1+	\$42,975,068	0.3000%	\$128,925	US Bank	DAILY	0.07%	\$29,750	US BANK
SERIES 2009 - B	06/04/09	10/01/41	Oct 1	1st Bus. Day	\$75,000,000	\$42,500,000	B of A	04/01/11	04/21/25		Aa2/VMIG 1	A/A-1	A1/F1+	\$42,975,068	0.2800%	\$120,330	Goldman	DAILY	0.07%	\$29,750	US BANK
					\$349,430,000	\$202,300,000	SUB-TOTAL	VARIABLE RATE	DEBT					\$204,739,321	0.3046%	\$623,612			0.07%	\$147,370	

														(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	\$96,935,000	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 1	Feb/Aug	\$103,400,000	\$94,110,000	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 \$366,045,000 SUB-TOTAL FIXED RATE DEBT

#### \$744,575,000 \$568,345,000 TOTAL- FIXED & VARIABLE RATE DEBT

	eting Agents			GO VS COP's	
Goldman	103,600,000	51%	GO:	471,410,000	83%
BAML	56,200,000	28%	COPS:	96,935,000	17%
US Bank	42,500,000	21%	Total	568,345,000	
	202,300,000				

LOC	Banks		Breakdown Betwo	een Variable & Fixed Ra	ate Mode
			Daily Issues	165,300,000	29%
SUMITOMO	37,000,000	18%	Weekly Issues	37,000,000	7%
BANK OF AMERICA	103,600,000	51%			
US BANK	61,700,000	30%	Sub-Total	202,300,000	
	202,300,000				
			Fixed Rate Issues	\$366,045,000	64%
			Sub-Total - Fixed	366,045,000	
			TOTAL DEBT		
			FIXED & VAR.	568,345,000	100%

#### SUMMARY OF DEBT RATES Mar-25

Rmkt Agent	GOLDMAN	GOLDMAN	GOLDMAN	MERRIL	L LYNCH	US BANK
Mode	DAILY	DAILY	DAILY	DAILY	WEEKLY	DAILY
Bond Issue	2009 - B	2011 A-1	2011 A-2	1993	2008-A	2009-A
Par Amount	42,500,000	36,660,000	24,440,000	19,200,000	37.000.000	42,500,000
LOC Bank	BOFA	BOFA	BOFA	US BANK	Sumitomo	US BANK
Reset					Wednesday	
3/1/2025	1.05%	1.05%	1.05%	1.05%	0.87%	0.80%
3/2/2025	1.05%	1.05%	1.05%	1.05%	0.87%	0.80%
3/3/2025	0.60%	0.60%	0.60%	0.65%	0.87%	0.70%
3/4/2025	0.90%	0.90%	0.90%	0.70%	0.87%	0.50%
3/5/2025	1.15%	1.15%	1.15%	1.00%	0.87%	0.95%
3/6/2025	2.25%	2.25%	2.25%	1.90%	1.27%	1.60%
3/7/2025	3.25%	3.25%	3.25%	2.95%	1.27%	3.00%
3/8/2025	3.25%	3.25%	3.25%	2.95%	1.27%	3.00%
3/9/2025	3.25%	3.25%	3.25%	2.95%	1.27%	3.00%
3/10/2025	3.30%	3.30%	3.30%	2.95%	1.27%	3.15%
3/11/2025	3.10%	3.10%	3.10%	3.00%	1.27%	3.05%
3/12/2025	3.05%	3.05%	3.05%	3.00%	1.27%	3.00%
3/13/2025	3.00%	3.00%	3.00%	2.90%	2.51%	3.00%
3/14/2025	3.00%	3.00%	3.00%	2.60%	2.51%	3.00%
3/15/2025	3.00%	3.00%	3.00%	2.60%	2.51%	3.00%
3/16/2025	3.00%	3.00%	3.00%	2.60%	2.51%	3.00%
3/17/2025	2.40%	2.40%	2.40%	2.15%	2.51%	2.60%
3/18/2025	2.15%	2.15%	2.15%	2.20%	2.51%	2.20%
3/19/2025	2.35%	2.35%	2.35%	2.25%	2.51%	2.30%
3/20/2025	2.50%	2.50%	2.50%	2.30%	2.19%	2.45%
3/21/2025	2.60%	2.60%	2.60%	2.30%	2.19%	2.55%
3/22/2025	2.60%	2.60%	2.60%	2.30%	2.19%	2.55%
3/23/2025	2.60%	2.60%	2.60%	2.30%	2.19%	2.55%
3/24/2025	2.45%	2.45%	2.45%	2.00%	2.19%	2.35%
3/25/2025	2.10%	2.10%	2.10%	1.80%	2.19%	2.15%
3/26/2025	2.10%	2.10%	2.10%	1.80%	2.19%	2.05%
3/27/2025	2.45%	2.45%	2.45%	2.20%	1.81%	2.40%
3/28/2025	2.85%	2.85%	2.85%	2.65%	1.81%	2.70%
3/29/2025	2.85%	2.85%	2.85%	2.65%	1.81%	2.70%
3/30/2025	2.85%	2.85%	2.85%	2.65%	1.81%	2.70%
3/31/2025	2.65%	2.65%	2.65%	2.55%	1.81%	2.60%
Avg Interest Rates	2.44%	2.44%	2.44%	2.22%	1.78%	2.34%
Rmkt Fee	0.07%	0.07%	0.07%	0.10%	0.07%	0.07%
LOC Fee	0.28%	0.32%	0.32%	0.30%	0.32%	0.30%
All-In Rate	2.79%	2.83%	2.83%	2.62%	2.17%	2.71%
Par Amount	•	103,600,000		56,20	0,000	42,500,000

	Percent of	Par	Weighted All-In		Base Rate
Interest Rate Mode	Total Variable Rate Debt	Outstanding	Average Rate		Average
Daily	81.71%	165,300,000	2.77%		2.39%
Weekly	18.29%	37,000,000	2.17%		1.78%
	100.00%	\$202,300,000	2.66%		2.28%
Fixed					
COPS 2016	26.48%	96,935,000	2.90%		
BABS 2010	47.81%	175,000,000	4.44%	(1)	
SERIES 2016	25.71%	94,110,000	3.32%		
	100.00%	\$366.045.000	3.74%		

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

Note: This page is intentionally left blank.

# Exhibit "C" Irvine Ranch Water District Interest Rate Swap Summary March 2025

		DuisuMa	0	40 M - 4	-									
SFR1M (Lbr R	nl) Ava %	Prior Mo. 4.43%	Current Mo. 4.44%	12-Mo Avg 4.82%										
	pi) Avg //	4.4070			4									
				cal Year Ac	tive Swaps	1	1			Cash	Flow	(Since 3/07)		Market
Effective	e Date	Maturity Date	Years to Maturity	Counter Party	Notional Amt	Туре	Base Index	Fixed Rate	Prior Month	Current Month	Fiscal YTD	Cumulative Net Accrual	Current Mark to Market	Notional Difference
	Fixed	d Paver Swa	aps - By Effe	ctive Date		1								
	3/10/2007	3/10/2029	3.9	ML	30,000,000	FXP	LIBOR	5.687%	(24,745	) (32,369)	(163,192)	(22,152,444)	27,908,197	(2,091,803
	3/10/2007	3/10/2029	3.9	CG	30,000,000	FXP	LIBOR	5.687%	(24,745		,		27,908,160	(2,091,840
Fotals/Weight	ed Avgs		3.9		\$ 60,000,000			5.687%	\$ (49,490	)\$ (64,738)	\$ (326,384)	\$ (44,304,682)	\$ 55,816,357	\$ (4,183,643
Total Curren														
Active Swaps	S				\$ 60,000,000				\$ (49,490	)\$ (64,738)	\$ (326,384)	\$ (44,304,682)	\$ 55,816,357	\$ (4,183,643
		(	Current Fisca	l Year Term	inated Swaps					Cas	h Flow		Mark to	Market
		Maturity		Counter			Base		Prior	Current		Cumulative	Current Mark to	Notional
Effective	e Date	Date		Party	Notional Amt	Туре	Index	Fixed Rate	Month	Month	Fiscal YTD	Net Accrual	Market	Difference
	4 V		Current Fis	cal Year - T	otal Swaps				Prior Month	Cas Current Month	h Flow Fiscal YTD	Cumulative Net Accrual	Mark to Current Mark to Market	Market Notional Difference
Total Curren Active & Terr		aps			\$ 60,000,000				\$ (49,490	) \$ (64,738)	\$ (326,384)	\$ (44,304,682)	\$ 55,816,357	\$ (4,183,643
					Interest I	Rate S	Swap P	ortfolio						
innts)					Cash F		-							Comparison s. Fixed Rate Debt
receipts/(paymennts) (000's)	(20,000) (30,000)													Cash Flow to Date
eceipts/ (00	(40,000)												Synthetic Fixed =	\$66,659,335
Net n	(60,000)												Fixed Rate =	\$81,050,672
	(80,000) (90,000)	a <sup>123</sup> Na	r <sup>23</sup> 11123	SEP 23	Hon, 13 Par	2 <sup>A</sup>	Nar <sup>2A</sup>	Marille July	A Gep2A	Nousy	Jan <sup>25</sup> M		Assumptions: - Fixed rate debt iss in Mar-07 (estimated TE rate - 'Synthetic' includes	- Bloomberg)

Note: This page is intentionally left blank.

# Exhibit "D"

# IRVINE RANCH WATER DISTRICT AP DISBURSEMENTS AND VOIDS FOR MARCH 2025

ELECTRONIC #	PAYMENT DATE	SUPPLIER	PAYMENT AMOUNT
448122	6-Mar-25	8X8 INC	15,027.80
448123	6-Mar-25	AAF INTERNATIONAL	1,334.97
448124	6-Mar-25	ACCELERATED TECHNOLOGY LABORATORIES, LLC	11,418.75
448125	6-Mar-25	AGILENT TECHNOLOGIES, INC.	137.27
448126	6-Mar-25	ANTHONY N. LARSEN	820.00
448127	6-Mar-25	APPLIED INDUSTRIAL TECHNOLOGIES - CA LLC	3,996.49
448128	6-Mar-25	AT&T CORP	4,917.66
448129	6-Mar-25	AT&T CORP	65.32
448130	6-Mar-25	AT&T CORP	228.96
448131	6-Mar-25	AUTOZONE PARTS, INC.	123.85
448132	6-Mar-25	BECKMAN COULTER, INC	1,444.67
448133	6-Mar-25	BEST DRILLING AND PUMP, INC.	263,221.25
448134	6-Mar-25	BETHEL KOREAN CHURCH	31.00
448135	6-Mar-25	BPS SUPPLY GROUP	637.25
448136	6-Mar-25	BRINKMANN INSTRUMENTS, INC.	75.84
448137	6-Mar-25	BROOKFIELD RESIDENTIAL	47.24
448138	6-Mar-25	CALPINE CORPORATION	377,004.67
448139	6-Mar-25	CALTROL, INC.	7,939.76
448140	6-Mar-25	CHEM SERVICE INC.	343.00
448141	6-Mar-25	CHEN, ANN	22.24
448142	6-Mar-25	CITY OF LAKE FOREST	22,022.00
448143	6-Mar-25	CLARKE MOSQUITO CONTROL PRODUCTS, INC.	23,077.47
448144	6-Mar-25	CLEAN ENERGY	9,369.24
448145	6-Mar-25	COX COMMUNICATIONS, INC.	6,688.84
448146	6-Mar-25	CUESTA CONSTRUCTION COMPANY	1,987.75
448147	6-Mar-25	DG INVESTMENT INTERMEDIATE HOLDINGS 2, INC.	7,665.90
448148	6-Mar-25	DIRECTV INC	164.24
448149	6-Mar-25	DO SUPPLY COMPANY INC	6,458.54
448150	6-Mar-25	EMD MILLIPORE CORPORATION	4,538.24
448151	6-Mar-25	ENVIRONMENTAL EXPRESS, INC.	2,521.86
448152	6-Mar-25	ENVIRONMENTAL SCIENCE ASSOCIATES	16,820.74
448153	6-Mar-25	FASTBLUE COMMUNICATIONS INC.	1,988.72
448154	6-Mar-25	FEDEX	126.95
448155	6-Mar-25	FIRE EXTINGUISHING SAFETY & SERVICE	4,846.06
448156	6-Mar-25	FISHER SCIENTIFIC COMPANY, LLC	9,116.15
448157	6-Mar-25	FRONTIER CALIFORNIA INC.	713.29
448158	6-Mar-25	GANNETT FLEMING, INC.	850.00
448159	6-Mar-25	GEA MECHANICAL EQUIPMENT US, INC.	13,230.54
448160	6-Mar-25	GRACE BUILT, INC.	1,193.66
448161	6-Mar-25	GREENLEAF ENGINEERING INC	1,394.68
448162	6-Mar-25	GUIDA SURVEYING INC.	2,091.00
448163	6-Mar-25	GUO, GE	24.47
448164	6-Mar-25	HACH COMPANY	9,588.59
448165	6-Mar-25	HALFACRE, LULA	50.00

ELECTRONIC #	PAYMENT DATE	SUPPLIER	PAYMENT AMOUNT
448166	6-Mar-25	HARRINGTON INDUSTRIAL PLASTICS LLC	7,876.10
448167	6-Mar-25	HAZEN AND SAWYER	20,693.75
448168	6-Mar-25	HERITAGE FIELDS LLC	263,792.54
448169	6-Mar-25	JDRS PROPERTY MANAGEMENT	35.04
448170	6-Mar-25	JOSE MARTINEZ TREE SERVICE INC.	14,500.00
448171	6-Mar-25	JUST ENERGY SOLUTIONS INC.	105.89
448172	6-Mar-25	KHOSROWBOD, NASSER	229.05
448173	6-Mar-25	KPRS CONSTRUCTION SERVICES INC	1,542.50
448174	6-Mar-25	LA SALLE, KIMBERLY	137.48
448175	6-Mar-25	LAKESHORE TOWERS	171.11
448176	6-Mar-25	LAZARRE, MARILYN	51.07
448177	6-Mar-25	LEIST, JAMES	27.47
448178	6-Mar-25	LEONARD, CONNER	57.08
448179	6-Mar-25	LI, XIUKUI	22.48
448180	6-Mar-25	LIFE TECHNOLOGIES CORPORATION	932.04
448181	6-Mar-25	LIN, XUEYAN	118.35
448182	6-Mar-25	LINDE GAS & EQUIPMENT INC.	4,377.57
448183	6-Mar-25	LOZANO SMITH, LLP	23,105.35
448184	6-Mar-25	LUBRICATION ENGINEERS	4,302.63
448185	6-Mar-25	MA, MINGYUAN	167.22
448186	6-Mar-25	MACEDONIO PARY	796.25
448187	6-Mar-25	MC FADDEN-DALE INDUSTRIAL HARDWARE, LLC	19.67
448188	6-Mar-25	MISSION COMMUNICATIONS, LLC	626.00
448189	6-Mar-25	MOKHTARE, MIKE M.	667.68
448190	6-Mar-25	MOTION INDUSTRIES INC	133.93
448191	6-Mar-25	MUTUAL PROPANE	245.02
448192	6-Mar-25	NINYO & MOORE	3,254.75
448193	6-Mar-25	O'REILLY AUTO ENTERPRISES, LLC	1,210.99
448194	6-Mar-25	ONESOURCE DISTRIBUTORS, LLC	36.65
448195	6-Mar-25	ORANGE COUNTY FIRE PROTECTION, INC.	630.00
448196	6-Mar-25	OSTS, INC	7,860.00
448197	6-Mar-25	PACIFIC CITY PROPERTIES	192.05
448198	6-Mar-25	PACIFIC HYDROTECH CORPORATION	392,441.91
448199	6-Mar-25	PACIFIC HYDROTECH CORPORATION	20,654.84
448200	6-Mar-25	PARKHOUSE TIRE, INC.	1,501.48
448201	6-Mar-25	PECK, ROBERT W	613.75
448202	6-Mar-25	PIONEER AMERICAS LLC	22,022.46
448203	6-Mar-25	PLUMBERS DEPOT INC	1,869.18
448204	6-Mar-25	POLLARDWATER.COM	1,773.63
448205	6-Mar-25	PRIME SYSTEMS INDUSTRIAL AUTOMATION, INC.	62,892.00
448206	6-Mar-25	PTI SAND & GRAVEL INC	3,144.22
448207	6-Mar-25	R C FOSTER CORPORATION	409,445.95
448208	6-Mar-25	REECE SUPPLY LLC	144.63
448209	6-Mar-25	REFRIGERATION SUPPLIES DISTRIBUTOR	1,715.25

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CHECK OR			
ELECTRONIC #	PAYMENT DATE	SUPPLIER	<b>PAYMENT AMOUNT</b>
448210	6-Mar-25	RETURN TO WORK PARTNERS INC.	1,625.00
448211	6-Mar-25	RICHARD C. SLADE & ASSOCIATES LLC	12,543.70
448212	6-Mar-25	SAFETY-KLEEN SYSTEMS, INC	1,618.80
448213	6-Mar-25	SAND CANYON MEDICAL GROUP	2,540.00
448214	6-Mar-25	SANTA MARGARITA FORD	877.30
448215	6-Mar-25	SANTIZO, GISELLE	26.63
448216	6-Mar-25	SHIMMICK CONSTRUCTION COMPANY INC	1,399.50
448217	6-Mar-25	SIGMA-ALDRICH, INC.	229.89
448218	6-Mar-25	SMITH, PATRICIA	15.87
448219	6-Mar-25	SMOGSTAR LLC	406.50
448220	6-Mar-25	SOUTHERN CALIFORNIA EDISON COMPANY	629,385.21
448221	6-Mar-25	SOUTHERN CALIFORNIA GRADING INC	490.10
448222	6-Mar-25	SOUTHERN COUNTIES LUBRICANTS LLC	2,420.44
448223	6-Mar-25	SPARKLETTS	38.40
448224	6-Mar-25	SRC-PH INVESTMENTS, LLC	1,561.60
448225	6-Mar-25	SS MECHANICAL CONSTRUCTION CORP	45,653.99
448226	6-Mar-25	STATE INDUSTRIAL PRODUCTS	832.43
448227	6-Mar-25	STERIS CORPORATION	3,477.05
448228	6-Mar-25	STETSON ENGINEERS INC.	2,553.00
448229	6-Mar-25	TANKVISIONS, INC	30.00
448230	6-Mar-25	TICE, MARSHA A	1,708.85
448231	6-Mar-25	TK ELEVATOR CORPORATION	268.53
448232	6-Mar-25	TOP TEN REALESTATE	121.95
448233	6-Mar-25	TRI COUNTY PUMP COMPANY	44,961.00
448234	6-Mar-25	TUTTLE-CLICK TUSTIN INC	268.00
448235	6-Mar-25	TYSON, THOMAS J	2,316.38
448236	6-Mar-25	UNITED PARCEL SERVICE INC	483.05
448237	6-Mar-25	VEOLIA WATER TECHNOLOGIES TREATMENT SOLUTIONS USA INC.	11,095.10
448238	6-Mar-25	VERIZON WIRELESS SERVICES LLC	14,838.75
448239	6-Mar-25	VOSS, ELLEN	95.65
448240	6-Mar-25	VSS SALES, INC.	13,783.09
448241	6-Mar-25	VULCAN MATERIALS COMPANY	2,142.72
448242	6-Mar-25	VWR FUNDING, INC.	375.29
448243	6-Mar-25	WALTERS WHOLESALE ELECTRIC CO	5,756.46
448244	6-Mar-25	WAXIE'S ENTERPRISES, LLC	618.93
448245	6-Mar-25	WINCHESTER EQUITY GROUP LLC	452.96
448246	6-Mar-25	YAN, XIAOXIAO	821.39
448247	6-Mar-25	ANTHEM BLUE CROSS	370.71
448248	6-Mar-25	CITY OF ORANGE	789.00
448249	6-Mar-25	XU YANG & YIMING JIN	161.42
448250	13-Mar-25	8X8 INC	240.00
448251	13-Mar-25	ADS CORP.	2,781.00
448252	13-Mar-25	AGILENT TECHNOLOGIES, INC.	698.22
448253	13-Mar-25	AIR TECHNOLOGY LABORATORIES	289.00

CHECK OR			
ELECTRONIC #	PAYMENT DATE	SUPPLIER	PAYMENT AMOUNT
448254	13-Mar-25	AIRGAS, INC.	3,584.10
448255	13-Mar-25	ALL AMERICAN ASPHALT	1,413.80
448256	13-Mar-25	ANDRADE, JORGE	583.21
448257	13-Mar-25	ANHOOD, AUDREY	34.98
448258	13-Mar-25	ANIXTER INC	49,704.55
448259	13-Mar-25	ARAKELIAN ENTERPRISES, INC.	10,014.73
448260	13-Mar-25	ASHFORD, WALT	341.44
448261	13-Mar-25	AT&T CORP	174.03
448262	13-Mar-25	AT&T CORP	2,051.20
448263	13-Mar-25	AT&T MOBILITY	95.62
448264	13-Mar-25	BADGER METER INC.	113,092.25
448265	13-Mar-25	BANK OF AMERICA	7,854.43
448266	13-Mar-25	BANK OF NEW YORK MELLON TRUST COMPANY NA	2,245.00
448267	13-Mar-25	BEADOR CONSTRUCTION COMPANY INC	357.50
448268	13-Mar-25	BLAIRS TOWING INC	205.00
448269	13-Mar-25	BRADY CORPORATION	7,856.00
448270	13-Mar-25	BRIGHT MARKET, LLC	1,785.00
448271	13-Mar-25	CALIFORNIA-NEVADA DISTRICT EXCHANGE CLUB CHARITABLE FOUNDATION, INC	250.00
448272	13-Mar-25	CANON SOLUTIONS AMERICA, INC	3.86
448273	13-Mar-25	CHAABAN, MANAR	89.78
448274	13-Mar-25	CITY OF SANTA ANA	605.97
448275	13-Mar-25	COLE-PARMER INSTRUMENT COMPANY, LLC	101.15
448276	13-Mar-25	CORELOGIC INC	632.52
448277	13-Mar-25	CORO SOUTHERN CALIFORNIA	2,500.00
448278	13-Mar-25	COX COMMUNICATIONS, INC.	61.49
448279	13-Mar-25	CR & R INCORPORATED	569.02
448280	13-Mar-25	DAVID THATCHER	375.00
448281	13-Mar-25	DC FROST ASSOCIATES, INC	1,313.66
448282	13-Mar-25	DELL MARKETING LP	6,298.15
448283	13-Mar-25	DETECTION INSTRUMENTS CORP	915.05
448284	13-Mar-25	DMS FACILITY SERVICES, LLC	37,063.09
448285	13-Mar-25	EAGLE PAVING LLC	1,590.30
448286	13-Mar-25	EAST ORANGE COUNTY WATER DISTRICT	1,971.88
448287	13-Mar-25	EASYVISTA, INC	16,950.00
448288	13-Mar-25	EMD MILLIPORE CORPORATION	700.92
448289	13-Mar-25	ENVIRONMENTAL EXPRESS, INC.	2,731.12
448290	13-Mar-25	ENVIRONMENTAL RESOURCE ASSOCIATES, INC.	226.39
448291	13-Mar-25	FEDEX	169.64
448292	13-Mar-25	FEDEX NATIONAL LTL, INC	336.96
448293	13-Mar-25	FISHER SCIENTIFIC COMPANY, LLC	1,934.22
448294	13-Mar-25	FLEIX, STACEY	24.65
448295	13-Mar-25	FORTRA, LLC	10,864.45
448296	13-Mar-25	GEA MECHANICAL EQUIPMENT US, INC.	21,409.43
448297	13-Mar-25	GSRP ST SOLAR I LLC	9,191.10
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ELECTRONIC #	PAYMENT DATE	SUPPLIER	PAYMENT AMOUNT
448298	13-Mar-25	GUNNELS, SUMMER	69.72
448299	13-Mar-25	HACH COMPANY	58,379.71
448300	13-Mar-25	HALLSTEN CORPORATION	109,140.73
448301	13-Mar-25	HARRINGTON INDUSTRIAL PLASTICS LLC	23,910.81
448302	13-Mar-25	HD SUPPLY, INC.	701.04
448303	13-Mar-25	HERITAGE FIELDS EL TORRO, LLC	4,200.00
448304	13-Mar-25	HERITAGE FIELDS LLC	182,488.07
448305	13-Mar-25	HUBBELL LENOIR CITY	735.23
448306	13-Mar-25	INFOSEND, INC.	40,277.69
448307	13-Mar-25	INNOVATIVE CONSTRUCTION SOLUTIONS	1,359,496.82
448308	13-Mar-25	INTEGRITY MUNICIPAL SYSTEMS LLC	59,600.00
448309	13-Mar-25	IRON MOUNTAIN INCORPORATED	2,369.54
448310	13-Mar-25	JANG, YOUNGHEE	48.20
448311	13-Mar-25	JB BOSTICK COMPANY INC	300.30
448312	13-Mar-25	JB BOSTICK LLC	1,211.97
448313	13-Mar-25	JOHN ROBINSON CONSULTING, INC.	6,330.00
448314	13-Mar-25	JOHNSON-FRANK & ASSOCIATES, INC.	1,985.00
448315	13-Mar-25	KB HOMES	616.26
448316	13-Mar-25	LEE, PATRICIA	116.83
448317	13-Mar-25	LINDE GAS & EQUIPMENT INC.	563.86
448318	13-Mar-25	LOMIBAO, CHRISTOPHER	457.72
448319	13-Mar-25	LONE STAR BLOWER, INC	14,400.00
448320	13-Mar-25	MARSHALL INSTITUTE, INC	13,647.24
448321	13-Mar-25	MC FADDEN-DALE INDUSTRIAL HARDWARE, LLC	34.96
448322	13-Mar-25	MICHAEL K. NUNLEY & ASSOCIATES, INC.	4,038.50
448323	13-Mar-25	MILES CHEMICAL COMPANY, INC.	13,004.01
448324	13-Mar-25	MR CRANE, INC.	6,931.63
448325	13-Mar-25	NATIONAL OILWELL VARCO, L.P.	303.12
448326	13-Mar-25	NMG GEOTECHNICAL INC	3,779.10
448327	13-Mar-25	O'REILLY AUTO ENTERPRISES, LLC	71.13
448328	13-Mar-25	OCIACC - ORANGE COUNTY IRANIAN AMERICAN CHAMBER OF COMMERCE	2,500.00
448329	13-Mar-25	OCTA	3,166.00
448330	13-Mar-25	OHLENDORF, CHRIS	24.47
448331	13-Mar-25	ONESOURCE DISTRIBUTORS, LLC	349.12
448332	13-Mar-25	ORACLE AMERICA, INC.	262,257.38
448333	13-Mar-25	ORANGE COUNTY WINWATER WORKS	8,676.35
448334	13-Mar-25	OSTS, INC	7,810.00
448335	13-Mar-25	P&M HOLDING GROUP, LLP	34,720.00
448336	13-Mar-25	PACIFIC EH&S SERVICES, INC.	256.00
448337	13-Mar-25	PACIFIC MECHANICAL SUPPLY	2,564.41
448338	13-Mar-25	PALP INC. DBA EXCEL PAVING COMPANY	215,518.52
448339	13-Mar-25	PARKHOUSE TIRE, INC.	1,602.22
448340	13-Mar-25	PARTNERS IN CONTROL, INC.	6,380.00
448341	13-Mar-25	PENN ARCHIVE SERVICES, INC.	92.98

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CHECK OR			
ELECTRONIC #	PAYMENT DATE	SUPPLIER	PAYMENT AMOUNT
448342	13-Mar-25	PERKINELMER U.S. LLC	2,651.94
448343	13-Mar-25	PHENOMENEX INC	768.27
448344	13-Mar-25	PIERPONT TECHNOLOGIES, LLC	87.50
448345	13-Mar-25	PIONEER AMERICAS LLC	44,856.03
448346	13-Mar-25	PLUMBERS DEPOT INC	1,966.77
448347	13-Mar-25	PORTOLA SENIOR HOUSING ASSOCIATES LP	45.24
448348	13-Mar-25	PRIME SYSTEMS INDUSTRIAL AUTOMATION, INC.	23,990.00
448349	13-Mar-25	RADWELL INTERNATIONAL INC	231.67
448350	13-Mar-25	RALPH ANDERSEN & ASSOCIATES	4,080.00
448351	13-Mar-25	RAMPONE, JENNIFER	323.95
448352	13-Mar-25	MARCO GUEVARA	16,750.00
448353	13-Mar-25	REECE SUPPLY LLC	1,342.46
448354	13-Mar-25	REN, SHIJIN	1,089.77
448355	13-Mar-25	RENTOKIL NORTH AMERICA, INC	1,080.00
448356	13-Mar-25	SAMSARA INC.	162,458.45
448357	13-Mar-25	SAND CANYON MEDICAL GROUP	205.00
448358	13-Mar-25	SANTA MARGARITA FORD	35,312.75
448359	13-Mar-25	SCA OF CA, LLC	2,939.44
448360	13-Mar-25	SCELZI EQUIPMENT, INC.	73.33
448361	13-Mar-25	SCHINDLER ELEVATOR CORPORATION	347.26
448362	13-Mar-25	SEWER EQUIPMENT CO OF AMERICA	3,171.52
448363	13-Mar-25	SHAMROCK SUPPLY COMPANY, INC.	312.75
448364	13-Mar-25	SHANG, FANG	1,047.13
448365	13-Mar-25	SHOETERIA, INC.	196.27
448366	13-Mar-25	SITMATIC	899.90
448367	13-Mar-25	SMOGSTAR LLC	65.00
448368	13-Mar-25	SOCAL SCADA SOLUTIONS LLC	39,497.00
448369	13-Mar-25	SOUTHERN CALIFORNIA EDISON COMPANY	361,239.95
448370	13-Mar-25	SOUTHERN CALIFORNIA GAS COMPANY	121.17
448371	13-Mar-25	SPEX CERTIPREP, LLC	208.85
448372	13-Mar-25	STATHAKIS, DIANE	35.67
448373	13-Mar-25	STICE COMPANY, INC.	1,446.50
448374	13-Mar-25	TAIT ENVIRONMENTAL SERVICES, INC.	1,020.75
448375	13-Mar-25	TANG, SQINGYING	35.99
448376	13-Mar-25	TEMPO INDUSTRIES	78.40
448377	13-Mar-25	THERMO ELECTRON NORTH AMERICA LLC	113,704.06
448378	13-Mar-25	THIRKETTLE CORPORATION	42,935.42
448379	13-Mar-25	TICIC SUB LLC	1,055.77
448380	13-Mar-25	TREAT SALON AND SPA	1,268.22
448381	13-Mar-25	TROJAN TECHNOLOGIES CORP.	19,999.66
448382	13-Mar-25	U S RIGGING SUPPLY	1,815.22
448383	13-Mar-25	ULINE, INC	994.96
448384	13-Mar-25	UNITED PARCEL SERVICE INC	82.38
448385	13-Mar-25	UNITED SITE SERVICES OF CALIFORNIA INC	361.33

CHECK OR			
ELECTRONIC #	PAYMENT DATE	SUPPLIER	<b>PAYMENT AMOUNT</b>
448386	13-Mar-25	USA WASTE OF CALIFORNIA, INC.	1,928.55
448387	13-Mar-25	V&A CONSULTING ENGINEERS	40,128.52
448388	13-Mar-25	VEOLIA NORTH AMERICA, INC.	4,307.14
448389	13-Mar-25	VERIZON WIRELESS SERVICES LLC	5,828.76
448390	13-Mar-25	VOICE, LLC	1,247.43
448391	13-Mar-25	WALTERS WHOLESALE ELECTRIC CO	1,140.05
448392	13-Mar-25	WARD, WILLIAM P JR.	1,644.88
448393	13-Mar-25	WASTE MANAGEMENT COLLECTIONS AND RECYCLING, INC.	13,810.47
448394	13-Mar-25	WAXIE'S ENTERPRISES, LLC	2,657.62
448395	13-Mar-25	XYLEM WATER SOLUTIONS USA, INC.	9,221.80
448396	13-Mar-25	ZHAO, JIAYI	43.78
448397	13-Mar-25	CONTINENTAL AMERICAN INSURANCE COMPANY	2,081.68
448398	13-Mar-25	COUNTY OF ORANGE	13,276.18
448399	13-Mar-25	FRANCHISE TAX BOARD	342.00
448400	13-Mar-25	HUMANA INSURANCE COMPANY	21.20
448401	13-Mar-25	INTERNATIONAL BROTHERHOOD OF ELECTRICAL WORKERS LOCAL 47	10,332.15
448402	13-Mar-25	MARY FABER SMITH	2,500.00
448403	13-Mar-25	PERS LONG TERM CARE	399.66
448404	13-Mar-25	SOUTHERN CALIFORNIA EDISON COMPANY	35,332.67
448405	20-Mar-25	AIRGAS, INC.	2,112.55
448406	20-Mar-25	AMETEK BROOKFIELD	2,394.63
448407	20-Mar-25	APCO GRAPHICS INC	292.01
448408	20-Mar-25	AT&T CORP	165.87
448409	20-Mar-25	AT&T CORP	29.56
448410	20-Mar-25	AT&T CORP	12,508.41
448411	20-Mar-25	AT&T MOBILITY	95.49
448412	20-Mar-25	AVIAT U.S., INC	728.00
448413	20-Mar-25	BAVCO BACKFLOW APPARATUS & VALVE COMPANY	16,938.30
448414	20-Mar-25	BORDIN SEMMER LLP	2,722.50
448415	20-Mar-25	BPS SUPPLY GROUP	649.92
448416	20-Mar-25	BUTIER ENGINEERING INC	11,880.00
448417	20-Mar-25	CANON FINANCIAL SERVICES, INC.	9,597.59
448418	20-Mar-25	CANON U.S.A., INC.	334.74
448419	20-Mar-25	CENTROID INTERMEDIATE, LLC	63,806.03
448420	20-Mar-25	CHANG, KATY	28.24
448421	20-Mar-25	CLIFFORD MORIYAMA	5,000.00
448422	20-Mar-25	CORE & MAIN LP	3,601.97
448423	20-Mar-25	COUNTY OF ORANGE	106,426.93
448424	20-Mar-25	DANAHER, THOMAS	76.70
448425	20-Mar-25	DCS MANAGEMENT LLC	84.34
448426	20-Mar-25	DELL MARKETING LP	5,851.90
448427	20-Mar-25	DETECTION INSTRUMENTS CORP	996.21
448428	20-Mar-25	DG INVESTMENT INTERMEDIATE HOLDINGS 2, INC.	1,670.69
448429	20-Mar-25	DILYTICS INC	5,440.00

CHECK OR			
ELECTRONIC #	PAYMENT DATE	SUPPLIER	PAYMENT AMOUNT
448430	20-Mar-25	ELECTRO-CHEMICAL DEVICES, INC.	2,296.38
448431	20-Mar-25	ELIJAH STANDING WARRIOR	1,500.00
448432	20-Mar-25	ENTERPRISE HOLDINGS, INC.	12,734.50
448433	20-Mar-25	EUROFINS EATON ANALYTICAL, LLC	2,812.50
448434	20-Mar-25	FARWEST CORROSION CONTROL COMPANY	6,116.01
448435	20-Mar-25	FEDEX	196.52
448436	20-Mar-25	FERREIRA CONSTRUCTION COMPANY, INC.	184,962.04
448437	20-Mar-25	FIRE EXTINGUISHING SAFETY & SERVICE	754.07
448438	20-Mar-25	FISHER SCIENTIFIC COMPANY, LLC	4,017.15
448439	20-Mar-25	FITCH RATINGS, INC.	5,000.00
448440	20-Mar-25	FRONTIER CALIFORNIA INC.	467.56
448441	20-Mar-25	GARCIA, SANTIAGO	17.96
448442	20-Mar-25	GEI CONSULTANTS INC	19,469.50
448443	20-Mar-25	GOLDEN STAR TECHNOLOGY, INC.	52,017.61
448444	20-Mar-25	GUY L WARDEN & SONS	7,199.19
448445	20-Mar-25	HACH COMPANY	14,186.04
448446	20-Mar-25	HAUN, JERED	46.19
448447	20-Mar-25	HERITAGE FIELDS LLC	865,896.25
448448	20-Mar-25	HUBBELL LENOIR CITY	9,590.02
448449	20-Mar-25	IDEA HALL	4,087.50
448450	20-Mar-25	INDUSTRIAL METAL SUPPLY CO	281.47
448451	20-Mar-25	JEFF OLAVE AND PILAR OLAVE	42.83
448452	20-Mar-25	KIM, DONG JOO	15.23
448453	20-Mar-25	LBA/PPF IND TOWNE CTR DR LLC	87.45
448454	20-Mar-25	LEE & RO, INC.	17,851.50
448455	20-Mar-25	LEE, WONCHUL	24.47
448456	20-Mar-25	LINDE GAS & EQUIPMENT INC.	18,701.44
448457	20-Mar-25	LPA, INC.	300.00
448458	20-Mar-25	LSA ASSOCIATES INC	16,423.41
448459	20-Mar-25	LU'S LIGHTHOUSE, INC.	1,517.37
448460	20-Mar-25	MALTA, DANIEL	82.38
448461	20-Mar-25	MARIE KNIGHT	3,650.00
448462	20-Mar-25	MICHAEL K. NUNLEY & ASSOCIATES, INC.	55,994.50
448463	20-Mar-25	MISSION COMMUNICATIONS, LLC	1,252.00
448464	20-Mar-25	MOODY'S INVESTORS SERVICE INC	11,500.00
448465	20-Mar-25	MR CRANE, INC.	5,074.38
448466	20-Mar-25	MUTUAL PROPANE	27.00
448467	20-Mar-25	NATIONAL SAFETY COMPLIANCE, INC	104.50
448468	20-Mar-25	NORIMA CONSULTING US	7,400.00
448469	20-Mar-25	NORTHWOOD PLACE APTS	411.60
448470	20-Mar-25	NOVA GEOTECHNICAL AND INSPECTION SERVICES	2,017.00
448471	20-Mar-25	O'REILLY AUTO ENTERPRISES, LLC	1,319.80
448472	20-Mar-25	ONESOURCE DISTRIBUTORS, LLC	13,961.35
448473	20-Mar-25	ORANGE COUNTY FIRE PROTECTION, INC.	2,360.00

CHECK OR			
ELECTRONIC #	PAYMENT DATE	SUPPLIER	PAYMENT AMOUNT
448474	20-Mar-25	ORANGE COUNTY WINWATER WORKS	5,534.78
448475	20-Mar-25	ORGANIC STANDARD SOLUTIONS INTERNATIONAL, LLC	213.74
448476	20-Mar-25	PACIFIC EH&S SERVICES, INC.	10,160.40
448477	20-Mar-25	PACIFIC HYDROTECH CORPORATION	125,907.58
448478	20-Mar-25	PACIFIC HYDROTECH CORPORATION	2,911.42
448479	20-Mar-25	PACIFIC HYDROTECH CORPORATION	3,715.29
448480	20-Mar-25	PACIFIC SPECTRUM LLC	75.00
448481	20-Mar-25	PARK, MICHELLE	36.48
448482	20-Mar-25	PINNACLE TOWERS LLC	947.99
448483	20-Mar-25	PIONEER AMERICAS LLC	78,206.41
448484	20-Mar-25	PLUMBERS DEPOT INC	3,238.88
448485	20-Mar-25	PORTOLA SPRINGS APARTMENTS LLC	581.97
448486	20-Mar-25	PROGROUP	5,653.33
448487	20-Mar-25	PRUDENTIAL OVERALL SUPPLY	9,798.85
448488	20-Mar-25	RADWELL INTERNATIONAL INC	2,864.63
448489	20-Mar-25	REECE SUPPLY LLC	980.79
448490	20-Mar-25	RHINO SAFETY SOLUTIONS, INC	2,500.00
448491	20-Mar-25	RICHARD C. SLADE & ASSOCIATES LLC	23,108.48
448492	20-Mar-25	RODNEY HARMSWORTH ASSOCIATES, INC.	10,307.50
448493	20-Mar-25	RRB WATER CONSULTING LLC	1,225.00
448494	20-Mar-25	SAFETY-KLEEN SYSTEMS, INC	227.00
448495	20-Mar-25	SAN CARLO APARTMENTS	38.71
448496	20-Mar-25	SAN MARINO APTS	513.45
448497	20-Mar-25	SAN MATEO APTS	184.80
448498	20-Mar-25	SAND CANYON MEDICAL GROUP	1,070.00
448499	20-Mar-25	SANTIAGO AQUEDUCT COMMISSION	15,273.86
448500	20-Mar-25	SHEA HOMES LIMITED PARTNERSHIP	89.35
448501	20-Mar-25	SHI, QI	25.97
448502	20-Mar-25	SHOETERIA, INC.	523.26
448503	20-Mar-25	SOUTH COAST WATER DISTRICT	1,757.60
448504	20-Mar-25	SOUTHERN CALIFORNIA EDISON COMPANY	437,279.37
448505	20-Mar-25	SOUTHERN CALIFORNIA GAS COMPANY	41,412.46
448506	20-Mar-25	STETSON ENGINEERS INC.	1,133.50
448507	20-Mar-25	STRADLING YOCCA CARLSON & RAUTH	500.00
448508	20-Mar-25	TAO, RAN	75.00
448509	20-Mar-25	TASSIN SCIENTIFIC SERVICES	1,388.25
448510	20-Mar-25	TGS MANAGEMENT COMPANY LLC	6,746.79
448511	20-Mar-25	THE BALDWIN GROUP WEST, LLC	5,833.33
448512	20-Mar-25	THIRKETTLE CORPORATION	316.10
448513	20-Mar-25	TIC-OFFICE PROPERTIES	739.11
448514	20-Mar-25	TIC-RETAIL PROPERTIES	65.59
448515	20-Mar-25	TIC-SPECTRUM OFFICE	1,212.94
448516	20-Mar-25	TIERRA VERDE INDUSTRIES	203.11
448517	20-Mar-25	TRI POINTE HOMES HOLDINGS, INC.	3,084.94

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ELECTRONIC #	PAYMENT DATE	SUPPLIER	PAYMENT AMOUNT
448518	20-Mar-25	TRIPAC MARKETING INC	918.57
448519	20-Mar-25	TROTT, NICHOLAS	180.33
448520	20-Mar-25	UNITED PARCEL SERVICE INC	134.23
448521	20-Mar-25	VINCE TURSINI	1,527.00
448522	20-Mar-25	VOICE, LLC	1,134.59
448523	20-Mar-25	VWR FUNDING, INC.	1,030.71
448524	20-Mar-25	VYAIRE MEDICAL	1,587.96
448525	20-Mar-25	WARMINGTON HOMES	15.50
448526	20-Mar-25	WAXIE'S ENTERPRISES, LLC	889.14
448527	20-Mar-25	XYLEM WATER SOLUTIONS USA, INC.	4,865.20
448528	20-Mar-25	YUNMI MARTIN	15,500.00
448529	20-Mar-25	CALIFORNIA ASSOCIATION OF SANITATION AGENCIES	37,680.00
448530	20-Mar-25	COUNTY OF ORANGE SANITATION DISTRICT	3,582.00
448531	20-Mar-25	Cronin, Gregory	60.00
448532	20-Mar-25	Patrick, Jason Alan	19.04
448533	27-Mar-25	AGILENT TECHNOLOGIES, INC.	155.80
448534	27-Mar-25	AIRGAS, INC.	1,389.53
448535	27-Mar-25	AMERICAN WATER WORKS ASSOC	12,868.00
448536	27-Mar-25	ASHIMINE, ALAN	22.45
448537	27-Mar-25	AT&T CORP	6,657.00
448538	27-Mar-25	AT&T CORP	228.96
448539	27-Mar-25	AT&T CORP	198.56
448540	27-Mar-25	ATLAS COPCO NORTH AMERICA INC.	7,043.87
448541	27-Mar-25	AUSTIN HARDWOODS, INC	843.72
448542	27-Mar-25	AUTO CENTER COMMUNITY ASSOCIATION	1,685.50
448543	27-Mar-25	BLAIRS TOWING INC	185.00
448544	27-Mar-25	BORDIN SEMMER LLP	357.50
448545	27-Mar-25	BOTTOM LINE INVESTMENTS	20.51
448546	27-Mar-25	BPS SUPPLY GROUP	1,943.49
448547	27-Mar-25	CALPINE CORPORATION	475,357.14
448548	27-Mar-25	CANON FINANCIAL SERVICES, INC.	192.88
448549	27-Mar-25	CANON U.S.A., INC.	1,788.82
448550	27-Mar-25	CANON U.S.A., INC.	3,741.05
448551	27-Mar-25	CENTROID INTERMEDIATE, LLC	22,712.55
448552	27-Mar-25	CHARLES P CROWLEY COMPANY INC	1,702.78
448553	27-Mar-25	CHEM TECH INTERNATIONAL INC	2,380.00
448554	27-Mar-25	CITY OF LAKE FOREST	24,979.85
448555	27-Mar-25	CITY OF NEWPORT BEACH	2,873.44
448556	27-Mar-25	COASTLINE EQUIPMENT COMPANY	35.77
448557	27-Mar-25	COX COMMUNICATIONS, INC.	3,154.20
448558	27-Mar-25	DAIOHS USA INCORPORATED	3,329.16
448559	27-Mar-25	DANESHVAR, RAHI REZA	277.80
448560	27-Mar-25	DAVIS FARR LLP	3,500.00
448561	27-Mar-25	DEALERS SERVICE COMPANY, INC	4,920.62

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ELECTRONIC #	PAYMENT DATE	SUPPLIER	PAYMENT AMOUNT
448562	27-Mar-25	DIRECTV INC	164.24
448563	27-Mar-25	EAGLE GRAPHICS INC.	95.91
448564	27-Mar-25	EAST ORANGE COUNTY WATER DISTRICT	1,922.09
448565	27-Mar-25	ENDEMIC ENVIRONMENTAL SERVICES, INC.	4,032.00
448566	27-Mar-25	ENDRESS AND HAUSER INC	3,102.65
448567	27-Mar-25	ENVIRONMENTAL RESOURCE ASSOCIATES, INC.	2,929.12
448568	27-Mar-25	FEDEX	418.84
448569	27-Mar-25	FISHER SCIENTIFIC COMPANY, LLC	3,289.60
448570	27-Mar-25	FRONTIER CALIFORNIA INC.	350.73
448571	27-Mar-25	GEORGE HILLS COMPANY, INC.	3,225.60
448572	27-Mar-25	HACH COMPANY	7,867.18
448573	27-Mar-25	HAMILTON, KURT	734.96
448574	27-Mar-25	HD SUPPLY, INC.	387.15
448575	27-Mar-25	INDUSTRIAL METAL SUPPLY CO	507.59
448576	27-Mar-25	INFOSEND, INC.	23,596.21
448577	27-Mar-25	IRIS GROUP HOLDINGS LLC	1,972.86
448578	27-Mar-25	JAMES DAVID CUSTOM HOMES	1,199.30
448579	27-Mar-25	JOSE MARTINEZ TREE SERVICE INC.	850.00
448580	27-Mar-25	JUST ENERGY SOLUTIONS INC.	146.85
448581	27-Mar-25	KEC ENGINEERING	1,778.55
448582	27-Mar-25	KIM, YOU JIN	34.87
448583	27-Mar-25	KYA SERVICE LLC	1,196.56
448584	27-Mar-25	LI, WEIHAO	24.47
448585	27-Mar-25	LINDE GAS & EQUIPMENT INC.	6,280.10
448586	27-Mar-25	LONE STAR BLOWER, INC	652.79
448587	27-Mar-25	LOZANO SMITH, LLP	189.00
448588	27-Mar-25	LUI, KEI	22.96
448589	27-Mar-25	MA, LI	9,328.50
448590	27-Mar-25	MC FADDEN-DALE INDUSTRIAL HARDWARE, LLC	128.81
448591	27-Mar-25	METTLER-TOLEDO RAININ, LLC	3,270.60
448592	27-Mar-25	MYERS & SONS HI-WAY SAFETY, INC.	3,911.29
448593	27-Mar-25	NATIONAL READY MIXED CONCRETE SALES, LLC	2,012.09
448594	27-Mar-25	NETWORK INTEGRATION COMPANY PARTNERS	9,166.00
448595	27-Mar-25	NICK BARBIERI TRUCKING, LLC	2,921.77
448596	27-Mar-25	ONESOURCE DISTRIBUTORS, LLC	2,773.12
448597	27-Mar-25	ORANGE COUNTY FIRE AUTHORITY	458.00
448598	27-Mar-25	ORANGE COUNTY WINWATER WORKS	126.80
448599	27-Mar-25	PARK WEST APTS	10,299.17
448600	27-Mar-25	PARKHOUSE TIRE, INC.	1,952.82
448601	27-Mar-25	PHILLIPS PLYWOOD CO, INC.	2,384.66
448602	27-Mar-25	PIONEER AMERICAS LLC	55,760.15
448603	27-Mar-25	PROTEOR USA	34.20
448604	27-Mar-25	PTI SAND & GRAVEL INC	1,662.64
448605	27-Mar-25	R.F. MACDONALD CO., LLC	2,388.00

LECTRONIC #	PAYMENT DATE	SUPPLIER	PAYMENT AMOUNT
448606	27-Mar-25	RALPH ANDERSEN & ASSOCIATES	9,750.00
448607	27-Mar-25	REECE SUPPLY LLC	7,698.61
448608	27-Mar-25	REFRIGERATION SUPPLIES DISTRIBUTOR	292.77
448609	27-Mar-25	RINCON CONSULTANTS, INC.	17,108.45
448610	27-Mar-25	RS HUGHES COMPANY, INC.	295.06
448611	27-Mar-25	SAND CANYON MEDICAL GROUP	60.00
448612	27-Mar-25	SITEONE LANDSCAPE SUPPLY, HOLDING LLC	4,079.17
448613	27-Mar-25	SOLANA APTS	861.22
448614	27-Mar-25	SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT	707.00
448615	27-Mar-25	SOUTH COAST WATER CO.	100.00
448616	27-Mar-25	SOUTHERN CALIFORNIA EDISON COMPANY	76.96
448617	27-Mar-25	SOUTHERN CALIFORNIA EDISON COMPANY	347,032.59
448618	27-Mar-25	SOUTHERN CALIFORNIA GAS COMPANY	231.70
448619	27-Mar-25	PD TRANSPORT	150.00
448620	27-Mar-25	SPARKLETTS	225.20
448621	27-Mar-25	SS MECHANICAL CONSTRUCTION CORP	24,995.00
448622	27-Mar-25	SUZANNA CHOI	7,000.00
448623	27-Mar-25	TAIT ENVIRONMENTAL SERVICES, INC.	480.00
448624	27-Mar-25	TEREX CORPORATION	3,989.82
448625	27-Mar-25	THE BOYD GROUP US INC	246.31
448626	27-Mar-25	TIC-IPG-COMMON	894.40
448627	27-Mar-25	TIC-OFFICE PROPERTIES	545.69
448628	27-Mar-25	TIC-SPECTRUM OFFICE	1,650.11
448629	27-Mar-25	UNITED PARCEL SERVICE INC	93.20
448630	27-Mar-25	US BANK NAT'L ASSOCIATION NORTH DAKOTA	88,848.16
448631	27-Mar-25	USA WASTE OF CALIFORNIA, INC.	680.12
448632	27-Mar-25	VEOLIA WATER TECHNOLOGIES TREATMENT SOLUTIONS USA INC.	45,059.54
448633	27-Mar-25	VEOLIA WATER TECHNOLOGIES, INC.	6,566.27
448634	27-Mar-25	VERIZON WIRELESS SERVICES LLC	5,538.61
448635	27-Mar-25	VHG LABS, INC	675.59
448636	27-Mar-25	VILLAGE AT PARK PLACE, LP	11,094.89
448637	27-Mar-25	VINCE TURSINI	2,593.00
448638	27-Mar-25	VULCAN MATERIALS COMPANY	2,164.81
448639	27-Mar-25	WALTERS WHOLESALE ELECTRIC CO	2,847.64
448640	27-Mar-25	WANG, QIANLONG	24.23
448641	27-Mar-25	WAXIE'S ENTERPRISES, LLC	1,855.24
448642	27-Mar-25	YSI INCORPORATED	352.13
448643	27-Mar-25	ANTHEM BLUE CROSS	370.71
448644	27-Mar-25	CALIFORNIA DEPT OF JUSTICE	400.00
448645	27-Mar-25	FRANCHISE TAX BOARD	217.54
448646	27-Mar-25	INTERNATIONAL BROTHERHOOD OF ELECTRICAL WORKERS LOCAL 47	10,369.51
448647	27-Mar-25	PERS LONG TERM CARE	399.66
448648	27-Mar-25	PETERSON LAW GROUP PROFESSIONAL CORPORATION CLIENT TRUST ACCOUNT	478,375.00
			., 5,5, 5.00

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ELECTRONIC #	PAYMENT DATE	SUPPLIER	<b>PAYMENT AMOUNT</b>
448650	27-Mar-25	VIETLAW, INC.	2,250.00
448651	27-Mar-25	VIETLAW, INC.	471,625.00
SUB-TOTAL IRWD	WELLS FARGO CH	HECK AND IRWD WELLS FARGO CHECK NO PRINT DISBURSEMENTS	11,545,708.50
1005753	6-Mar-25	Bornhoff, Mike (Mike)	121.00
1005754	6-Mar-25	Cariker, Cody J (Cody)	14.70
1005755	6-Mar-25	Contreras, Max Albert	16.80
1005756	6-Mar-25	Estrada, Robert C	72.52
1005757	6-Mar-25	Hansen, Casey	28.00
1005758	6-Mar-25	Koenig, Timothy (Tim)	17.50
1005759	6-Mar-25	LaMar, Steven E	1,931.94
1005760	6-Mar-25	Madding, Joshua	99.54
1005761	6-Mar-25	Maldonado, Damien Michael	32.20
1005762	6-Mar-25	Melendez, Evan	320.00
1005763	6-Mar-25	Nguyen, Jeanny	125.00
1005764	6-Mar-25	Ordonez, Bernardino A (Berny)	103.60
1005765	6-Mar-25	Parra, Dennis	345.00
1005766	6-Mar-25	Pham, Amie	13.30
1005767	6-Mar-25	Pulles, Margaret M (Margaret)	31.55
1005768	6-Mar-25	Rajaee, Omid	125.00
1005769	6-Mar-25	Ramirez, Eric	48.44
1005770	6-Mar-25	Reed, Megan A	27.02
1005771	6-Mar-25	Rios, Elias L	34.44
1005772	6-Mar-25	Stupy, Cole Austin	16.80
1005773	6-Mar-25	Tran, Quang (David)	105.00
1005774	6-Mar-25	Valencia, Reynaldo (Rey)	30.73
1005775	6-Mar-25	Villella, Aaren	345.00
1005776	6-Mar-25	Vu, Johnny T (Johnny)	20.30
1005777	6-Mar-25	Wise, Maureen (Mo)	169.00
1005823	13-Mar-25	Escobar, Omar (Omar)	29.43
1005824	13-Mar-25	Giatpaiboon, Scott	1,190.33
1005825	13-Mar-25	Jordan, Dawn M (Dawn)	6.86
1005826	13-Mar-25	Lu, Michael	7.70
1005827	13-Mar-25	Madrid, Adam	57.82
1005828	13-Mar-25	Martin, Colton S (Colton)	619.00
1005829	13-Mar-25	Miller, Jacquelyn Rachel (Jackie)	14.98
1005830	13-Mar-25	Munoz, Ruben	35.56
1005831	13-Mar-25	Perez, Rodolfo (Rudy)	34.76
1005832	13-Mar-25	Reed, Megan A	27.02
1005833	13-Mar-25	Rios, Elias L	34.44
1005834	13-Mar-25	Sanchez, Maria	29.12
1005835	13-Mar-25	Squyres, Diane M (Diane)	9.38
1005836	13-Mar-25	Trigg, Tyler	103.67
1005837	13-Mar-25	Villella, Aaren	60.00
1003037	10-1-101 <b>-</b> 20		00.00

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ELECTRONIC #	PAYMENT DATE		SUPPLIER	PAYMENT AMOUNT		
1005838	13-Mar-25	Yubac, Aljon Kyle		125.00		
1005899	20-Mar-25	Bronstein, Louis (Lou)				
1005900	20-Mar-25	Cariker, Cody J (Cody)		14.70		
1005901	20-Mar-25	Cervantes, Isela J		32.48		
1005902	20-Mar-25	Chaney, David (Dave)		14.42		
1005903	20-Mar-25	Contreras, Joaquin		29.82		
1005904	20-Mar-25	Giatpaiboon, Scott		44.80		
1005905	20-Mar-25	Greer, Matthew		17.78		
1005906	20-Mar-25	Haug, Jack Philip Ryan		44.24		
1005907	20-Mar-25	Jordan, Dawn M (Dawn)		14.07		
1005908	20-Mar-25	Koenig, Timothy (Tim)		35.00		
1005909	20-Mar-25	Lopez, Miguel		23.52		
1005910	20-Mar-25	Madding, Joshua		199.08		
1005911	20-Mar-25	Nguyen, Jeanny		63.28		
1005912	20-Mar-25	O'Neill, Owen H		163.51		
1005913	20-Mar-25	Olivolo, Eric J (Eric)		35.84		
1005914	20-Mar-25	Orozco, Gustavo A (Gus)		239.00		
1005915	20-Mar-25	Ovcharenko, Rachael				
1005916	20-Mar-25	Paalman, Christina Louise 1,0				
1005917	20-Mar-25	Reed, Megan A				
1005918	20-Mar-25	Salazar, Kyle				
1005919	20-Mar-25	Shapiro, Matthew				
1005920	20-Mar-25	Smith, Cameron Douglas				
1005921	20-Mar-25	Squyres, Diane M (Diane)				
1005922	20-Mar-25	Stupy, Cole Austin 1		16.80		
1005923	20-Mar-25	Velez, Cameron Joseph				
1005924	20-Mar-25	Villella, Aaren		59.36		
1005925	20-Mar-25	Zamora, Victor A		38.97		
1005926	20-Mar-25	Zaragoza, Anthony		20.00		
1005980	27-Mar-25	Anderson, Winston James		76.30		
1005981	27-Mar-25	Barreto, Gustavo (Gus)		172.39		
1005982	27-Mar-25	Contreras, Joaquin		29.82		
1005983	27-Mar-25	Do, Thu-Tam T (Thu-Tam)		15.96		
1005984	27-Mar-25	Estrada, Audie Nickolas		181.44		
1005985	27-Mar-25	Estrada, Robert C		72.52		
1005986	27-Mar-25	Gates, April		20.16		
1005987	27-Mar-25	Haug, Jack Philip Ryan		118.52		
1005988	27-Mar-25	Lu, Michael		15.40		
1005989	27-Mar-25	Madding, Joshua		99.54		
1005990	27-Mar-25	Marquez, Jesus		45.50		
1005991	27-Mar-25	Martinez, Jose A IV (Jose) 12.90				
1005992	27-Mar-25	Moeder, Jacob J (Jacob)		48.50		
1005993	27-Mar-25	Munoz, Ruben		345.00		
1005994	27-Mar-25	Ovcharenko, Rachael		180.00		

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ELECTRONIC #	PAYMENT DATE	SUPPLIER	PAYMENT AMOUNT		
1005995	27-Mar-25	Ramirez, Lizandro	123.86		
1005996	27-Mar-25	Reed, James W (James)	125.00		
1005997	27-Mar-25	Rios, Elias L	122.98		
1005998	27-Mar-25	Salazar, Kyle	36.54		
1005999	27-Mar-25	Saldana Rodriguez, Cristina	93.70		
1006000	27-Mar-25	Shapiro, Matthew	146.58		
1006001	27-Mar-25	Smith, Cameron Douglas	201.60		
1006002	27-Mar-25	Valdes, Jeffrey Glenn	108.36		
1006003	27-Mar-25	Valencia, Reynaldo (Rey)	30.73		
1006004	27-Mar-25	Villella, Aaren	253.37		
SUB-TOTAL IRWD	WELLS FARGO AC	CH FOR EXPENSE REPORTS	12,159.22		
1005778	6-Mar-25	ACCUSTANDARD, INC.	205.32		
1005779	6-Mar-25	ALEXANDER'S CONTRACT SERVICES, INC.	135,917.77		
1005780	6-Mar-25	AMAZON CAPITAL SERVICES, INC.	5,289.49		
1005781	6-Mar-25	APPLIED ENGINEERING CONCEPTS	9,677.50		
1005782	6-Mar-25	BIGWIG MONSTER, LLC	14,400.00		
1005783	6-Mar-25	C WELLS PIPELINE MATERIALS, INC	5,652.13		
1005784	6-Mar-25	CALIFORNIA BARRICADE RENTALS, INC.	34,024.50		
1005785	6-Mar-25	CANNON CORPORATION	9,088.25		
1005786	6-Mar-25	CDW GOVERNMENT LLC	36,857.59		
1005787	6-Mar-25	CITY OF IRVINE	72.44		
1005788	6-Mar-25	COUNTY OF ORANGE SANITATION DISTRICT	1,826.00		
1005789	6-Mar-25	DAVID BALLASCH	1,254.30		
1005790	6-Mar-25	ELTA DENTAL OF CALIFORNIA			
1005791	6-Mar-25	ELTA DENTAL OF CALIFORNIA47EMARIA ELECTRIC MOTOR SERVICES, INC.33			
1005792	6-Mar-25	HS INTERNATIONAL, INC			
1005793	6-Mar-25	FARRELL PRINTING, INC.	198.75		
1005794	6-Mar-25	FIDELITY SECURITY LIFE INSURANCE COMPANY	8,287.52		
1005795	6-Mar-25	GANAHL LUMBER CO.	3,259.40		
1005796	6-Mar-25	GM SAGER CONSTRUCTION CO, INC.	99,800.00		
1005797	6-Mar-25	HANSON BRIDGETT LLP	768.00		
1005798	6-Mar-25	HDR ENGINEERING INC	7,530.00		
1005799	6-Mar-25	HILL BROTHERS CHEMICAL COMPANY 36,39			
1005800	6-Mar-25	KIMBALL MIDWEST 5,41			
1005801	6-Mar-25	KRONICK MOSKOVITZ TIEDEMANN & GIRARD 2,187			
1005802	6-Mar-25	LAGUNA BEACH COUNTY WATER DISTRICT 2,341.			
1005803	6-Mar-25	LANDCARE HOLDINGS, INC. 39,837.2			
1005804	6-Mar-25	LWP CLAIMS SOLUTIONS INC 2,333.0			
1005805	6-Mar-25	MERRIMAC PETROLEUM, INC. 29,755.3			
1005805	6-Mar-25				
1005807	6-Mar-25				
1005807	6-Mar-25	PACIFIC STAR CHEMICAL, LLC PAPER DEPOT DOCUMENT DESTRUCTION LLC	3,197.01 430.00		
1005809	6-Mar-25	PIPELOGIX INC	35,309.88		

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ELECTORIC #         PAYMENT DATE         SUPPLIE         PAYMENT AMOUNT           1005810         6-Mar-25         PMC-STS INC         5,701.00           1005812         6-Mar-25         PUE PROCESS FLITATION INC         4,975.05           1005813         6-Mar-25         PUE PROCESS FLITATION INC         4,975.05           1005814         6-Mar-25         RELANCE STANDARD LIFE INSURANCE INC         1,111.60           1005815         6-Mar-25         RELANCE STANDARD LIFE INSURANCE COMPANY         1,312.94           1005816         6-Mar-25         SIEMENS INDUSTRY, INC.         2,534.28           1005817         6-Mar-25         SIEMENS INDUSTRY, INC.         2,534.28           1005818         6-Mar-25         STANTEC CONSULTING SERVICES INC.         3,343.00           1005820         6-Mar-25         STANTEC CONSULTING SERVICES INC.         3,343.00           1005821         6-Mar-25         SWAINS ELECTRIC MOTOR SERVICES INC.         2,150.00           1005821         6-Mar-25         SWAINS ELECTRIC MOTOR SERVICES INC.         2,150.00           1005821         6-Mar-25         W.W. GRAINGER, INC.         2,150.00           1005821         6-Mar-25         ADARY SFL/COLINY SERVICES, INC.         1,360.00           1005843         13-Mar-25	CHECK OR					
1006811         6-Mar-25         PSOMAS         7,711.26           1005812         6-Mar-25         PRIJE PROCESS FILTRATION INC         4,976.80           1005814         6-Mar-25         RRAM AIR ENGINEERING INC         3,150.00           1005814         6-Mar-25         RELANCE STADDARD LIFE INSURANCE COMPANY         1,111.60           1005816         6-Mar-25         SES SEDS INC         20,499.28           1005817         6-Mar-25         SIM-FIND SECURITY CENTERS, INC.         285.00           1005818         6-Mar-25         SIM-TIFE NOLFIND SERVICE INC.         285.00           1005819         6-Mar-25         SIM-TIFE NOLFIND SERVICE INC.         285.00           1005820         6-Mar-25         STANTEC CONSULTING SERVICE INC.         285.00           1005821         6-Mar-25         STANTEC CONSULTING SERVICE INC.         215.00           1005822         6-Mar-25         W. W. GRINGER, INC.         215.00           1005843         13-Mar-25         ACOUSTANDARD, INC.         215.00           1005844         13-Mar-25         ACUSTANDARD, INC.         1,446.62           1005845         13-Mar-25         AMAZON CAPITAL SERVICES, INC.         1,446.62           1005844         13-Mar-25         AMAZON CAPITAL SERVICES, INC.		PAYMENT DATE	SUPPLIER	<b>PAYMENT AMOUNT</b>		
1005812         6-Mar-25         PURE PROCESS FILTRATION INC         4,978.05           1005813         6-Mar-25         REACH EMPLOYEE ASSISTANCE INC         1,111.60           1005815         6-Mar-25         RELAINCE STANDARD LIFE INSURANCE COMPANY         1,312.94           1005816         6-Mar-25         SIEMENS INDUSTRY, INC.         2,634.28           1005817         6-Mar-25         SIEMENS INDUSTRY, INC.         2,834.28           1005818         6-Mar-25         SIMMEN INDUSTRY, INC.         2,843.28           1005819         6-Mar-25         STANTEC CONSULTING SERVICES INC.         2,840.78           1005820         6-Mar-25         SWAINS ELECTRIC MOTOR SERVICE         15,340.78           1005821         6-Mar-25         SWAINS ELECTRIC MOTOR SERVICE INC.         2,977.38           1005820         6-Mar-25         ACCUSTANDARD, INC.         215.00           1005841         13-Mar-25         ACCUSTANDARD, INC.         216.00           1005841         13-Mar-25         ACCUSTANDARD, INC.         290.91           1005843         13-Mar-25         AUTOZON FARTINE, INC.         271.49           1005844         13-Mar-25         AUTOZON FARTINE, INC.         1,940.00           1005844         13-Mar-25         AUTOZON FORATION	1005810	6-Mar-25	PMC-STS INC	5,700.00		
1005813         6-Mar-25         RAM AIR ENGINEERING INC         3,150.00           1005814         6-Mar-25         REACH EMPLOYEE ASSISTANCE INC         1,111.60           1005816         6-Mar-25         RELANCE STANDARD LIFE INSURANCE COMPANY         1,312.94           1005816         6-Mar-25         SAS SEEDS INC         20,499.28           1005817         6-Mar-25         SOUTHERN CALIFORNIA SECURITY CENTERS, INC.         285.00           1005819         6-Mar-25         STANTEC CONSULTING SERVICES INC.         33,443.00           1005820         6-Mar-25         SWAINS ELECTRIC MOTOR SERVICE         15,340.78           1005821         6-Mar-25         W.W., GRAINGER, INC.         216.00           1005822         6-Mar-25         W.W., GRAINGER, INC.         216.00           1005823         6-Mar-25         ACCUSTANDARD, INC.         216.00           1005844         13-Mar-25         ADCUSTANDARD, INC.         216.00           1005844         13-Mar-25         ADCUSTANDARD, INC.         216.00           1005844         13-Mar-25         ADPLED ENGINEERING CONCEPTS         5,530.00           1005844         13-Mar-25         ADTOZ CORPORATION         968.76           1005845         13-Mar-25         CONCENTRALAS, INC.         3	1005811	6-Mar-25	PSOMAS	7,711.25		
1005814         6-Mar-25         REACH EMPLOYEE ASSISTANCE INC         1,111.60           1005815         6-Mar-25         RELIANCE STANDARD LIFE INSURANCE COMPANY         1,312.94           1005816         6-Mar-25         SISEMENS INC         20,499.28           1005817         6-Mar-25         SIEMENS INDUSTRY, INC.         25,342.28           1005818         6-Mar-25         SUITHERN CALIFORNIA SECURITY CENTERS, INC.         33,43.00           1005820         6-Mar-25         SWAINS ELECTRIC MOTOR SERVICES         33,43.00           1005821         6-Mar-25         SWAINS ELECTRIC MOTOR SERVICES INC.         3,787.38           1005821         6-Mar-25         W.W. GRAINGER, INC.         215.00           1005841         13-Mar-25         ADSOLUTE STANDARD, INC.         216.00           1005841         13-Mar-25         ADAVIS STANCER, INC.         1,448.62           1005843         13-Mar-25         ADAVIS CHORY CORPORATION         969.76           1005844         13-Mar-25         ADZIC TECHNOLOGY CORPORATION         969.76           1005844         13-Mar-25         ADZIC TECHNOLOGY CORPORATION         23.88.25           1005845         13-Mar-25         CALIFORNIA BARRICADE RENTALS, INC.         3.700.50           1005846         13-Mar-25	1005812	6-Mar-25	PURE PROCESS FILTRATION INC	4,978.05		
1005815         6-Mar-25         RELIANCE STANDARD LIFE INSURANCE COMPANY         1.312.94           1005816         6-Mar-25         S& SEEDS INC         20,499.28           1005817         6-Mar-25         SIEMENS INDUSTRY, INC.         2.534.28           1005818         6-Mar-25         SOUTHERN CALIFORNIA SECURTY CENTERS, INC.         33,943.00           1005820         6-Mar-25         SWINS ELECTRIC MOTOR SERVICE         15,340.78           1005821         6-Mar-25         W.W. GRAINGER, INC.         9,787.38           1005822         6-Mar-25         AASOLITE STANDARD, INC.         215.00           1005840         13-Mar-25         ACCUSTANDARD, INC.         290.91           1005841         13-Mar-25         ACCUSTANDARD, INC.         290.91           1005843         13-Mar-25         ADAYS FALCONRY SERVICE, LLC         1,800.00           1005844         13-Mar-25         ADAYS FALCONRY SERVICE, INC.         1,804.25           1005845         13-Mar-25         ADPLIED ENGINEERING CONCEPTS         5530.00           1005846         13-Mar-25         ADTEO TECTECHOLOGY CORPORATION         298.76           1005847         13-Mar-25         CALIFORINE BARRICADE RENTIALS, INC.         37.00.50           1005848         13-Mar-25         CALIF	1005813	6-Mar-25	RAM AIR ENGINEERING INC	3,150.00		
1005816         6-Mar-25         S&S SEEDS INC         20,499.28           1005817         6-Mar-25         SIEMENS INDUSTRY, INC.         2,534.28           1005818         6-Mar-25         SUTHEN CALIFORNIA SECURITY CENTERS, INC.         33,943.00           1005820         6-Mar-25         SWAINS ELECTIC MOTOR SERVICES INC.         33,943.00           1005821         6-Mar-25         WINS ELECTIC MOTOR SERVICE         15,340.78           1005822         6-Mar-25         WIN GRAINGER, INC.         215.00           1005839         13-Mar-25         ADAM'S FALCONRY SERVICE, LLC         1,800.00           1005841         13-Mar-25         ADAM'S FALCONRY SERVICE, ILC         1,800.00           1005843         13-Mar-25         ADAM'S FALCONRY SERVICE, ILC         1,800.00           1005844         13-Mar-25         ADATIC DENVICES, INC.         1,344.62           1005845         13-Mar-25         AUTOZONE PARTS, INC.         271.49           1005846         13-Mar-25         AUTOZONE PARTS, INC.         1,080.00           1005846         13-Mar-25         BIO-ACOUSTICAL ENGINEERING CORP         6,250.00           1005846         13-Mar-25         COUNCHALERERING CORP         2,508.25           1005847         13-Mar-25         CAURD BARICACOLERE	1005814	6-Mar-25	REACH EMPLOYEE ASSISTANCE INC	1,111.60		
1005817         6-Mar-25         SIEMENS INDUSTRY, INC.         2,534.28           1005818         6-Mar-25         SOUTHERN CALIFORNIA SECURITY CENTERS, INC.         285.00           1005820         6-Mar-25         SWAINS ELECTRIC MOTOR SERVICES INC.         33,443.00           1005821         6-Mar-25         SWAINS ELECTRIC MOTOR SERVICE         15,340.78           1005822         6-Mar-25         W.W. GRAINGER, INC.         9,787.38           1005840         13-Mar-25         AECUSTANDARD, INC.         290.91           1005841         13-Mar-25         AAMS FALCONRY SERVICE, LLC         1,800.00           1005842         13-Mar-25         AMARON CAPITAL SERVICES, INC.         1,348.62           1005843         13-Mar-25         AMARON CAPITAL SERVICES, INC.         1,348.62           1005844         13-Mar-25         AMTOZON CAPITAL SERVICES, INC.         201.41           1005845         13-Mar-25         AUTOZON PARTS, INC.         271.49           1005844         13-Mar-25         AUTOZON PORTON         969.76           1005845         13-Mar-25         AUTOZON PORTON         23.882.50           1005846         13-Mar-25         CAUFORNIA BARRICADE RENTALS, INC.         1.088.142           1005846         13-Mar-25         CANNON COPPOR	1005815	6-Mar-25	RELIANCE STANDARD LIFE INSURANCE COMPANY	1,312.94		
1005818         6-Mar-25         SOUTHERN CALIFORNIA SECURITY CENTERS, INC.         285.00           1005819         6-Mar-25         SYMINES CONSULTING SERVICES INC.         33.943.00           1005820         6-Mar-25         SWAINES ELECTRIC MOTOR SERVICE         15.3440.78           1005821         6-Mar-25         TETRA TECH, INC         51.100.00           1005822         6-Mar-25         W.W. GRAINGER, INC.         9.787.38           1005840         13-Mar-25         ASCULTE STANDARDS, INC.         290.91           1005841         13-Mar-25         ADAM'S FALCONRY SERVICE, LIC         1.800.00           1005842         13-Mar-25         AMZON CAPITAL SERVICES, INC.         1.348.62           1005843         13-Mar-25         AUTOZONE PARTS, INC.         271.49           1005844         13-Mar-25         AUTOZONE PARTS, INC.         1.080.00           1005845         13-Mar-25         AUTOZONE PARTS, INC.         1.080.00           1005846         13-Mar-25         AUTOZONE PARTS, INC.         1.080.00           1005847         13-Mar-25         BORC-ADD SURVEVING & MAPPING, INC.         1.080.02           1005848         13-Mar-25         CALIFORNIA BARRICADE RENTALS, INC.         3.700.50           1005856         13-Mar-25         CAN	1005816	6-Mar-25	S&S SEEDS INC	20,499.28		
1005819         6-Mar-25         STANTEC CONSULTING SERVICES INC.         33,943.00           1005820         6-Mar-25         SWAINS ELECTRIC MOTOR SERVICE         15,340.78           1005821         6-Mar-25         TETRA TECH, INC         9,787.38           1005839         13-Mar-25         ABSOLUTE STANDARDS, INC.         215.00           1005840         13-Mar-25         ADCUSTANDARDS, INC.         290.91           1005841         13-Mar-25         ADAVIS SEL/CONKY SERVICE, LLC         1,800.00           1005842         13-Mar-25         ADAVIS SEL/CONKY SERVICE, LLC         1,800.00           1005843         13-Mar-25         ADAVID REINIG CONCEPTS         5,530.00           1005844         13-Mar-25         ADICOUSTICAL ENGINEERING CONCEPTS         5,630.00           1005844         13-Mar-25         BIO-ACOUSTICAL ENGINEERING CORP         6,250.00           1005845         13-Mar-25         BIO-ACOUSTICAL ENGINEERING CORP         6,250.00           1005844         13-Mar-25         CALIFORNIA BARRICADE RENTALS, INC.         10,881.02           1005845         13-Mar-25         CALIFORNIA BARRICADE RENTALS, INC.         10,870.00           1005846         13-Mar-25         COLOUSTICAL ENGINEERIN, INC.         10,870.00           1005857	1005817	6-Mar-25	SIEMENS INDUSTRY, INC.	2,534.28		
1005820         6-Mar-25         SWAINS ELECTRIC MOTOR SERVICE         15,340.78           1005821         6-Mar-25         TETRA TECH, INC         51,100.00           1005822         6-Mar-25         W.W. GRAINGER, INC.         9,787.38           1005839         13-Mar-25         ABSOLUTE STANDARDS, INC.         215.00           1005840         13-Mar-25         ACCUSTANDARD, INC.         290.91           1005841         13-Mar-25         AACCUSTANDARD, INC.         290.91           1005843         13-Mar-25         ANAYO CAPITAL SERVICES, INC.         13.446.62           1005844         13-Mar-25         ANZO CON CAPITAL SERVICES, INC.         13.446.62           1005845         13-Mar-25         AUTOZONE PARTS, INC.         271.49           1005846         13-Mar-25         BORCHARD SURVICES, INC.         10.881.42           1005847         13-Mar-25         BORCHARD SURVEYING & MAPPING, INC.         10.881.42           1005848         13-Mar-25         CALIFONIA BARRICADE RENTALS, INC.         3.700.50           1005850         13-Mar-25         CANDON CORPORATION         25.388.25           1005851         13-Mar-25         COLOD ENGINEERS, INC.         10.970.00           1005855         13-Mar-25         COLONIAL LIFE & ACCIDENT INSURAN	1005818	6-Mar-25	SOUTHERN CALIFORNIA SECURITY CENTERS, INC.	285.00		
1005821         6-Mar-25         TETRA TECH, INC         51,100.00           1005822         6-Mar-25         W. W. GRAINGER, INC.         9,787.38           1005839         13-Mar-25         ABSOLUTE STANDARDS, INC.         2015.00           1005841         13-Mar-25         ACCUSTANDARD, INC.         209.91           1005842         13-Mar-25         ADAM'S FALCONRY SERVICE, LLC         1,800.00           1005842         13-Mar-25         AMAZON CAPITAL SERVICES, INC.         1,348.62           1005843         13-Mar-25         AUTOZONE PARTS, INC.         271.49           1005844         13-Mar-25         AUTOZONE PARTS, INC.         1,080.00           1005845         13-Mar-25         BORCHARD SURVEYING GORP         6,250.00           1005846         13-Mar-25         BORCHARD SURVEYING GORP         1,080.00           1005847         13-Mar-25         CALISON CORPORATION         25,388.25           1005849         13-Mar-25         CANDIN CORPORATION         25,388.25           1005851         13-Mar-25         CANDIN CORPORATION         25,388.25           1005851         13-Mar-25         CANDIN CORPORATION         25,388.25           1005851         13-Mar-25         CONDINIA LIFE & ACCIDENT INSURANCE CO.         370.32	1005819	6-Mar-25	STANTEC CONSULTING SERVICES INC.	33,943.00		
1005822         6-Mar-25         W. W. GRAINGER, INC.         9,787.38           1005839         13-Mar-25         ABSOLUTE STANDARDS, INC.         215.00           1005840         13-Mar-25         ACCUSTANDARD, INC.         290.91           1005841         13-Mar-25         ACMAYS SERVICE, LLC         1,800.00           1005842         13-Mar-25         APPLIED ENGINEERING CONCEPTS         5,530.00           1005843         13-Mar-25         APPLIED ENGINEERING CONCEPTS         5,530.00           1005844         13-Mar-25         AUTOZONE PARTS, INC.         271.49           1005845         13-Mar-25         BOR-COUSTICAL ENGINEERING CORP         6,250.00           1005846         13-Mar-25         BORCHARD SURVEYING & MAPPING, INC.         10,881.42           1005847         13-Mar-25         COLEIS PIPELINE MATERIALS, INC.         3,700.50           1005848         13-Mar-25         CALIFORNIA BARRICADE RENTALS, INC.         3,700.50           1005850         13-Mar-25         COLEIS PIPELINE RACIENT MARCE CO.         3703.22           1005851         13-Mar-25         COLONTAL LIFE & ACCIDENT INSURANCE CO.         3703.22           1005855         13-Mar-25         COUNTY OF ORANGE SANITATION DISTRICT         11,350.38           1005856         13	1005820	6-Mar-25	SWAINS ELECTRIC MOTOR SERVICE	15,340.78		
1005839         13-Mar-25         ABSOLUTE STANDARD, INC.         215.00           1005840         13-Mar-25         ACCUSTANDARD, INC.         290.91           1005841         13-Mar-25         ADAM'S FALCONRY SERVICE, LLC         1,800.00           1005842         13-Mar-25         ADAO'S FALCONRY SERVICE, ILC         1,348.62           1005843         13-Mar-25         APPLIED ENGINEERING CONCEPTS         5,530.00           1005844         13-Mar-25         AUTOZONE PARTS, INC.         271.49           1005845         13-Mar-25         BOC-ACOUSTICAL ENGINEERING CORP         6,250.00           1005846         13-Mar-25         BOC-ACOUSTICAL ENGINEERING CORP         6,250.00           1005846         13-Mar-25         BOC-CAUSTICAL ENGINEERING, INC.         1,080.00           1005847         13-Mar-25         CAULIS PIPELINE MATERIALS, INC         10,881.42           1005848         13-Mar-25         CANON CORPORATION         25,388.25           1005850         13-Mar-25         CALOLD ENGINEERS, INC         10,970.00           1005854         13-Mar-25         COLONIAL LIFE & ACCIDENT INSURANCE CO.         370.32           1005855         13-Mar-25         CONSERV CONSTRUCTION INC.         6,697.50           1005856         13-Mar-25         <	1005821	6-Mar-25	TETRA TECH, INC	51,100.00		
1005840         13-Mar-25         ACCUSTANDARD, INC.         290.91           1005841         13-Mar-25         ADAM'S FALCONRY SERVICE, LLC         1,800.00           1005842         13-Mar-25         AMAZON CAPITAL SERVICES, INC.         1,348.62           1005843         13-Mar-25         APPLIED ENGINEERING CONCEPTS         5,530.00           1005844         13-Mar-25         AUTOZONE PARTS, INC.         271.49           1005845         13-Mar-25         BIO-ACOUSTICAL ENGINEERING CORP         6,250.00           1005846         13-Mar-25         BIO-ACOUSTICAL ENGINEERING CORP         6,250.00           1005847         13-Mar-25         BIO-ACOUSTICAL ENGINEERING CORP         6,250.00           1005847         13-Mar-25         CWELLS PIPELINE MATERIALS, INC.         3,700.50           1005848         13-Mar-25         CALIFORNIA BARRICADE RENTALS, INC.         3,700.50           1005850         13-Mar-25         CANON O CORPORATION         25,388.25           1005851         13-Mar-25         CANON O CORPORATION         25,388.25           1005852         13-Mar-25         CONSERV CONSTRUCTION INC.         6,697.50           1005854         13-Mar-25         COUNTY OF ORANGE SANITATION DISTRICT         1,360.38           1005855         13-Mar-25<	1005822	6-Mar-25	W. W. GRAINGER, INC.	9,787.38		
1005841         13-Mar-25         ADAM'S FALCONRY SERVICE, LLC         1,800.00           1005842         13-Mar-25         AMAZON CAPITAL SERVICES, INC.         1,348.62           1005843         13-Mar-25         APPLIED ENGINEERING CONCEPTS         5,530.00           1005844         13-Mar-25         AUTOZONE PARTS, INC.         271.49           1005845         13-Mar-25         AUTEC TECHNOLOGY CORPORATION         969.76           1005846         13-Mar-25         BIO-ACOUSTICAL ENGINEERING CORP         6,250.00           1005847         13-Mar-25         BORCHARD SURVEYING & MAPPING, INC.         1,080.00           1005848         13-Mar-25         CALIFORNIA BARRICADE RENTALS, INC.         3,700.50           1005850         13-Mar-25         CALIFORNIA BARRICADE RENTALS, INC.         3,700.50           1005851         13-Mar-25         CANON CORPORATION INC.         6,697.50           1005853         13-Mar-25         COONSERV CONSTRUCTION INC.         6,697.50           1005854         13-Mar-25         COUNIX LIFE & ACCIDENT INSURANCE CO.         370.32           1005855         13-Mar-25         DONS REV/CONSTRUCTION INC.         6,697.50           1005856         13-Mar-25         DOUNS ALLASCH         1,484.95           1005856         13-Ma	1005839	13-Mar-25	ABSOLUTE STANDARDS, INC.	215.00		
1005842         13.Mar-25         AMAZON CAPITAL SERVICES, INC.         1,348.62           1005843         13.Mar-25         APPLIED ENGINEERING CONCEPTS         5,530.00           1005844         13.Mar-25         AUTOZONE PARTS, INC.         271.49           1005845         13.Mar-25         AUTEC TECHNOLOGY CORPORATION         969.76           1005846         13.Mar-25         BIO-ACOUSTICAL ENGINEERING CORP         6,250.00           1005847         13.Mar-25         BORCHARD SURVEYING & MAPPING, INC.         1,080.00           1005848         13.Mar-25         CALIFORNIA BARRICADE RENTALS, INC.         10,081.42           1005849         13.Mar-25         CALIFORNIA BARRICADE RENTALS, INC.         3,700.50           1005850         13.Mar-25         CALIO ENGINEERS, INC         10,970.00           1005851         13.Mar-25         COLONIAL LIFE & ACCIDENT INSURANCE CO.         370.32           1005853         13.Mar-25         COUDNIAL LIFE & ACCIDENT INSURANCE CO.         370.32           1005854         13.Mar-25         COUNTY OF ORANGE SANITATION DISTRICT         11,350.38           1005855         13.Mar-25         DOUSERV CONSTRUCTION INC.         44,950.00           1005856         13.Mar-25         DOUNT OF ORANGE SANITATION DISTRICT         11,350.38 <tr< td=""><td>1005840</td><td>13-Mar-25</td><td>ACCUSTANDARD, INC.</td><td>290.91</td></tr<>	1005840	13-Mar-25	ACCUSTANDARD, INC.	290.91		
1005843         13-Mar-25         APPLIED ENGINEERING CONCEPTS         5,530.00           1005844         13-Mar-25         AUTOZONE PARTS, INC.         271.49           1005845         13-Mar-25         AZTEC TECHNOLOGY CORPORATION         969.76           1005846         13-Mar-25         BIO-ACOUSTICAL ENGINEERING CORP         6,250.00           1005847         13-Mar-25         BIO-ACOUSTICAL ENGINEERING CORP         1,080.00           1005848         13-Mar-25         CORCHARD SURVEYING & MAPPING, INC.         10,881.42           1005849         13-Mar-25         CALIFORNIA BARRICADE RENTALS, INC.         3,700.50           1005850         13-Mar-25         CANNON CORPORATION         25,388.25           1005851         13-Mar-25         COLONIAL LIFE & ACCIDENT INSURANCE CO.         370.32           1005853         13-Mar-25         COLONIAL LIFE & ACCIDENT INSURANCE CO.         370.32           1005854         13-Mar-25         COUNTY OF ORANGE SANITATION DISTRICT         11,350.38           1005855         13-Mar-25         DOSERV CONSTRUCTION INC.         44,950.00           1005856         13-Mar-25         DOSERV CONTROL SERVICES         5,850.00           1005857         13-Mar-25         DARK TRAFFIC CONTROL SERVICES         5,850.00           10058	1005841	13-Mar-25	ADAM'S FALCONRY SERVICE, LLC	1,800.00		
1005844       13-Mar-25       AUTOZONE PARTS, INC.       271.49         1005845       13-Mar-25       AZTEC TECHNOLOGY CORPORATION       969.76         1005846       13-Mar-25       BIO-ACOUSTICAL ENGINEERING CORP       6,250.00         1005847       13-Mar-25       BORCHARD SURVEYING & MAPPING, INC.       1,080.00         1005848       13-Mar-25       CALLFORNIA BARRICADE RENTALS, INC.       10,881.42         1005849       13-Mar-25       CALLFORNIA BARRICADE RENTALS, INC.       3,700.50         1005850       13-Mar-25       CANON CORPORATION       25,388.25         1005851       13-Mar-25       COLONIAL LIFE & ACCIDENT INSURANCE CO.       370.32         1005852       13-Mar-25       COLONIAL LIFE & ACCIDENT INSURANCE CO.       370.32         1005853       13-Mar-25       COUNTY OF ORANGE SANITATION DISTRICT       11,350.38         1005855       13-Mar-25       COUNTY OF ORANGE SANITATION DISTRICT       11,350.38         1005856       13-Mar-25       DONTY OF ORANGE SANITATION DISTRICT       11,350.38         1005857       13-Mar-25       DONTY OF ORANGE SANITATION DISTRICT       11,484.95         1005858       13-Mar-25       DAVID BALLASCH       14,484.00         1005858       13-Mar-25       DAVID RAINEERING AND CONTRACTING, INC. </td <td>1005842</td> <td>13-Mar-25</td> <td>AMAZON CAPITAL SERVICES, INC.</td> <td>1,348.62</td>	1005842	13-Mar-25	AMAZON CAPITAL SERVICES, INC.	1,348.62		
1005845         13-Mar-25         AZTEC TECHNOLOGY CORPORATION         969.76           1005846         13-Mar-25         BIO-ACOUSTICAL ENGINEERING CORP         6,250.00           1005847         13-Mar-25         BORCHARD SURVEYING & MAPPING, INC.         1,080.00           1005848         13-Mar-25         CWELLS PIPELINE MATERIALS, INC.         10,881.42           1005849         13-Mar-25         CALIFORNIA BARRICADE RENTALS, INC.         3,700.50           1005850         13-Mar-25         CANNON CORPORATION         25,388.25           1005851         13-Mar-25         COLONIAL LIFE & ACCIDENT INSURANCE CO.         370.32           1005853         13-Mar-25         COUNSTRUCTION INC.         6,697.50           1005854         13-Mar-25         COUNTY OF ORANGE SANITATION DISTRICT         11,350.38           1005855         13-Mar-25         COUNTY OF ORANGE SANITATION DISTRICT         11,484.95           1005856         13-Mar-25         DOSTRIC CONTROL SERVICES         5,850.00           1005858         13-Mar-25         DESE, INC.         41,4804.00           1005856         13-Mar-25         DRAKE TRAFFIC CONTROL SERVICES         5,850.00           1005861         13-Mar-25         FAINELL PINITING, INC.         119,940.00           1005861	1005843	13-Mar-25	APPLIED ENGINEERING CONCEPTS	5,530.00		
1005846         13-Mar-25         BIO-ACOUSTICAL ENGINEERING CORP         6,250.00           1005847         13-Mar-25         BORCHARD SURVEYING & MAPPING, INC.         1,080.00           1005848         13-Mar-25         C WELLS PIPELINE MATERIALS, INC         10,881.42           1005849         13-Mar-25         CALIFORNIA BARRICADE RENTALS, INC.         3,700.50           1005850         13-Mar-25         CANNON CORPORATION         25,388.25           1005851         13-Mar-25         CANNON CORPORATION         25,388.25           1005852         13-Mar-25         COLONIAL LIFE & ACCIDENT INSURANCE CO.         370.32           1005853         13-Mar-25         CONSERV CONSTRUCTION INC.         6,697.50           1005854         13-Mar-25         COUNTY OF ORANGE SANITATION DISTRICT         11,350.38           1005855         13-Mar-25         COUNTY OF ORANGE SANITATION DISTRICT         14,844.95           1005856         13-Mar-25         DAVID BALLASCH         44,845.00           1005857         13-Mar-25         DESE, INC.         41,804.00           1005858         13-Mar-25         DESE, INC.         40,455.00           1005858         13-Mar-25         ENVIRONMENTAL ENGINEERING AND CONTRACTING, INC.         19,940.00           1005861 <td< td=""><td>1005844</td><td>13-Mar-25</td><td>AUTOZONE PARTS, INC.</td><td>271.49</td></td<>	1005844	13-Mar-25	AUTOZONE PARTS, INC.	271.49		
1005847         13-Mar-25         BORCHARD SURVEYING & MAPPING, INC.         1,080.00           1005848         13-Mar-25         C WELLS PIPELINE MATERIALS, INC         10,881.42           1005849         13-Mar-25         CALIFORNIA BARRICADE RENTALS, INC.         3,700.50           1005850         13-Mar-25         CALIFORNIA BARRICADE RENTALS, INC.         3,700.50           1005850         13-Mar-25         CANON CORPORATION         25,388.25           1005851         13-Mar-25         COLONIAL LIFE & ACCIDENT INSURANCE CO.         370.32           1005853         13-Mar-25         COLONIAL LIFE & ACCIDENT INSURANCE CO.         370.32           1005854         13-Mar-25         COLONSTRUCTION INC.         6,697.50           1005855         13-Mar-25         COUNST SERVICE GROUP         44,950.00           1005856         13-Mar-25         DOUTY OF ORANGE SANITATION DISTRICT         11,350.38           1005856         13-Mar-25         DOUTY OF ORANGE SERVICES         5,850.00           1005857         13-Mar-25         DOXEN INC.         40,455.00           1005858         13-Mar-25         ENVIRONMENTAL ENGINEERING AND CONTRACTING, INC.         19,940.00           1005858         13-Mar-25         FORLINTING, INC.         111.63           1005861	1005845	13-Mar-25	AZTEC TECHNOLOGY CORPORATION	969.76		
1005848       13-Mar-25       C WELLS PIPELINE MATERIALS, INC       10,881.42         1005849       13-Mar-25       CALIFORNIA BARRICADE RENTALS, INC.       3,700.50         1005850       13-Mar-25       CANNON CORPORATION       25,388.25         1005851       13-Mar-25       CAROLLO ENGINEERS, INC       10,970.00         1005852       13-Mar-25       COLONIAL LIFE & ACCIDENT INSURANCE CO.       370.32         1005853       13-Mar-25       CONSERV CONSTRUCTION INC.       6,697.50         1005854       13-Mar-25       COUNTS OF ORANGE SANITATION DISTRICT       11,350.38         1005855       13-Mar-25       COUNTY OF ORANGE SANITATION DISTRICT       11,484.95         1005856       13-Mar-25       DAVID BALLASCH       14,84.00         1005857       13-Mar-25       DESE, INC.       41,804.00         1005858       13-Mar-25       DESE, INC.       19,940.00         1005859       13-Mar-25       ENVIRONMENTAL ENGINEERING AND CONTRACTING, INC.       19,940.00         1005860       13-Mar-25       FARRELL PRINTING, INC.       111.63         1005861       13-Mar-25       FARRELL PRINTING, INC.       111.63         1005862       13-Mar-25       GANAHL LUMBER CO.       180.75         1005863       13-Ma	1005846	13-Mar-25	BIO-ACOUSTICAL ENGINEERING CORP	6,250.00		
1005849       13-Mar-25       CALIFORNIA BARRICADE RENTALS, INC.       3,700.50         1005850       13-Mar-25       CANNON CORPORATION       25,388.25         1005851       13-Mar-25       CAROLLO ENGINEERS, INC       10,970.00         1005852       13-Mar-25       COLONIAL LIFE & ACCIDENT INSURANCE CO.       370.32         1005853       13-Mar-25       CONSERV CONSTRUCTION INC.       6,697.50         1005854       13-Mar-25       COUNTY OF ORANGE SANITATION DISTRICT       11,350.38         1005855       13-Mar-25       COUNTY OF ORANGE SANITATION DISTRICT       11,484.95         1005856       13-Mar-25       DAVID BALLASCH       44,840.00         1005857       13-Mar-25       DAVID BALLASCH       1,484.95         1005858       13-Mar-25       DAKE TRAFFIC CONTROL SERVICES       5,850.00         1005858       13-Mar-25       DRAKE TRAFFIC CONTROL SERVICES       5,850.00         1005860       13-Mar-25       ENVIRONMENTAL ENGINEERING AND CONTRACTING, INC.       19,940.00         1005861       13-Mar-25       FARRELL PRINTING, INC.       111.63         1005862       13-Mar-25       FARRELL PRINTING, INC.       111.63         1005863       13-Mar-25       GOLONSTRUCTION, INC.       97,850.00         10	1005847	13-Mar-25	BORCHARD SURVEYING & MAPPING, INC.	1,080.00		
1005850       13-Mar-25       CANNON CORPORATION       25,388.25         1005851       13-Mar-25       CAROLLO ENGINEERS, INC       10,970.00         1005852       13-Mar-25       COLONIAL LIFE & ACCIDENT INSURANCE CO.       370.32         1005853       13-Mar-25       COLONIAL LIFE & ACCIDENT INSURANCE CO.       6,697.50         1005854       13-Mar-25       COOMBS SERVICE GROUP       44,950.00         1005855       13-Mar-25       COUNTY OF ORANGE SANITATION DISTRICT       11,360.38         1005856       13-Mar-25       DAVID BALLASCH       1,484.95         1005857       13-Mar-25       DCSE, INC.       41,804.00         1005858       13-Mar-25       DCSE, INC.       41,804.00         1005858       13-Mar-25       DCSE, INC.       19,940.00         1005859       13-Mar-25       ENVIRONMENTAL ENGINEERING AND CONTRACTING, INC.       19,940.00         1005860       13-Mar-25       EXINE, INC.       40,455.00         1005861       13-Mar-25       EXINE, INC.       40,455.00         1005861       13-Mar-25       FARELL PRINTING, INC.       111.63         1005861       13-Mar-25       GANAHL LUMBER CO.       180.75         1005864       13-Mar-25       GCI CONSTRUCTION, INC.       <	1005848	13-Mar-25	C WELLS PIPELINE MATERIALS, INC	10,881.42		
1005851       13-Mar-25       CAROLLO ENGINEERS, INC       10,970.00         1005852       13-Mar-25       COLONIAL LIFE & ACCIDENT INSURANCE CO.       370.32         1005853       13-Mar-25       CONSERV CONSTRUCTION INC.       6,697.50         1005854       13-Mar-25       COOMBS SERVICE GROUP       44,950.00         1005855       13-Mar-25       COUNTY OF ORANGE SANITATION DISTRICT       11,350.38         1005856       13-Mar-25       DOUNTY OF ORANGE SANITATION DISTRICT       14,84.95         1005856       13-Mar-25       DAVID BALLASCH       41,804.00         1005857       13-Mar-25       DCSE, INC.       41,804.00         1005858       13-Mar-25       DRAKE TRAFFIC CONTROL SERVICES       5,850.00         1005859       13-Mar-25       ENVIRONMENTAL ENGINEERING AND CONTRACTING, INC.       19,940.00         1005860       13-Mar-25       EXLINE, INC.       40,455.00         1005861       13-Mar-25       FARRELL PRINTING, INC.       111.63         1005862       13-Mar-25       FARRELL PRINTING, INC.       180.75         1005863       13-Mar-25       GCI CONSTRUCTION, INC.       97,850.00         1005864       13-Mar-25       GCI CONSTRUCTION CO, INC.       61,500.00         1005865       13-	1005849	13-Mar-25	CALIFORNIA BARRICADE RENTALS, INC.	3,700.50		
1005852       13-Mar-25       COLONIAL LIFE & ACCIDENT INSURANCE CO.       370.32         1005853       13-Mar-25       CONSERV CONSTRUCTION INC.       6,697.50         1005854       13-Mar-25       COOMBS SERVICE GROUP       44,950.00         1005855       13-Mar-25       COUNTY OF ORANGE SANITATION DISTRICT       11,350.38         1005856       13-Mar-25       DAVID BALLASCH       1,484.95         1005857       13-Mar-25       DCSE, INC.       41,804.00         1005858       13-Mar-25       DRAKE TRAFFIC CONTROL SERVICES       5,850.00         1005859       13-Mar-25       ENVIRONMENTAL ENGINEERING AND CONTRACTING, INC.       19,940.00         1005860       13-Mar-25       EXLINE, INC.       40,455.00         1005861       13-Mar-25       FARRELL PRINTING, INC.       111.63         1005862       13-Mar-25       FIDELITY SECURITY LIFE INSURANCE COMPANY       8,361.96         1005863       13-Mar-25       GCI CONSTRUCTION, INC.       97,850.00         1005864       13-Mar-25       GOFORTH & MARTI       2,003.09         1005866       13-Mar-25       GOFORTH & MARTI       2,003.09         1005867       13-Mar-25       GRISWOLD INDUSTRIES       7,675.06         1005868       13-Mar-25	1005850	13-Mar-25	CANNON CORPORATION			
1005853       13-Mar-25       CONSERV CONSTRUCTION INC.       6,697.50         1005854       13-Mar-25       COOMBS SERVICE GROUP       44,950.00         1005855       13-Mar-25       COUNTY OF ORANGE SANITATION DISTRICT       11,350.38         1005856       13-Mar-25       DAVID BALLASCH       1,484.95         1005857       13-Mar-25       DCSE, INC.       41,804.00         1005858       13-Mar-25       DRAKE TRAFFIC CONTROL SERVICES       5,850.00         1005859       13-Mar-25       ENVIRONMENTAL ENGINEERING AND CONTRACTING, INC.       19,940.00         1005860       13-Mar-25       EXLINE, INC.       40,455.00         1005861       13-Mar-25       FARRELL PRINTING, INC.       111.63         1005862       13-Mar-25       FIDELITY SECURITY LIFE INSURANCE COMPANY       8,361.96         1005863       13-Mar-25       GOL CONSTRUCTION, INC.       97,850.00         1005864       13-Mar-25       GOL CONSTRUCTION CO, INC.       61,500.00         1005865       13-Mar-25       GOFORTH & MARTI       2,003.09         1005866       13-Mar-25       GRISWOLD INDUSTRIES       7,675.06         1005868       13-Mar-25       HAAKER EQUIPMENT COMPANY       701.33	1005851	13-Mar-25	AROLLO ENGINEERS, INC 10,9			
1005854       13-Mar-25       COOMBS SERVICE GROUP       44,950.00         1005855       13-Mar-25       COUNTY OF ORANGE SANITATION DISTRICT       11,350.38         1005856       13-Mar-25       DAVID BALLASCH       1,484.95         1005857       13-Mar-25       DCSE, INC.       41,804.00         1005858       13-Mar-25       DRAKE TRAFFIC CONTROL SERVICES       5,850.00         1005859       13-Mar-25       ENVIRONMENTAL ENGINEERING AND CONTRACTING, INC.       19,940.00         1005860       13-Mar-25       EXLINE, INC.       40,455.00         1005861       13-Mar-25       FARRELL PRINTING, INC.       111.63         1005862       13-Mar-25       FIDELITY SECURITY LIFE INSURANCE COMPANY       8,361.96         1005863       13-Mar-25       GOL CONSTRUCTION, INC.       97,850.00         1005864       13-Mar-25       GOL CONSTRUCTION CO, INC.       61,500.00         1005865       13-Mar-25       GOFORTH & MARTI       2,003.09         1005866       13-Mar-25       GOFORTH & MARTI       2,003.09         1005867       13-Mar-25       GRISWOLD INDUSTRIES       7,675.06         1005868       13-Mar-25       HAKER EQUIPMENT COMPANY       701.33	1005852	13-Mar-25	OLONIAL LIFE & ACCIDENT INSURANCE CO.			
1005855       13-Mar-25       COUNTY OF ORANGE SANITATION DISTRICT       11,350.38         1005856       13-Mar-25       DAVID BALLASCH       1,484.95         1005857       13-Mar-25       DCSE, INC.       41,804.00         1005858       13-Mar-25       DRAKE TRAFFIC CONTROL SERVICES       5,850.00         1005859       13-Mar-25       ENVIRONMENTAL ENGINEERING AND CONTRACTING, INC.       19,940.00         1005860       13-Mar-25       EXLINE, INC.       40,455.00         1005861       13-Mar-25       FARRELL PRINTING, INC.       111.63         1005862       13-Mar-25       FIDELITY SECURITY LIFE INSURANCE COMPANY       8,361.96         1005863       13-Mar-25       GOL CONSTRUCTION, INC.       97,850.00         1005864       13-Mar-25       GOL CONSTRUCTION, INC.       97,850.00         1005865       13-Mar-25       GOL CONSTRUCTION CO, INC.       61,500.00         1005866       13-Mar-25       GOL CONSTRUCTION CO, INC.       61,500.00         1005866 <t< td=""><td>1005853</td><td>13-Mar-25</td><td colspan="4">ONSERV CONSTRUCTION INC. 6</td></t<>	1005853	13-Mar-25	ONSERV CONSTRUCTION INC. 6			
1005856       13-Mar-25       DAVID BALLASCH       1,484.95         1005857       13-Mar-25       DCSE, INC.       41,804.00         1005858       13-Mar-25       DRAKE TRAFFIC CONTROL SERVICES       5,850.00         1005859       13-Mar-25       ENVIRONMENTAL ENGINEERING AND CONTRACTING, INC.       19,940.00         1005860       13-Mar-25       EXLINE, INC.       40,455.00         1005861       13-Mar-25       FARRELL PRINTING, INC.       111.63         1005862       13-Mar-25       FIDELITY SECURITY LIFE INSURANCE COMPANY       8,361.96         1005863       13-Mar-25       GOI CONSTRUCTION, INC.       97,850.00         1005865       13-Mar-25       GCI CONSTRUCTION CO, INC.       61,500.00         1005866       13-Mar-25       GOFORTH & MARTI       2,003.09         1005867       13-Mar-25       GRISWOLD INDUSTRIES       7,675.06         1005868       13-Mar-25       HAAKER EQUIPMENT COMPANY       701.33	1005854	13-Mar-25	COOMBS SERVICE GROUP	44,950.00		
100585713-Mar-25DCSE, INC.41,804.00100585813-Mar-25DRAKE TRAFFIC CONTROL SERVICES5,850.00100585913-Mar-25ENVIRONMENTAL ENGINEERING AND CONTRACTING, INC.19,940.00100586013-Mar-25EXLINE, INC.40,455.00100586113-Mar-25FARRELL PRINTING, INC.111.63100586213-Mar-25FIDELITY SECURITY LIFE INSURANCE COMPANY8,361.96100586313-Mar-25GANAHL LUMBER CO.180.75100586413-Mar-25GCI CONSTRUCTION, INC.97,850.00100586513-Mar-25GOFORTH & MARTI2,003.09100586713-Mar-25GRISWOLD INDUSTRIES7,675.06100586813-Mar-25HAAKER EQUIPMENT COMPANY701.33	1005855	13-Mar-25	COUNTY OF ORANGE SANITATION DISTRICT	11,350.38		
1005858       13-Mar-25       DRAKE TRAFFIC CONTROL SERVICES       5,850.00         1005859       13-Mar-25       ENVIRONMENTAL ENGINEERING AND CONTRACTING, INC.       19,940.00         1005860       13-Mar-25       EXLINE, INC.       40,455.00         1005861       13-Mar-25       FARRELL PRINTING, INC.       111.63         1005862       13-Mar-25       FARRELL PRINTING, INC.       111.63         1005863       13-Mar-25       FIDELITY SECURITY LIFE INSURANCE COMPANY       8,361.96         1005863       13-Mar-25       GANAHL LUMBER CO.       180.75         1005864       13-Mar-25       GCI CONSTRUCTION, INC.       97,850.00         1005865       13-Mar-25       GOFORTH & MARTI       2,003.09         1005866       13-Mar-25       GOFORTH & MARTI       2,003.09         1005867       13-Mar-25       GRISWOLD INDUSTRIES       7,675.06         1005868       13-Mar-25       HAAKER EQUIPMENT COMPANY       701.33	1005856	13-Mar-25	DAVID BALLASCH	1,484.95		
1005859       13-Mar-25       ENVIRONMENTAL ENGINEERING AND CONTRACTING, INC.       19,940.00         1005860       13-Mar-25       EXLINE, INC.       40,455.00         1005861       13-Mar-25       FARRELL PRINTING, INC.       111.63         1005862       13-Mar-25       FIDELITY SECURITY LIFE INSURANCE COMPANY       8,361.96         1005863       13-Mar-25       GANAHL LUMBER CO.       180.75         1005864       13-Mar-25       GCI CONSTRUCTION, INC.       97,850.00         1005865       13-Mar-25       GOFORTH & MARTI       2,003.09         1005866       13-Mar-25       GOFORTH & MARTI       2,003.09         1005867       13-Mar-25       GRISWOLD INDUSTRIES       7,675.06         1005868       13-Mar-25       HAAKER EQUIPMENT COMPANY       701.33	1005857	13-Mar-25	DCSE, INC.	41,804.00		
100586013-Mar-25EXLINE, INC.40,455.00100586113-Mar-25FARRELL PRINTING, INC.111.63100586213-Mar-25FIDELITY SECURITY LIFE INSURANCE COMPANY8,361.96100586313-Mar-25GANAHL LUMBER CO.180.75100586413-Mar-25GCI CONSTRUCTION, INC.97,850.00100586513-Mar-25GM SAGER CONSTRUCTION CO, INC.61,500.00100586613-Mar-25GOFORTH & MARTI2,003.09100586713-Mar-25GRISWOLD INDUSTRIES7,675.06100586813-Mar-25HAAKER EQUIPMENT COMPANY701.33	1005858	13-Mar-25	DRAKE TRAFFIC CONTROL SERVICES	5,850.00		
100586113-Mar-25FARRELL PRINTING, INC.111.63100586213-Mar-25FIDELITY SECURITY LIFE INSURANCE COMPANY8,361.96100586313-Mar-25GANAHL LUMBER CO.180.75100586413-Mar-25GCI CONSTRUCTION, INC.97,850.00100586513-Mar-25GM SAGER CONSTRUCTION CO, INC.61,500.00100586613-Mar-25GOFORTH & MARTI2,003.09100586713-Mar-25GRISWOLD INDUSTRIES7,675.06100586813-Mar-25HAAKER EQUIPMENT COMPANY701.33	1005859	13-Mar-25	ENVIRONMENTAL ENGINEERING AND CONTRACTING, INC.	19,940.00		
1005862       13-Mar-25       FIDELITY SECURITY LIFE INSURANCE COMPANY       8,361.96         1005863       13-Mar-25       GANAHL LUMBER CO.       180.75         1005864       13-Mar-25       GCI CONSTRUCTION, INC.       97,850.00         1005865       13-Mar-25       GM SAGER CONSTRUCTION CO, INC.       61,500.00         1005866       13-Mar-25       GOFORTH & MARTI       2,003.09         1005867       13-Mar-25       GRISWOLD INDUSTRIES       7,675.06         1005868       13-Mar-25       HAAKER EQUIPMENT COMPANY       701.33	1005860	13-Mar-25	EXLINE, INC.	40,455.00		
1005863       13-Mar-25       GANAHL LUMBER CO.       180.75         1005864       13-Mar-25       GCI CONSTRUCTION, INC.       97,850.00         1005865       13-Mar-25       GM SAGER CONSTRUCTION CO, INC.       61,500.00         1005866       13-Mar-25       GOFORTH & MARTI       2,003.09         1005867       13-Mar-25       GRISWOLD INDUSTRIES       7,675.06         1005868       13-Mar-25       HAAKER EQUIPMENT COMPANY       701.33	1005861	13-Mar-25				
1005864       13-Mar-25       GCI CONSTRUCTION, INC.       97,850.00         1005865       13-Mar-25       GM SAGER CONSTRUCTION CO, INC.       61,500.00         1005866       13-Mar-25       GOFORTH & MARTI       2,003.09         1005867       13-Mar-25       GRISWOLD INDUSTRIES       7,675.06         1005868       13-Mar-25       HAAKER EQUIPMENT COMPANY       701.33	1005862	13-Mar-25	FIDELITY SECURITY LIFE INSURANCE COMPANY 8,361.			
1005865       13-Mar-25       GM SAGER CONSTRUCTION CO, INC.       61,500.00         1005866       13-Mar-25       GOFORTH & MARTI       2,003.09         1005867       13-Mar-25       GRISWOLD INDUSTRIES       7,675.06         1005868       13-Mar-25       HAAKER EQUIPMENT COMPANY       701.33	1005863	13-Mar-25	GANAHL LUMBER CO. 180.7			
1005866       13-Mar-25       GOFORTH & MARTI       2,003.09         1005867       13-Mar-25       GRISWOLD INDUSTRIES       7,675.06         1005868       13-Mar-25       HAAKER EQUIPMENT COMPANY       701.33	1005864	13-Mar-25	GCI CONSTRUCTION, INC. 97,850.04			
1005867       13-Mar-25       GRISWOLD INDUSTRIES       7,675.06         1005868       13-Mar-25       HAAKER EQUIPMENT COMPANY       701.33	1005865	13-Mar-25	GM SAGER CONSTRUCTION CO, INC. 61,500.0			
1005868 13-Mar-25 HAAKER EQUIPMENT COMPANY 701.33	1005866	13-Mar-25	GOFORTH & MARTI 2,003.05			
	1005867	13-Mar-25	GRISWOLD INDUSTRIES	7,675.06		
1005869 13-Mar-25 HDR ENGINEERING INC 38,143.50	1005868	13-Mar-25	HAAKER EQUIPMENT COMPANY	701.33		
	1005869	13-Mar-25	HDR ENGINEERING INC	38,143.50		

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ELECTRONIC #	PAYMENT DATE	SUPPLIER	<b>PAYMENT AMOUNT</b>		
1005870	13-Mar-25	HILL BROTHERS CHEMICAL COMPANY	5,939.70		
1005871	13-Mar-25	INDUSTRIAL SCIENTIFIC CORPORATION	6,003.97		
1005872	13-Mar-25	INNOVATIVE MACHINE TOOL REPAIR LLC	5,067.70		
1005873	13-Mar-25	INORGANIC VENTURES INC	294.30		
1005874	13-Mar-25	JAMES J. LEIGH	3,290.16		
1005875	13-Mar-25	JCI JONES CHEMICALS, INC.	3,705.07		
1005876	13-Mar-25	KIMBALL MIDWEST	2,472.53		
1005877	13-Mar-25	KUTAK ROCK LLP	132.00		
1005878	13-Mar-25	LANDCARE HOLDINGS, INC.	91,737.53		
1005879	13-Mar-25	LIEBERT CASSIDY WHITMORE	1,612.50		
1005880	13-Mar-25	MICROSOFT CORPORATION	24.00		
1005881	13-Mar-25	MSA SAFETY INCORPORATED	4,952.60		
1005882	13-Mar-25	MULTIQUIP INC	423.32		
1005883	13-Mar-25	NEUMERIC TECHNOLOGIES CORPORATION	11,000.00		
1005884	13-Mar-25	NEWPORT WINDOW MAINTENANCE INC	2,535.00		
1005885	13-Mar-25	ORANGE COUNTY MOSQUITO AND VECTOR CONTROL DISTRICT	89.40		
1005886	13-Mar-25	ORIGIN CONSULTING LLC	9,070.00		
1005887	13-Mar-25	PACIFIC PARTS & CONTROLS INC	5,188.00		
1005888	13-Mar-25	PYRO-COMM SYSTEMS INC	985.00		
1005889	13-Mar-25	R&B AUTOMATION, INC.	7,602.59		
1005890	13-Mar-25	RAM AIR ENGINEERING INC	8,415.00		
1005891	13-Mar-25	RED WING SHOE STORE	297.28		
1005892	13-Mar-25	RELIANCE STANDARD LIFE INSURANCE COMPANY	36,872.03		
1005893	13-Mar-25	RINCON TRUCK CENTER INC.	958.71		
1005894	13-Mar-25	SYNAGRO WEST, LLC	106,458.88		
1005895	13-Mar-25	HE GUERRA COMPANIES			
1005896	13-Mar-25	/. W. GRAINGER, INC. 1			
1005897	13-Mar-25	WEST YOST & ASSOCIATES, INC.	2,961.50		
1005898	13-Mar-25	WESTAMERICA COMMUNICATIONS, INC.	660.00		
1005927	20-Mar-25	A1 QUALITY BLINDS	1,104.44		
1005928	20-Mar-25	ACCELERATED TECHNOLOGY LABORATORIES, LLC	80,436.00		
1005929	20-Mar-25	AECOM TECHNICAL SERVICES, INC.	200,105.39		
1005930	20-Mar-25	AMAZON CAPITAL SERVICES, INC.	3,859.97		
1005931	20-Mar-25	ANIMAL PEST MANAGEMENT SERVICES, INC.	5,075.50		
1005932	20-Mar-25	AUTOZONE PARTS, INC.	352.12		
1005933	20-Mar-25	BIGWIG MONSTER, LLC	24,000.00		
1005934	20-Mar-25	BORCHARD SURVEYING & MAPPING, INC.	1,080.00		
1005935	20-Mar-25	CALIFORNIA BARRICADE RENTALS, INC.	33,221.94		
1005936	20-Mar-25	CANNON CORPORATION	22,700.75		
1005937	20-Mar-25	CAROLLO ENGINEERS, INC 2,553.00			
1005938	20-Mar-25	CIMARRON ENERGY, INC 38,541.91			
1005939	20-Mar-25	CITY OF IRVINE	167,051.66		
1005940	20-Mar-25	CLIFTON MAXWELL II	4,652.00		
1005941	20-Mar-25	DAVID BALLASCH	4,981.57		

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ELECTRONIC #	PAYMENT DATE	SUPPLIER	<b>PAYMENT AMOUNT</b>	
1005942	20-Mar-25	DEMARIA ELECTRIC MOTOR SERVICES, INC.	66,675.70	
1005943	20-Mar-25	DRAKE TRAFFIC CONTROL SERVICES	1,360.00	
1005944	20-Mar-25	DUDEK	3,515.00	
1005945	20-Mar-25	EL TORO WATER DISTRICT	46,857.00	
1005946	20-Mar-25	EUROFINS ENVIRONMENT TESTING AMERICA HOLDINGS, INC.	2,552.82	
1005947	20-Mar-25	FARRELL PRINTING, INC.	214.64	
1005948	20-Mar-25	FORGE MEDIA GROUP LLC	31,750.00	
1005949	20-Mar-25	FRESNO VALVES & CASTINGS, INC.	6,808.19	
1005950	20-Mar-25	GANAHL LUMBER CO.	2,291.06	
1005951	20-Mar-25	GOFORTH & MARTI	5,780.68	
1005952	20-Mar-25	GRISWOLD INDUSTRIES	6,947.72	
1005953	20-Mar-25	HAAKER EQUIPMENT COMPANY	2,208.74	
1005954	20-Mar-25	HDR ENGINEERING INC	35,015.19	
1005955	20-Mar-25	HILL BROTHERS CHEMICAL COMPANY	12,585.44	
1005956	20-Mar-25	INNOVATIVE MACHINE TOOL REPAIR LLC	2,004.00	
1005957	20-Mar-25	INORGANIC VENTURES INC	165.27	
1005958	20-Mar-25	KRONICK MOSKOVITZ TIEDEMANN & GIRARD	856.00	
1005959	20-Mar-25	LAGUNA BEACH COUNTY WATER DISTRICT	8,609.84	
1005960	20-Mar-25	LANDCARE HOLDINGS, INC.	51,173.10	
1005961	20-Mar-25	MARK KADESH	11,092.00	
1005962	20-Mar-25	MUNICIPAL WATER DISTRICT OF ORANGE COUNTY	22,788.00	
1005963	20-Mar-25	NCL OF WISCONSIN INC	532.75	
1005964	20-Mar-25	PAYNE & FEARS LLP	1,942.50	
1005965	20-Mar-25	RAM AIR ENGINEERING INC	34,561.52	
1005966	20-Mar-25	RED WING SHOE STORE	1,119.13	
1005967	20-Mar-25	RESOLUTE COMPANY		
1005968	20-Mar-25	INCON TRUCK CENTER INC.		
1005969	20-Mar-25	ELECT TRENCHLESS PIPELINES INC		
1005970	20-Mar-25	SOUTHERN CALIFORNIA SECURITY CENTERS, INC.	1,012.41	
1005971	20-Mar-25	TETRA TECH, INC	17,545.00	
1005972	20-Mar-25	UNIVAR SOLUTIONS USA , LLC	10,531.60	
1005973	20-Mar-25	W. W. GRAINGER, INC.	3,600.91	
1005974	20-Mar-25	WATER TREATMENT CHEMICALS INC	20,133.00	
1005975	20-Mar-25	WATERLINE TECHNOLOGIES INC	4,080.00	
1005976	20-Mar-25	WATERSMART SOFTWARE INC	16,894.88	
1005977	20-Mar-25	WECK ANALYTICAL ENVIRONMENT SERVICES, INC.	7,679.00	
1005978	20-Mar-25	WEST YOST & ASSOCIATES, INC.	9,500.00	
1005979	20-Mar-25	WESTAMERICA COMMUNICATIONS, INC.	825.00	
1006005	27-Mar-25	ABC ICE, INC	337.83	
1006006	27-Mar-25	AECOM TECHNICAL SERVICES, INC.	4,115.00	
1006007	27-Mar-25	AMAZON CAPITAL SERVICES, INC. 2,924.15		
1006008	27-Mar-25	AUTOZONE PARTS, INC.	1,426.60	
1006009	27-Mar-25	BIGWIG MONSTER, LLC	38,400.00	
1006010	27-Mar-25	BLUE-WHITE INDUSTRIES	708.50	

1006012         27-Mar-25         CALIFORNIA BARRICADE RENTALS, INC.         42,501,45           1006013         27-Mar-25         CONEXUS INDUSTRIES, INC.         2,077,34           1006015         27-Mar-25         DISC, INC.         20,024,20           1006015         27-Mar-25         DRAKE TRAFFIC CONTROL SERVICES         3,120,00           1006017         27-Mar-25         FARELI PRINTING, INC.         4,488,82           1006018         27-Mar-25         FARRELI PRINTING, INC.         4,301,38           1006020         27-Mar-25         GANAHIL UMBER CO.         4,301,38           1006021         27-Mar-25         GANAHIL UMBER CO.         4,301,38           1006022         27-Mar-25         HILL BROTHES CHEMICAL COMPANY         1,064,37           1006022         27-Mar-25         HILL BROTHES CHEMICAL COMPANY         6,634,52           1006024         27-Mar-25         HILL BROTHES CHEMICAL COMPANY         6,84,52           1006025         27-Mar-25         JON MICHAEL COMAS         2,710,59           1006026         27-Mar-25         JON MICHAEL COMAS         2,713,40           1006027         27-Mar-25         JON MICHAEL COMAS         2,713,40           1006028         27-Mar-25         JON MICHAEL COMAS         2,713,40 <th>CHECK OR</th> <th></th> <th></th> <th></th>	CHECK OR			
1006012         27-Mar-25         CALIFORNIA BARRICADE RENTALS, INC.         42,501,45           1006013         27-Mar-25         CONNEXUS INDUSTRIES, INC.         20,072,43           1006015         27-Mar-25         DESE, INC.         20,024,20           1006015         27-Mar-25         DRAKE TRAFFIC CONTROL SERVICES         31,20,00           1006017         27-Mar-25         FAIREL PRINTING, INC.         44,86,82           1006018         27-Mar-25         FAIREL PRINTING, INC.         4,301,33           1006021         27-Mar-25         GANAHL UMBER CO.         4,301,33           1006021         27-Mar-25         GM SAGER CONSTRUCTION CO, INC.         77,828,00           1006021         27-Mar-25         HUB RETECHNOLOGY INC.         11,846,34           1006022         27-Mar-25         HUB RETECHNOLOGY INC.         11,846,34           1006022         27-Mar-25         HUB RETECHNOLOGY INC.         11,846,34           1006022         27-Mar-25         JONN MICHAES COMPANY         6,634,52           1006022         27-Mar-25         JONN MICHAES COMPANY         2,174,05           1006022         27-Mar-25         JONN MICHAES COMPANY         3,8489,37           1006023         27-Mar-25         JONN MICHAES COMPANY         3,848	ELECTRONIC #	PAYMENT DATE	SUPPLIER	PAYMENT AMOUNT
1006013         27.Mar-25         CONNEXUS INDUSTRIES, INC.         2.077.43           1006014         27.Mar-25         DISCOVERY SCIENCE CENTER OF ORANGE COUNTY         5.817.15           1006015         27.Mar-25         DISCOVERY SCIENCE CENTER OF ORANGE COUNTY         5.817.15           1006016         27.Mar-25         FARRELL PRINTING, INC.         4.498.82           1006017         27.Mar-25         GHAAKE TOAFFIC CONSTRUCTION CO, INC.         77.828.00           1006019         27.Mar-25         GMASARE CONSTRUCTION CO, INC.         77.828.00           1006021         27.Mar-25         HUBER TECTONLOOP CONSTRUCTION CO, INC.         77.828.00           1006022         27.Mar-25         HUBER TECTONLOOP CONSTRUCTION CO, INC.         77.828.00           1006021         27.Mar-25         HUBER TECTONLOOP CONSTRUCTION CO, INC.         77.436.50           1006022         27.Mar-25         INDUSTRIAL NETWORKING SOLUTIONS         2.710.65           1006022         27.Mar-25         INDUSTRIAL NETWORKING SOLUTIONS         2.710.65           1006024         27.Mar-25         LANDCARE HOLDINGS, INC.         38.499.37           1006025         27.Mar-25         LUBERT CASSIDV MITIMORE         941.00           1006032         27.Mar-25         LUBERT CASSIDV MITIMORE         36.32.0	1006011	27-Mar-25	C WELLS PIPELINE MATERIALS, INC	20,170.27
1006014         27-Mar-25         DCSE, INC.         20.024.20           1006015         27-Mar-25         DISCOVERY SCIENCE CENTE OF ORANGE COUNTY         5.817.15           1006017         27-Mar-25         DRAKE TRAFFIC CONTROL SERVICES         3.120.00           1006018         27-Mar-25         FLUID CONSERVATION SYSTEMS, INC.         6,500.00           1006019         27-Mar-25         GRANAH LUMBER CO.         4,301.38           1006020         27-Mar-25         HALE REP CONTON CO, INC.         77.828.00           1006021         27-Mar-25         HALE REP CONTON CO, INC.         77.828.00           1006022         27-Mar-25         HALE BOTHERS CHEMICAL COMPANY         6,634.52           1006023         27-Mar-25         HUBER TECHNOLOCY INC.         11,846.34           1006024         27-Mar-25         INDUSTRIK SOLUTIONS         2,710.59           1006022         27-Mar-25         INDUSTRIK SOLUTIONS         2,714.05           1006022         27-Mar-25         INDUSTRIK SOLUTIONS         2,714.05           1006022         27-Mar-25         INDUSTRIK SOLUTIONS         2,714.05           1006024         27-Mar-25         ILUBERT CASIDY WHITMORE         3,400.00           1006025         27-Mar-25         ILUBERT CASIDY WHITMORE	1006012	27-Mar-25	CALIFORNIA BARRICADE RENTALS, INC.	42,501.45
1006015         27-Mar-25         DISCOVERY SCIENCE CENTER OF ORANGE COUNTY         5,817.15           1006016         27-Mar-25         DRAKE TRAFFIC CONTROL SERVICES         3,120.00           1006017         27-Mar-25         FARREL PRINTING, INC.         4,408.82           1006018         27-Mar-25         FARREL PRINTING, INC.         4,301.38           1006020         27-Mar-25         GM SAGER CONSTRUCTION CO, INC.         77,828.00           1006021         27-Mar-25         HAAKER EQUIPMENT COMPANY         1,004.37           1006022         27-Mar-25         HUBER TECHNOLCOCY INC.         11,864.54           1006024         27-Mar-25         INUSTRIAL NETWORKING SOLUTIONS         2,710.59           1006025         27-Mar-25         INUSTRIAL NETWORKING SOLUTIONS         2,710.59           1006026         27-Mar-25         INUSTRIAL NETWORKING SOLUTIONS         2,710.59           1006027         27-Mar-25         INDUSTRIAL NETWORKING SOLUTIONS         2,710.59           1006028         27-Mar-25         INDUSTRIAL NETWORKING SOLUTIONS         2,710.59           1006029         27-Mar-25         INDCARE HOLDINGS, INC.         2,740.59           1006029         27-Mar-25         INDCARE HOLDINGS, INC.         2,733.40           1006031         2	1006013	27-Mar-25	CONNEXUS INDUSTRIES, INC.	2,077.43
1006016         27-Mar-25         DRAKE TRAFFIC CONTROL SERVICES         3,120.00           1006017         27-Mar-25         FABRELL PRINTING, INC.         4,498.22           1006018         27-Mar-25         FLUID CONSERVATION SYSTEMS, INC.         6,500.00           1006019         27-Mar-25         GM SAGER CONSTRUCTION CO, INC.         77.828.00           1006020         27-Mar-25         HAAKE REQUIPMENT COMPANY         1004.37           1006021         27-Mar-25         HUBER TECHNOLOGY INC.         11,846.34           1006022         27-Mar-25         HUBER TECHNOLOGY INC.         11,846.34           1006023         27-Mar-25         INDUSTRIAL NETWORKING SOLUTIONS         2,710.59           1006026         27-Mar-25         INDUSTRIAL NETWORKING SOLUTIONS         2,174.05           1006027         27-Mar-25         ILEBERT CASSIDY WHITMORE         941.00           1006028         27-Mar-25         ILEBERT CASSIDY WHITMORE         941.00           1006029         27-Mar-25         ILEBERT CASSIDY WHITMORE         941.00           1006020         27-Mar-25         ILEBERT CASSIDY WHITMORE         941.00           1006031         27-Mar-25         ILOP CLAIMS SOLUTIONS INC         27.133.40           1006033         27-Mar-25         NEU	1006014	27-Mar-25	DCSE, INC.	20,024.20
1006017         27-Mar-25         FARRELL PRINTING, INC.         4,498.82           1006018         27-Mar-25         GANAHL LUMBER CO.         4,301.38           1006020         27-Mar-25         GM SAGER CONSTRUCTION CO, INC.         77,828.00           1006021         27-Mar-25         GM SAGER CONSTRUCTION CO, INC.         77,828.00           1006022         27-Mar-25         HIL BOTHERS CHEMARY         1,004.37           1006023         27-Mar-25         HIL BOTHERS CHEMARCAL COMPANY         6,634.52           1006024         27-Mar-25         HUBER TECHNOLOGY INC.         11,846.34           1006025         27-Mar-25         INDUSTRIAL NETWORKING SOLUTIONS         2,7140.59           1006026         27-Mar-25         IONN MICHAEL COVAS         185.00           1006027         27-Mar-25         IONN MICHAEL COVAS         38,499.37           1006028         27-Mar-25         IUP CLAIMS SOLUTIONS INC         27,133.40           1006030         27-Mar-25         IUP CLAIMS SOLUTIONS INC         27,133.40           1006031         27-Mar-25         IUP CLAIMS SOLUTIONS INC         36,220           1006032         27-Mar-25         NOR RISCRE, EDWARD         36,220           1006033         27-Mar-25         NUM RISOLE CONTORATION	1006015	27-Mar-25	DISCOVERY SCIENCE CENTER OF ORANGE COUNTY	5,817.15
1006018         27-Mar-25         FLUID CONSERVATION SYSTEMS, INC.         6,500.00           1006019         27-Mar-25         GMAAHL LUMBER CO.         4,301.38           1006020         27-Mar-25         GM SAGE CONSTRUCTION CO, INC.         77,828.00           1006021         27-Mar-25         HAAKER EQUIPMENT COMPANY         6,634.52           1006022         27-Mar-25         HULB ROTHERS CHEMICAL COMPANY         6,634.52           1006023         27-Mar-25         INDUSTRIAL NETWORKING SOLUTIONS         2,710.59           1006026         27-Mar-25         INDUSTRIAL NETWORKING SOLUTIONS         2,710.59           1006027         27-Mar-25         INDUSTRIAL NETWORKING SOLUTIONS         2,711.34           1006026         27-Mar-25         IANDCARE HOLDINGS, INC.         38.449.37           1006027         27-Mar-25         LIEPERT CASSIDY WHITMORE         941.00           1006020         27-Mar-25         ILW CLAIMS SOLUTIONS INC         27,133.40           1006031         27-Mar-25         MORRISROE, EDWARD         66.20           1006032         27-Mar-25         MORRISROE, EDWARD         36.415.79           1006033         27-Mar-25         MORRISROE, EDWARD         74.00.0           10060034         27-Mar-25         PYRO-COMM SYSTEM	1006016	27-Mar-25	DRAKE TRAFFIC CONTROL SERVICES	3,120.00
1006019         27-Mar-25         GANAHL LUMBER CO.         4,301.38           1006020         27-Mar-25         GM SAGER CONSTRUCTION CO, INC.         77,828.00           1006021         27-Mar-25         HAKER EQUIPMENT COMPANY         1,004.37           1006022         27-Mar-25         HUBER TECHNOLOGY INC.         11,846.34           1006023         27-Mar-25         INDUSTRIAL NETWORKING SOLUTIONS         2,710.59           1006024         27-Mar-25         INDUSTRIAL NETWORKING SOLUTIONS         2,710.59           1006025         27-Mar-25         INNOVATIVE MACHINE TOOL REPAIR LLC         2,710.59           1006026         27-Mar-25         LANDCARE HOLDINGS, INC.         38,498.37           1006027         27-Mar-25         LANDCARE HOLDINGS, INC.         27,133.40           1006028         27-Mar-25         LINP CLAIMS SOLUTIONS INC         27,133.40           1006030         27-Mar-25         MCR TECHNOLOGIES INC         13,841.15           1006031         27-Mar-25         NOR TECHNOLOGIES CORPORATION         35,720.00           1006033         27-Mar-25         NEUMERIC TECHNOLOGIES CORPORATION         35,720.00           1006034         27-Mar-25         RED WINTROP SHAW PITTMAN LLP         7,400.00           1006035         27-Mar-25 <td>1006017</td> <td>27-Mar-25</td> <td>FARRELL PRINTING, INC.</td> <td>4,498.82</td>	1006017	27-Mar-25	FARRELL PRINTING, INC.	4,498.82
1006020         27.Mar-25         GM SAGER CONSTRUCTION CO, INC.         77,828.00           1006021         27.Mar-25         HAAKER RQUIPMENT COMPANY         1,004.37           1006022         27.Mar-25         HILL BROTHERS CHEMICAL COMPANY         6,634.52           1006023         27.Mar-25         INDUSTRIAL NETWORKING SOLUTIONS         2,710.85           1006024         27.Mar-25         INDUSTRIAL NETWORKING SOLUTIONS         2,714.95           1006026         27.Mar-25         INDUSTRIAL NETWORKING SOLUTIONS         2,714.95           1006026         27.Mar-25         IANNOVATIVE MACHINE FOOL REPAIR LLC         2,174.05           1006026         27.Mar-25         LANDCARE HOLDINGS, INC.         38,499.37           1006028         27.Mar-25         LANDCARE HOLDINGS, INC.         38,499.37           1006029         27.Mar-25         MCR TECHNOLOGIES INC         27.133.40           1006030         27.Mar-25         MCR TECHNOLOGIES CORPORATION         35,720.00           1006031         27.Mar-25         NEUREIC TECHNOLOGIES CORPORATION         35,720.00           1006033         27.Mar-25         RED WING SHOE TORE         473.03           1006034         27.Mar-25         RED WING SHOE TORE         473.03           1006035         27.Mar-25 <td>1006018</td> <td>27-Mar-25</td> <td>FLUID CONSERVATION SYSTEMS, INC.</td> <td>6,500.00</td>	1006018	27-Mar-25	FLUID CONSERVATION SYSTEMS, INC.	6,500.00
1006021         27-Mar-25         HAAKER EQUIPMENT COMPANY         1,004.37           1006022         27-Mar-25         HILL BROTHERS CHEMICAL COMPANY         6,634.52           1006023         27-Mar-25         HILB BROTHERS CHEMICAL COMPANY         6,634.52           1006024         27-Mar-25         INDUSTRIAL NETWORKING SOLUTIONS         2,710.59           1006025         27-Mar-25         INNOVATIVE MACHINE TOOL REPAIR LLC         2,174.05           1006026         27-Mar-25         LINDOCARE HOLDINGS, INC.         38,489.37           1006027         27-Mar-25         LINDOCARE HOLDINGS, INC.         38,489.37           1006028         27-Mar-25         LIVP CLAIMS SOLUTIONS INC.         27,133.40           1006030         27-Mar-25         MORRISROE, EDWARD         662.20           1006031         27-Mar-25         MORRISROE, EDWARD         663.20           1006032         27-Mar-25         NEUMERIC TECHNOLOGIES CORPORATION         35,720.00           1006033         27-Mar-25         NEUMERIC TECHNOLOGIES CORPORATION         35,720.00           1006034         27-Mar-25         RED WING SHOL STORE         473.03           1006035         27-Mar-25         RED WING SHOL STORE         473.03           10060038         27-Mar-25         SU	1006019	27-Mar-25	GANAHL LUMBER CO.	4,301.38
1006022         27-Mar-25         HILL BROTHERS CHEMICAL COMPANY         6,634.52           1006023         27-Mar-25         HUBER TECHNOLOGY INC.         11,846.34           1006024         27-Mar-25         INDUSTRIAL NETWORKING SOLUTIONS         2,710.59           1006025         27-Mar-25         INDUSTRIVE MACHINE TOOL REPAIR LLC         2,174.05           1006026         27-Mar-25         JOHN MICHAEL COVAS         185.00           1006027         27-Mar-25         LANDCARE HOLDINGS, INC.         38,489.37           1006028         27-Mar-25         LIADCARE HOLDINGS, INC.         27,133.40           1006030         27-Mar-25         MCR TECHNOLOGIES INC         13,641.15           1006031         27-Mar-25         MCR TECHNOLOGIES INC         13,641.15           1006032         27-Mar-25         NEUMERIC TECHNOLOGIES CORPORATION         35,720.00           1006033         27-Mar-25         NEUMERIC TECHNOLOGIES CORPORATION         35,720.00           1006034         27-Mar-25         RED WING SHOE STORE         475.00           1006035         27-Mar-25         RED WING SHOE STORE         475.00           1006036         27-Mar-25         RIL SUZTENTION         8,137.99           1006036         27-Mar-25         RID SIN ERINIC	1006020	27-Mar-25	GM SAGER CONSTRUCTION CO, INC.	77,828.00
1006023         27-Mar-25         HUBER TECHNOLOGY INC.         11,846.34           1006024         27-Mar-25         INDUSTRIAL NETWORKING SOLUTIONS         2,710.59           1006025         27-Mar-25         INNOVATIVE MACHINE TOOL REPAIR LLC         2,174.05           1006026         27-Mar-25         JOHN MICHAEL COVAS         185.00           1006027         27-Mar-25         LANDCARE HOLDINGS, INC.         38,489.37           1006028         27-Mar-25         LIEBERT CASSIDY WHITMORE         941.00           1006029         27-Mar-25         MCR TECHNOLOGIES INC         13,641.15           1006031         27-Mar-25         MCR TECHNOLOGIES CORPORATION         35,720.00           1006032         27-Mar-25         NEUMERIC TECHNOLOGIES CORPORATION         35,720.00           1006033         27-Mar-25         RED WING SHOE STORE         475.00           1006034         27-Mar-25         RED WING SHOE STORE         473.03           1006035         27-Mar-25         RED WING SHOE STORE         473.03           1006036         27-Mar-25         RED WING SHOE STORE         473.03           1006037         27-Mar-25         RED WING SHOE STORE         473.03           1006038         27-Mar-25         SKORUZ TECHNOLOGIES INC         13	1006021	27-Mar-25	HAAKER EQUIPMENT COMPANY	1,004.37
1006024         27-Mar-25         INDUSTRIAL NETWORKING SOLUTIONS         2,710.59           1006025         27-Mar-25         INNOVATIVE MACHINE TOOL REPAIR LLC         2,174.05           1006026         27-Mar-25         JOHN MICHAEL COVAS         185.00           1006027         27-Mar-25         LINDCARE HOLDINGS, INC.         38,499.37           1006028         27-Mar-25         LIEDERT CASSIDY WHITMORE         941.00           1006029         27-Mar-25         LIVE CLAINS SOLUTIONS INC         27,133.40           1006030         27-Mar-25         MCR ISCHOLOGIES INC         13,641.15           1006031         27-Mar-25         NEUMERIC TECHNOLOGIES CORPORATION         35,720.00           1006032         27-Mar-25         NEUMERIC TECHNOLOGIES CORPORATION         35,720.00           1006034         27-Mar-25         PIRO-COMM SYSTEMS INC         475.00           1006035         27-Mar-25         PIRO-COMM SYSTEMS INC         475.00           1006036         27-Mar-25         RED WING SHOE STORE         473.03           1006037         27-Mar-25         RIG ENTERPRISES, INC         1,236.19           1006038         27-Mar-25         STUDSON, INC.         13,720.20           1006041         27-Mar-25         VUCAN INDUSTRIES INC	1006022	27-Mar-25	HILL BROTHERS CHEMICAL COMPANY	6,634.52
1006025         27-Mar-25         INNOVATIVE MACHINE TOOL REPAIR LLC         2,174.05           1006026         27-Mar-25         JOHN MICHAEL COVAS         185.00           1006027         27-Mar-25         LANDCARE HOLDINGS, INC.         38,489.37           1006028         27-Mar-25         LIEBERT CASSIDY WHITMORE         941.00           1006029         27-Mar-25         LIEBERT CASSIDY WHITMORE         941.00           1006030         27-Mar-25         MCR TECHNOLOGIES INC         13,641.15           1006031         27-Mar-25         MCR TECHNOLOGIES CORPORATION         636.20           1006032         27-Mar-25         NEUMERIC TECHNOLOGIES CORPORATION         35,720.00           1006033         27-Mar-25         PIEUMERIC TECHNOLOGIES CORPORATION         36,817.99           1006034         27-Mar-25         REUMERIC TECHNOLOGIES CORPORATION         475.00           1006035         27-Mar-25         RED WING SHOE STORE         473.03           1006036         27-Mar-25         RED WING SHOE STORE         44940.00           1006037         27-Mar-25         STUDSON, INC.         13,720.20           1006040         27-Mar-25         STUDSON, INC.         13,720.20           1006041         27-Mar-25         VULCAN INDUSTRIES INC	1006023	27-Mar-25	HUBER TECHNOLOGY INC.	11,846.34
1006026         27.Mar-25         JOHN MICHAEL COVAS         185.00           1006027         27.Mar-25         LANDCARE HOLDINGS, INC.         38,489.37           1006028         27.Mar-25         LIEBERT CASSIDY WHITMORE         941.00           1006029         27.Mar-25         LIEBERT CASSIDY WHITMORE         27.133.40           1006030         27.Mar-25         LIVP CLAIMS SOLUTIONS INC         27.133.40           1006031         27.Mar-25         MCR TECHNOLOGIES INC         13.641.15           1006032         27.Mar-25         NEUMERIC TECHNOLOGIES CORPORATION         35,720.00           1006033         27.Mar-25         NEUMERIC TECHNOLOGIES CORPORATION         35,720.00           1006033         27.Mar-25         NEUMERIC TECHNOLOGIES INC         475.00           1006034         27.Mar-25         RED WING SHOE STORE         473.03           1006035         27.Mar-25         RAM AIR ENGINEERING INC         1,236.19           1006036         27.Mar-25         RUC XINOLOGIES INC         1,236.19           1006038         27.Mar-25         STUDSON, INC.         13,720.20           1006040         27.Mar-25         VULCAN INDUSTRIES INC         10,439.20           1006041         27.Mar-25         VULCAN INDUSTRIES INC         5,5	1006024	27-Mar-25	INDUSTRIAL NETWORKING SOLUTIONS	2,710.59
1006027         27-Mar-25         LANDCARE HOLDINGS, INC.         38,489.37           1006028         27-Mar-25         LIEBERT CASSIDY WHITMORE         941.00           1006029         27-Mar-25         LWP CLAIMS SOLUTIONS INC         27,133.40           1006030         27-Mar-25         MCR TECHNOLOGIES INC         13,641.15           1006031         27-Mar-25         MCRTISROE, EDWARD         636.20           1006032         27-Mar-25         NEUMERIC TECHNOLOGIES CORPORATION         35,720.00           1006033         27-Mar-25         PILLSBURY WINTHROP SHAW PITTMAN LLP         7,400.00           1006034         27-Mar-25         PYRO-COMM SYSTEMS INC         475.00           1006035         27-Mar-25         RED WING SHOE STORE         473.03           1006037         27-Mar-25         RLG ENTERPRISES, INC         1,236.19           1006038         27-Mar-25         SKORUZ TECHNOLOGIES INC         44,940.00           1006039         27-Mar-25         SUDSON, INC.         13,720.20           1006041         27-Mar-25         SUDSON, INC.         13,720.20           1006042         27-Mar-25         VULCAN INDUSTRIES INC         61,368.53           1006043         27-Mar-25         VULCAN INDUSTRIES INC         6,507.22	1006025	27-Mar-25	INNOVATIVE MACHINE TOOL REPAIR LLC	2,174.05
1006028         27-Mar-25         LIEBERT CASSIDY WHITMORE         941.00           1006029         27-Mar-25         LWP CLAIMS SOLUTIONS INC         27,133.40           1006030         27-Mar-25         MCR TECHNOLOGIES INC         13,641.15           1006031         27-Mar-25         MCR RISROE, EDWARD         636.20           1006032         27-Mar-25         NEUMERIC TECHNOLOGIES CORPORATION         35,720.00           1006033         27-Mar-25         NEUMERIC TECHNOLOGIES CORPORATION         35,720.00           1006034         27-Mar-25         PIRO-COMM SYSTEMS INC         475.00           1006035         27-Mar-25         RAM AIR ENGINEERING INC         8,187.99           1006036         27-Mar-25         RLG ENTERPRISES, INC         1,236.19           1006037         27-Mar-25         RLG ENTERPRISES, INC         1,326.19           1006038         27-Mar-25         SKORUZ TECHNOLOGIES INC         1,320.20           1006040         27-Mar-25         STUDSON, INC.         13,720.20           1006041         27-Mar-25         STUDSON, INC.         13,720.20           1006042         27-Mar-25         VULCAN INDUSTRIES INC         6,507.22           1006042         27-Mar-25         VULCAN INDUSTRIES INC         6,507.22	1006026	27-Mar-25	JOHN MICHAEL COVAS	185.00
1006029         27-Mar-25         LWP CLAIMS SOLUTIONS INC         27,133.40           1006030         27-Mar-25         MCR TECHNOLOGIES INC         13,641.15           1006031         27-Mar-25         MCRISROE, EDWARD         636.20           1006032         27-Mar-25         NEUMERIC TECHNOLOGIES CORPORATION         35,720.00           1006033         27-Mar-25         PIELUSBURY WINTHROP SHAW PIITMAN LLP         7,400.00           1006034         27-Mar-25         PYRO-COMM SYSTEMS INC         475.00           1006035         27-Mar-25         RAM AIR ENGINEERING INC         8,187.99           1006036         27-Mar-25         RED WING SHOE STORE         473.03           1006037         27-Mar-25         RLG ENTERPRISES, INC         1,236.19           1006038         27-Mar-25         SKORUZ TECHNOLOGIES INC         44,940.00           1006039         27-Mar-25         SUDSON, INC.         13,720.20           1006040         27-Mar-25         VULCAN INDUSTRIES INC         39,375.00           1006041         27-Mar-25         VULCAN INDUSTRIES INC         61,368.53           1006042         27-Mar-25         VULCAN INDUSTRIES INC         61,368.53           1006043         27-Mar-25         WEST COAST SAFETY SUPPLY, INC         66	1006027	27-Mar-25	LANDCARE HOLDINGS, INC.	38,489.37
1006030         27-Mar-25         MCR TECHNOLOGIES INC         13,641.15           1006031         27-Mar-25         MORRISROE, EDWARD         636.20           1006032         27-Mar-25         NEUMERIC TECHNOLOGIES CORPORATION         35,720.00           1006033         27-Mar-25         PILLSBURY WINTHROP SHAW PITTMAN LLP         7,400.00           1006034         27-Mar-25         PRO-COMM SYSTEMS INC         475.00           1006035         27-Mar-25         RED WING SHOE STORE         473.03           1006036         27-Mar-25         RLG ENTERPRISES, INC         1,236.19           1006037         27-Mar-25         SKORUZ TECHNOLOGIES INC         44,940.00           1006038         27-Mar-25         SKORUZ TECHNOLOGIES INC         43,9375.00           1006040         27-Mar-25         SKORUZ TECHNOLOGIES INC         13,720.20           1006040         27-Mar-25         SUDSON, INC.         13,720.20           1006040         27-Mar-25         VULCAN INDUSTRIES INC         10,439.20           1006041         27-Mar-25         WEST COAST SAFETY SUPPLY, INC         5652.89           1006042         27-Mar-25         WEST COAST SAFETY SUPPLY, INC         56507.22           1006043         27-Mar-25         WEST COAST SAFETY SUPPLY, INC	1006028	27-Mar-25	LIEBERT CASSIDY WHITMORE	941.00
1006031         27-Mar-25         MORRISROE, EDWARD         636.20           1006032         27-Mar-25         NEUMERIC TECHNOLOGIES CORPORATION         35,720.00           1006033         27-Mar-25         PILLSBURY WINTHROP SHAW PITTMAN LLP         7,400.00           1006034         27-Mar-25         PYRO-COMM SYSTEMS INC         475.00           1006035         27-Mar-25         RAM AIR ENGINEERING INC         8,187.99           1006037         27-Mar-25         RED WING SHOE STORE         473.03           1006038         27-Mar-25         SKORUZ TECHNOLOGIES INC         1,236.19           1006037         27-Mar-25         SKORUZ TECHNOLOGIES INC         1,236.19           1006038         27-Mar-25         SKORUZ TECHNOLOGIES INC         1,236.19           1006040         27-Mar-25         STUDSON, INC.         1,3702.00           1006040         27-Mar-25         STUDSON, INC.         13,720.20           1006041         27-Mar-25         VULCAN INDUSTRIES INC         10,439.20           1006042         27-Mar-25         W.W. GRAINGER, INC.         5,652.89           1006043         27-Mar-25         WEST COAST SAFETY SUPPLY, INC         6,507.22           1006045         27-Mar-25         WEST COAST SAFETY SUPPLY, INC         6,50	1006029	27-Mar-25	LWP CLAIMS SOLUTIONS INC	27,133.40
1006032         27-Mar-25         NEUMERIC TECHNOLOGIES CORPORATION         35,720.00           1006033         27-Mar-25         PILLSBURY WINTHROP SHAW PITTMAN LLP         7,400.00           1006034         27-Mar-25         PXRO-COMM SYSTEMS INC         475.00           1006035         27-Mar-25         RAM AIR ENGINEERING INC         475.00           1006036         27-Mar-25         RED WING SHOE STORE         473.03           1006037         27-Mar-25         SKORUZ TECHNOLOGIES INC         44940.00           1006038         27-Mar-25         STUDSON, INC.         13,720.20           1006040         27-Mar-25         STUDSON, INC.         13,720.20           1006040         27-Mar-25         STUDSON, INC.         13,720.20           1006041         27-Mar-25         VULCAN INDUSTRIES INC         44,940.00           1006042         27-Mar-25         VULCAN INDUSTRIES INC         10,439.20           1006043         27-Mar-25         W.W. GRAINGER, INC.         5652.89           1006043         27-Mar-25         W.ST COAST SAFETY SUPPLY, INC         6,507.22           1006045         27-Mar-25         WEST COAST SAFETY SUPPLY, INC         35,756.39           1006045         27-Mar-25         WEST YOST & ASSOCIATES, INC.         17,	1006030	27-Mar-25	MCR TECHNOLOGIES INC	13,641.15
1006033         27-Mar-25         PILLSBURY WINTHROP SHAW PITTMAN LLP         7,400.00           1006034         27-Mar-25         PYRO-COMM SYSTEMS INC         475.00           1006035         27-Mar-25         RAM AIR ENGINEERING INC         8,187.99           1006036         27-Mar-25         RED WING SHOE STORE         473.03           1006037         27-Mar-25         RED WING SHOE STORE         473.03           1006038         27-Mar-25         SKORUZ TECHNOLOGIES INC         1,236.19           1006039         27-Mar-25         STUDSON, INC.         13,720.20           1006040         27-Mar-25         UNIVAR SOLUTIONS USA, LLC         10,439.20           1006041         27-Mar-25         VULCAN INDUSTRIES INC         61,368.53           1006042         27-Mar-25         W.W. GRAINGER, INC.         5,652.89           1006043         27-Mar-25         W.ST COAST SAFETY SUPPLY, INC         6,507.22           1006044         27-Mar-25         WEST YOST & ASSOCIATES, INC.         966.00           SUB-TOTAL IRWD WELLS FARGO ACH DISBURSEMENTS         4,948,680.52         4,948,680.52           2000936         6-Mar-25         FERGUSON US HOLDINGS, INC.         17,756.49           2000937         6-Mar-25         THOMPSON & PHIPPS INC         3	1006031	27-Mar-25	MORRISROE, EDWARD	636.20
1006034         27-Mar-25         PYRO-COMM SYSTEMS INC         475.00           1006035         27-Mar-25         RAM AIR ENGINEERING INC         8,187.99           1006036         27-Mar-25         RED WING SHOE STORE         473.03           1006037         27-Mar-25         RLG ENTERPRISES, INC         1,236.19           1006038         27-Mar-25         SKORUZ TECHNOLOGIES INC         44,940.00           1006039         27-Mar-25         STUDSON, INC.         13,720.20           1006040         27-Mar-25         TETRA TECH, INC         39,375.00           1006041         27-Mar-25         UNIVAR SOLUTIONS USA, LLC         10,439.20           1006042         27-Mar-25         VULCAN INDUSTRIES INC         61,368.53           1006043         27-Mar-25         W. GRAINGER, INC.         5,652.89           1006044         27-Mar-25         WEST COAST SAFETY SUPPLY, INC         6,507.22           1006045         27-Mar-25         WEST COAST SAFETY SUPPLY, INC         6,507.22           1006045         27-Mar-25         WEST YOST & ASSOCIATES, INC.         17,756.49           2000936         6-Mar-25         FERGUSON US HOLDINGS, INC.         17,756.39           2000937         6-Mar-25         FERGUSON US HOLDINGS, INC.         312.32<	1006032	27-Mar-25	NEUMERIC TECHNOLOGIES CORPORATION	35,720.00
1006035       27-Mar-25       RAM AIR ENGINEERING INC       8,187.99         1006036       27-Mar-25       RED WING SHOE STORE       473.03         1006037       27-Mar-25       RLG ENTERPRISES, INC       1,236.19         1006038       27-Mar-25       SKORUZ TECHNOLOGIES INC       44,940.00         1006039       27-Mar-25       STUDSON, INC.       13,720.20         1006040       27-Mar-25       TETRA TECH, INC       39,375.00         1006041       27-Mar-25       UNIVAR SOLUTIONS USA, LLC       10,439.20         1006042       27-Mar-25       VULCAN INDUSTRIES INC       61,368.53         1006043       27-Mar-25       W.U. GRAINGER, INC.       5,652.89         1006043       27-Mar-25       W.S. GRAINGER, INC.       5,652.89         1006044       27-Mar-25       W.S. GRAINGER, INC.       966.00         SUB-TOTAL IRWD WELLS FARGO ACH DISBURSEMENTS       4,948,680.52         2000936       6-Mar-25       FERGUSON US HOLDINGS, INC.       17,756.49         2000937       6-Mar-25       THOMPSON & PHIPPS INC       35,756.39         2000938       13-Mar-25       ELEMENTAL SCIENTIFIC, INC.       312.32         2000939       13-Mar-25       IDEXX DISTRIBUTION, INC       7,579.87	1006033	27-Mar-25	PILLSBURY WINTHROP SHAW PITTMAN LLP	7,400.00
1006036       27-Mar-25       RED WING SHOE STORE       473.03         1006037       27-Mar-25       RLG ENTERPRISES, INC       1,236.19         1006038       27-Mar-25       SKORUZ TECHNOLOGIES INC       44,940.00         1006039       27-Mar-25       STUDSON, INC.       13,720.20         1006040       27-Mar-25       TETRA TECH, INC       39,375.00         1006041       27-Mar-25       UNIVAR SOLUTIONS USA, LLC       10,439.20         1006042       27-Mar-25       VULCAN INDUSTRIES INC       61,368.53         1006043       27-Mar-25       W.W. GRAINGER, INC.       5,652.89         1006044       27-Mar-25       WEST COAST SAFETY SUPPLY, INC       6,507.22         1006045       27-Mar-25       WEST YOST & ASSOCIATES, INC.       966.00         SUB-TOTAL IRWD WELLS FARGO ACH DISBURSEMENTS       4,948,680.52       966.00         2000936       6-Mar-25       FERGUSON US HOLDINGS, INC.       17,756.49         2000937       6-Mar-25       THOMPSON & PHIPPS INC       35,756.39         2000938       13-Mar-25       ELEMENTAL SCIENTIFIC, INC.       312.32         2000939       13-Mar-25       FERGUSON US HOLDINGS, INC.       12,726.92         2000940       13-Mar-25       IDEXX DISTRIBUTION, INC	1006034	27-Mar-25	PYRO-COMM SYSTEMS INC	475.00
1006037       27-Mar-25       RLG ENTERPRISES, INC       1,236.19         1006038       27-Mar-25       SKORUZ TECHNOLOGIES INC       44,940.00         1006039       27-Mar-25       STUDSON, INC.       13,720.20         1006040       27-Mar-25       TETRA TECH, INC       39,375.00         1006041       27-Mar-25       UNIVAR SOLUTIONS USA , LLC       10,439.20         1006042       27-Mar-25       VULCAN INDUSTRIES INC       61,368.53         1006043       27-Mar-25       W.W. GRAINGER, INC.       5,652.89         1006044       27-Mar-25       WEST COAST SAFETY SUPPLY, INC       6,507.22         1006045       27-Mar-25       WEST YOST & ASSOCIATES, INC.       966.00         SUB-TOTAL IRWD WELLS FARGO ACH DISBURSEMENTS       4,948,680.52         2000936       6-Mar-25       FERGUSON US HOLDINGS, INC.       17,756.49         2000937       6-Mar-25       FERGUSON US HOLDINGS, INC.       17,756.49         2000938       13-Mar-25       ELEMENTAL SCIENTIFIC, INC.       312.32         2000939       13-Mar-25       FERGUSON US HOLDINGS, INC.       12,726.92         2000939       13-Mar-25       FERGUSON US HOLDINGS, INC.       12,726.92         2000940       13-Mar-25       IDEXX DISTRIBUTION, INC	1006035	27-Mar-25	RAM AIR ENGINEERING INC	8,187.99
1006038       27-Mar-25       SKORUZ TECHNOLOGIES INC       44,940.00         1006039       27-Mar-25       STUDSON, INC.       13,720.20         1006040       27-Mar-25       TETRA TECH, INC       39,375.00         1006041       27-Mar-25       UNIVAR SOLUTIONS USA, LLC       10,439.20         1006042       27-Mar-25       VULCAN INDUSTRIES INC       61,368.53         1006043       27-Mar-25       W. W. GRAINGER, INC.       5,652.89         1006044       27-Mar-25       WEST COAST SAFETY SUPPLY, INC       6,507.22         1006045       27-Mar-25       WEST COAST SAFETY SUPPLY, INC       6,507.22         1006045       27-Mar-25       WEST YOST & ASSOCIATES, INC.       17,756.49         2000936       6-Mar-25       FERGUSON US HOLDINGS, INC.       17,756.49         2000937       6-Mar-25       THOMPSON & PHIPPS INC       35,766.39         2000938       13-Mar-25       ELEMENTAL SCIENTIFIC, INC.       312.32         2000939       13-Mar-25       FERGUSON US HOLDINGS, INC.       12,726.92         2000940       13-Mar-25       IDEXX DISTRIBUTION, INC       7,579.87         2000941       13-Mar-25       THOMPSON & PHIPPS INC       27,100.82	1006036	27-Mar-25	RED WING SHOE STORE	473.03
1006039       27-Mar-25       STUDSON, INC.       13,720.20         1006040       27-Mar-25       TETRA TECH, INC       39,375.00         1006041       27-Mar-25       UNIVAR SOLUTIONS USA, LLC       10,439.20         1006042       27-Mar-25       VULCAN INDUSTRIES INC       61,368.53         1006043       27-Mar-25       W.W. GRAINGER, INC.       5,652.89         1006044       27-Mar-25       WEST COAST SAFETY SUPPLY, INC       6,507.22         1006045       27-Mar-25       WEST COAST SAFETY SUPPLY, INC       966.00         SUB-TOTAL IRWD WELLS FARGO ACH DISBURSEMENTS       4,948,680.52       966.00         2000936       6-Mar-25       FERGUSON US HOLDINGS, INC.       17,756.49         2000937       6-Mar-25       THOMPSON & PHIPPS INC       35,756.39         2000938       13-Mar-25       ELEMENTAL SCIENTIFIC, INC.       312.32         2000939       13-Mar-25       FERGUSON US HOLDINGS, INC.       12,726.92         2000940       13-Mar-25       IDEXX DISTRIBUTION, INC       7,579.87         2000941       13-Mar-25       THOMPSON & PHIPPS INC       27,100.82	1006037	27-Mar-25	RLG ENTERPRISES, INC	1,236.19
1006040       27-Mar-25       TETRA TECH, INC       39,375.00         1006041       27-Mar-25       UNIVAR SOLUTIONS USA , LLC       10,439.20         1006042       27-Mar-25       VULCAN INDUSTRIES INC       61,368.53         1006043       27-Mar-25       W. W. GRAINGER, INC.       5,652.89         1006044       27-Mar-25       WEST COAST SAFETY SUPPLY, INC       6,507.22         1006045       27-Mar-25       WEST YOST & ASSOCIATES, INC.       966.00         SUB-TOTAL IRWD WELLS FARGO ACH DISBURSEMENTS       4,948,680.52         2000936       6-Mar-25       FERGUSON US HOLDINGS, INC.       17,756.49         2000937       6-Mar-25       THOMPSON & PHIPPS INC       35,756.39         2000938       13-Mar-25       ELEMENTAL SCIENTIFIC, INC.       312.32         2000939       13-Mar-25       FERGUSON US HOLDINGS, INC.       12,726.92         2000940       13-Mar-25       IDEXX DISTRIBUTION, INC       7,579.87         2000941       13-Mar-25       THOMPSON & PHIPPS INC       27,100.82	1006038	27-Mar-25	SKORUZ TECHNOLOGIES INC	44,940.00
1006041       27-Mar-25       UNIVAR SOLUTIONS USA , LLC       10,439.20         1006042       27-Mar-25       VULCAN INDUSTRIES INC       61,368.53         1006043       27-Mar-25       W. W. GRAINGER, INC.       5,652.89         1006044       27-Mar-25       WEST COAST SAFETY SUPPLY, INC       6,507.22         1006045       27-Mar-25       WEST COAST SAFETY SUPPLY, INC       966.00         SUB-TOTAL IRWD WELLS FARGO ACH DISBURSEMENTS       4,948,680.52         2000936       6-Mar-25       FERGUSON US HOLDINGS, INC.       17,756.49         2000937       6-Mar-25       THOMPSON & PHIPPS INC       35,756.39         2000938       13-Mar-25       ELEMENTAL SCIENTIFIC, INC.       312.32         2000939       13-Mar-25       FERGUSON US HOLDINGS, INC.       12,726.92         2000940       13-Mar-25       THOMPSON & PHIPPS INC       7,579.87         2000941       13-Mar-25       THOMPSON & PHIPPS INC       27,100.82	1006039	27-Mar-25	STUDSON, INC.	13,720.20
1006042       27-Mar-25       VULCAN INDUSTRIES INC       61,368.53         1006043       27-Mar-25       W. W. GRAINGER, INC.       5,652.89         1006044       27-Mar-25       WEST COAST SAFETY SUPPLY, INC       6,507.22         1006045       27-Mar-25       WEST YOST & ASSOCIATES, INC.       966.00         SUB-TOTAL IRWD WELLS FARGO ACH DISBURSEMENTS       4,948,680.52         2000936       6-Mar-25       FERGUSON US HOLDINGS, INC.       17,756.49         2000937       6-Mar-25       THOMPSON & PHIPPS INC       35,756.39         2000938       13-Mar-25       ELEMENTAL SCIENTIFIC, INC.       312.32         2000939       13-Mar-25       FERGUSON US HOLDINGS, INC.       12,726.92         2000940       13-Mar-25       IDEXX DISTRIBUTION, INC       7,579.87         2000941       13-Mar-25       THOMPSON & PHIPPS INC       27,100.82	1006040	27-Mar-25		39,375.00
1006043       27-Mar-25       W. W. GRAINGER, INC.       5,652.89         1006044       27-Mar-25       WEST COAST SAFETY SUPPLY, INC       6,507.22         1006045       27-Mar-25       WEST YOST & ASSOCIATES, INC.       966.00         SUB-TOTAL IRWD WELLS FARGO ACH DISBURSEMENTS       4,948,680.52         2000936       6-Mar-25       FERGUSON US HOLDINGS, INC.       17,756.49         2000937       6-Mar-25       THOMPSON & PHIPPS INC       35,756.39         2000938       13-Mar-25       ELEMENTAL SCIENTIFIC, INC.       312.32         2000930       13-Mar-25       FERGUSON US HOLDINGS, INC.       12,726.92         2000940       13-Mar-25       THOMPSON & PHIPPS INC       7,579.87         2000941       13-Mar-25       THOMPSON & PHIPPS INC       27,100.82	1006041	27-Mar-25	UNIVAR SOLUTIONS USA , LLC	10,439.20
1006044       27-Mar-25       WEST COAST SAFETY SUPPLY, INC       6,507.22         1006045       27-Mar-25       WEST YOST & ASSOCIATES, INC.       966.00         SUB-TOTAL IRWD WELLS FARGO ACH DISBURSEMENTS       4,948,680.52         2000936       6-Mar-25       FERGUSON US HOLDINGS, INC.       17,756.49         2000937       6-Mar-25       THOMPSON & PHIPPS INC       35,756.39         2000938       13-Mar-25       ELEMENTAL SCIENTIFIC, INC.       312.32         2000939       13-Mar-25       FERGUSON US HOLDINGS, INC.       12,726.92         2000940       13-Mar-25       IDEXX DISTRIBUTION, INC       7,579.87         2000941       13-Mar-25       THOMPSON & PHIPPS INC       27,100.82	1006042	27-Mar-25	VULCAN INDUSTRIES INC	61,368.53
1006045         27-Mar-25         WEST YOST & ASSOCIATES, INC.         966.00           SUB-TOTAL IRWD WELLS FARGO ACH DISBURSEMENTS         4,948,680.52           2000936         6-Mar-25         FERGUSON US HOLDINGS, INC.         17,756.49           2000937         6-Mar-25         THOMPSON & PHIPPS INC         35,756.39           2000938         13-Mar-25         ELEMENTAL SCIENTIFIC, INC.         312.32           2000939         13-Mar-25         FERGUSON US HOLDINGS, INC.         12,726.92           2000940         13-Mar-25         IDEXX DISTRIBUTION, INC         7,579.87           2000941         13-Mar-25         THOMPSON & PHIPPS INC         27,100.82	1006043	27-Mar-25	W. W. GRAINGER, INC.	5,652.89
SUB-TOTAL IRWD WELLS FARGO ACH DISBURSEMENTS         4,948,680.52           2000936         6-Mar-25         FERGUSON US HOLDINGS, INC.         17,756.49           2000937         6-Mar-25         THOMPSON & PHIPPS INC         35,756.39           2000938         13-Mar-25         ELEMENTAL SCIENTIFIC, INC.         312.32           2000939         13-Mar-25         FERGUSON US HOLDINGS, INC.         12,726.92           2000940         13-Mar-25         IDEXX DISTRIBUTION, INC         7,579.87           2000941         13-Mar-25         THOMPSON & PHIPPS INC         27,100.82	1006044	27-Mar-25	WEST COAST SAFETY SUPPLY, INC	6,507.22
2000936         6-Mar-25         FERGUSON US HOLDINGS, INC.         17,756.49           2000937         6-Mar-25         THOMPSON & PHIPPS INC         35,756.39           2000938         13-Mar-25         ELEMENTAL SCIENTIFIC, INC.         312.32           2000939         13-Mar-25         FERGUSON US HOLDINGS, INC.         12,726.92           2000940         13-Mar-25         IDEXX DISTRIBUTION, INC         7,579.87           2000941         13-Mar-25         THOMPSON & PHIPPS INC         27,100.82	1006045	27-Mar-25	WEST YOST & ASSOCIATES, INC.	966.00
2000937         6-Mar-25         THOMPSON & PHIPPS INC         35,756.39           2000938         13-Mar-25         ELEMENTAL SCIENTIFIC, INC.         312.32           2000939         13-Mar-25         FERGUSON US HOLDINGS, INC.         12,726.92           2000940         13-Mar-25         IDEXX DISTRIBUTION, INC         7,579.87           2000941         13-Mar-25         THOMPSON & PHIPPS INC         27,100.82	SUB-TOTAL IRWD	WELLS FARGO AC	CH DISBURSEMENTS	4,948,680.52
2000937         6-Mar-25         THOMPSON & PHIPPS INC         35,756.39           2000938         13-Mar-25         ELEMENTAL SCIENTIFIC, INC.         312.32           2000939         13-Mar-25         FERGUSON US HOLDINGS, INC.         12,726.92           2000940         13-Mar-25         IDEXX DISTRIBUTION, INC         7,579.87           2000941         13-Mar-25         THOMPSON & PHIPPS INC         27,100.82				
2000938         13-Mar-25         ELEMENTAL SCIENTIFIC, INC.         312.32           2000939         13-Mar-25         FERGUSON US HOLDINGS, INC.         12,726.92           2000940         13-Mar-25         IDEXX DISTRIBUTION, INC         7,579.87           2000941         13-Mar-25         THOMPSON & PHIPPS INC         27,100.82	2000936	6-Mar-25	FERGUSON US HOLDINGS, INC.	17,756.49
2000939         13-Mar-25         FERGUSON US HOLDINGS, INC.         12,726.92           2000940         13-Mar-25         IDEXX DISTRIBUTION, INC         7,579.87           2000941         13-Mar-25         THOMPSON & PHIPPS INC         27,100.82	2000937	6-Mar-25	THOMPSON & PHIPPS INC	35,756.39
2000940         13-Mar-25         IDEXX DISTRIBUTION, INC         7,579.87           2000941         13-Mar-25         THOMPSON & PHIPPS INC         27,100.82	2000938	13-Mar-25	ELEMENTAL SCIENTIFIC, INC.	312.32
2000941 13-Mar-25 THOMPSON & PHIPPS INC 27,100.82	2000939	13-Mar-25	FERGUSON US HOLDINGS, INC.	12,726.92
	2000940	13-Mar-25	IDEXX DISTRIBUTION, INC	7,579.87
2000942 13-Mar-25 UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA 6,113.23	2000941	13-Mar-25	THOMPSON & PHIPPS INC	27,100.82
	2000942	13-Mar-25	UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA	6,113.23

CHECK OR			
<b>ELECTRONIC</b> #	PAYMENT DATE	SUPPLIER	<b>PAYMENT AMOUNT</b>
2000943	20-Mar-25	ACCUSOURCE, INC.	1,282.62
2000944	20-Mar-25	FERGUSON US HOLDINGS, INC.	4,532.51
2000945	20-Mar-25	THOMPSON & PHIPPS INC	854.54
2000946	27-Mar-25	PARKWAY LAWNMOWER SHOP	227.93
2000947	27-Mar-25	THOMPSON & PHIPPS INC	29,515.53
SUB-TOTAL IRWD	WELLS FARGO PC		143,759.17
100267	6-Mar-25	SERRANO WATER DISTRICT	3,009,452.07
100268	20-Mar-25	BANK OF AMERICA	146,473.72
100269	20-Mar-25	CALIFORNIA DEPARTMENT OF TAX AND FEE ADMINISTRATION	847.00
100270	20-Mar-25	SUMITOMO MITSUI BANKING CORPORATION	47,055.89
100271	20-Mar-25	U.S. BANK NATIONAL ASSOCIATION	81,911.40
100272	20-Mar-25	WELLS FARGO BANK, N.A.	4,666.85
100273	27-Mar-25	BANK OF AMERICA	500.00
100274	27-Mar-25	CALIFORNIA DEPARTMENT OF TAX AND FEE ADMINISTRATION	26,001.54
SUB-TOTAL IRWD	WELLS FARGO W	IRE DISBURSEMENTS	3,316,908.47
16148	6-Mar-25	CALPERS	816,191.11
16149	20-Mar-25	FRANCHISE TAX BOARD	92,885.28
16150	20-Mar-25	CALPERS	326,103.98
16151	20-Mar-25	INTERNAL REVENUE SERVICE	281,471.77
16152	20-Mar-25	CALIFORNIA DEPARTMENT OF CHILD SUPPORT SERVICES	3,539.83
16153	20-Mar-25	EMPLOYMENT DEVELOPMENT DEPARTMENT	28,744.91
16154	20-Mar-25	CHARD SNYDER & ASSOCIATES, INC.	1,301.63
16155	20-Mar-25	EMPOWER RETIREMENT, LLC	214,620.83
16156	27-Mar-25	FRANCHISE TAX BOARD	92,898.23
16157	27-Mar-25	CALPERS	326,659.22
16158	27-Mar-25	INTERNAL REVENUE SERVICE	280,493.65
16159	27-Mar-25	CALIFORNIA DEPARTMENT OF CHILD SUPPORT SERVICES	3,539.83
16160	27-Mar-25	EMPLOYMENT DEVELOPMENT DEPARTMENT	23,739.89
16161	27-Mar-25	CALPERS	816,440.30
16162	27-Mar-25	CHARD SNYDER & ASSOCIATES, INC.	900.94
16163	27-Mar-25	EMPOWER RETIREMENT, LLC	211,424.05
16164	27-Mar-25	BARDEEN PARTNERS, INC.	214,000.00
SUB-TOTAL IRWD	BOFA WIRE DISBU	URSEMENTS	3,734,955.45

## SUB-TOTAL BOFA AND WELLS FARGO CHECK AND ELECTRONIC DISBURSEMENTS

446087	7-Nov-24	KOUJAH, LULIA	4.81
446097	7-Nov-24	MIKE ETCHANDY FARMS, INC.	6,894.91
446164	7-Nov-24	YU, SONGNA	18.63
446237	14-Nov-24	HENKELS & MCCOY WEST LLC	1,068.65
446243	14-Nov-24	KIM, HELEN	479.38
446253	14-Nov-24	MOKABBERI, ALI	60.05

# 23,702,171.33

ECTRONIC #	PAYMENT DATE	SUPPLIER	PAYMENT AMOUNT
446261	14-Nov-24	NEWMAN, HAROLD	58.69
446312	14-Nov-24	WARMINGTON HOMES	39.61
446359	21-Nov-24	DZYNE TECHNOLOGIES LLC	1,581.48
446382	21-Nov-24	IRVINE PROPERTY MANAGEMENT	26.88
447753	13-Feb-25	CURATIVE I.T. LLC	443.98
447765	13-Feb-25	FELD, SEAN E	30.00
447799	13-Feb-25	LENNAR HOMES OF CALIFORNIA, INC.	128.53
448026	27-Feb-25	CONNEXUS INDUSTRIES, INC.	2,077.43
448310	13-Mar-25	JANG, YOUNGHEE	48.20
1005915	20-Mar-25	Ovcharenko, Rachael	180.00
2000868	7-Nov-24	S&S SEEDS INC	20,499.28
2000901	19-Dec-24	THERMO ELECTRON NORTH AMERICA LLC	103,509.44
2000918	23-Jan-25	THERMO ELECTRON NORTH AMERICA LLC	8,233.57
B-TOTAL BOFA	AND WELLS FARG	O CHECK AND ELECTRONIC VOIDED IN MARCH 2025	145,383.52

NET

23,556,787.81

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# Exhibit "E"

# MONTHLY SUMMARY OF PAYROLL ACH PAYMENTS

#### March 2025

	AMOUNT	VENDOR	PURPOSE
3/7/2025 3/21/2025	1,307,215.47 1,302,063.52 <b>\$2,609,278.99</b>	BANK OF AMERICA BANK OF AMERICA	ACH Payments for Payroll ACH Payments for Payroll

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# 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-MAR-25 to 31-MAR-25

NAME	CHECK NO.	CHECK DATE	AMOUNT	ITEM DESCRIPTION	EXPENSE JUSTIFICATION
Barreto, Gus	1005981	27-Mar-25	172.39	Other(Misc)	Safety shoe allowance
Bornhoff, Mike	1005753	6-Mar-25	121.00	Certification	CWEA Mechanical Technologist Grade IV
Bronstein, Louis	1005899	20-Mar-25	152.60	Mileage	Roundtrip attending CASA Conference, Palm Springs, CA January 29-31, 2025
Giatpaiboon, Scott	1005824	13-Mar-25	281.81	Lodging	2025 Pittcon Conference and Exposition, Boston, MA - March 2, 2025
Giatpaiboon, Scott	1005824	13-Mar-25	281.81	Lodging	2025 Pittcon Conference and Exposition, Boston, MA - March 3, 2025
Giatpaiboon, Scott	1005824	13-Mar-25	281.81	Lodging	2025 Pittcon Conference and Exposition, Boston, MA - March 4, 2025
Giatpaiboon, Scott	1005824	13-Mar-25	281.81	Lodging	2025 Pittcon Conference and Exposition, Boston, MA - March 5, 2025
Haug, Jack Philip Ryan	1005987	27-Mar-25	118.52	OT Meal	Over time meal for six people March 20, 2025
LaMar, Steven E	1005759	6-Mar-25	238.99	Lodging	CCEEB 2025 Fall Planning Conference, Carmel, CA - November 13, 2024
LaMar, Steven E	1005759	6-Mar-25	238.99	Lodging	CCEEB 2025 Fall Planning Conference, Carmel, CA - November 14, 2024
LaMar, Steven E	1005759	6-Mar-25	213.91	Auto Rental	CCEEB 2025 Fall Planning Conference, Carmel, CA - November 13-15, 2024
LaMar, Steven E	1005759	6-Mar-25	267.91	Lodging	ACWA Annual Fall Conference, Palm Desert, CA - December 2, 2024
LaMar, Steven E	1005759	6-Mar-25	267.91	Lodging	ACWA Annual Fall Conference, Palm Desert, CA - December 3, 2024
LaMar, Steven E	1005759	6-Mar-25	267.91	Lodging	ACWA Annual Fall Conference, Palm Desert, CA - December 4, 2024
LaMar, Steven E	1005759	6-Mar-25	147.40	Mileage	Roundtrip attending ACWA Annual Fall Conference, Palm Desert, CA - December 2
Martin, Colton	1005828	13-Mar-25	425.00	Certification	Project Management Professional certification
Martin, Colton	1005828	13-Mar-25	194.00	Membership	Project Management Professional membership
Melendez, Evan	1005762	6-Mar-25	320.00	Certification	Backflow Prevention Assembly Tester
Munoz, Ruben	1005993	27-Mar-25	345.00	Certification	CWEA Collections Systems Operator Grade I
Nguyen, Jeanny	1005763	6-Mar-25	125.00	Other(Misc)	Safety shoe allowance
O'Neill, Owen H	1005912	20-Mar-25	163.51	Lunch <30	Biosolids Maintenance Mechanic Appreciation Luncheon
Orozco, Gustavo	1005914	20-Mar-25	239.00	Membership	CWEA membership
Ovcharenko, Rachael	1005915	20-Mar-25	180.00	Certification	PE Civil Engineer license renewal
Parra, Dennis	1005765	6-Mar-25	239.00	Membership	CWEA membership
Parra, Dennis	1005765	6-Mar-25	106.00	Certification	CWEA Collections Grade I
Rajaee, Omid	1005768	6-Mar-25	125.00	Other(Misc)	Safety shoe allowance
Ramirez, Lizandro	1005995	27-Mar-25	123.86	Other(Misc)	Safety shoe allowance
Reed, James W	1005996	27-Mar-25	125.00	Certification	Cross Connection Specialist
Smith, Cameron	1006001	27-Mar-25	100.80	Mileage	Public Sector CIO Summit - 1107 W. Park Avenue, Redlands, CA 92373
Smith, Cameron	1006001	27-Mar-25	100.80	Mileage	Public Sector CIO Summit - 1107 W. Park Avenue, Redlands, CA 92373
Villella, Aaren	1005775	6-Mar-25	239.00	Membership	CWEA membership
Villella, Aaren	1005775	6-Mar-25	106.00	Certification	CWEA Collection Systems Grade I
Wise, Maureen (Mo)	1005777	6-Mar-25	169.00	Membership	Society of Wetlands Scientists renewal
Yubac, Aljon Kyle	1005838	13-Mar-25	125.00	Other(Misc)	Safety shoe allowance
1		Total Amount:	\$6,885.74		

<sup>-</sup> 2-5, 2024	 	

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April 28, 2025 Prepared by: V. Li Submitted by: C. Smithson / N. Adly Approved by: Paul A. Cook

#### CONSENT CALENDAR

#### FISCAL YEAR 2024-25 IRWD GUIDING PRINCIPLES SCORECARD

#### SUMMARY:

The IRWD Guiding Principles Scorecard through the third quarter of Fiscal Year (FY) 2024-25 is provided as Exhibit "A". This document reflects the critical performance measures that gauge the District's key business objectives, based on the Board-adopted Guiding Principles.

#### BACKGROUND:

IRWD's Guiding Principles Scorecard is based on four Board-adopted Guiding Principles used to achieve its vision. These principles relate to 1) Customer Service, 2) Resource Management, 3) Employee Development, and 4) Community Leadership. The Scorecard includes measures that reflect operating performance, financial, customer, and other key measures that provide an overview of the ongoing operations of IRWD. Staff has also included additional detailed information on certain selected key indicators.

#### FISCAL IMPACTS:

Not applicable.

#### 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 reviewed by a Committee.

#### **RECOMMENDATION:**

**RECEIVE AND FILE.** 

LIST OF EXHIBITS:

Exhibit "A" - IRWD Guiding Principles Scorecard

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#### Exhibit "A"

# **IRVINE RANCH WATER DISTRICT**

#### **Guiding Principles Scorecard**

Through the Third Quarter of Fiscal Year 2024-25

#### Customer Service

We are dedicated to delivering superior service to our customers.

· · · · · · · · · · · · · · · ·		
Measure	Last Year	This Year
Customer Satisfaction	96%	92%
Electronic Payments Received	88%	89%
Customer Contacts	61,339	58,553
Delinquent Customers on Payment	539	503
Arrangements	539	503
Residential Customers within Water	82%	700/
Budget	82%	79%
All Customers within	0.20/	70%
Water Budget	83%	79%
Occupancy Certificates	1,275	946
Actionable Sewer Odor Inquiries	4	9
Actionable Water Quality Inquiries	18	57



To achieve greater customer and employee satisfaction, increased reliability and resource conservation, and excellent external relationships with suppliers and others.

#### Resource Management

We are dedicated to providing, conserving, and maximizing the efficient use and reuse of water and renewable resources to the benefit of our customers and to enhance the environment.

customers and to enhance the environment.			
Measure	Last Year	This Year	
Planned Maintenance Completed	64%	63%	
Potable Water Supply (AF)	40,906	44,492	
Non-Potable Water Supply (AF)	24,585	23,855	
Irvine Lake Storage (AF) <sup>3</sup>	12,298	9,704	
Recycled Water Storage (AF) <sup>4</sup>	3,373	3,047	
Sewage Treatment Cost per MG	\$3,441	\$3,727	
Capital Spending vs Budget	68%	85%	
AQMD Reported Incidents	7	2	
Plant Incidents (NPDES)	4	3	
Sewer Spills (Non-private)	3	1	

<sup>1</sup> In Thousands

Education Programs

Hours Spent Outreach Events

<sup>2</sup> Social Media / non-IRWD Websites

Industry Awards and Honors

Measure

Water Efficiency Website Page

External Media Impressions<sup>1, 2</sup>

Student Participation in Water

State Legislative & Regulatory

Billing Website Page Views<sup>1</sup>

Views<sup>1</sup>



Community Leadership We will share our resources with the community through education,

policy leadership and employee involvement.

Last Year This Year

75

73

12,289

2,306

862

26

3

43

72

7,469

4,233

874

24

12



#### **Employee Development**

We are committed to recruiting and retaining top quality employees and to providing a workplace environment, training, and a recognition and reward system that enhances employee performance and satisfaction.

Measure	Last Year	This Year
Participation in 457 Retirement	90%	89%
Employee Retention	91%	89%
OSHA Days Away, Restricted, or	3.0	1.9
Transferred per 100 employees	5.0	1.9
Cross Training Opportunities	17	25
Interns Employed	19	13
Recognition Awards Given	134	95



<sup>3</sup> Total Water in Lake as of Quarter End

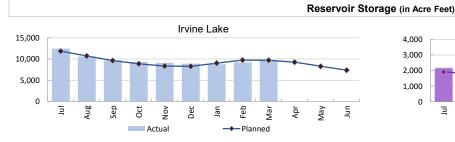
<sup>4</sup> As of Quarter End

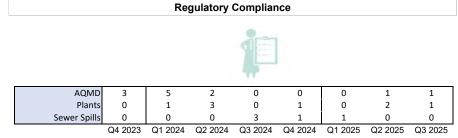
#### **IRVINE RANCH WATER DISTRICT**

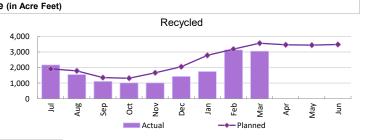
#### Guiding Principles Closer Perspective

Through the Third Quarter of Fiscal Year 2024-25











April 28, 2025 Prepared by: S. Choi Submitted by: K. Burton Approved by: Paul A. Cook

#### CONSENT CALENDAR

#### DESIGNATION OF IRWD AUTHORIZED AGENTS FOR THE GOVERNOR'S OFFICE OF EMERGENCY SERVICES

#### SUMMARY:

Every three years, the State of California Governor's Office of Emergency Services (CalOES) requires local jurisdictions to execute a Designation of Applicants Agent Resolution For Non-State Agencies form (Form 130) to receive State grants and financial assistance in the event of a declared emergency. This form must be approved by the Board and on file with CalOES, authorizing local jurisdictions to file and engage with the Federal Emergency Management Agency (FEMA) and CalOES for State grants and disaster assistance.

Staff recommends that the Board approve the Designation of IRWD Authorized Agents for the Governor's Office of Emergency Services, appointing and authorizing the General Manager, Executive Director of Finance and Administration, and the Director of Safety & Security to file and engage with CalOES for grants and disaster assistance applied for by the District.

#### **BACKGROUND:**

CalOES requires non-state agencies to execute a CalOES Form 130 to receive State grants, certain financial assistance under Public Law 93-288, as amended by the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988, and State financial assistance under the California Disaster Assistance Act. CalOES Form 130 must be approved by the Board, authorizing agents of IRWD to file and engage with FEMA and CalOES for State grants and disaster assistance. The CalOES Form 130 will be in effect for three years, following the date of Board approval, for all open and future disaster assistance.

#### FISCAL IMPACTS:

Not applicable.

#### 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 reviewed by a Committee.

Consent Calendar: Designation of IRWD Authorized Agents for the Governor's Office of Emergency Services April 28, 2025 Page 2

#### **<u>RECOMMENDATION:</u>**

THAT THE BOARD APPROVE THE CALIFORNIA GOVERNOR'S OFFICE OF EMERGENCY SERVICES FORM 130 (IRWD RESOLUTION NO. 2025-9), DESIGNATING IRWD AUTHORIZED AGENTS FOR THE PURPOSE OF OBTAINING FINANCIAL ASSISTANCE FOR ANY EXISTING AND FUTURE GRANT PROGRAMS.

#### LIST OF EXHIBITS:

Exhibit "A" – California Governor's Office of Emergency Services, Form 130 Exhibit "B" – List of Authorized Agents OES-FPD-130 (Rev. 10-2022)

Cal OES ID No:

# DESIGNATION OF APPLICANT'S AGENT RESOLUTION FOR NON-STATE AGENCIES

BE IT RESOLVED BY THE Board of Directors

OF THE Irvine Ranch Water District

OR

(Governing Body)

**General Manager** 

(Name of Applicant)

THAT

(Title of Authorized Agent)

Executive Director of Finance & Administration, OR

(Title of Authorized Agent)

Director of Safety & Security

(Title of Authorized Agent)

is hereby authorized to execute for and on behalf of the Irvine Ranch Water District,

(Name of Applicant) a public entity established under the laws of the State of California, this application and to file it with the California Governor's Office of Emergency Services for the purpose of obtaining federal financial assistance for any existing or future grant program, including, but not limited to any of the following:

- Federally declared Disaster (DR), Fire Mitigation Assistance Grant (FMAG), California State Only Disaster (CDAA), Immediate Services Program (ISP), Hazard Mitigation Grant Program (HMGP), Building Resilient Infrastructure and Communities (BRIC), Legislative Pre-Disaster Mitigation Program (LPDM), under
- Public Law 93-288 as amended by the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988, and/or state financial assistance under the California Disaster Assistance Act.
- Flood Mitigation Assistance Program (FMA), under Section 1366 of the National Flood Insurance Act of 1968.
- National Earthquake Hazards Reduction Program (NEHRP) 42 U.S. Code 7704 (b) ((2) (A) (ix) and 42 U.S. Code 7704 (b) (2) (B) National Earthquake Hazards Reduction Program, and also The Consolidated Appropriations Act, 2018, Div. F, Department of Homeland Security Appropriations Act, 2018, Pub. L. No. 115-141
- California Early Earthquake Warning (CEEW) under CA Gov Code Gov, Title 2, Div. 1, Chapter 7, Article 5, Sections 8587.8, 8587.11, 8587.12

That the Irvine Ranch Water District , a public entity established under the (Name of Applicant)

laws of the State of California, hereby authorizes its agent(s) to provide to the Governor's Office of Emergency Services for all matters pertaining to such state disaster assistance the assurances and agreements required.



OES-FPD-130 (Rev. 10-2022)

# Please check the appropriate box below

This is a universal resolution and is effective for all open and future disasters/grants declared up to three (3) years following the date of approval.

This is a disaster/grant specific resolution and is effective for only

disaster/grar	number(s):

Passed and approved this <u>28</u> day of <u>April</u>, <u>20</u> <u>25</u>

(Name and Title of Governing Body Representative)

(Name and Title of Governing Body Representative)

(Name and Title of Governing Body Representative)

# CERTIFICATION

l,, c	luly appointed andof
(Name)	(Title)
Irvine Ranch Water District	, do hereby certify that the above is a true and
(Name of Applicant)	
correct copy of a resolution passed a	nd approved by the Board of Directors
of the Irvine Ranch Water Distric	<b>:t</b> day of, 20
(Name of Applicant)	

(Signature)



# Cal OES Form 130 Instructions

A Designation of Applicant's Agent Resolution for Non-State Agencies is required of all Applicants to be eligible to receive funding. A new resolution must be submitted if a previously submitted resolution is older than three (3) years from the last date of approval, is invalid, or has not been submitted.

When completing the Cal OES Form 130, Applicants should fill in the blanks on pages 1 and 2. The blanks are to be filled in as follows:

### **Resolution Section:**

**Governing Body**: This is the group responsible for appointing and approving the Authorized Agents.

Examples include: Board of Directors, City Council, Board of Supervisors, Board of Education, etc.

Name of Applicant: The public entity established under the laws of the State of California.

Examples include: School District, Office of Education, City, County or Non-profit agency that has applied for the grant, such as: City of San Diego, Sacramento County, Burbank Unified School District, Napa County Office of Education, University Southern California.

Authorized Agent: These are the individuals that are authorized by the Governing Body to engage with the Federal Emergency Management Agency and the California Governor's Office of Emergency Services regarding grants for which they have applied. There are two ways of completing this section:

- 1. Titles Only: The titles of the Authorized Agents should be entered here, not their names. This allows the document to remain valid if an Authorized Agent leaves the position and is replaced by another individual. If "Titles Only" is the chosen method, this document must be accompanied by either a cover letter naming the Authorized Agents by name and title, or the Cal OES AA Names document. The supporting document can be completed by any authorized Agent, secretary to the Director). It does not require the Governing Body's signature.
- 2. Names and Titles: If the Governing Body so chooses, the names **and** titles of the Authorized Agents would be listed. A new Cal OES Form 130 will be required if any of the Authorized Agents are replaced, leave the position listed on the document, or their title changes.



**Checking Universal or Disaster-Specific Box**: A Universal resolution is effective for all past disasters and for those declared up to three (3) years following the date of approval. Upon expiration it is no longer effective for new disasters, but it remains in effect for disasters declared prior to expiration. It remains effective until the disaster goes through closeout unless it is superseded by a newer resolution.

Governing Body Representative: These are the names and titles of the approving Board Members.

Examples include: Chairman of the Board, Director, Superintendent, etc. The names and titles **cannot** be one of the designated Authorized Agents. A minimum of three (3) approving board members must be listed. If less than three are present, meeting minutes must be attached in order to verify a quorum was met.

# **Certification Section:**

Name and Title: This is the individual in attendance who recorded the creation and approval of this resolution.

Examples include: City Clerk, Secretary to the Board of Directors, County Clerk, etc. This person **cannot** be one of the designated Authorized Agents or Approving Board Member. If a person holds two positions (such as City Manager and Secretary to the Board) and the City Manager is to be listed as an Authorized Agent, then that person could sign the document as Secretary to the Board (not City Manager) to eliminate "Self-Certification."

# List of Authorized Agents

Exhibit "B"

Entity Name:

Irvine Ranch Water District

Cal OES ID:

• Enter each Authorized Agent (AA) as listed on the Designation of Applicant's Agent Resolution (Cal OES 130) for Non-State Agencies or as it appears on the Signature Authority (Cal OES 130SA) for California State Agencies.

- Check box to receive electronic copies of Cal OES Notification of Obligation and/or Payment packages. (Minimum 1 AA.)
- Email addresses must use an email that shares the official entity URL.

Authorized Agent Name	Authorized Agent Title	Email Address	Pkg?
Paul Cook	General Manager	cook@irwd.com	$\checkmark$
Neveen Adly	Executive Director of Finance & Admininistration	adly@irwd.com	$\checkmark$
Steve Choi	Director of Safety & Security	choi@irwd.com	$\checkmark$

•An Approved Contact may be designated by an AA to request or receive information on grant payment status. Add them by inputting their information below. (Ex. Accounting/Admin offices) Must use an official email URL.

Approved Contact Name	Approved Contact Title	Email Address	Pkg?
Eileen Lin	Director of Accounting & Treasury	lin@irwd.com	
			]

Please use a second page if more space is needed.

Fmail

Fmail

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April 28, 2025 Prepared by: W. Kleinau Submitted by: J. Manning / W. Chambers Approved by: Paul A. Cook

#### CONSENT CALENDAR

#### IRWD 2025 SEWER SYSTEM MANAGEMENT PLAN UPDATE

#### SUMMARY:

The State Water Resources Control Board is the permitting agency for IRWD's sewage collection system. The State Board requires that the owner of a sewage collection system develop, implement, and update a Sewer System Management Plan (SSMP) every six years. As part of the SSMP implementation, the State Board also requires that the governing entity of the agency that owns the sewer system approve the updates to the SSMP. Staff has completed the District's SSMP update and recommends that the Board approve the IRWD 2025 SSMP.

#### BACKGROUND:

IRWD operates the largest sewer system in Orange County, with over 132,000 sewer connections serving 446,000 customers. The District maintains 1,145 miles of gravity sewer mains, 29 miles of sewer force mains, 19 sewer siphons, and 12 lift stations throughout its service area. Regular cleaning, inspection, and maintenance of all components of the sewer system preserve its safe and reliable operations.

Under the State Board's General Waste Discharge Requirements (WDRs) for sewage collection systems, owners of the systems must develop, implement, and maintain an SSMP to facilitate the appropriate funding and management of sewer systems. An SSMP must include provisions to properly and efficiently manage, operate, and maintain the sewer system, while taking into consideration risk management and cost-benefit analyses. Additionally, an SSMP must contain a Spill Emergency Response Plan that establishes standard procedures for immediate response to a spill in a manner designed to minimize health and water quality impacts, along with potential nuisance conditions. IRWD's current SSMP was approved by the Board on August 27, 2018.

#### IRWD 2025 SSMP Update:

In December 2022, the State Board issued an updated general order with additional requirements. This updated SSMP addresses those changes and aligns with the District's current maintenance practices and goals to conduct effective and efficient sewer maintenance.

The updated IRWD 2025 SSMP is provided as Exhibit "A". The following elements were updated in accordance with the State Water Resource Control Board's General Order 2022-0103-DWQ:

- Element 1 SSMP Goal and Introduction;
- Element 2 Organization;
- Element 3 Legal Authority;
- Element 4 Operation and Maintenance Program;

Consent Calendar: IRWD 2025 Sewer System Management Plan Update April 28, 2025 Page 2

- Element 5 Design and Performance Provisions;
- Element 6 Spill Emergency Response Plan;
- Element 7 Sewer Pipe Blockage Control Program;
- Element 8 System Evaluation, Capacity Assurance and Capital Improvements;
- Element 9 Monitoring, Measurement and Program Modifications;
- Element 10 Internal Audits;
- Element 11 Communication Program; and
- Attachment 1 Spill Emergency Response Plan.

The updated SSMP aligns the structure with and addresses minor regulatory changes in the new 2022 WDR. Some of these changes include identifying data submitters, submitting a GIS map of the sewer system, and attaching an updated Spill Response Plan. In addition to the regulatory changes, the SSMP update reflects our current maintenance practices in section 4.2 such as high maintenance frequencies, corrosion and odor monitoring, and routine jetting and CCTV frequencies. The update also notifies the State Board of IRWD's intent to utilize data integrations on the collections system to develop an enhanced maintenance program.

### Training Associated with Implementation of the 2025 SSMP:

The Collection Systems Department staff is trained annually on all aspects of the SSMP. The Collection Systems Manager facilitates and documents all training, focusing on safety, response, and roles and responsibilities in the department.

#### FISCAL IMPACTS:

None.

## ENVIRONMENTAL COMPLIANCE:

This item is defined in the State Water Resource Control Board's General Order 2022-0103-DWQ.

#### COMMITTEE STATUS:

This item was not reviewed by a Committee.

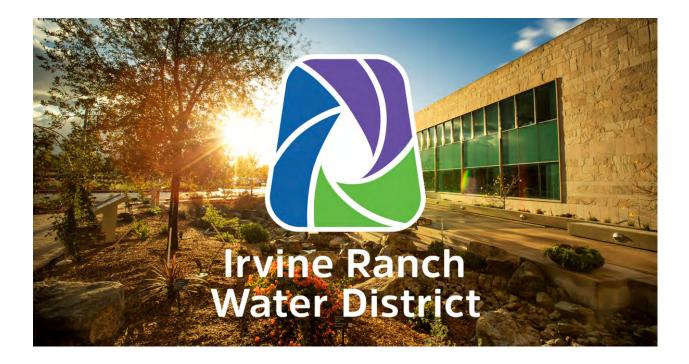
#### **RECOMMENDATION:**

# THAT THE BOARD APPROVE THE IRWD 2025 SEWER SYSTEM MANAGEMENT PLAN.

## LIST OF EXHIBITS:

Exhibit "A" – IRWD 2025 Sewer System Management Plan

Exhibit "A"



# Sewer System Management Plan - Update

Date adopted by the Governing Entity - IRWD Board of Directors: 4/28/25

WDID: 8SSO10587 – Michelson WRP WDID: 9SSO10669 – Los Alisos WRP CS WDID: 8SSO11513 – IRWD OCSD Regional 1 CS WDID: 8SSO11518 – IRWD OCSD Regional 2 CS WDID: 9SSO11514 – IRWD El Toro CS This page has intentionally been left blank.

# **Terms, Abbreviations and Definitions**

**Annual Report** - An Annual Report (previously termed as Collection System Questionnaire in Order 2006-0003-DWQ) is a mandatory report in which the Enrollee provides a calendar-year update of its efforts to prevent spills.

**Basin Plan** - A Basin Plan is a water quality control plan specific to a Regional Water Quality Control Board (Regional Water Board), that serves as regulations to: (1) define and designate beneficial uses of surface and groundwaters, (2) establish water quality objectives for protection of beneficial uses, and (3) provide implementation measures.

**Beneficial Uses -** The term "Beneficial Uses" is a Water Code term, defined as the uses of the waters of the State that may be protected against water quality degradation. Examples of beneficial uses include but are not limited to, municipal, domestic, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves.

**California Integrated Water Quality System (CIWQS)** - CIWQS is the statewide database that provides mandatory electronic reporting as required in State and Regional Water Board-issued waste discharge requirements.

**Data Submitter** - A Data Submitter is an individual designated and authorized by the Enrollee's Legally Responsible Official to enter spill data into the online CIWQS Sanitary Sewer System Database. A Data Submitter does not have the authority of a Legally Responsible Official to certify reporting entered into the online CIWQS Sanitary Sewer System Database.

**Disadvantaged Community** - A disadvantaged community is a community with a median household income of less than eighty percent (80%) of the statewide annual median household income. For the purpose of this General Order, there is no differentiation between a small and large disadvantaged community.

**Drainage Conveyance System** - A drainage conveyance system is a publicly- or privatelyowned separate storm sewer system, including but not limited to drainage canals, channels, pipelines, pump stations, detention basins, infiltration basins/facilities, or other facilities constructed to transport stormwater and non-stormwater flows.

**Enrollee** - An Enrollee is a public, private, or other non-governmental entity that has obtained approval for regulatory coverage under this General Order, including: A state agency, municipality, special district, or other public entity that owns and/or operates one or more sanitary sewer systems; greater than one (1) mile in length (each individual sanitary sewer system); one mile or less in length where the State Water Resources Control Board or a Regional Water Quality Control Board requires regulatory coverage under this Order, or; A federal agency, private company, or other non-governmental entity that owns and/or operates a sanitary sewer system of any size where the State Water Resources Control Board or a Regional Water

Quality Control Board requires regulatory coverage under this Order in response to a history of spills, proximity to surface water, or other factors supporting regulatory coverage.

**Environmentally Sensitive Area** - An environmentally sensitive area is a designated agricultural and/or wildlife area identified to need special natural landscape protection due to its wildlife or historical value.

**Exfiltration** - Exfiltration is the underground exiting of sewage from a sanitary sewer system through cracks, offset or separated joints, or failed infrastructure due to corrosion or other factors.

**Flood Control Channel** - A flood control channel is a channel used to convey stormwater and non-stormwater flows through and from areas for flood management purposes.

**Governing Entity** - A governing entity includes but is not limited to the following: A publicly elected governing board, council, or commission of a municipal agency; A Department or Division director of a federal or state agency that is not governed by a board; A governing board or commission of an organization or association; and A private system owner/manager that is not governed by a board.

**Hydrologically Connected** - Two waterbodies are hydrologically connected when one waterbody flows, or has the potential to flow, into the other waterbody. For the purpose of this General Order, groundwater is hydrologically connected to a surface water when the groundwater feeds into the surface water. (The surface waterbody in this example is termed a gaining stream as it gains flow from surrounding groundwater.)

Lateral (including Lower and Upper Lateral) - A lateral is an underground segment of smaller diameter pipe that transports sewage from a customer's building or property (residential, commercial, or industrial) to the Enrollee's main sewer line in a street or easement. Upper and lower lateral boundary definitions are subject to local jurisdictional codes and ordinances, or private system ownership. A lower lateral is the portion of the lateral located between the sanitary sewer system main, and either the property line, sewer clean out, curb line, established utility easement boundary, or other jurisdictional locations. An upper lateral is the portion of the lateral from the property line, sewer clean out, curb line, established utility easement boundary, or other jurisdictional locations, to the building or property.

**Legally Responsible Official** - A Legally Responsible Official is an official representative, designated by the Enrollee, with authority to sign and certify submitted information and documents required by this General Order.

**Nuisance** - For the purpose of this General Order, a nuisance, as defined in Water Code section 13050(m), is anything that meets all of the following requirements: Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property; Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal; and Occurs during, or as a result of, the treatment or disposal of wastes.

4

A-4

**Private Sewer Lateral** - A private sewer lateral is the privately-owned lateral that transports sewage from private property(ies) into a sanitary sewer system.

**Private Sanitary Sewer System** - A private sanitary sewer system is a sanitary sewer system of any size that is owned and/or operated by a private individual, company, corporation, or organization. A private sanitary sewer system may or may not connect into a publicly owned sanitary sewer system.

**Potential to Discharge, Potential Discharge -** Potential to Discharge, or Potential Discharge, means any exiting of sewage from a sanitary sewer system which can reasonably be expected to discharge into a water of the State based on the size of the sewage spill, proximity to a drainage conveyance system, and the nature of the surrounding environment.

Receiving Water - A receiving water is a water of the State that receives a discharge of waste.

**Resilience** - Resilience is the ability to recover from or adjust to adversity or change, and grow from disruptions. Resilience can be built through planning, preparing for, mitigating, and adapting to changing conditions.

**Sanitary Sewer System** - A sanitary sewer system is a system that is designed to convey sewage, including but not limited to, pipes, manholes, pump stations, siphons, wet wells, diversion structures and/or other pertinent infrastructure, upstream of a wastewater treatment plant headworks, including: Laterals owned and/or operated by the Enrollee; Satellite sewer systems; and/or Temporary conveyance and storage facilities, including but not limited to temporary piping, vaults, construction trenches, wet wells, impoundments, tanks and diversion structures. For the purpose of this Order, sanitary sewer systems include only systems owned and/or operated by the Enrollee.

**Satellite Sewer System** - A satellite sewer system is a portion of a sanitary sewer system owned or operated by a different owner than the owner of the downstream wastewater treatment facility ultimately treating the sewage.

**Sewer System Management Plan** - A sewer system management plan is a living document an Enrollee develops and implements to effectively manage its sanitary sewer system(s) in accordance with this General Order.

**Sewage** - Sewage, and its associated wastewater, is untreated or partially treated domestic, municipal, commercial and/or industrial waste (including sewage sludge), and any mixture of these wastes with inflow or infiltration of stormwater or groundwater, conveyed in a sanitary sewer system.

**Spill** - A spill is a discharge of sewage from any portion of a sanitary sewer system due to a sanitary sewer system overflow, operational failure, and/or infrastructure failure. Exfiltration of sewage is not considered to be a spill under this General Order if the exfiltrated sewage remains in the subsurface and does not reach a surface water of the State.

**Training** - Training is in-house or external education and guidance needed that provides the knowledge, skills, and abilities to comply with this General Order.

**Waste** - Waste, as defined in Water Code section 13050(d), includes sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of disposal.

**Waste Discharge Identification Number (WDID)** - A waste discharge identification number (WDID) identifies each individual sanitary sewer system enrolled under this General Order. A WDID number is assigned to each enrolled system upon an Enrollee's approved regulatory coverage.

**Waters of the State** - Waters of the State are surface waters or groundwater within boundaries of the state as defined in Water Code section 13050(e), in which the State and Regional Water Boards have authority to protect beneficial uses. Waters of the State include, but are not limited to, groundwater aquifers, surface waters, saline waters, natural washes and pools, wetlands, sloughs, and estuaries, regardless of flow or whether water exists during dry conditions. Waters of the State include waters of the United States.

**Waters of the United States -** Waters of the United States are surface waters or waterbodies that are subject to federal jurisdiction in accordance with the Clean Water Act.

**Water Quality Objective -** A water quality objective is the limit or maximum amount of pollutant, waste constituent or characteristic, or parameter level established in statewide water quality control plans and Regional Water Boards' Basin Plans, for the reasonable protection of beneficial uses of surface waters and groundwater and the prevention of nuisance.

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# **Element 1 - SSMP Goal and Introduction**

The purpose of this document is to provide the Irvine Ranch Water Districts **(IRWD)** Collection System with a system-wide living management plan for the operation, maintenance, expansion, repair, and replacement of IRWD's sewer collection system.

This document intends to be a day-to-day working management plan that also meets Attachment D - Sewer System Management Plan (SSMP) – Required Elements of California's Statewide Waste Discharge Requirements (WDR) for Sanitary Sewer Systems General Order WQ 2022-0103-DWQ.

Per delegated authority from the IRWD's Board of Directors and the General Manager, as of March 2025 the Executive Director of Operations Wendy Chamber is designated as the Legally Responsible Official (LRO) to make all necessary changes to the SSMP and is overall responsible regarding all components in policy and procedure for IRWD's Collection System.

On September 30<sup>th</sup>, 2005, IRWD certified that the mandatory "Goals" element of the SSMP was complete.

The goal of IRWD's SSMP is: "to provide a plan and schedule to properly manage, operate, and maintain all parts of the sanitary sewer system. This will help reduce/prevent spills and mitigate any spills that do occur."

A copy of the Order and the certified SSMP is available to personnel operating and maintaining the IRWD sanitary sewer system. Pursuant to California Water Code Section 13267(b), IRWD will also comply with the Spill Monitoring and Reporting Program No. 2006-0003-DWQ" as amended by Order No. WQ 2013-0058-EXEC, and all future revisions, included by reference in the Order. A copy of the WDR and MRP Order No. WQ 2013-0058-EXEC amending the original MRP is included in Appendix A of this SSMP.

This SSMP is written to be in compliance with California's Statewide Re-Issued Waste Discharge Requirements (WDR) for Sanitary Sewer Systems General Order WQ 2022-0103-DWQ.

On May 17<sup>th</sup>, 2023, Karen Mogus, Deputy Director - Division of Water Quality for the State Water Resource Control Board issued 5 letters to IRWD staff confirming certification of IRWD's Continuation of Existing Regulatory Coverage in the California Integrated Water Quality System (CIWQS) database for all 5 WDID's. Please see Attachment 2, which details the certification letters received.

## **1.1 Regulatory Context**

The first version of the Statewide WDR for Sanitary Sewer Systems was General Order No. 2006-0003-DWQ, adopted on May 2, 2006. It required publicly owned sewer collection systems that meet the order's requirements to complete an SSMP Development Plan and Schedule and implement an SSMP formally approved by the agency's governing body.

IRWD submitted its initial Notice of Intent (NOI) for Coverage to the State Water Board on the following dates for the following (5) Waste Discharge Identification's (WDID):

- 1. #9SSO10669 and became an official enrollee effective November 17, 2006.
- 2. #8SSO10587 and became an official enrollee effective November 17, 2006.
- 3. #8SSO11513 and became an official enrollee effective December 26, 2007.
- 4. #9SSO11514 and became an official enrollee effective December 26, 2007.
- 5. #8SSO11518 and became an official enrollee effective June 2, 2011.

To comply with General Order No. 2006-003-DWQ, IRWD created an SSMP Development Plan and Schedule, which was approved and certified by IRWD's Director of Water Quality John Hills on September 30, 2005. A scanned copy of IRWD's SSMP Development Plan and Schedule has been forwarded via CIWQS under the SSMP Update upload tab within the historical versions archive. IRWD implemented its first approved SSMP on September 30, 2005.

IRWD has complied with the General Monitoring and Reporting requirements by the online reporting of Sanitary Sewer Spills in the California Integrated Water Quality System (CIWQS) since September 30, 2005.

On August 6, 2013, the State Water Board issued Order No. WQ 2013-0058-EXEC Amending Monitoring and Reporting Program (MRP) to replace the MRP established in General Order No. 2006-0003-DWQ. The MRP from Order No. WQ 2013-0058-EXEC became effective on September 9, 2013.

The latest version of the Statewide WDR General Order for Sanitary Sewer Systems, General Order WQ 2022-0103-DWQ, was approved on December 6, 2022, and became effective on June 5, 2023. To continue regulatory coverage from the previous General Order 2006-0003-DWQ to General Order WQ 2022-0103- DWQ, the Legally Responsible Official (LRO) must electronically certify the Continuation of Existing Regulatory Coverage in the CIWQS Database per the General Order WQ 2002- 0103-DWQ.

IRWD's Legally Responsible Official has certified the Continuation of Existing Regulatory Coverage in CIWQS, in addition the last date for the governing board (IRWD's Board of Directors) approving the SSMP Update is <u>August 27<sup>th</sup></u>, <u>2018</u>.

## **1.2 SSMP Update Schedule**

General Order No. 2006-003-DWQ required IRWD to update its SSMP every five years, certify the SSMP by its governing board when significant updates to the SSMP are made, and upload the board-approved certified SSMP to the CIWQS Database.

Since creating and implementing the first SSMP, IRWD has reviewed and updated its SSMP when business practices, policies, and procedures changed, which is more frequent than what was required by General Order No. 2006-003-DWQ. IRWD tracks changes in a Change Log initialed and dated by the LRO in the SSMP. To comply with General Order No. 2006-003-DWQ, IRWD updated and re-certified its SSMP through its Board of Directors in August 2018. After each Board-approved update, IRWD certified its updated SSMP on the CIWQS website.

The next SSMP certification update for IRWD to comply with the General Order WQ 2022-0103-DWQ is due in CIWQS by May 2, 2025. After which, updates and certifications of IRWD's SSMP will be required every six years according to the General Order WQ 2022-0103-DWQ.

IRWD will conduct periodic internal audits at least once every three years as required by the General Order WQ 2022-0103-DWQ. IRWD is required to prepare and upload a report to the CIWQS website within six months after the end of an audit period. IRWD's next SSMP internal audit will be for the three-year period ending May 2, 2027.

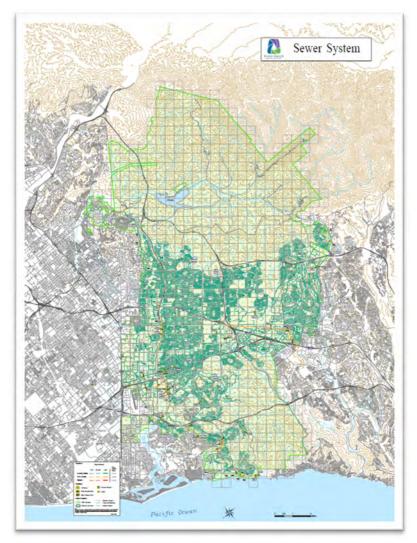
In addition to the SSMP certification and Internal SSMP audit dates, IRWD has identified key near-term SSMP compliance dates as required by the General Order WQ 2022-0103-DWQ in Table 1-1, see next page.

<b>Compliance Item</b>	Near-Term Due Date	WDR Section
ual Report for Category 4 Non-lateral Spills	Feb 1st of each calendar year.	Attach E1 Sec 3.6
nual Report for Category 2, 3 & 4 Lateral Spills	Feb 1st of each calendar year.	Attach E1 Sec 3.6
Annual Report	April 1st of each year.	5.11 Attach E1 Sec 3.9
	<b>9SSO11514 - El Toro CS -</b> Audit due 11/2/25	
Internal SSMP Audit	<b>8SSO11513 - OCSD1 CS -</b> Audit due 2/2/28	
	<b>8SSO11518 - OCSD2 CS -</b> Audit due 2/2/28	5.4 Attach E1 Sec 10
	<b>9SSO10669 - LAWRP CS -</b> Audit due 2/2/28	
	<b>8SSO10587 - MWRP CS -</b> Audit due 11/2/27	
SSMP Update and Certification	<b>9SSO11514 - El Toro CS -</b> Update due 5/2/26	
	<b>8SSO11513 - OCSD1 CS -</b> Update due 8/2/25	
	<b>8SSO11518 - OCSD2 CS -</b> Update due 8/2/25	5.5 Attach E1 Sec 11
	<b>9SSO10669 - LAWRP CS -</b> Update due 8/2/25	
	<b>8SSO10587 - MWRP CS -</b> Update due 5/2/25	
Electronic Sanitary Sewer System Service Area Boundary Map	Wednesday, December 31, 2025	5.14 Attach E1 Sec 8

**Emergency Response Plan, Section 6** of the SSMP.

## 1.3 Sewer System Asset Overview

Irvine Ranch Water District (IRWD) is a California Special District formed in 1961 and incorporated under the California water code. IRWD owns a sanitary sewer system with approximately 132,000 sewer connections serving 446,000 customers. IRWD operates and maintains 1,145 miles of sanitary sewer mains, is structurally responsible for 361 miles of lower lateral and operates and maintains 29 miles of force mains spanning 181 square miles (84,000 acres) of service area in Orange County. The wastewater collection system serves the City of Irvine, Lake Forest, parts of Tustin, Newport Beach, Foothill Ranch, Costa Mesa, and unincorporated areas of Orange County. There is a small amount of wastewater generated in the City of Newport Beach and Irvine that is collected by trunk sewers owned, operated, and maintained by the IRWD, then discharged into sewers owned and maintained by the Orange County Sanitation District (OCSD). See below for a current map as of March 2025.



### **IRWD Sewer System Map (current as of March 2025)**

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IRWD's sewer mains range in size from 6 to 60 inches in diameter as shown in **Table 1-2**. The sewer main material is primarily composed of vitrified clay pipe (VCP) and polyvinyl chloride (PVC), with other miscellaneous materials. Drainage patterns in the wastewater collection system are influenced by the physical geography of the service area and result in five separate wastewater collection systems (WDID's) within the IRWD service area which are covered by the Sewer System Management Plan.

Table 1-2 summarizes an approximation of various assets and service connections owned by IRWD as of March 2025. The asset and service connection counts for any given year are recorded and updated in IRWD's Annual Report in CIWQS.

Assets	Quantity
Number of Maintenance Holes	28,547
Number of Clean Outs	6,316
Number of Active Segments	35,448
Number of Siphons	19
Number of Pump Stations	12
Number of Diversion Structures	10
Data Management System	Maximo IBM
Lower Laterals See Rules and Reg	
Service Connections	132,000

## **Table 1-2 IRWD Sewer Main Metrics**

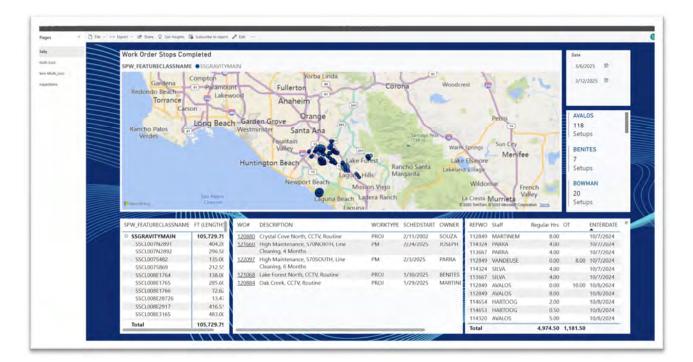
Assets	Quantity
Sewer Main - Gravity (Miles)	1,145
Lower Lateral - Gravity (Miles)	361
Force Main - Pressurized (Miles)	29
Total System (Miles)	1535

Pipe Classification	Pipe Size	Miles
Small Main	>=6"	420
Main	8"	870
Large Main	9"-18"	194
Trunk	19"-36"	42
Interceptor	>36"-60"	9

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Note: IRWD does not have a combined wastewater collection system. Thus, there are no structures diverting stormwater to the collection system.

IRWD employs a computerized maintenance management system (CMMS/Maximo/Power BI/Active-G) to document asset data, spill information, work orders, preventive maintenance (PM) schedules, emergency response, and records of completed work. Below is an illustration (Figure 1-1) of the Maximo Maintenance Dashboard utilized by management to verify condition and inspection.



**Figure 1-1 Maximo Maintenance Dashboard** 

IRWD utilizes a combination of multiple Geographic Information Systems (ESRI Arc Pro/Field Mapplet Console/Arc GIS Online Mobile Maps) to display location and asset data for the sewer collection system. This mapping system provides access to as-builts drawings as well as other data utilized by engineering, field inspection, regulatory, maintenance and construction staff. See Figure 1-2 for an illustration of a section of the GIS interface.

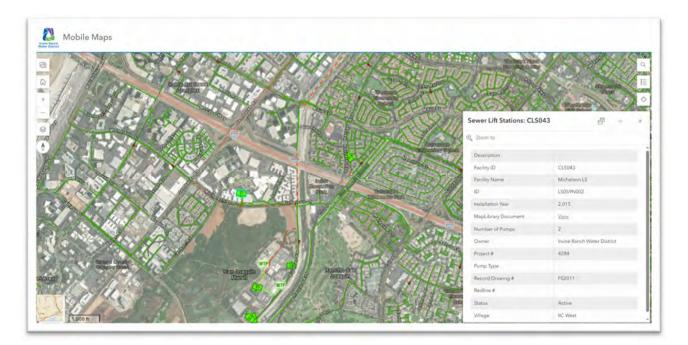


Figure 1-2 Arc GIS Online Mobile Maps

## **1.4 SSMP Document Overview**

Attachment D of the General Order 2022-0103-DWQ specifies the mandatory elements of the SSMP. These elements are listed in Figure 1-3, below which is directly from the General Order 2022-0103-DWQ.

Table of Contents         System Management Plan Goal And Introduction	
Regulatory Context Sewer System Management Plan Update Schedule Sewer System Asset Overview zation Authority tion And Maintenance Program. Updated Map of Sanitary Sewer System Preventive Operation and Maintenance Activities	D-: D-: D-: D-: D-:
Sewer System Management Plan Update Schedule	D-: D-: D-: D-:
Sewer System Asset Overview zation Authority tion And Maintenance Program Updated Map of Sanitary Sewer System Preventive Operation and Maintenance Activities	
zation Authority tion And Maintenance Program. Updated Map of Sanitary Sewer System Preventive Operation and Maintenance Activities	D-3
Authority tion And Maintenance Program Updated Map of Sanitary Sewer System Preventive Operation and Maintenance Activities	D-4
tion And Maintenance Program Updated Map of Sanitary Sewer System Preventive Operation and Maintenance Activities	D-4
Updated Map of Sanitary Sewer System Preventive Operation and Maintenance Activities	
Preventive Operation and Maintenance Activities	D-4
Preventive Operation and Maintenance Activities	
Technica	D-4
Training	
Equipment Inventory	D-
And Performance Provisions	D-
Updated Design Criteria and Construction Standards and Specifications	D-
Procedures and Standards	
mergency Response Plan	D-6
Pipe Blockage Control Program	D-7
n Evaluation, Capacity Assurance and Capital Improvements	D-7
System Evaluation and Condition Assessment	D-7
Prioritization of Corrective Action	D-9
Capital Improvement Plan	D-9
ring, Measurement and Program Modifications	D-9
Il Audits	D-10
unication Program	D-10
	Updated Design Criteria and Construction Standards and Specifications Procedures and Standards

## Figure 1-3: Attachment D of the General order 2022-0103

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# **Element 2 - Organization**

Elements 2 requires that the plan must identify organizational staffing responsible and integral for implementing the local Sewer System Management Plan through an organization chart or similar narrative documentation that includes:

## 2.1 Name of the Legally Responsible Official

On November 2, 2007, IRWD's Board certified that the Executive Director of Operations is the responsible or authorized representative as described in Section J of Order No. 2006-0003-DWQ.

The Board of Directors and the General Manager have appointed Wendy Chambers as the current Executive Director of Operations. Under section 5.1 of the General Order WQ 2022-0103-DWQ, the Executive Director of Operations continues to be the Legally Responsible Official for IRWD.

## **2.2 Contact Information for SSMP Administrators**

This sub-element includes the position titles, telephone numbers, and email addresses for management, administrative, and maintenance positions responsible for implementing specific Sewer System Management Plan elements.

Table 2.1 and sub-element 2.3 define and illustrate the organizational structure of IRWD staff responsible for implementing the SSMP, including the LROs, as required by the General Order WQ 2022-0103-DWQ.

The Spill reporting chain of communication is located in the Spill Emergency Response Plan. The current Legally Responsible Officials as well as organizational hierarchy for assisting with implementation of the different SSMP elements are detailed below:

#### Title: Executive Director of Operations (Primary LRO)

- Name: Wendy Chambers
- Phone: (949)453-5720
- Email: <u>chambersw@irwd.com</u>
- Responsible for overall implementation of all 11 Elements of the SSMP.

#### **Title: Director of Maintenance Operations**

- Name: Jason Manning
- Phone: (949)453-5841
- Email: <u>manning@irwd.com</u>
- Responsibilities: Reviews with senior leadership and establishes the Collection Systems Department's goals, organization structure, legal authority, O&M program, system monitoring and SSMP audits.

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#### Title: Collection System Manager (Secondary LRO)

- Name: William Kleinau
- Phone:(323)895-8455
- Email: <u>kleinau@irwd.com</u>
- Additional: Manages the day-to-day operations for the collection system, responsible for spill response, training and reporting spills to the Water Board, CAL OES, County and additional agencies.

#### Title: Collection System Supervisor (Data Submitter)

- Name: Brandon Jospeh
- Email: Joseph@irwd.com
- Additional: Responsible for supervising day-to-day maintenance of the collection system.

#### Title: Collection System Supervisor (Data Submitter)

- Name: Jeremy Hartoog
- Email: <u>Hartoog@irwd.com</u>
- Additional: Responsible for supervising the day-to-day inspection of the collection system.

#### **Title: Regulatory Compliance Manager**

- Name: Lori Rigby
- Email: <u>Rigby@irwd.com</u>
- Other: Responsible for managing the District's NPDES program as well as all sampling and field inspections regarding discharges and compliance.

#### **Title: Water Quality Manager**

- Name: Scott Giatpaiboon
- Email: giatpaib@irwd.com
- Additional: Manages the Districts laboratory operations which includes performing analytics on samples taken routinely as well as sewer spill sampling analytics.

#### **Title: Automation Manager**

- Name: Joe Lam
- Email: <u>lam@irwd.com</u>
- Additional: Manages the Districts SCADA system which enables remote monitoring and control of the Districts sewer lift stations as well as historical metrics for performance. Receive After hours calls and alerts for sewer concerns via dialer system.

#### Title: Engineering Manager – Capital Projects and Pipelines

- Name: Malcom Cortez
- Email: <u>Cortez@irwd.com</u>
- Additional: Manages the Districts rehabilitation program regarding sewer pipelines and structures as well as assists with long term planning.

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#### Title: Engineering Manager – Field Mapplet/Hydraulic Modeling

- Name: Eric Akiyoshi
- Email: <u>akiyoshi@irwd.com</u>
- Additional: Manages the Districts GIS system Field Mapplet with regards to adding new developments and remove inactive assets, also manages the Districts hydraulic model and continually updates the District sewer master plan.

#### Title: Enterprise GIS Manager

- Name: Cameron Smith
- Email: <u>smithc@irwd.com</u>
- Additional: Manages the District's GIS system with regards to Arc Pro/Mobile Maps and additional applications that allow collection systems to view assets and perform maintenance.

#### **Title: Reliability Manager**

- Name: Verowin Hunting
- Email: <u>hunting@irwd.com</u>
- Additional: Manages the Districts CMMS system Maximo and oversees updates as well as Power BI dashboard to enhance maintenance cycles as well as increase reliability.

#### Title: Electrical and Mechanical Manager

- Name: Owen O'Neil
- Email: <u>oneill@irwd.com</u>
- Additional: Manages the District's repairs and rehabilitation for lift stations and other structures related to backup generators and pumps.

#### **Title: Customer Service Manager**

- Name: Ryan Matuska
- Email: <u>matuska@irwd.com</u>
- Additional: Manages the District's customer service center which receives calls from the public regarding sewer spills, odors, vermin, noises and additional related concerns.

#### Title: Network and Cybersecurity Manager

- Name: Randy Williams
- Email: <u>williams@irwd.com</u>
- Additional: Manages the Districts information technology cybersecurity and ensures connectivity with SCADA systems.

#### **Title: Director of Safety and Security**

- Name: Steve Choi
- Email: <u>choi@irwd.com</u>
- Additional: Directs the District's safety and security program.

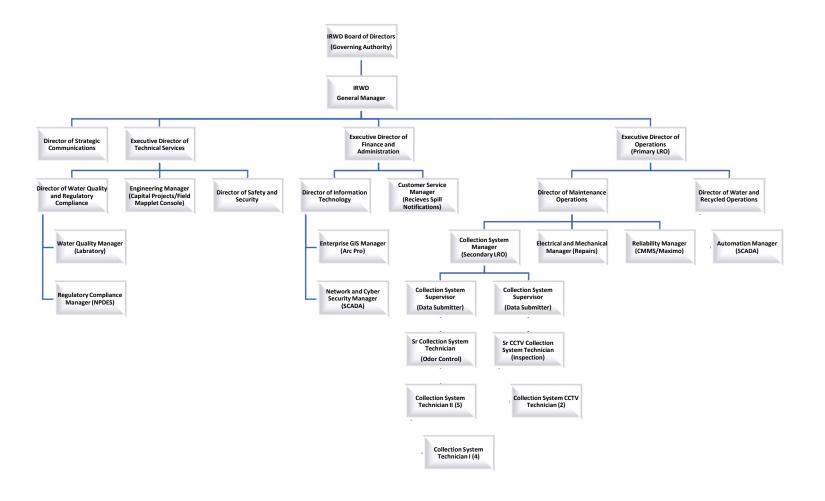
#### Title: Director of Strategic Communication & Advocacy

- Name: Christine Compton
- Email: <u>compton@irwd.com</u>
- Additional: Oversees content and graphics development, IRWD branding, customer outreach, internal communications and media communications. Monitors and guides IRWD's regional, state, and federal legislative and regulatory advocacy, and coordinates IRWD's Policy.

WDR Reference	SSMP Element/Measure	<b>Responsible Position</b>
D-2 to D-10	Overall SSMP Development and Implementation	Executive Director of Operations
D-2	Goal	Director of Maintenance Operations
D-3	Organization	Director of Maintenance Operations
D-4	Legal Authority	Director of Maintenance Operations
D-4	Operations and Maintenance Program – Mapping	Enterprise GIS Manager
D-5,8	Operations and Maintenance Program – Sewer Pipeline and Manhole Preventive and Routine Maintenance	Collection Systems Manager
D-4	Operations and Maintenance Program – Lift Station Mechanical and Electrical Preventive and Routine Maintenance	Director of Maintenance Operations
D-4	Operations and Maintenance Program – System Inspection	Collection Systems Manager
D-4	Operations and Maintenance Program – Condition Assessment; Rehabilitation and Replacement Program	Executive Director of Technical Services
D-8	Operations and Maintenance Program – Capital Program Funding	Executive Director of Technical Services
D-4	Operations and Maintenance Program – Training	Collection Systems Manager and Safety Director
D-4	Operations and Maintenance – Critical and Replacement Part inventory	Collection System Manager
D-5	Design and Performance Provisions	Executive Director of Technical Services
D-6	Spill Emergency Response Plan	Collection Systems Manager
D-7	Sewer Pipe Blockage Control Program	Regulatory Compliance Manager
D-8	System Evaluation and Capacity Assurance Plan	Executive Director of Technical Services
D-9	Monitoring, Measurement, and Program Modifications	Director of Maintenance Operations
D-10	SSMP Program Audits	Director of Maintenance Operations
D-11	Communication Program – Public education	Director of Strategic Communication
D-11	Communication Program – Satellite agencies	Executive Director of Operations

#### Table 2.1: Positions Responsible for SSMP Development and Implementation

## 2.3 Organizational Lines of Authority



## 2.4 Chain of Communication for Reporting Spills

The following sub-element summarizes the chain of communication for reporting spills from receipt of complaint or other information, including the person responsible for reporting spills to the State and Regional Water Boards and other agencies, as applicable. For a more comprehensive view of the chain of communication see Element 6 Spill Emergency Response Plan.

#### **Reporting Responsibilities:**

- Once a detection of a spill is reported, either by the public or IRWD personnel, Collection Systems staff will be dispatched to the scene by Customer Service Representatives during normal operating hours.
- If notification occurs after hours, the Collection Systems Standby personnel are notified by IRWD's after-hours answering service. The Collection System Manager will coordinate information gathering and response efforts with Collection Systems staff and additional departments as needed.
- IRWD maintains a satisfactory response by ensuring all Collection Systems staff are listed as emergency responders and as such are required to be on the Collection Systems Standby rotation which provides two operators year-round to respond to all sewer-related matters. The Collection System Manager is responsible for ensuring a satisfactory response to all sewer system emergencies.
- Collection Systems staff will determine if the spill is a sewer spill and owned by the District. If not sewer, and not District-owned staff will coordinate appropriate procedures and notify the Collection System Manager. If the spill is sewer and IRWD owned, staff will take pictures immediately up arrival to the spill site and begin the spill containment/calculation investigation which will prompt a call to Cal-OES from the Collection System Manager with a preliminary calculation.
- The Collection Systems Manager is responsible for contacting the State and Regional Water Boards as well as other agencies including but not limited to Orange County Health Care Agency, Orange County Department of Public Works and Cal-OES. In the absence of the Collection System Manager the Collection Systems Supervisors will be responsible for reporting to impacted agencies.

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# **Element 3 - Legal Authority**

Element 3 includes an electronic link to IRWD's current sewer system use ordinances, service agreements and/or other legally binding procedures which demonstrate that IRWD has the necessary legal authority to:

- Prevent illicit discharges into its sanitary sewer system from inflow and infiltration (I&I); unauthorized stormwater; chemical dumping; unauthorized debris; roots; fats, oils, and grease; and trash, including rags and other debris that may cause blockages.
- Collaborate with storm sewer agencies to coordinate emergency spill responses, ensure access to storm sewer systems during spill events, and prevent unintentional cross connections of sanitary sewer infrastructure to storm sewer infrastructure.
- Require that sewer system components and connections be properly designed and constructed.
- Ensure access for maintenance, inspection, and/or repairs for portions of the service lateral owned and/or operated by the Enrollee.
- Enforce any violation of its sewer ordinances, service agreements, or other legally binding procedures; and
- Obtain easement accessibility agreements for locations requiring sewer system operations and maintenance, as applicable.

## **3.1 IRWD Rules and Regulations**

The Irvine Ranch Water District Rules and Regulations adopted by the Board of Directors December 16, 2019, provides IRWD with the Legal Authority that includes the following:

When IRWD finds an inconsistency or shortcoming in the Ordinance or when IRWD programs are modified, the Ordinance is reviewed and updated as necessary. The Ordinance is aligned with current practices, ensuring the legal authority for the required SSMP elements is maintained. The Ordinance can be found on IRWD's public website at: <u>IRWD Rules and Regulations (Weblink)</u>

For collaboration with storm and sewer agencies to coordinate emergency spill responses, ensure access to storm and sewer systems during spill events, and prevent unintentional cross-connections of sanitary sewer infrastructure to storm sewer infrastructure, IRWD has been meeting monthly, quarterly and annually with surrounding storm collection systems that are satellites to IRWD's interceptor systems, this is accomplished through monthly SARBS Board meetings as well as quarterly OCSD-WDR group meetings attended by the Collection System Manager and Collection System Supervisors.

## **3.2 Legal Authorities**

The District complies with the legal authority requirements of the WDR. The District's legal authorities are included in the following documents:

• Rules and Regulations for Water, Sewer, Recycled Water, and Natural Treatment System Service

- <u>Regulations for the Discharge of Wastewater to Sewerage Facilities of the Irvine Ranch Water</u> <u>District that are in the South Orange County Wastewater Authority Service Area, Ordinance</u> <u>2015-1</u>
- Procedural Guidelines and General Design Requirements
- IRWD Standard Drawings and IRWD Standard Specifications for the sewer system
- Standard Specifications for Public Works Construction (Greenbook)

The primary source of IRWD's legal authorities is Section 7 of the District's Rules and Regulations, which is dedicated to "Use of District Sewerage Facilities". The following sections provide a narrative of the District's legal authorities for each of the requirements of the WDR.

## Table 5-1 Summary of the District's legal authorities

	Reference to Rules and Regulations	Reference to Guidelines* or Standard Details
Requirement		
ILLICIT DISCHARGES		
Prevent illicit discharges into the wastewater collection system	Sec. 7.3.1	
Limit the discharge of fats, oils, and grease and other debris that may cause blockages	Sec. 7.11	
Control infiltration and inflow (I/I) from private service laterals	Sec. 7.3.2	
PROPER DESIGN AND CONSTRUCTION		
Require that sewers and connection be properly designed and constructed	Sec. 4.4.2, 5.1, 5.2	Proc Guidelines, Sec. 4
Require proper installation, testing, and inspection of new and rehabilitated sewers		Proc Guidelines, Sec. 2.5
ACCESS TO LATERALS and EASEMENTS		
Clearly define District responsibility and policies	Sec. 4.15, 5.2	
Ensure access for maintenance, inspection, or repairs for portions of the service lateral owned or maintained by the District.		Stand Detail Drawing S-3
FOG SOURCE CONTROL		
Requirements to install grease removal devices (such as traps or interceptors)	Sec. 7.11.4	
Design standards for grease removal devices	Sec. 7.11.6.8	
Maintenance requirements, BMP requirements, record keeping and reporting requirements for	Sec. 7.11.6.8,	
grease removal devices	7.11.6.11,	
	7.11.7	
Authority to inspect grease producing facilities	Sec. 7.11.7.4	
ENFORCEMENT		

Enforce any violations of its sewer ordinances	Sec. 7.11.8, 14	

## **3.3 Prevention of Illicit Discharges**

Measures prohibiting illicit discharges are included in Sections 7.3.1 to 7.3.12. The specific purpose of the Section is to prevent the discharge of any pollutant or any combination of pollutants into the sewers that would obstruct or damage the collection system, interfere with treatment, or threaten harm to human health or the environment. A full copy of the latest version of IRWD's Rules and Regulations for Water, Sewer, Recycled Water, and Natural Treatment System Service is available on the District's website.

Section 7.11 of the District's Rules and Regulations also limit the discharge of fats, oils, and grease. Legal authorities regarding control of fats,

## **3.4 Proper Design and Construction of Sewers and Connections**

The District's legal authorities pertaining to the design, construction, and inspection of sewer pipelines and connections are included in IRWD's Rules and Regulations for Water, Sewer, Recycled Water, and Natural Treatment System Service, IRWD's Standard Drawings and Standard General Technical Specifications. IRWD also utilizes the Standard Specifications for Public Works Construction, popularly known as the "Greenbook".

Section 4.4.2 of the District's Rules and Regulations requires the lower lateral and lower lateral connections to be designed in accordance with the District's Procedures Guide and Construction Manual. The District also has the authority to determine and specify the size, location, and manner of installing the lower lateral.

## **3.5 Lateral Maintenance Access**

Per Section 4.15.1 to 4.15.4 of the District's Rules and Regulations, property owners are responsible for clearing and cleaning the upper and lower laterals to their connection point with the main sewer. IRWD is only responsible for repairs to the lower lateral to the sewer main. See Section 2 for the definitions for upper lateral and lower laterals. The District's Construction Manual Standard Detail Drawing S-3 requires a clean out on the lateral at the property line or edge of easement providing the District with access to the lower lateral. The latest version of the District's Standard Detail Drawings for the sewer system are available on the District's website.

## **3.6 Enforcement Measures**

Sections 14.1 to 14.3 of IRWD's Rules and Regulations for Water, Sewer, Recycled Water, and Natural Treatment System Service describe measures available to IRWD staff for enforcement of sewer provisions. Any person, firm, corporation, association, or agency found to be violating any provision of the District's Rules and Regulations; or the terms and conditions of the applicant's, owner's, or customer's service agreement, permit; or any and all applicable Federal, State, or local statues, regulations, ordinances; or other requirement; shall be served by the District with written notice stating

the nature of the violation and providing a reasonable time limit for the satisfactory correction. The offender shall, within the period stated in such notice, permanently cease all violations. This provision is in addition to and not by way of derogation of any other remedies or procedures available to the District by law, regulation, or pursuant to any of the provisions of these Rules and Regulations including, but not limited to, Section 7.

Failure to permanently cease all violations within the time stated shall result in revocation of the permit by the District and termination of water, sewer, recycled water and/or natural treatment system service as provided in Sections 14.2 and 14.3. Violations regarding any one service may result, at the sole discretion of the Board or Manager, in termination of any combination of or all water, sewer, recycled water and natural treatment system service.

### 3.7 Agreements with Other Agencies

The SSMP requirements for legal authority are fulfilled by IRWD's Rules and Regulations for Water, Sewer, Recycled Water, and Natural Treatment System Service. However, IRWD does have additional legal agreements with other agencies, which are described in this section for reference.

## **3.7.1 Orange County Sanitation District Agreement**

A portion of IRWD service boundaries is currently included inside the boundaries of Orange County Sanitation District (OCSD), which has the direct responsibility for the transport and treatment of wastewater discharged to IRWD sewer system pursuant to that agency's Wastewater Ordinance. In addition, IRWD coordinates with OCSD to permit and implement the industrial waste requirements of the Clean Water Act and the State Water Resources Control Board. OCSD, in conjunction with IRWD, jointly permit all major industrial dischargers and categorical industries pursuant to its State approved pretreatment program requirements.

## 3.7.2 South Orange County Wastewater Authority Agreement

A portion of IRWD service boundary is included in the boundaries of the South Orange County Wastewater Authority (SOCWA), which has the responsibility to implement a pretreatment program associated with the facilities that discharge into SOCWA's Aliso Creek Ocean Outfall (ACOO) pursuant to that agency's Wastewater Ordinance. IRWD's Los Alisos Water Recycling Plant (LAWRP) discharges secondary treated effluent into the ACOO. Thus, IRWD coordinates with SOCWA to permit and implement the industrial waste requirements of the Clean Water Act and the State Water Resources Control Board. SOCWA, in conjunction with IRWD, jointly permits all major industrial dischargers and categorical industries pursuant to State approved pretreatment program requirements.

## 3.7.3 Satellite Systems

IRWD accepts a small quantity of wastewater into its sewer system from the University of California, Irvine (UCI) which is located within IRWD's service boundaries. IRWD has a Sewer Service Agreement with UCI regarding acceptance of their discharges and requiring UCI to amend the agreement if additional capacity is required. IRWD has verified that UCI has developed a site specific SSMP for their sewer system. IRWD sewer system has adequate capacity to convey the minor flows it accepts from UCI.

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# **Element 4 - Operation and Maintenance Program**

This section describes IRWD's Operation and Maintenance Program, designed to prevent spills throughout the collection system and comply with Attachment D Section 4 of the General Order WQ 2022-0103-DWQ.

IRWD is responsible for operating and maintaining both gravity and pressurized assets. Gravity assets include main line, lower lateral, and manhole pipes. Pressurized assets include force mains and pump station components. There are several different failure modes within the gravity and pressurized collection system that can cause spills or shorten asset life.

In support of IRWD's goals of reducing/preventing spills, meeting SSMP regulatory requirements, achieving identified service level targets, and operating in a cost-effective manner, IRWD's Operations and Maintenance Program is divided into seven sub-programs.

Each sub-program under the Operations and Maintenance Program consists of several strategies, maintenance programs, policies, procedures, and decision-making processes developed to sustain IRWD's assets and manage risk at a socially, environmentally, and economically viable level.

The Operations and Maintenance Program does not cover spill emergency response. All spill response activities follow the Spill Emergency Response Plan, Section 6 of the SSMP.

## 4.1. Updated Map of Sanitary Sewer System

An up-to-date map(s) of the sanitary sewer system has been provided in Element 1 and web link will be available in CIWQS and uploaded as a separate attachment under the name **"IRWD Mobile Maps"**, this will provide State and Regional Water Board staff access to IRWD's Sanitary Sewer System map(s) as well as as-builts.

The map(s) does show gravity line segments and maintenance holes, pumping facilities, pressure pipes and valves, and applicable stormwater conveyance facilities within the sewer system service area boundaries.

## 4.2. Preventive Operation and Maintenance Activities

IRWD employs a Computerized Maintenance Management System (CMMS) Maximo to document asset data, work orders (WO), preventive maintenance (PM), work planning & scheduling, service requests (SR), spill emergency response, vendor, and vehicle & equipment (V&E) data. Staff collect and update data daily. IRWD utilizes the CMMS data to create reports identifying performance trends such as work orders completed on time, production rates, costs per unit completed, etc.

#### 4.2.1 The scheduling system includes inspection and maintenance activities for:

- o Lift Stations
- o Siphons
- o Sewer line cleaning
- Sewer line inspections
- o Odor and corrosion control
- o Diversion structures
- Vermin and root control
- o Additional appurtenances

# 4.2.2 Higher-frequency inspections and maintenance of known problem areas, including areas with tree-root problems are strategically planned:

- o 6-month and 4-month high maintenance categories
- o Semi-annual wet well vacuum program
- o Pump performance monitoring that analyses station trends and anomalies
- o Quarterly and Semi-annual siphon maintenance program
- Remote monitoring of liquid level at all 19 siphon locations

#### 4.2.3 Regular visual and closed-circuit television (CCTV) inspections:

- The District employs a team of CCTV inspection technicians which document data from system inspection and maintenance activities utilizing the most current NASSCO PACP/MACP/LACP coding standards.
- All Collection Systems CCTV staff are NASSCO certified and trained in how to operate the District's CCTV equipment. Staff training, including system areas/components prone to root-intrusion potentially resulting in system backup and/or failure is detailed to staff in regular meetings as well as daily work orders.
- The District plans to inspect all sewer mains on a 10-year cycle. The District's technicians utilize advanced data management systems that are consistently updated and enable decision makers to maintain information dominance regarding defects and observations which may cause disruptions in service or system failures. (Utilizing Phoenix DB)
- The District employs a contractor to perform annual corrective and preventative maintenance measures regarding root control.

#### 4.2.4 Sewer Line and Structure Maintenance

The District proactively maintains its sewer pipes and structures utilizing a classification system that is data driven which is categorized and monitored to ensure satisfactory performance.

**High Maintenance - Structures:** Structures such as siphons, diversion structures, wet wells as well as other Districtwide locations that have proven to need continuous maintenance more frequently. The frequency ranches from monthly to annually.

**High Maintenance - Historical:** Sewer mains segments that have been identified to accumulate grease, debris, calcium and other materials based on inspection, trends from remote monitoring telemetry as well as historical data on system performance. The frequency ranches from 4-month to 6-month.

**Corrosion and Odor:** Locations monitored throughout the District which are prone to hydrogen sulfide accumulation are monitored with remote and stationary odor monitoring equipment. The Districts corrosion and odor program are modified continuously based on weather, flow levels, pipe material, treatment plant conditions as well as odor concerns reported by the public.

**Routine:** IRWD's Routine preventive maintenance program ensures all "non-high maintenance" sewers are scheduled for maintenance and cleaning, but on a less frequent basis than pipes with a history of concerns.

- All "non-high maintenance" pipes that are 15 inches and below in diameter are cleaned on a 3-year cycle.
- Pipes that are 16-30 inches are cleaned on a 5-year cycle.
- Pipes greater than 30 inches are cleaned as needed and are part of an inspection program.

The District is continuously evaluating its cleaning program and has plans to utilize enhanced data integration with remote monitoring, inspection data and historical data input into our CMMS Maximo to create a highly enhanced routine cleaning schedule.

#### 4.2.5 Lift Station Operation and Maintenance

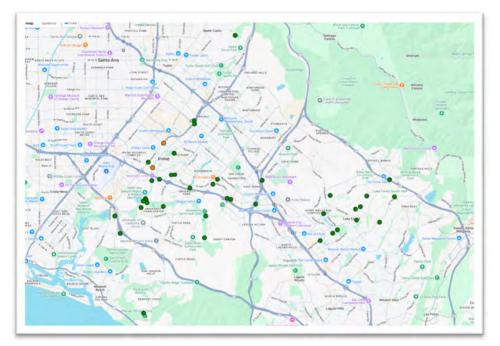
The District currently owns, operates, and maintains 12 sewage lift stations. Each of the lift stations is equipped with SCADA and monitored daily by the Collection System Supervisors. The Collection System Manager and Supervisors can monitor lift station SCADA data from the office or remotely on laptop computers. The District addresses SCADA alarms daily. A collection system maintenance crew visits each lift station at least once weekly to perform operational inspections.

The collection system crew documents weekly operational inspections using a Lift Station Inspection form located in EzMax Mobile which is an application within Maximo. Collection System Supervisors coordinate maintenance of electrical and mechanical equipment with the District's Electrical and Mechanical Services Department.

The District has installed quick-connect connections and isolation valves at critical lift stations to easily bypass the station in the event of lift station mechanical or electrical failure. The District has many replacement pumps and components for most of its lift stations.

#### 4.2.6 System Monitoring

The District has 41 maintenance holes/vaults with sensor technology at strategic locations in the sewer system. These are strategically installed in pipelines and siphons with potential capacity constraints and maintenance holes with potential vandalism or illegal dumping. The sensors trigger alarms in the case of surcharging beyond a preset levels or in the case of intrusion.



## **Figure 4.2.6 (Remote Monitoring Locations)**

The District has also installed redundant level controls at each lift station. In addition to redundant level controls, the District has installed Mission Control Units, which are secondary communication systems in the event of loss of SCADA communication, loss or power, and/or high wet well. In the case of a high wet well, floats are in place to trigger all pumps to turn on. In the event of loss of SCADA communication System Manager, Supervisors, Primary and Secondary Responders.

#### 4.2.7 Customer Service Requests

In addition to documenting preventive maintenance activities, the District replaced the Customer Service Request System with the Oracle Customer Care and Billing system (Oracle CC&B) in FY 2015.

- Customer Service documents show the customer complaints using the Oracle CC&B system. Customer Service sends a Customer Service Request as both a text and e-mail notification to the Collection System Manager and Collection System Supervisors.
- Customer Service also follows up with a phone call to the Collection System Manager or Collection System Supervisors. During after-hours, when Customer Service is not on duty, all calls are forwarded to the District's answering service.
- The answering service contacts the Primary Responder using a text, e-mail notification, and a phone call. The answering service does not enter calls into the Customer Service Request system.
- o During the after-hours, the Primary Responder or Collection System First Responder will

enter the service call into the Customer Service Request system. The responding Collection System Supervisor will document findings and close-out the Customer Service Request in the Customer Service Request system.

## 4.3. Training

In-house and external training are provided on a regular basis for sanitary sewer system operations and maintenance staff and contractors, which includes:

- o Annual refresher training reviewing the General Order 2022-0103 DWQ
- Spill Emergency Response Plan procedures and practice drills.
- Skilled estimation of spill volume for field operators.
- o Electronic CIWQS reporting procedures for Data Submitters and LRO's.
- Contractors awarded a job or a project by IRWD are responsible for their own training program in addition to being trained in IRWD's spill response procedures.

#### 4.3.1 CWEA - Collection Systems Maintenance Certification:

All Collection System employees have earned or are in the process of earning the California Water Environment Association Collection System Maintenance certification.

- Employees responsible for performing collection system maintenance activities that are journeymen and just entering the collections dept of IRWD as a Collection Systems Tech I required to obtain CWEA Collection System Maintenance Grade 1 certification and CDL Class A within one year of employment.
- Collection System Technician II employees are required to have three years of field experience, Class A CDL and CWEA Collection Systems Maintenance Grade 1 certification.
- The CCTV Technician classification is an entry-level position and requires a collection system maintenance grade 1, Class A CDL and NASSCO PACP certificate.
- Senior Technicians require CWEA Collection Systems Maintenance Grade 2 certification, Class A CDL and a NASSCO PACP certificate.
- The Collection System Supervisor position requires possessing a CWEA Collection System Maintenance Grade 3 certification, Class A CDL and a NASSCO Certificate.
- The Collection System Manager is required to have a CWEA Collection System Maintenance Grade 4 certification, a bachelor's degree in business, public administration, or related field, six years of management experience in the collection system field, and three years of experience as a supervisor.

## 4.4. Equipment Inventory

An inventory of sewer system equipment, including the identification of critical replacement and spare parts, is maintained in the Districts CMMS(Maximo) as well as within our inventory management system which is maintained by the Purchasing Manager and Collection Systems Manager.

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## **Element 5 - Design and Performance Provisions**

IRWD maintains Standards and Specifications (Standards) that comply with Attachment D Section 5 of the General Order WQ 2022-0103-DWQ.

The Standards include updated design criteria and construction standards and specifications for the construction, installation, repair, and rehabilitation of existing and proposed system infrastructure components. It also contains procedures and standards for inspecting and testing newly constructed, installed, repaired, and rehabilitated sewer system assets. The Standards are reviewed annually and updated as changes are needed.

The Standards can be found on IRWD's public website at:

https://www.irwd.com/images/pdf/doingbusiness/engineering/2025/IRWDConstructionManualFeb2025.pdf

https://www.irwd.com/doing-business/engineering

# **5.1. Updated Design Criteria and Construction Standards and Specifications**

Updated design criteria, and construction standards and specifications, for the construction, installation, repair, and rehabilitation of existing and proposed system infrastructure components, including but not limited to pipelines, pump stations, and other system appurtenances. If existing design criteria and construction standards are deficient to address the necessary component-specific hydraulic capacity as specified in Element 8 (System Evaluation, Capacity Assurance and Capital Improvements) of this Attachment, the procedures must include component-specific evaluation of the design criteria.

The District has developed design and construction standards for the installation of new sewer systems, pump station components, and other appurtenances.

The latest versions of all of the District's design and construction standards, guidelines, specifications, and details are publicly available on the internet at The District's webpage include the following documents:

Procedural Guidelines and General Design Requirements

- Standard Drawings
- General Technical Specifications

In addition, anyone interested in automatically receiving updates to the District's documents, guidelines, and requirements can sign up for IRWD <u>eNotify</u>: which will send e-mail notifications when changes are made to any of the documents or when a change is posted to the IRWD website.

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The District's Procedural Guidelines and General Design Requirements include:

- Development Plan and Permit Processing Procedures
- District authority to access work site
- Sewer system inspection standards and procedures for construction

Design Criteria for Sewer Facilities

- Pipe size, material, minimum and maximum slope, and flow design criteria.
- Standard location and alignment, stationing, and minimum depth.
- Manhole location, size, type, frame and covers, and lining.
- Cleanout design criteria.
- Force main design criteria.
- Sewer lateral design criteria.
- Sewer pump stations design criteria; and,
- Design criteria for easement and right-of-way for sewer.

The District's Sewer Standard Drawings includes the following eight standard details for the sewer system listed in **Table 5-1**.

Drawing No.	Description
S-1	Manhole
S-2	Drop Manhole
S-3	Sewer Lateral
S-4	Cut-in Wye Connection
S-5	Terminal Cleanout
S-6	Sewer Trench
S-7	Steel Casing for Sewer Pipe
S-8	Concrete Slope Anchors

#### **Table 5-1: Sewer Standard Drawings**

The District's General Technical Specifications, for use in all District construction contracts, includes a comprehensive set of specifications for sewer system pipelines and facility construction. The District contracts with a design engineer for the development of design drawings and specifications for sewer pipeline and pump station rehabilitation and replacement projects. In addition, IRWD has adopted and uses Standard Specifications for Public Works Construction (Greenbook).

## **5.2. Procedures and Standards**

Procedures, and standards for the inspection and testing of newly constructed, newly installed, repaired, and rehabilitated system pipelines, pumps, and other equipment and appurtenances.

IRWD uses the inspection and testing requirements detailed in the District's Procedural Guidelines and General Design Requirements, General Technical Specifications, and the Standard Specifications for Public Works Construction (Greenbook).

The District's Procedural Guidelines and General Design Requirements requires sewer inspections at the following intervals:

- Trench excavation and bedding
- Placing of pipe, fittings, and structures
- Placing and compacting the pipe zone backfill
- Backfill of the trench to grade
- Raising of manhole and clean-outs and during system cleaning
- Pipeline CCTV inspection at completion of construction

Prior to pipelines CCTV inspection, pipelines must be balled and flushed, air-tested, and mandrelled.

CCTV inspection is then performed to determine if any of the following defects exist:

- Off grade 0.08 foot, or greater, deviation from grade.
- Joint separations exceeding <sup>3</sup>/<sub>4</sub>-inch.
- Misaligned joints (none permitted on straight runs or on wrong side of pipe curves). Joint spaces exceeding <sup>3</sup>/<sub>4</sub>-inch on designed curves.
- Chips in pipe ends more than <sup>1</sup>/<sub>4</sub>" deep.
- Cracked or damaged pipe or evidence of presence of an external object bearing upon the pipe (rocks, roots, etc.).
- Dropped joints.
- Infiltration in excess of maximum permissible specified in the District Standard Specifications, Section 15043.
- Debris or other foreign objects in the line.
- Other obvious deficiencies.

Any defects found must be corrected prior to final acceptance. Inspection and testing standards for sewer pipeline repair and rehabilitation projects are developed by the design engineer during the design phase of the project. Similarly, inspection and testing requirements for pump station repair or rehabilitation projects are developed by the design engineer during the design phase of

the project.

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# **Element 6 - Spill Emergency Response Plan**

IRWD maintains a Spill Emergency Response Plan (SERP) containing procedures that comply with Attachment D Section 6, E1, and E2 of the General Order WQ 2022-0103-DWQ. <u>See Attachment 1.</u>

IRWD collaborates with storm sewer agencies to coordinate emergency spill responses, ensure access to storm sewer systems during spill events, and prevent unintentional cross-connections of sanitary sewer infrastructure to storm sewer infrastructure, IRWD has been meeting annually with surrounding collection systems that are satellites to the Interceptor System.

The Spill Emergency Response Plan must include an up-to-date Plan to ensure prompt detection and response to spills to reduce spill volumes and collect information for the prevention of future spills.

#### IRWD's Spill Emergency Response Plan includes procedures to:

- Notify primary responders, appropriate local officials, and appropriate regulatory agencies of a spill in a timely manner.
- Notify other potentially affected entities (for example, health agencies, water suppliers, etc.) of spills that potentially affect public health or reach waters of the State.
- Comply with the notification, monitoring and reporting requirements of this General Order, State law and regulations, and applicable Regional Water Board Orders.
- Ensure that appropriate staff and contractors implement the Spill Emergency Response Plan and are appropriately trained.
- Address emergency system operations, traffic control and other necessary response activities.
- Contain a spill and prevent/minimize discharge to waters of the State or any drainage conveyance system.
- Minimize and remediate public health impacts and adverse impacts on beneficial uses of waters of the State.
- Remove sewage from the drainage conveyance system.
- Clean the spill area and drainage conveyance system in a manner that does not inadvertently impact beneficial uses in the receiving waters.
- Implement technologies, practices, equipment, and interagency coordination to expedite spill containment and recovery.
- Implement pre-planned coordination and collaboration with storm drain agencies and other utility agencies/departments prior, during, and after a spill event.
- Conduct post-spill assessments of spill response activities.
- Document and report spill events as required in this General Order; and
- Annually, review and assess effectiveness of the Spill Emergency Response Plan, and update the Plan as needed.

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No later than the next business day, a completed internal Spill Report Form should be forwarded to the Collection Systems Manager and Director of Maintenance. Any debriefings of the respondents to the Spill will occur at the Senior Management level. The internal Spill Reporting form is utilized to document the Spill event, communicate Spill event to all appropriate IRWD staff internally, enter all required information into the CIWQS on-line database, and to certify the Spill by the LRO.

For more details, please see Attachment 1(Spill Emergency Response Plan).

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# **Element 7 - Sewer Pipe Blockage Control Program**

IRWD recognizes the need for a sewer pipe blockage control program to control fats, oils, grease, rags and debris. Substances such as FOG, roots, rags, and debris represent a required element in IRWD's efforts to successfully operate its collection system in a manner that meets regulatory requirements, achieves identified service level targets, and is cost-effective.

The procedures IRWD adheres to include:

## 7.1 An implementation plan and schedule for a public education and outreach program that promotes proper disposal of pipe-blocking substances:

- Regulatory Compliance hands out educational materials at multiple District events throughout the year which include grease removal containers for customers as well as educational information. Ongoing outreach involves a multi-media webpage title, <u>"Beware of FOG: Fats, Oils & Grease"</u>, and the <u>Sewer Savvy Business Recognition Program.</u>
- The District utilizes education as the primary method for controlling the discharge of FOG to the sewer system from multi-family housing and single-family homes. The District provides educational information concerning FOG in the District's Quarterly Newsletter at least once annually. In addition, the District mails FOG education brochures with utility bills on an annual basis to educate District customers.
- The District conducts more frequent mailing of FOG brochures for areas identified as potential upstream sources of FOG in the sewer system. Additionally, the District provides FOG brochures and educational material to multi-family housing for posting in common areas.
- FOG Control Program staffing consists of a combination of District staff and contractor staff. The District employs a Regulatory Compliance Manager (FOG program manager), along with two additional staff members in the Regulatory Compliance Department. The Regulatory Compliance Manager and applicable staff are responsible for management of the following activities:
  - o FOG Control Program implementation, performance monitoring, and reporting
  - o FSE inspections
  - FSE compliance follow-up
  - o FOG Control Program enforcement

# 7.2 A plan and schedule for the disposal of pipe-blocking substances generated within the sanitary sewer system service area:

- Collection Systems has a dedicated debris decant area located at the Michelson Water Reclamation Plant which is utilized for disposal of grease, calcium, grit and additional debris. This additional waste accumulated while performing jetting operations is hauled away per our agreement with our waste hauler contractor and is scheduled based on the needs of the District.
- Grease hauling companies serving the IRWD area are shown in Table 7-1, and Grease Rendering facilities serving the IRWD area are shown in Table 7-2.

Company	Phone Number
Ameriguard Maintenance Services	(800) 347-7876 x14
JR Grease Traps and Interceptor Service	(714) 739-4628
New Leaf Biofuel	(619) 236-8500
One More Time	(323) 268-2801
SMC Grease Specialist	(951) 788-6042
Superior Service Recycling	(714) 502-0240

#### **Table 7-1: Grease Hauling Companies Serving Orange County**

Company	Address	Phone Number	Type of Operation
Baker Commodities, Inc.	4020 Bandini Blvd	(323) 269-6177 or	Grease recyclers. Drop
	Los Angeles, CA (Vernon, CA)	(800) 427-0696	off location and grease trap cleaning/hauling.
Darling International	10441 Stanford Ave	(714) 556-7867	Drop off location and
	Garden Grove, CA		grease trap cleaning/hauling.
OCC Recycling	2701 Fairview Road Costa Mesa, CA	(714) 432-5131	Used cooking oil only
One More Time	4144 Bandini Blvd	(323) 268-2801	Used cooking oil only
	Los Angeles, CA (Vernon, CA)		
Orange County Sanitation District, Plant No. 1	10844 Ellis Ávenue, Fountain Valley, CA 92708	(714) 593-7428	Primary grease drop off point for grease haulers serving IRWD
Southwest Processors	4120 Bandini Blvd	(800) 900-3366	Grease recyclers. Drop
Inc.	Los Angeles, CA		off location and grease
	(Vernon, CA)		trap cleaning/hauling.

#### Table 7-2: Grease Rendering/Drop Off Points for Irvine Area

**Note:** Listed above are FOG disposal facilities serving the IRWD area. The primary grease drop off location is Orange County Sanitation District's Plant No. 1.

# 7.3 The legal authority prohibits discharges to the system and identify measures to prevent spills and blockages:

- Per the last SSMP (2018) that was adopted by the board and all subsequent WDR updates have been recognized and implemented in perpetuity. Measures that have been identified include advanced telemetry remote monitoring which are strategically placed throughout the District as well as routine inspections performed in high maintenance areas as well as additional locations of concern.
- The District has both incorporated measures to prevent spills and blockages caused by FOG into the District's Rules and Regulations and has the authority to identify additional measures as deemed necessary. The District's Rules and Regulations require the following measures to prevent spills and blockages caused by FOG:
  - Implementation of Best Management Practices to minimize discharge of FOG (Section 7.11.3.4)
  - Requirement to install a grease removal device (Section 7.11.4)
  - Requirement for grease removal equipment maintenance (Section 7.11.6.3)
  - All new construction of FSEs after December 30, 2004 are required to install grease interceptors prior to commencing discharges of wastewater to the sewer system as identified through the FSE FOG Plan Review Process.

- Existing FSEs determined to be the cause or contributor of FOG related blockages or spills are required to install grease interceptors within 180 days of identification.
- Existing FSEs undergoing remodeling or a change in operations or ownership are required to install grease interceptors as identified through the FSE FOG Plan Review Process.
- Legal Authority to Support FOG Source Control Program The District's legal authority to prohibit discharges to the system and identify measures to prevent spills and blockages caused by FOG is included in Section 7.11 of the District's Rules and Regulations for Water, Sewer, Recycled Water, and Natural Treatment System Service. Table 7-3 summarizes the legal authorities related to FOG source control and references the relevant section of the District's Rules and Regulations that establishes these authorities.

FOG Legal Authority	Section of IRWD's Rules and Regulations
FOG Discharge Prohibition	7.11.3.1
Food Service Establishment Prohibitions	7.11.3.2
Requirement for FOG Wastewater Discharge Permit	7.11.3.3
Requirements for Implementation of FOG Best Management Practices	7.11.3.4
Requirement to Install, Operate, and Maintain Grease Removal Equipment	7.11.4
Grease Interceptor and Grease Trap Requirements	7.11.6.8 & 7.11.6.9
Authority to Require Monitoring, Reporting, Inspection, and Sampling for FOG Source Control Compliance	7.11.7
Record-Keeping Requirements	7.11.7.2
Authority to Perform Inspection and Sampling	7.11.7.4
Enforcement	7.6 & 7.11.8

# Table 7-3 Legal Authority

# 7.4 Requirements to install grease removal devices, design standards for the removal devices, maintenance requirements, best management practices requirements, recordkeeping and reporting requirements:

- IRWD Rules and Regulations ensure all plumbing and health codes are followed which verifies grease removal devices are installed and sized correctly per drainage fixture unit (DFU) calculation tables as well as District inspectors. Pursuant to Section 7.11.4 of the District's Rules and Regulations, FSEs are required to install, operate and maintain approved type and adequately sized grease interceptors.
- The District's general FOG Wastewater Discharge Permit requires FSEs to conform with the following record keeping and notification requirements:
- Record Keeping requirements
  - Logbook of employee training
  - Records of spills and/or cleaning of the lateral or sewer system
  - o Logbook of grease control equipment cleaning activities
  - Copies of grease control equipment records or waste hauling manifests
  - Records of sampling data and height monitoring of FOG and solid accumulation in the interceptor
  - o Notification requirements
    - Notification of a spill
    - Notification regarding planned changes
  - The District's general FOG Wastewater Discharge Permit requires the implementation of the following Best Management Practices:
    - Installation of drain screens
    - Segregation and collection of waste cooking oils
    - Disposal of food waste into trash or garbage, and not into sink
    - Employee training
    - Kitchen signage
  - The District's FOG regulation requires grease removal equipment sizing and installation to conform to the current edition of the California Plumbing Code and requires grease removal equipment to be constructed and located in accordance with the requirements and criteria set forth in the FOG Control Program. The District's Fats, Oils, and Grease (FOG) Control Program Manual, dated December 15, 2004, documents the current approach utilized by the Regulatory Compliance Manager to size grease interceptors.
  - The District's Regulatory Compliance Manager reviews and approves the sizing and installation of grease removal devices. The design and sizing is based on the current version of the California Plumbing Code Section 1014.3. The Regulatory Compliance Manager will also consider the potential for large grease interceptors to become septic

and may compare the California Plumbing Code sizing against other sizing formulas and use best judgment based on other factors (e.g. FSE cooking equipment, menu, frequency of use of drainage fixture units) to determine the final size of the interceptor.

- The FOG Control Program Manual also requires the floor of an interceptor to be shallow enough to allow for proper cleaning and an individual interceptor not to be larger than 3,000 gallons for most installations. FSEs with very large flows may be required to install multiple interceptors. Finally, an FSE calculation of 375 to 750 gallons is required to install a 750-gallon interceptor.
- The District's general FOG Wastewater Discharge Permit requires FSEs to perform grease removal equipment maintenance as frequently as is necessary to ensure FOG and/or solids in the device do not exceed 25 percent of the capacity of the equipment. Typically, the maintenance frequency required is quarterly yet is no less frequent than once every six months. If FSE inspections identify non-compliance with the District's FOG regulation, the Regulatory Compliance Manager may require an FSE to perform more frequent maintenance.

## 7.5 Authority to inspect grease producing facilities, enforcement authorities, and whether the Enrollee has sufficient staff to inspect and enforce the fats, oils, and grease ordinance:

- IRWD's Regulatory Compliance Department oversees the FOG inspection program and designates authority to implement oversight by having staff and consultant support for emergency response and routine inspections.
- Section 7.11.3.2 of the District's Rules and Regulations applies the following prohibition to all FSEs:
  - Installation of food grinders is prohibited. This includes a requirement to remove existing food grinders.
  - Use of additives to emulsify FOG is prohibited.
  - Disposal of waste cooking oil into drainage pipes is prohibited.
  - Discharge of wastewater from dishwashers to any grease removal equipment is prohibited.
  - Discharge of wastewater with temperatures in excess of 140 degrees F to any grease removal equipment is prohibited.
  - Use of any biological additives for grease remediation or as a supplement to grease removal equipment maintenance is prohibited.
  - Discharge of waste from toilets, urinals, and other fixtures containing fecal materials to sewer lines connected to grease removal equipment is prohibited.
  - Discharges of any waste including FOG and solid material removed from grease removal equipment to the sewer system is prohibited.
  - Diluting discharge as a substitute for treatment is prohibited.
- Section 7.11.7.4 of the District's Rules and Regulations provides the District with the authority to perform inspection and sampling at FSEs and Section 7.11.8 provides authority

to enforce provisions of the Fats, Oils, and Grease Control program.

• The District has developed an enforcement response guideline to respond to Non-Compliance issues identified during the inspection process. The District bases the enforcement response on the severity of the non-compliance and the history of noncompliance at the FSE. The enforcement response follows a tiered approach consisting of three tiers: Notice of Non-Compliance, Notice of Violation, and Assessment of Penalties. Table 7-4 lists the levels of enforcement response.

Tier	Enforcement Trigger
Tier 1 – Notice of Non- Compliance	A Tier 1 enforcement response is typically utilized for isolated deficiencies that are not serious non-compliance issues. No enforcement action is taken after correction of the deficiency. For example, a single BMP non-compliance finding would result in a Tier 1 enforcement response.
Tier 2 – Notice of Violation	A Tier 2 enforcement response is triggered due to the severity of non- compliance, an FSE that is non-responsive to previous requirements, or an FSE that remains in non-compliance beyond required timelines. This level of enforcement is triggered by multiple deficiencies identified in an inspection. An example of a serious non-compliance issue would be a deficiency in grease removal equipment maintenance or functionality. Another example is when a grease discharge from an FSE directly identified as the cause of a spill or blockage event.
Tier 3 – Assessment of Penalties	Similar to Tier 2, a Tier 3 enforcement response is triggered due to the severity of non-compliance, an FSE that is non-responsive to previous requirements, or an FSE that remains in non-compliance beyond required timelines. A Tier 3 enforcement response is rare and is utilized by the District as a last resort to generate FSE compliance. This level consists of assessment of non-compliance fees; increased assessment of fees; revocation of FSE's Conditional Waiver requiring installation of a grease interceptor; and the potential loss of the FSE's right to discharge wastewater to the sewer system.

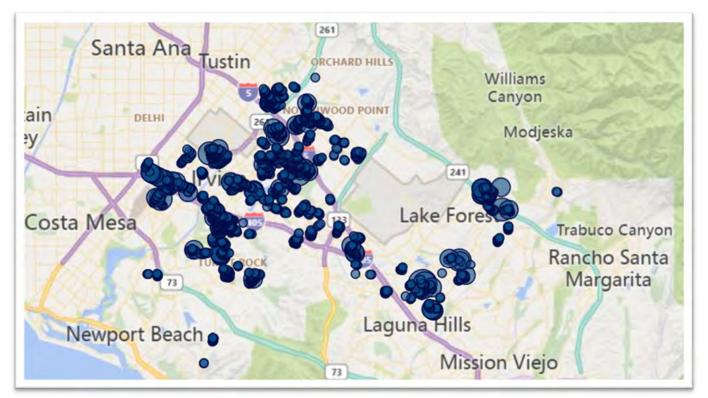
#### Table 7-4: Levels of FSE Enforcement Response

• The District has an appeals process for FSEs to appeal the decisions of the Regulatory Compliance Manager or General Manager. A hearing is conducted and the FSE will be given the opportunity to present information supporting the FSE's position. A FSE affected by a Notice of Violation from an inspector or by the action or determination of the Regulatory Compliance Manager may file a request for a hearing with the General Manager. The General Manager will conduct a hearing with the FSE, review the facts, and make a determination concerning the appeal. An FSE affected by the action or determination of the General Manager may file a request for an appeal hearing with the Board of Directors who will review the facts and make a determination.

• The District utilizes a contractor to perform FSE inspections, issue Notice of Violation letters, and to perform compliance follow-up inspections. District staff perform FOG Control Program enforcement activities if the contractor determines compliance is not achieved at the time of the compliance follow-up inspection. The District also dedicates a portion of the District's sewer cleaning crews to FOG-related preventive maintenance activities.

# 7.6 An identification of sanitary sewer system sections subject to fats, oils, and grease blockages and establishment of a cleaning schedule for each section:

• District staff monitors High Maintenance locations through our CMMS system (Maximo IBM) and has two scheduled cycles for the areas labeled: 4-month and 6-month High Maintenance in Maximo IBM.



#### 4- and 6-month high maintenance locations(illustration)

• The District employs preventive maintenance to address areas prone to FOG accumulation in the system. The District has identified areas in the sewer system with FOG issues through a combination of maintenance crew knowledge, past grease-related spills and stoppages,

CCTV inspection data, and the FOG characterization study performed in 2004. Staff maintain a database of all of the FSEs within the District. The District will continue to adjust the sewer cleaning frequency of pipes to address the FOG issue while optimizing the amount of sewer cleaning performed. The District employs the methods outlined in Chapter 4 – Operations and Maintenance Program to optimize its preventive maintenance activities.

• The District also has an on-going CCTV inspection program that will continue searching for sewer pipes with FOG issues. In addition, sewer cleaning crews record the type and severity of material found during cleaning activities and the District utilizes this information to identify new areas with FOG issues and to adjust sewer cleaning frequencies as described in Section 6.3.

# 7.7 Implementation of source control measures for all sources of fats, oils, and grease reaching the sanitary sewer system for each section identified above:

- All Food Service Establishments are required to implement Best Management Practices (BMPs) in their operations to minimize the discharge of FOG to the sewer system and our annual inspection verifies implementation. All Food Service Establishments are required to pretreat their wastewater using grease interceptors to remove FOG prior to discharge to the sewer system. Administer enforcement measures and costs associated with FOG discharge and blockages. Review waste oil and grease removal manifest from FSE's.
- The District utilizes the Orange County Sanitation District's (OCSD) source control program to regulate wastewater discharges from Industrial users into the District's sewer collection system. The District will coordinate with OCSD for regulation and enforcement of industrial dischargers for any FOG related discharges identified by the District.
- Section 7.11.3.1 of the District's Rules and Regulations prohibits a Food Service Establishment (FSE) from discharging FOG that may accumulate and/or cause or contribute to blockages in either IRWD's sewer system or sewer system lateral connecting the FSE to IRWD's sewer system.

The District performs several types of FSE inspections to ensure FSEs comply with FOG regulations and FOG Control Program requirements. **Table 7-2** lists the different types of inspection performed by the District.

Inspection Type	Description
Initial Inspections	These inspections are conducted to identify and classify each FSEs potential to generate FOG and its potential to discharge the FOG to the sanitary sewer system. If not adequately controlled, this FOG can lead to sewer blockages and, potentially, spills. The inspection identifies the type of food, equipment, and kitchen practices that contribute to FOG discharges and the equipment (e.g., grease interceptors, grease traps) that may reduce the discharge of FOG to the sewer. These initial inspections also provide the opportunity to educate the FSEs on the impact of their grease discharges, what they can do to minimize grease discharges, and how the District's FOG regulations could potentially impact them.
Best Management Practices Inspection	These inspections are conducted to evaluate compliance with the facility's best management practices requirements.
Grease Removal Equipment Inspections	These inspections are conducted to evaluate compliance with the facility's grease removal equipment requirements.
Compliance Inspections	These inspections are conducted where it is determined by the Regulatory Compliance Manager that a follow-up inspection is required for a Non-Compliance issue that has been identified in previous BMP, GRE, or FOG source sewer pipe inspections.
Enforcement Inspections	These inspections are conducted when elevated enforcement of the Permit requirements is required or when the revocation of the FSEs grease interceptor installation Conditional Waiver, Waiver or Variance is required.

### Table 7-2 Types of FOG Source Control Inspection Performed by IRWD

• The District focuses inspections on FSEs in the vicinity and upstream of areas in the sewer system with known FOG issues and on FSEs identified as having a greater potential to generate FOG and discharge FOG to the sewer system. FSE inspections are conducted approximately annually and more frequently for FSEs with greater potential to discharge grease to the sewer system.

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# Element 8 - System Evaluation, Capacity Assurance and Capital Improvements

Element 8 contains multiple components which include the following procedures and activities:

- Routine evaluation and assessment of system conditions.
- Capacity assessment and design criteria.
- Prioritization of corrective actions.
- A capital improvement plan.

### 8.1 Routine Evaluation and Assessment of System Condition

IRWD's plan includes procedures to:

- Evaluate the sanitary sewer system assets utilizing the best practices and technologies available.
- Identify and justify the amount (percentage) of its system for its condition to be assessed each year.
- Prioritize the condition assessment of system areas that:
  - Hold a high level of environmental consequences if vulnerable to collapse, failure, blockage, capacity issues, or other system deficiencies.
  - Are in or within the vicinity of surface waters, steep terrain, high groundwater elevations, and environmentally sensitive areas.
  - Are within the vicinity of receiving water with a bacterial-related impairment on the most current Clean Water Act section 303(d) List.
  - Assess the system conditions using visual observations, video surveillance and/or other comparable system inspection methods.
  - Utilize observations/evidence of system conditions that may contribute to exiting of sewage from the system which can reasonably be expected to discharge into a water of the State;
  - Maintain documents and recordkeeping of system evaluation and condition assessment inspections and activities; and
  - Identify system assets vulnerable to direct and indirect impacts of climate change, including but not limited to: sea level rise; flooding and/or erosion due to increased storm volumes, frequency, and/or intensity; wildfires; and increased power disruptions.

The Irvine Ranch Water District System Capacity Plan (System Capacity Plan), formerly referred to as the Master Plan) is updated continuously(weekly).

The System Capacity Plan has the following two major components:

- 1. An evaluation of the existing system's capacity performance and identification of potential relief projects
- 2. Design of a new trunk sewer system to serve future development

The District performs capacity assurance planning for both the trunk sewers as well as for sewer pipelines within smaller planning areas. The District performed capacity assurance planning for the trunk sewers in March 2017. The District also prepares water, sewer, and reclaimed water facility planning studies, also known as a Sub-Area Master Plans (SAMP), on areas after a developer has generated a specific plan of development with a planning area. The District has not experienced any capacity-related sewer overflows.

The System Capacity Plan establishes performance criteria and storm events used to evaluate the system performance, identify potentially capacity-deficient locations, develop preliminary relief solutions, and size new facilities to serve future development.

IRWD's 10-year Design Storm and 5-year Performance Storm are applied to the hydraulic models to assess how IRWD's system would perform under existing and build-out conditions. Model-predicted spills identify potentially capacity-deficient systems, which are organized into two different planning periods:

# 8.2 Capacity Assessment and Design Criteria

IRWD's Plan include procedures to identify system components that are experiencing or contributing to spills caused by hydraulic deficiency and/or limited capacity, including procedures to identify the appropriate hydraulic capacity of key system elements for:

- Dry-weather peak flow conditions that cause or contribute to spill events.
- The appropriate design storm(s) or wet weather events that cause or contribute to spill events.
- The capacity of key system components; and
- Identify the major sources that contribute to the peak flows associated with sewer spills.

The capacity assessment must consider:

- Data from existing system condition assessments, system inspections, system audits, spill history, and other available information.
- Capacity of flood-prone systems subject to increased infiltration and inflow, under normal local and regional storm conditions.
- Capacity of systems subject to increased infiltration and inflow due to larger and/or higher-intensity storm events because of climate change.

- Increases of erosive forces in canyons and streams near underground and above-ground system components due to larger and/or higher-intensity storm events.
- Capacity of major system elements to accommodate dry weather peak flow conditions, and updated design storm and wet weather events; and
- Necessary redundancy in pumping and storage capacities.

One of the primary objectives of the Sewer Collection System Master Plan, developed by the District and AKM Consulting Engineers in March 2017, was to determine the available capacity of the collection system and to identify any deficiencies resulting from those system capacities. To accomplish this objective, the District created a hydraulic model of the collection system. The hydraulic model is composed of both the physical characteristics of the system and the flows the District estimates will be conveyed by the system. Analyses were performed to determine the water demand and sewage flow generation factors for representative land uses throughout the District's service area. This analysis was documented in a Water Demand and Flow Generation Factor Study, which includes the procedures used to calculate water demands and sewage flow generation factors as well as the results of those analyses.

Hourly variations in wastewater flows are an important part of determining the hydraulic capacity of the sewer collection system. The District's Flow Measurement Program characterized the flow volumes per d use and this information was used to define the hourly flow variations for residential and non- residential land use types.

Under the first phase of the flow measurement program, several flow measurement devices (monitors) were installed throughout the collection system. These devices were positioned to measure flow from generally homogenous land use areas. Each device sampled the flow rate within the sewer system on a five-minute interval. For each measurement site, hourly average flow rates were used to define the diurnal pattern of the actual flow in the system. Hourly peak flow factors were calculated to allow comparison of the flow measurement results between drainage basins with different flow volumes. Hourly peak flow factors are calculated by dividing the average hourly flow rate by the average daily flow rate. **Figure 8-1** and **Figure 8-2** show the observed diurnal curves for residential and non- residential flows. These flow patterns are documented in Section 4 of the Sewer Collection System Master Plan.

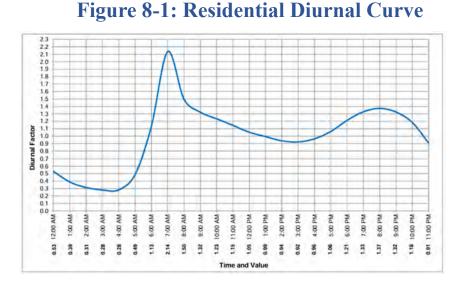
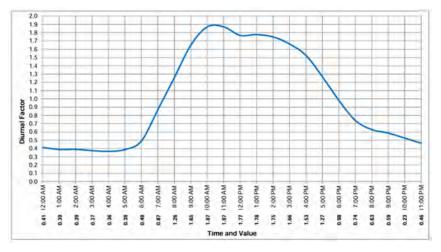


Figure 8-2: Commercial Diurnal Curve



In June 2012, the District's Sewer System Management Plan Program Audit included an audit finding indicating the District's current planning criteria of accounting for inflow/infiltration (I/I) using conservative depth over diameter (d/D) ratios may be inadequate for areas with high levels of I/I.

In November 2012, the District performed a preliminary study from data collected at selected lift stations between January 1, 2010, and March 31, 2012. The study concluded that normalized volumetric RDII responses from the evaluated tributary basins are considered moderate. Furthermore, RDII peak factors associated with the Canada, Coastal Ridge and Coyote lift stations suggest that peak flows leading to the wet wells of those stations were likely significant during the two large, system-stressing storms evaluated. Based on the results of this preliminary evaluation, the District plans on performing additional analysis during the next Sewer Master Plan project to determine if a change to the planning criteria for accounting for I/I is needed in areas with high levels of I/I.

#### 8.2.1 Design and Performance Criteria

Section 4 of the Sewer Collection System Master Plan documents the District's design and performance criteria for gravity pipelines including the allowable sewer main slope, peaking factors, and minimum depth. Section 4 also includes performance criteria for force mains, sewer pump stations, and siphons.

#### 8.2.2 Gravity Mains

The District requires design flows for residential sewer mains to be calculated based on the flow generation factors presented in Table 4-4 of the Sewer Collection System Master Plan according to the most appropriate land use category. The District encompasses a variety of land use types: residential and non-residential. The District requires Residential and Commercial/Industrial flow design criteria to be calculated by the design engineer based on projected generation rates for specific commercial or industrial development. Peak dry weather design flows for sewer mains are to be designed to maintain a specific depth (d) to diameter (D) ratio, based on the selected diameter of the pipeline as shown in Table 8-1.

	Peak Dry Weather Flow d/D		
	Diameter < 15"	Diameter = 15"	Diameter > 15"
Priority 1	> 82%	> 82%	> 82%
Priority 2	75% - 82%	75% - 82%	75% - 82%
Priority 3	67% - 75%	67% - 75%	-
Priority 4	50% - 67%	-	-
Design Requirement	≤50%	<u>≤</u> 67%	≤75%

#### Table 8-1: d/D Performance Criteria for Gravity Sewer Pipes<sup>6</sup>

Maintenance of specific d/D ratios under peak dry weather flow conditions provides sufficient pipeline capacity to accommodate wet weather flow, including infiltration, inflow and other storm related water, over and above the actual wastewater. This additional headspace also provides a margin of safety for variations in flow estimation. The overall intent is to provide a factor of safety within the pipeline for wet weather and other unexpected flows.

Design criteria establish a means of selecting a pipeline size and vertical slope that provides the required capacity and flushing velocity for projected flows and the available head space above the water surface for potential unexpected peak flows above normal projected conditions. Such instances of peak flows exceeding design conditions may occur during rain events where any number of potential avenues of water conveyance may allow rainwater into the sewer collection system. Groundwater is another potential source of defect flow that may contribute to overall Inflow and Infiltration (I&I) that can occur during the life span of a pipeline segment. Excessive I&I within a collection system will increase the risk of sanitary sewer overflows.

The design criteria for gravity pipelines provides for an industry standard margin of safety from

sanitary sewer overflows by dedicating the remaining head space (air space above the water level) for unexpected I&I situations. Once in operation for a long period of time, if a pipeline operates with a peak flow higher than the design criteria, it is not necessarily a trigger for upsizing the pipeline segment capacity. This is particularly relevant for areas that have already reached their ultimate build-out condition and do not expect any further increase in flows.

The District's Sewer Collection System Master Plan included gravity pipeline performance criteria to provide a means to prioritize existing pipeline segments experiencing flows above design standards. As shown in Table 8-1 above, a ranking system of one to four was created for different pipe size categories and d/D ratio ranges to evaluate the performance of pipelines and focus on segments presenting the highest risk of flowing at full capacity.

Sewer mains are required to be designed and constructed to provide mean velocities as described in Section 4-2 of the District's Procedural Guidelines and General Design Requirements<sup>7</sup> at the design depth defined in Table 8-1 above. Table 4-7 of the Sewer Collection System Master Plan documents the design criteria for allowable sewer main slope.

The adequacy of a sewer collection system is based upon its ability to convey the peak flows. District sewer mains are required to be designed and sized using peak flow conditions, determined by multiplying average flow conditions by a peaking factor. The capacity of the sewer collection system was validated by developing a calibrated hydraulic modeling and verifying with field observations. The methodology described below provides a representative understanding of the hydraulic modeling analysis supports the SSMP: The average base loads were established to match the flow monitoring and SCADA data at various lift stations, treatment plants, and 65 temporary sewer flow monitors. The average flows routing the tributary areas were loaded in the hydraulic model over a 24-hour period. The instantaneous model flows are generated from the average flow conditions and the corresponding hourly diurnal patterns. Section 6-9 of 2016 Sewer Collection System Hydraulic Model Manual included the diurnal patterns for residential, commercial, and specific customers developed for the peak dry weather scenario simulations. Once the model was calibrated, the system was analyzed and verified for adequate capacity.

Additionally, developments containing more than 400 dwelling units are required to provide the District with a Sub-Area Master Plan (SAMP). The SAMP includes an analysis of the proposed sewer system using a computerized hydraulic model, a complete description of the facilities to be constructed, maps, and computations providing the design criteria meeting the requirements of the Sewer System Guidelines. The Sewer Collection System Master Plan incorporates the information provided by SAMPs where appropriate and available.

#### 8.2.3 Force Mains

Section 4-10 of the IRWD Procedural Guidelines and General Design Requirements documents the design and performance criteria for force mains.

#### 8.2.4 Sewer Pump Stations

Pump stations design and performance criteria included in the Sewer Collection System Master Plan conforms to Section 4-13 of the District's Procedural Guidelines and General Design Requirements.

#### 8.2.5 Siphons

Section 4-8 of the Sewer Collection System Master Plan documents performance criteria utilized in evaluating the existing siphons. Final criteria for ultimate upgrades will be at the discretion of IRWD and addressed during the design phase of the project. Siphons are only used when specifically approved by the District Engineer, and after all other design options have been investigated.

#### 8.2.5 Reliability and Redundancy

The District performed a system reliability and redundancy analysis documented in Section 7 of Sewer Collection System Master Plan. As part of the Sewer Collection System Master Plan update in 2016, a Criticality based Reliability and Redundancy analysis of the gravity system pipes, siphon, force mains, and lift stations was conducted. The analysis utilized the existing closed-circuit television (CCTV) inspection data, the developed hydraulic model data, as well as other elements deemed of importance to the analysis. InfoMaster, an ArcGIS based asset integrity management and capital planning software package, was utilized to conduct the analysis. It is a tool that assists in characterizing the likelihood and consequence of failure for individual pipes in the network. IRWD's CCTV inspection data and hydraulic analysis data were used by the InfoMaster software to assist in the analysis. InfoMaster relates the combination of both Likelihood of Failure and Consequence of Failure to risk. Risk takes into account the asset's physical condition, as well as the impact that its failure would have on system performance and stakeholders.

#### 8.2.6 Gravity Pipe Risk Analysis

The resulting gravity system risk profile and recommended action items are included in Section 7-2 of Sewer Collection System Master Plan. A decision tree shown in Figure 7-4 of Sewer Collection System Master Plan is used to determine the action items related to each gravity pipe.

#### 8.2.7 Siphon Risk Analysis

The siphon risk analysis was conducted along with the gravity main pipes. Because of the fact that siphons for the most part flow under pressure, and have a d/D greater than 0.75, all siphons are classified in the "Extreme Risk" or "High Risk" category. The list of siphons and their risk profile is shown in Table 7-2 of the Sewer Collection System Master Plan.

#### 8.2.8 Force Main Risk Analysis

In the Force Main Risk Analysis, the overall Likelihood of Failure and Consequence of Failure scores are calculated as a weighted average of all individual Likelihood of Failure and Consequence of Failure scores. Each of the Likelihood of Failure and Consequence of Failure elements are assigned different weighting factors depending on the goals and priorities of IRWD. The detail of risk analysis for force main is included in Section 7-5 of Sewer Collection System Master Plan.

#### 8.2.9 Lift Station Risk Analysis

The weighted Scores for all Likelihood of Failure and Consequence of Failure Elements for Lift Station are shown in Table 7-5 of Sewer Collection System Master Plan. The Condition Grade is weighted heavily because it is based on actual observations made during the field visits to each lift station. Proximity to Major Waterways and Rate of Flow are weighted heavily because in the event of a spill, these lift stations would have the most impact on the community and the environment. Based on the Likelihood of Failure and Consequence of

Failure scores and weightings, the resulting Lift Station Risk Profile is shown in Table 7-6 of Sewer Collection System Master Plan.

## 8.3 Prioritization of Corrective Action

The findings of the condition assessments and capacity assessments must be used to prioritize corrective actions. Prioritization must consider the severity of the consequences of potential spills.

The Sewer Collection System Master Plan documents the priority of the pipe segments experiencing flows above the design standard d/D. Using the Performance Criteria, Plate 4 of Sewer Collection System Master Plan developed recommended action items from the risk analysis conducted on gravity pipes. IRWD conducts on-going maintenance and rehabilitation efforts for capacity enhancement, reliability, and redundancy measures. IRWD performs CCTV inspections on the sewer collection system and takes necessary steps to maintain and rehabilitate the gravity and force main sewer pipe. Since 2014, IRWD rehabilitated approximately 12,000 LF of 8-inch, 10-inch, 12-inch, and 15-inch sewer pipe with Cure-in-Place (CIP) Lining. In addition to CIP pipe lining, sewer pipe rehabilitation projects involve sewer line cleaning, additional CCTV inspections, mechanical root removal process, Calcium removal, and spot repairs.

The Sewer Collection System Master Plan provides the risk profile of Siphons and Lift Stations. In addition to the scored based risk assessment, IRWD performed condition assessment of the facilities to prioritize the rehabilitation projects. The IRWD goal is to rehabilitate one Siphon and one Lift Station annually to meet the capacity enhancement and improve reliability and redundancy measures.

# 8.4 Capital Improvement Plan

IRWD's capital improvement plan includes the following items:

- Project schedules including completion dates for all portions of the capital improvement program.
- Internal and external project funding sources for each project.
- Joint coordination between operation and maintenance staff, and engineering staff/consultants during planning, design, and construction of capital improvement projects.
- Interagency coordination with other impacted utility agencies.

<u>IRWD's capital budget</u> (FY25/26/27) included several on-going capacity, reliability, and redundancy projects including:

The Sewer Collection System Master Plan documents the priority of the pipe segments experiencing flows above the design standard d/D. Using the Performance Criteria, Plate 4 of Sewer Collection System Master Plan developed recommended action items from the risk analysis conducted on gravity pipes.

IRWD conducts on-going maintenance and rehabilitation efforts for capacity enhancement, reliability, and redundancy measures.

IRWD maintenance staff performs CCTV inspections on the sewer collection system and takes necessary steps to maintain and rehabilitate the gravity and force main sewer pipe.

Since 2014, IRWD rehabilitated over 12,000 LF of 8-inch, 10-inch, 12-inch, and 15-inch sewer pipe with Cure-in-Place (CIP) Lining. In addition to CIP pipe lining, sewer pipe rehabilitation projects involve sewer line cleaning, additional CCTV inspections, mechanical root removal process, Calcium removal, and spot repairs.

Tables 7-2 and 7-4 of Sewer Collection System Master Plan (SCSMP) provided the risk profile of Siphons and Lift Stations. In addition to the scored based risk assessment, IRWD performed condition assessment of the facilities to prioritize the rehabilitation projects.

IRWD's sewer system includes 19 inverted siphons in various locations. In 2016, the District completed a preliminary assessment and ranking of the siphons considering their risk of failure. The siphons are being rehabilitated in two phases, four (4) siphons were rehabilitated in Phase I, and (7) in Phase II (See project below). The remaining siphons will be included in the future capital budget as needed. IRWD will continue to monitor the condition of collection facilities and implement capital plans as to rehabilitate one Lift Station and one siphon annually to meet the capacity enhancement and improve reliability and redundancy measures.

In 2020, a risk assessment was completed on all vertical facilities and updates consequence of failure and likelihood of failure scores for all lift stations. The result of the project recommends that, before 2030, detailed condition assessments be conducted on 4 lift stations:

- 1. Harvard Avenue Trunk Station (HATS)
- 2. Canada
- 3. Coyote
- 4. Irvine Park

IRWD's capital budget includes the following projects:

- <u>Michelson Force Main Rehabilitation Project</u> This project will install CIP Pipelining on approximately 3,400 LF of force main sewer pipe.
- <u>Lake Forest Woods Sewer Improvements</u> This project will relocate approximately 1,500 LF of sewer gravity main pipelines from within a creek to outside the creek. Additionally, riprap check dams will be constructed to slow creek flow velocities and reduce erosion near the new sewer alignment.
- <u>Newport Coast Lift Station Rehabilitation Project</u>

- This project rehabilitates CIP Pipelining on approximately 3,000 LF of force main sewer pipe and installs a new portion of epoxy-lined Ductile Iron Pipe that connects the rehabilitated force main to the lift station drywell

- <u>Sewer Siphon Rehabilitation</u> This project uses the results from the Criticality analysis a nd implements the identified rehabilitation. Phase I has been completed, and Phase II is in process and scheduled for completion in 2025.
- <u>Sewer System Calcium Removal</u> As discussed earlier, the routine sewer line cleaning and inspection identify areas for calcium removal, this project implements this maintenance task.
- <u>Sewer Line Repairs</u> This project is an on-going annual project put in place for, previously unidentified, sewer repairs.
- <u>Update Capacity Analysis</u> By December of 2026 the District will have completed an updated capacity analysis of the entire system.

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# Element 9 - Monitoring, Measurement and Program Modifications

IRWD's plan includes an Adaptive Management section that addresses Plan implementation effectiveness and the steps for necessary Plan improvement, including:

# 9.1 Maintaining relevant information, including audit findings, to establish and prioritize appropriate planned activities:

- (a) *Maintain relevant information that can be used to establish and prioritize appropriate SSMP activities.* IRWD maintains relevant information by continuously utilizing data from our CMMS as well as data analyzed from our robust CCTV program which utilizes new approaches as well as technological advances in monitoring equipment.
- (b) Monitor the implementation and, where appropriate, measure the effectiveness of each element of the SSMP. IRWD staff monitors and measures the effectiveness of the SSMP by meeting with staff to ensure elements are understood and goals are communicated and tracked daily.
- (c) *Assess the success of the preventative maintenance program.* The newly adopted preventative maintenance program in coordination with GIS has led to an overall reduction in spill events as well as an increase in performance metrics for sewer line cleaning and inspection.
- (d) Update program elements, as appropriate, based on monitoring or performance evaluations. Elements for preventative maintenance and inspection are updated on a continuous basis due to our new odor and corrosion control program identifying new areas of needed maintenance as well as areas that can be reduced with maintenance efforts.
- (e) *Identify and illustrate spill trends, including frequency, location, and volume.* These are illustrated in CIWQS system performance graphs available in the Audit report.

# **9.2 Monitoring the implementation and measuring the effectiveness of each Plan Element:**

The District utilizes data captured in the District's geographical information system (GIS), computerized maintenance management system (CMMS), and the State Water Resources Control Board's California Integrated Water Quality System (CIWQS) SPILL database to monitor and measure the performance of the SSMP and SSMP implementation. The District monitors sewer spill performance to accomplish the following:

- Establish and prioritize appropriate SSMP activities
- Monitor the implementation and effectiveness of the SSMP
- Assess the success of the preventative maintenance program
- Identify and illustrate spill trends including frequency, volume, and location

The District's computerized maintenance management system contains information on the effectiveness of preventative maintenance activities and allows for historical review of pipeline work order history to adjust maintenance and repair priorities. The District also performs a failure cause analysis of all individual sewer overflow events and based on this review, identifies corrective actions to SSMP program elements as appropriate.

# 9.3 Assessing the success of the preventive operation and maintenance activities.

IRWD's system performance graphs as well as comparison in relation to other Regions 8 and 9 WDID's are superior and among the highest performing. Please see Table 9-1 below:

Туре	Performance Measure	Source
	Total miles of gravity sewer	GIS
System Statistics	Total miles of pressure sewer	GIS
	Total number of sewage pumping stations	GIS
	Total number and percentage of spills by Category	CIWQS
	Number and percentage of dry weather versus wet weather spills	CIWQS
Measures Based on Spill Number	Number of spills by cause:	CIWQS
on spin Number	Number of spills per 100 miles of sewer per year	CIWQS
	Number of locations with more than one spill in the past year	CIWQS
	Volume of spills per 100 miles per Year	CIWQS
	Number and percentage of spills by Size Class	CIWQS
	Total volume of spills	CIWQS
Measures Based on Spill Volume	Mean and median spill volume	CIWQS
	Total spill volume recovered and percentage of overall total spill volume	CIWQS
	Net volume of spills (total minus recovered) and percentage of overall total spill volume	CIWQS

#### **Table 9-1: Performance Metrics for Monitoring and Measurement**

	Total volume reaching storm drainage channel and not recovered or reaching surface waters and percentage of overall total spill volume	CIWQS
Spill Response	Average response time during business hours	CIWQS
Time	Average response time outside of business hours	CIWQS
Maintenance Program	Number of blockages in the past year by cause	CMMS
	Planned cleaning (LF)	CMMS
	Planned cleaning versus goal (LF) – Gap analysis	CMMS
	Planned CCTV inspection (LF)	CMMS
	Planned CCTV inspection versus goal (LF) – Gap analysis	CMMS

# 9.4 Updating Plan procedures and activities, as appropriate, based on results of monitoring and performance evaluations:

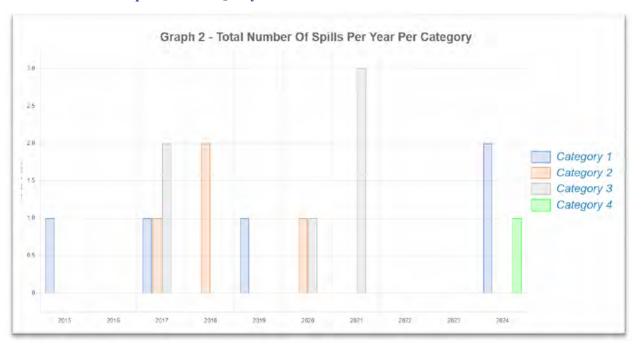
The District will update its SSMP at least every six years. The District will determine the need to update its SSMP prior to a 6-year update based on the results of the biennial audit and the performance of its sanitary sewer systems.

District staff will seek approval from the District Board for any significant changes to the SSMP. The authority for approval of minor changes such as employee names, contact information, or minor procedural changes is delegated to the Director of Maintenance Operations. Copies of the current SSMP document will be available to all interested parties on the District's website.

## 9.5 Identification and Illustration of trends:

IRWD owns and operates a variety of physical assets. It is important to monitor the most common causes of failure, recognize the consequences of failure, and identify the best practices to prevent failures. By doing this, IRWD can refocus efforts, move financial resources, and implement program modifications that will help reduce spills and sustain asset life.

• See system performance graphs available in CIWQS. (see below)



Graph 9-1 CIWQS System Performance for Michelson WRP

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# **Element 10 - Internal Audits**

IRWD is required to conduct an internal audit of its SSMP at a minimum frequency of once every three years, as required by the General Order WQ 2022-0103-DWQ.

A report will be prepared after an audit period, and within six months after the end of an audit period, the Legally Responsible Official must submit and certify the audit report to the CIWQS website.

IRWD uses the SSMP Audit Procedures, Section 5.4 of the Reissued "ORDER WQ 2022-0103-DWQ", as guidance when conducting an internal audit.

The next audit for IRWD is listed in element 1 for the compliance schedule. The audit report will be submitted to CIWQS by November 2, 2024.

#### Section 5.4 for Order WQ 2022-0103-DWQ - Sewer System Management Plan Audits

The Enrollee shall conduct an internal audit of its Sewer System Management Plan, and implementation of its Plan, at a minimum frequency of once every three years. The audit must be conducted for the period after the end of the Enrollee's last required audit period. Within six months after the end of the required 3-year audit period, the Legally Responsible Official shall submit an audit report into the online CIWQS Sanitary Sewer System Database per the requirements in section 3.10 (Sewer System Management Plan Audit Reporting Requirements) of Attachment E1 of this General Order.

Audit reports submitted to the CIWQS Sanitary Sewer System Database will be viewable only to Water Boards staff.

# The internal audit shall be appropriately scaled to the size of the system(s) and the number of spills. The Enrollee's sewer system operators must be involved in completing the audit. At minimum, the audit must:

- Evaluate the implementation and effectiveness of the Enrollee's Sewer System Management Plan in preventing spills.
- Evaluate the Enrollee's compliance with this General Order.
- Identify Sewer System Management Plan deficiencies in addressing ongoing spills and discharges to waters of the State; and
- Identify necessary modifications to the Sewer System Management Plan to correct deficiencies.

#### The Enrollee shall submit a complete audit report that includes:

- Audit findings and recommended corrective actions.
- A statement that sewer system operators' input on the audit findings has been considered; and a proposed schedule for the Enrollee to address the identified deficiencies.

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# **Element 11 - Communication Program**

IRWD's Communication Program was designed to comply with Attachment D Section 11 of the General Order WQ 2022-0103-DWQ. IRWD has provided and will continue to provide information to its customers and the public about the SSMP as described below. IRWD communicates with tributary and satellite sewer systems as needed, see below.

### **11.1 Communication with the Public**

The District communicates on a regular basis with the public on the development, implementation, and performance of its SSMP. The communication system provides the public with the opportunity to provide input to the District's SSMP and SSMP implementation. This communication occurs in the form of notices in the newsletter and on the District web site. Public comments are accepted at all monthly District Board meetings and the Districts will evaluate public input, when provided, and will address as appropriate.

The District's Board of Directors presents a report of sewer spills volume and location as a part of the quarterly dashboard report of strategic measures during Board meetings. This information is available to the public in the monthly agenda and Board packets available on the internet. These quarterly sewer overflow performance reports are the primary means for the District to communicate the on-going performance of the SSMP and SSMP implementation to the public. District Board Meetings are open to the public with agendas posted on the District website prior to the meeting.

Table 11-1 lists the various strategies the District employs to communicate with the public on the development, implementation, and performance of the District's SSMP.

### **11.2** Communication with Tributary and/or Satellite Systems

The District's wastewater collection system serves the City of Irvine, Lake Forest, as well as parts of Tustin, Newport Beach, Foothill Ranch, Costa Mesa, and unincorporated areas of Orange County. These areas are within the District service area and are not considered tributary or satellite system.

IRWD does accept a small quantity of wastewater into its sewer system from the University of California, Irvine (UCI), which is located within IRWD's service boundaries. UCI has provided the District with a copy of the SSMP for the UCI sewer system. The District has communicated to UCI the commitment to provide mutual assistance in the event of a sewer overflow, if UCI requests support. The IRWD sewer system has adequate capacity to convey the minor flows it accepts from UCI. IRWD does not currently have a formal agreement with UCI regarding discharge of wastewater into the District's collection system.

There is a small amount of wastewater generated in the City of Newport Beach and Irvine that is collected by trunk sewers owned, operated, and maintained by the IRWD, then discharged into sewers owned and maintained by the Orange County Sanitation District (OCSD). The District

communicates with the City of Newport Beach and OCSD through quarterly Orange County Waste Discharge Requirements Steering Committee and general meetings.

Subject Matter	Strategy	Description	Frequency
SSMP Development	Website	SSMP presented to the Board for approval. The document is available for public review prior to the Board meeting. The public can provide input and comments to the Board at any Board meeting.	During and after development of SSMP update
SSMP Implementation	Website	The District has a webpage dedicated to the collection system. The page includes a link to the District's SSMP and contact information with any questions regarding SSMP content, implementation, and performance.	Always available on District webpage
Spill Emergency Response	Website	IRWD website has Emergency and <u>IRWD Alert</u> button on homepage. Emergency and IRWD Alert webpage have contact information for who to call in case of an emergency.	<u>Always available on</u> District webpage
Fats, Oils, and Grease Best Practices	Website	IRWD website has a webpage providing the public with information relating to FOG control best practices.	Always available on District webpage
SSMP Performance	Board Meeting	Quarterly report on spill performance included with Strategic Measures.	Quarterly for Board Meetings
SSMP Performance	CIWQS Website	Spill performance information is available to the public on the State Water Resources Control Board (SWRCB) California Integrated Water Quality System (CIWQS).	Always available on internet

### Table 11-1 Communication Table

# Attachment 1

# **Spill Emergency Response Plan**











# SPILL EMERGENCY RESPONSE PLAN (SERP)

UPDATE (MAY 2023)



Irvine Ranch

# Spill Emergency Response Plan Update Part 1 – Compliance Guide

SERP Review and Approved By	Name/Title	Signature/Date
Legally Responsible Official (1)		
Legally Responsible Official (2)		
Legally Responsible Official (3)		

## ACTIVITY CHANGE LOG (SERP)

Date	Responsible Person/Title	Description Activity/Change

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# LIST OF ATTACHMENTS

- Attachment 1 WDR Implementation guidance (SWRCB)
- **Attachment 2 SERP Key Performance Indicators (KPIs)**
- **Attachment 3 Spill Category Determination Worksheet**
- Attachment 4 Spill Time Estimation Worksheet
- **Attachment 5** Spill Duration and Flow Worksheet
- **Attachment 6 Spill Measured Volume Estimation Worksheet**
- **Attachment 7 Spill Upstream Connections Volume Estimation Worksheet**
- **Attachment 8 Spill Response Evaluation Worksheet**
- Attachment 9 Training Record Worksheet
- Attachment 10 Cleaning Services Declination Waiver
- Attachment 11 Equipment Inventory and Critical Spare Parts List
- Attachment 12 Spill Data and Trends Worksheet
- Attachment 13 SPILL RESPONSE FIELD FORM

#### Introduction

This document, the Spill Emergency Response Plan (SERP), formerly known as the Overflow Emergency Response Plan (OERP) has been prepared by Fischer Compliance LLC with assistance from Irvine Ranch Water District (IRWD) staff for complying with one of a series of updated regulatory requirements resulting from the State Water Resources Control Board 2022 adoption of the "reissued" Statewide Waste Discharge Requirements General Order for Sanitary Sewer Systems<sup>1</sup> (referred to as "the 2022 WDR" throughout this document."

One primary area of focus by the State Water Board through updated regulatory requirements in the 2022 WDR is *objective compliance* with effective implementation of elements of the IRWD's Sewer System Management Plan (SSMP). The State Water Board emphasizes urgency on the structure, content, and organization of an IRWD-specific SERP for ensuring effective spill, containment, control, and mitigation<sup>2</sup>.

The effectiveness of the SERP is measured by the following objectives, providing IRWD-specific translation of the corresponding State Water Board expectations for required effective spill responses:

- Implement effective and proactive spill containment, control, and mitigation
- Comply with State Water Board guidance on SERP implementation (see Attachment 1)
- Reduce future IRWD WDR violations, potential water quality impacts, and nuisances
- Meet/exceed all WDR compliance points in a systematic, streamlined, and transparent manner to facilitate use by Legally Responsible Official(s), Managers, and field staff
- Measure and improve IRWD SERP effectiveness (see Attachment 2)
- Expedite review by Water Board compliance inspectors and prepare IRWD for future regulatory audits of the SERP

These objectives provide the cornerstone for PART 1 (COMPLIANCE GUIDE) of this document, formulated by Fischer Compliance LLC around a streamlined process for objectively reviewing each applicable SERP compliance point, presenting the method(s) for how IRWD is complying with each requirement, and providing customized Key Performance Indicators (KPIs) for IRWD SERP for measuring effectiveness. PART 2 (FIELD GUIDE) includes streamlined procedures for IRWD first responders and field operations staff.

Table 1 below provides a summary of applicable Spill Emergency Response Plan requirements for full compliance with the WDR.

<sup>&</sup>lt;sup>1</sup> See <u>Order No. 2022-0103-DWQ</u>

<sup>&</sup>lt;sup>2</sup> See <u>Order No. 2022-0103-DWO</u>, Attachment D (page D-2) which states "the State Water Board or a Regional Water Board may consider the Enrollee's efforts in implementing an effective Sewer System Management Plan to prevent, contain, control, and mitigate spills when considering Water Code section 13327 factors to determine necessary enforcement of this General Order."

Compliance Point	WDR Section	Page	Regulatory Requirements
1	Spec. 5.7	22	Allocate necessary resources for spill responses
2-1	5.12	23	• Update and Implement SERP within 6 months of 2022 WDR adoption date (6/5/2023); certify SERP up to date in Annual Report)
2-2	5.12	24	Targets and measures for protection of public health and environment
2-3	5.12	24	• Timely spill responses, minimized impacts and nuisances by stopping, intercepting, recovering, cleaning publicly accessible areas, preventing toxic discharges to waters of the State
3	5.13	24	Comply with Notification, Monitoring, Reporting, Recordkeeping requirements
4	ATT D-3	D-4	• Collaborate with storm drain agencies and ensure easement accessibility agreements for locations requiring operations
5-1	ATT D-4	D-5	SERP training and practice drills
5-2	ATT D-4	D-4.4	<ul> <li>Inventory of sewer system equipment/identification of critical replacement and spare parts</li> </ul>
6-1	ATT D-6	D-6	Ensure Training/Implementation of SERP for staff and contractors
6-2	ATT D-6	D-6	Address Emergency Operations/Traffic Control
6-3	ATT D-6	D-6	• Implement technologies, practices, equipment, coordination
6-4	ATT D-6	D-6	Conduct Post-spill assessments
6-5	ATT D-6	D-6	Annually review/assess effectiveness of SERP/update
see 2-1 above	ATT D-6	D-6	Spill Emergency Response Plan/prompt detection/response
see 3 above	ATT D-6	D-6	<ul> <li>Notifications (primary responders, agencies)</li> </ul>
see 3 above	ATT D-6	D-6	<ul> <li>Notifications (other potentially affected agencies)</li> </ul>
see 3 above	ATT D-6	D-6	Comply with WDR Att. E1 requirements
see 2-3 above	ATT D-6	D-6	<ul> <li>Containment, minimize/prevent spills to waters of state and drainage conveyances</li> </ul>
see 2-2 above	ATT D-6	D-6	Minimize public health and environmental impacts
see 2-2 above	ATT D-6	D-6	Remove sewage from drain conveyance
see 2-2 above	ATT D-6	D-6	Clean spill area/drain conveyance
see 4 above	ATT D-6	D-6	Implement pre-planned coordination and collaboration     with storm drain agencies
see 3 above	ATT D-6	D-6	Document and report spill events

#### Table 1 - Summary of Applicable Spill Emergency Response Plan Requirements

#### **Compliance Evaluation Inspection**

For preparing the SERP, an onsite compliance inspection was completed for assessing IRWD's existing spill prevention, containment, control, and mitigation effectiveness<sup>3</sup>. This included review of the existing Overflow Emergency Response Plan (OERP), spill prevention/reduction strategies, field practices, data collection approach, critical spare parts/inventory, and field staff training. In addition, the inspection included review of data in the State Water Board's "California Integrated Water Quality System" (CIWQS<sup>4</sup>) including agency spill response metrics and benchmarks (see Table 2 below for details).

#### Table 2 – IRWD spill data and compliance benchmarks

Spill Data	Compliance Benchmarks
• Spill Response Effectiveness (agency notification - operator arrival)	<u>0.50 hours</u> (averaged, 2018-2023) <u>2.0 hours max</u> (2018-2023)
Notification Compliance     (Category 1 spill notification to Cal-OES)	<u>1 violation</u> (75% compliance, 2018-2023)
Draft Reporting Compliance     (Category 1 spills within 3 business days)	<u>0 violations</u> (100% compliance, 2018-2023)
• Spill Recovery (%) (2018-2023)	Cat 1=18% Cat 2=98% Cat 3=76%

#### **SERP Effectiveness**

For measuring effectiveness, numerous Key Performance Indicators (KPIs) were developed for facilitating completion of the required annual review, assessment, and update of the SERP (see Attachment 2).

CIWQS, publicly available at:

https://ciwqs.waterboards.ca.gov/ciwqs/readOnly/PublicReportSSOServlet?reportAction=criteria&reportId=sso\_main

<sup>&</sup>lt;sup>3</sup> See Order No. 2022-0101-DWQ, Provision 6.1.6 (Water Boards' considerations for discretionary enforcement purposes)

# **COMPLIANCE POINT #1**

## 1-1 Regulatory Requirement

WDR Section	Summary of Requirements
Specif. 5.7 (p22)	Allocate necessary resources for spill responses

#### **1-2** Compliance

- The Directors of Regulatory Compliance/ Recycling Operations jointly collaborate for ensuring full compliance through implementation, review, and training on the updated SERP.
- For additional specific examples detailing how the IRWD is coordinating and allocating its resources for addressing operations, system capacity, reliability, and redundancy, see IRWD SSMP, Chapter 10.

#### **1-3** Effectiveness

• For tracking ongoing operational performance metrics required for conducting its annual review/assessment of the SERP, IRWD utilizes <u>Attachment 2, Compliance Point #1</u>.

# **COMPLIANCE POINT #2-1**

#### 2-1-1 Regulatory Requirements

WDR Sections	Summary of Requirements
• Specif. 5.12 (pgs23-24)	<ul> <li>Update and Implement SERP within 6 months of 2022 WDR adoption date (6/5/2023)</li> <li>Certify the SERP up to date in the Annual Report</li> </ul>
• ATT D-6 (pgD-6)	<ul> <li>Prompt detection and response to spills to reduce spill volumes and collection information for prevention of future spills.</li> <li>Containment, minimize/prevent spills to waters of state and drainage conveyances</li> </ul>

#### 2-1-2 Compliance

- The Directors of Regulatory Compliance/ Recycling Operations jointly collaborate for ensuring full compliance through implementation, review, and training on the updated SERP.
- For procedures with prompt detection and response to spills, reducing spill volumes, and collection information for prevention of future spills, containment, and minimizing/preventing spills to waters of state and drainage conveyances, refer to the <u>IRWD Spill Response Field Guide (PART 2)</u>

#### 2-1-3 Effectiveness

• For tracking ongoing operational performance metrics required for conducting its annual review/assessment of the SERP, IRWD utilizes <u>Attachment 2, Compliance Point #2-1</u>).

# COMPLIANCE POINT #2-2

## 2-2-1 Regulatory Requirements

WDR Section	Summary of Requirements
• Specif. 5.12 (p24)	Targets for protection of public health and the environment
• ATT D-6 (pgD-6)	<ul> <li>Minimize public health and environmental impacts</li> <li>Remove sewage from drain conveyance</li> <li>Clean spill area/drain conveyance</li> </ul>

#### 2-2-2 Compliance

- The Directors of Regulatory Compliance/ Recycling Operations jointly collaborate for ensuring full compliance through implementation, review, and training on the updated SERP.
- For procedures for minimizing public health and environmental impacts, removing sewage from drainage conveyances, and cleaning spills, refer to the <u>IRWD Spill Response Field Guide (PART 2)</u>.

#### 2-2-3 Effectiveness

• For tracking ongoing operational performance metrics required for conducting its annual review/assessment of the SERP, IRWD utilizes <u>Attachment 2, Compliance Point #2-2</u>.

# COMPLIANCE POINT #2-3

## 2-3-1 Regulatory Requirements

WDR Section	Summary of Requirements
• Specif. 5.12 (p23-24)	• Timely spill responses, minimized impacts and nuisances by stopping, intercepting, recovering, cleaning publicly accessible areas, preventing toxic discharges to waters of the State
• ATT D-6 (pgD-6)	<ul> <li>Containment, minimize/prevent spills to waters of state and drainage conveyances</li> </ul>

## 2-3-2 Compliance

- The Directors of Regulatory Compliance/ Recycling Operations jointly collaborate for ensuring full compliance through implementation, review, and training on the updated SERP.
- Sewer-related service calls are treated as high priority events that demand a prompt response to the location of the problem.
- Upon notification of a potential sewer overflow, a District Primary Responder is dispatched onsite within 30 minutes during normal working hours and during standby.
- For procedures related to containment, minimizing/preventing spills, and related procedures to waters of state and drainage conveyances, refer to the <u>IRWD Spill Response Field Guide (PART 2)</u>.

#### 2-3-3 Effectiveness

• For tracking ongoing operational performance metrics required for conducting its annual review/assessment of the SERP, see <u>Attachment 2, Compliance Point #2-3</u>.

# COMPLIANCE POINT #3

## 3-1 Regulatory Requirements

WDR Section	Summary of Requirements
• Spec. 5.13 (p24)	Comply with Notification, Monitoring, Reporting, Recordkeeping requirements
• ATT D-6	<ul> <li>Notifications (primary responders, agencies)</li> </ul>
(pD-6)	<ul> <li>Notifications (other potentially affected agencies)</li> </ul>
	Comply with WDR Att. E1 requirements and document and report spill events

## 3-2 Compliance

- The Directors of Regulatory Compliance/ Recycling Operations jointly collaborate for ensuring full compliance for through implementation, review, and training on the updated SERP.
- For ensuring timely and effective compliance notifications for potential or actual spills including notifications to primary responders/agencies
- IRWD utilizes an outward-facing contact number (949-453-5300), posted on its webpage, social media sites, and monthly water bills for ensuring customers can report complaints.
- During business hours, IRWD customers first interface with a phone tree by selecting zero to be forwarded to a receptionist who then connects a caller to a field queue where agents are assigned to receive and dispatch calls. Next, customer service creates a field activity note, then communicates to the Collection System Supervisor or Manager, who then dispatches crews.
- After-hours emergency calls use the same contact system, except the after-hours answering service receives calls, then gathers basic information, and forwards it to a primary responder on a standby list. IRWD has multiple disciplines on standby, including Electrical, Mechanical Maintenance, Automation, and Regulatory Compliance for effective emergency responses.
- IRWD monitors pump stations through a 24/7 supervisory control and data acquisition (SCADA) system that is programmed to send an alarm for notifying primary responders.
- IRWD conducts extensive research for its spills for ensuring accurate volume estimations and confirming related supporting data before certification by the Legally Responsible Official (LRO) in CIWQS.

- IRWD procedures include issuance of spill discharge reports for all historic spills. This report provides the CIWQS required data from the spill. Other information that is compiled per event is entered on a SSO spill explanation report that includes an explanation of the event, spill volume calculations, site location map, and any other site pictures.
- For large spills over 50,000 gallons reaching surface waters, IRWD field staff have both methodology and internal procedures in place for responding and monitoring receiving water sampling and monitoring requirements. Staff are prepared to perform sample collections.
- IRWD also has an established communication chain that exists to notify the field staff to conduct sampling should an event occur during and after operational hours. Staff are also trained in the reporting procedures and timelines.
- For additional procedures, refer to the IRWD Spill Response Field Guide (PART 2)

#### **3-3** Effectiveness

• For tracking ongoing operational performance metrics required for conducting its annual review/assessment of the SERP, IRWD utilizes <u>Attachment 2, Compliance Point #3</u>.

# **COMPLIANCE POINT #4**

#### 4-1 Regulatory Requirements

WDR Section	Summary of Requirements
• ATT D-3 (pD-4)	Procedures: Collaborating with storm drain agencies
• ATT D-6 (pD-6)	• Implement pre-planned coordination and collaboration with storm drain agencies and other utilities/departments prior to, during and after a spill.

## 4-2 Compliance

- The Directors of Regulatory Compliance/ Recycling Operations jointly collaborate for ensuring full compliance through implementation, review, and training on the updated SERP.
- IRWD also implements procedures for collaboration with storm sewer agencies for ensuring access to storm sewer systems during spill events and preventing unintentional cross connections. This

includes coordinating with the County Area Spill Control (CASC), OCSAN, Costa Mesa City, City of Santa Margarita, City of Lake Forest, City of Tustin, and Newport Coast agencies. IRWD is also establishing informal agreements with storm drain agencies for coordination of spill responses.

- IRWD utilizes the following publicly-available resources for its assessment of spills and collaboration with outside agencies (wastewater, water, stormwater, etc): USGS mapping tool with watershed and topography information<sup>5</sup>, California Board Basin Plan Beneficial Use Viewer tool,<sup>6</sup> and the State Water Board eWRIMS tool<sup>7</sup>.
- For ensuring compliance with easement agreements, IRWD implement's <u>Section 4.15.1 to 4.15.4 of</u> <u>IRWD's Rules and Regulations</u>.
- For more information on District procedures, refer to the IRWD Spill Response Field Guide (PART 2)

#### 4-3 Effectiveness

• For tracking ongoing operational performance metrics required for conducting its annual review/assessment of the SERP, IRWD utilizes <u>Attachment 2, Compliance Point #4</u>.

# COMPLIANCE POINT #5-1

#### 5-1-1 Regulatory Requirement

Page #(s)	WDR Section	Summary of Requirements
Page D-5	ATT D-4.3	SERP training and practice drills

#### 5-1-2 Compliance

- The Directors of Regulatory Compliance/ Recycling Operations jointly collaborate for ensuring full compliance through implementation, review, and training on the updated SERP including review of internal response procedures, practice drills, skilled volume estimation, and CIWQS reporting.
- IRWD is conducting ongoing internal and external training, and routinely participates in California Water Environment (CWEA) trainings. For additional compliance details, see section 9.2 above). In addition, for contractor training, once companies are selected to perform work for IRWD, IRWD requires contractors to provide safety plans, confined space plans, and wastewater bypass plans

<sup>&</sup>lt;sup>5</sup> See <u>https://apps.nationalmap.gov/viewer/</u>

<sup>&</sup>lt;sup>6</sup> See <u>https://gispublic.waterboards.ca.gov/portal/apps/webappviewer/index.html?id=116f7daa9c4d4103afda1257be82eb16</u>

<sup>&</sup>lt;sup>7</sup> See <u>https://waterrightsmaps.waterboards.ca.gov/viewer/index.html?viewer=eWRIMS.eWRIMS\_gvh#</u>

prior to work. These are reviewed by the Safety Department, Collection System Maintenance, and Engineering prior to commencing project. SSO response is part of their Safety Plan and Wastewater Bypass Plan. In the specification documents. There is a notification list with contacts in case of an emergency (including SSO). If any work involves or requires coordination with pump station operations, IRWD will provide pump station operations staff to support coordination with contractor activities.

- For further improving SSMP implementation and effectiveness, the District has established XX% of its field staff holding CWEA collection system maintenance certifications<sup>8</sup>.
- For additional procedures, refer to the IRWD Spill Response Field Guide (PART 2)

#### 5-1-3 Effectiveness

• For tracking ongoing operational performance metrics required for conducting its annual review/assessment of the SERP, IRWD utilizes <u>Attachment 2, Compliance Point #5-1</u>.

# COMPLIANCE POINT #5-2

#### 5-2-1 Regulatory Requirement

Page #(s)	WDR Section	Summary of Requirements
Page D-5	ATT D-4.4	<ul> <li>Inventory of sewer system equipment/identification of critical replacement and spare parts</li> </ul>

#### 5-1-2 Compliance

- The Directors of Regulatory Compliance/ Recycling Operations jointly collaborate for ensuring full compliance with an inventory of system equipment, including identification of critical replacement and spare parts.
- For additional procedures, refer to the IRWD Spill Response Field Guide (PART 2)

#### 5-1-3 Effectiveness

• For tracking ongoing operational performance metrics required for conducting its annual review/assessment of the SERP, IRWD utilizes <u>Attachment 2, Compliance Point #5-2</u>.

<sup>&</sup>lt;sup>8</sup> California Water environmental Association (CWEA), <u>https://www.cwea.org/certification/</u>

# **COMPLIANCE POINTS #6-1**

#### 6-1-1 Regulatory Requirement

Page #(s)	WDR Section	Summary of Requirements
Page D-5	ATT D-6	<ul> <li>Ensure training/implementation of SERP for staff and contractors</li> </ul>

#### 6-1-2 Compliance

- The Directors of Regulatory Compliance/ Recycling Operations jointly collaborate for ensuring full compliance through implementation, review, and training on the updated SERP.
- For additional procedures, refer to the IRWD Spill Response Field Guide (PART 2)

#### 6-1-3 Effectiveness

• For tracking ongoing operational performance metrics required for conducting its annual review/assessment of the SERP, IRWD utilizes <u>Attachment 2, Compliance Point #6-1</u>.

# **COMPLIANCE POINT #6-2**

#### 6-2-1 Regulatory Requirement

Page #(s)	WDR Section	Summary of Requirements
Page D-5	ATT D-6	Address Emergency Operations/Traffic Control

#### 6-2-2 Compliance/Effectiveness

- The Directors of Regulatory Compliance/ Recycling Operations jointly collaborate for ensuring full compliance through implementation, review, and training on the updated SERP.
- For additional procedures, refer to the IRWD Spill Response Field Guide (PART 2)

#### 6-2-3 Effectiveness

• For tracking ongoing operational performance metrics required for conducting its annual review/assessment of the SERP, IRWD utilizes <u>Attachment 2, Compliance Point #6-2</u>.

# COMPLIANCE POINT #6-3

#### 6-3-1 Regulatory Requirement

Page #(s)	WDR Section	Summary of Requirements
Page D-5	ATT D-6	Address Emergency Operations/Traffic Control

#### 6-3-2 Compliance

- The Directors of Regulatory Compliance/ Recycling Operations jointly collaborate for ensuring full compliance through implementation, review, and training on the updated SERP.
- For additional procedures, refer to the IRWD Spill Response Field Guide (PART 2)

#### 6-3-3 Effectiveness

• For tracking ongoing operational performance metrics required for conducting its annual review/assessment of the SERP, IRWD utilizes <u>Attachment 2, Compliance Point #6-3</u>.

# **COMPLIANCE POINT #6-4**

#### 6-4-1 Regulatory Requirement

WDR Page #(s)	Section	Summary of Requirements
Page D-5	ATT D-6	Conduct Post-spill assessments

#### 6-4-2 Compliance

- The Directors of Regulatory Compliance/ Recycling Operations jointly collaborate for ensuring full compliance through implementation, review, and training on the updated SERP.
- Additional post-spill assessment details include continuous reviewing and update of IRWD field report form; reviewing available spill photographs; reviewing historical maintenance activities; conducting closed-circuit television (CCTV) inspections for determining the condition line segments immediately following a spill and reviewing video/historic logs; and reviewing the results of Fats, Oils and Grease (FOG) source control investigation(s) as appropriate.
- For additional procedures, refer to the IRWD Spill Response Field Guide (PART 2)

#### 6-4-3 Effectiveness

• For tracking ongoing operational performance metrics required for conducting its annual review/assessment of the SERP, IRWD utilizes <u>Attachment 2, Compliance Point #6-4</u>.

# **COMPLIANCE POINT #6-5**

#### 6-5-1 Regulatory Requirement

WDR Page #(s)	Section	
Page D-5	ATT D-6	Annually review/assess effectiveness of SERP/update

#### 6-5-2 Compliance/Effectiveness

- The Directors of Regulatory Compliance/ Recycling Operations jointly collaborate for ensuring full compliance through implementation, review, and training on the updated SERP.
- For additional procedures, refer to the <u>IRWD Spill Response Field Guide (PART 2)</u>

#### 6-5-3 Effectiveness

• For tracking ongoing operational performance metrics required for conducting its annual review/assessment of the SERP, IRWD utilizes <u>Attachment 2, Compliance Point #6-5</u>.

## LIST OF ATTACHMENTS

- Attachment 1 WDR Implementation guidance (SWRCB)
- **Attachment 2 SERP Key Performance Indicators (KPIs)**
- Attachment 3 Spill Category Determination Worksheet
- Attachment 4 Spill Time Estimation Worksheet
- Attachment 5 Spill Duration and Flow Worksheet
- Attachment 6 Spill Measured Volume Estimation Worksheet
- **Attachment 7 Spill Upstream Connections Volume Estimation Worksheet**
- **Attachment 8 Spill Response Evaluation Worksheet**
- Attachment 9 Training Record Worksheet
- Attachment 10 Cleaning Services Declination Waiver
- Attachment 11 Equipment Inventory and Critical Spare Parts List
- Attachment 12 Spill Data and Trends Worksheet
- Attachment 13— SPILL RESPONSE FIELD FORM

# PART 2 (FIELD GUIDE)

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## 1.0 Respond and Assess

#### WDR General Order 2022-0103-DWQ Section D-6

IWRD response begins upon notification of the potential spill. The task sequence may vary depending on the circumstance(s) encountered, and the First Responder shall exercise their best judgment while responding to and mitigating the spill's effects. The first responder shall contact their supervisor for direction as appropriate. The First Responder's Goals are to:

- Prevent, contain, control, and mitigate the spill.
- Safely respond to the site as quickly as possible. IRWD's response goal is 45 minutes.
- Thoroughly assess to determine the responsibility, if additional resources are needed, and the best course of action to control and mitigate the spill.
- Collect all required data and document on forms provided.
  - A. Upon Arrival:
    - i. Document the arrival time on the Sewer Spill Response Field Report
    - ii. Take a 10-second video of the spilling structure (if currently active)
    - iii. Take photos of the affected area
  - B. Determine Responsibility
    - i. Is the problem within IRWD owned/operated Sewer System? If no, proceed to step (C.)
      - a. Determine the source, spill category and start notification procedures appropriately. The Collections staff will notify the SPILL Notification group and provide updates on the status of the SPILL event. This group includes both Collections, Regulatory Compliance, and EEC staff contacts.
      - b. During business hours, IWRD Regulatory Compliance will make notifications to the responsible regulatory agency. The Collections Division will handle regulatory notification for spills occurring after-hours.
      - c. Determine additional response personnel and resources needed.
      - d. Attempt to contain or divert the spill.
      - e. Setup traffic control measures to divert pedestrian traffic away from the affected area(s)
  - C. Is the problem due to another agency's facility?
    - i. Contact the agency and inform them of the problem (See Table 2, pg.6).
    - ii. Attempt to contain the spill and keep the public out of harm's way until the agency's personnel arrive.
  - D. Is the problem due to a privately-owned facility?
    - i. Contact the property manager, owner, or resident and inform them of their responsibility. Recommend they call a plumbing service.

- ii. Notify Regulatory Compliance of the private spill
- iii. Assist with containment, if necessary, to prevent the spill from entering a DCS.
- iv. Document and report the private spill per San Diego Regional 9 General Order No. 2007-005.
- v. Contact your supervisor for further directions.
- E. Is there a backup in a home or building?
  - i. Provide resident/business owner with IRWD brochure describing responsibilities and recommendations.
  - ii. Contact your supervisor.
    - iii. Contact the Risk Manager or Claims Representative
  - iv. If the resident refuses clean-up services, request the resident sign a Declination of Services letter.
- F. Survey the area and assess the direction of the sewage flow on the ground and the potential destination to help determine containment needs such as:
  - i. Jetter or combo truck
  - ii. Assistance (Personnel x\_\_\_)
  - iii. Supervisor
  - iv. Traffic Control/Crowd Control
  - v. Signage for public notification
  - vi. Electrical Technician for pump station failures
- G. Collect the following minimal information for IRWD Regulatory Compliance Staff. Additionally, document activities and findings on the Spill Response Field Report.
  - i. Estimated spill volume discharged (gallons)
  - ii. If ongoing, estimated spill discharge rate (gpm)
  - iii. Spill incident description
    - a. Brief narrative
    - b. Date/time IRWD became aware of the spill
    - c. Name of responsible sanitary sewer system agency
    - d. Spill cause (if known)
  - iv. Indication of whether the spill has been contained
  - v. Name of surface water impacted by the spill
  - vi. Any other known spill impacts
  - vii. Spill incident location (address, city, state, and zip code)

## 2.0 Spill Categories

WDR General Order 2022-0103-DWQ Section 5.13.1

Individual spill notification, monitoring, and reporting must be in accordance with the following spill categories:

**Category 1** - is any volume of sewage from or caused by a sanitary sewer system regulated under the General Order that results in a discharge to:

- A surface water, including a surface water body that contains no flow or volume;
- A drainage conveyance system that discharges to surface waters when the sewage is not fully captured and returned to the sewer system;
- Any spill volume not recovered is considered discharged to surface water unless the drainage conveyance system discharges to a dedicated stormwater infiltration basin or facility;
- A spill from an IRWD-owned and/or operated lateral that discharges to a surface water is a category 1 spill
- **Category 2** is a spill of 1,000 gallons or greater from or caused by a sanitary sewer system regulated under this general Order that does not discharge to a surface water.
  - A spill of 1,000 gallons out of a lateral and is caused by a failure or blockage in the sanitary sewer system is a Category 2 spill
- **Category 3** is a spill of 50 gallons and less than 1,000 gallons from or caused by a sanitary sewer system regulated under this general Order that does not discharge to a surface water.
  - A spill of 50 gallons and less than 1,000 gallons that spill out of a lateral and is caused by a failure or blockage in the sanitary sewer system is a Category 3 spill.
- **Category 4** is a spill of less than 50 gallons from or caused by a sanitary sewer system regulated under this general Order that does not discharge to a surface water.
  - A spill of less than 50 gallons that spills out of a lateral and is caused by a failure or blockage in the sanitary sewer system is a Category 4 spill.

## 3.0 Contain and Mitigate

#### WDR General Order 2022-0103-DWQ Section 5.12 and Section D-6, 6.6 & 6.7

Containment of a spill is one of the primary ways to mitigate the effects of the spill. Immediately cover or plug storm drain inlets to divert sewer flow to the containment location. Containment of a spill becomes increasingly difficult once the overflow reaches a drainage conveyance system or a waterway. The quicker the source and extent of the spill can be determined, and the spill contained and/or controlled, the less the impact on the environment and public health. The first responder's decisions should be based on the best action to mitigate the spill's impacts and prevent discharge to surface waters.

Multiple techniques have been identified to contain the spill depending on the circumstances, spill category, and material available. Table 1 lists possible containment options for field crews in no particular order.

Location	Strategies for Containment	
Curb & Gutter	Create a berm or dam using the following:	
	Rubber Berm	
	Dry Sweep	
	• Dirt	
	<ul><li>Sandbags</li><li>Deploy Absorbent Bags</li></ul>	
	Hand-Dig a trench to contain the spill	
Open Space	<ul> <li>Trand-Dig a trendit to contain the spin</li> <li>Create Sandbag Dam</li> </ul>	
	Create a berm to divert the sewage to a natural low point	
Lift Station	Vacuum retrieve from the wet well using Hydro-Vac	
	Establish Bypass Operations	
Drainage Channel	Create a Dam using sandbags or dirt	
Diamage Chainer	Use vacuum retrieval if accessible by hydro-vac	
Strom Drain	Block inlets using rubber mats and/or sandbags	
	Plug manhole outlets using pneumatic plugs or sandbags	
	Plug outfall manhole to prevent discharge into the environment	
Backup In Building	Attempt to remove cleanout caps to allow the sewage to discharge outside the building	
Suchup in Sunang	Establish containment using the most effective method from above	
Creeks/Streams (Low-	Create Sandbag Dams	
flow only)	Install a silt fence to contain floating solids	
5,	Contact the local health department or Fish and Wildlife for direction	
	NOTE: Containment attempts should not negatively impact aquatic life	

#### Table 1 - Containment Strategies

## 4.0 Emergency System Operations

WDR General Order 2022-0103-DWQ Section D-6, 6.5

- A. IRWD first responders may need to set up temporary traffic control to protect the public's health and safety in the event of a street collapse or undermining of a roadway. In addition, temporary traffic control allows responding crews to safely contain and clear the blockage and prevent sewage from further dispersing by vehicular traffic. Multiple guides provide information on temporary traffic control, including the Cal Trans Work Area Traffic Control Handbook (WATCH), or the Manual on Uniform Traffic Control Devices (MUTCD). However, temporary traffic control shall be set up based on the agency's training guidelines. Finally, responding crews shall use temporary traffic control devices or barriers to divert the public from contact with the spill.
- B. If a spill affects a waterway or ocean requiring the posting of signage, Orange County Public Works will post and remove signage for waterways and beach closures as needed. They will not remove the signs until the spill's effects have been mitigated. Major spills may warrant broader public notice. The Collection Systems Manager and/or Director of Recycling Operations will contact the Director of Public Affairs or the Public Affairs Manager. Public Affairs will create and execute the outreach plan for media. If media crews show up at a job site, IRWD crews will ask media personnel to wait and contact Public Affairs immediately. Do not respond to questions from the media or interview requests unless the Director of Public Affairs or the Public Affairs Manager provides direction and permission. The approval of Public Affairs is required before contacting local media when significant areas may have been contaminated by sewage.

## 5.0 Correct Cause and Restore Flow

Correcting the cause and restoring flow depends on the type of IRWD infrastructure the spill is discharging from.

- A. **IWRD Mainline** If the blockage is in the main, it will be between a manhole with little to no flow and a manhole surcharging or spilling. Response crews should set up the hydro-vac or jetter truck on the dry manhole, downstream from the surcharged manhole, to clear the blockage and restore flow. If it is difficult to remove the blockage, increase containment or initiate bypass pumping. Request additional assistance to CCTV inspect the line to assess the problem. If needed, contact your supervisor for assistance.
- B. **IWRD Sewer Lift Station** If the station is equipped with an alarm screen, check the alarm status for an indication of a problem. If the station has no power, follow the IRWD procedure until power has been restored. Determine the storage time remaining in the wet well and sewer system; bypass pumping may be necessary.

If power is present, but pumps are not pumping, switch the HOA switch to hand. If pumps start, monitor wet well levels and control them with the HOA switch. Follow agency procedures to notify a Qualified Electrical Worker or Instrumentation & Control personnel.

C. **IRWD Force Main** – When responding to a broken force main, response personnel should immediately shut down the pumps at the lift station affecting the force main and apply lockout -tagout measures to ensure the pumps remain off. The first responder should establish the remaining storage in the wet well and collection system, then (based on agency-specific language) contact the necessary crews to repair the main, set up bypass pumping, or utilize vacuum trucks to control the wet well levels and prevent an additional spill from occurring.

## 6.0 Spill Specific Monitoring

WDR General Order 2022-0103-DWQ Section D-6, 6.3 & E-1, 2.1

The IRWD shall visually assess the spill locations and spread using photography, a global positioning system (GPS), or other best available tools. In addition, a best practice would be to provide a drawing of the spill spread and dimensions specific to the spill. In the drawing, indicate the spill's final destination or containment point. The IRWD shall document the spill locations, including;

Photography and GPS coordinates for:

- The system location where the spill originated. If multiple spill appearance points exist, use the point closest to the spill origin;
- Include GPS coordinates for the spill destination or containment point if available

Photography for:

• Drainage conveyance system entry locations

- The locations of discharge to surface waters, if applicable
- The extent of the spread, and
- The location(s) of the spill clean up

## 7.0 Initiate Spill Clean Up

#### WDR General Order 2022-0103-DWQ Section 5.12 & Section D-6, 6.9

Recovery and thorough clean-up are necessary for all IRWD sewer spills. When recovering spills, all solids and materials should be recovered and removed from the site, and every effort should be made to recover as much of the SPILL as possible. In addition, implement disinfection procedures to reduce the potential for health and human issues and adverse environmental impacts aspillciated with the spill event.

Procedures for cleaning affected areas after a spill are as follows:

- A. Back up in Building
  - 1. If a building or structure is flooded due to a failure in the IRWD sewer system, contact the Manager of Contracts Administration and Risk at 123.456.7899
  - 2. If the backup and spill are due to a failure in the agency's system, but the resident refuses the offered clean up services, politely ask the resident to sign a Declination of Cleaning Services letter.\*\* Agency-Specific language, but I feel it's an essential addition for all the agencies that aren't doing this.
- B. Street, Curb or Gutter or Hardscape
  - 1. Remove all debris and solids with a broom, rakes, shovels, and wash down water.
  - 2. Before removing any contaminated soil and plants, photograph the area and speak to the property owner.
  - 3. Wash pavement, curb, and gutter area, with the high-pressure wand, then vacuum all wash water with a hydro-vac.
- C. Open Area/ Landscape
  - 1. In an open area that is primarily dirt, response crews shall use either a hydro-vac vacuum nozzle, or dig and remove dirt until a dry layer is visible.
  - 2. If the area is a grass-landscaped area, flush the spill area with copious amounts of water and vacuum the area thoroughly. The flushing volume should be three times the estimated spill volume.
- D. Natural and Man-Made Waterways
  - 1. Notify Orange County Public Works in the event an SPILL impacts any waterways. Contain contaminated creeks where feasible. Remove all contaminated water by pumping to the

collection system or vacuuming using a vacuum truck and return all collected water to the sewer system. Introduce additional wash water to flush contaminated areas towards the containment area.

## 8.0 Remove Sewage from Drainage Conveyance System

#### WDR General Order 2022-0103-DWQ Section 5.12 & Section D-6, 6.8 & 6.9

IRWD response crews shall remove all sewage that has entered the drainage conveyance system by vacuuming all water, debris, solids, and paper in the drainage conveyance system. With containment still in place, flush the affected area with water to the containment location and vacuum water and debris. Depending on agency policy, either hydro jet the affected drainage conveyance system or flush clean water to the containment location where a vac truck is located. Operators should be aware of the drainage conveyance system infrastructure. If the system is in poor condition, then flushing may be a better option in this case rather than hydro-jetting. Once thoroughly cleaned, remove the containment and flush and vacuum the remaining area, capturing all water.

## 9.0 Regulatory Notification

#### WDR General Order 2022-0103-DWQ Section D-6, 6.1 & 6.2

If a spill that discharged in or on the waters of the State or discharged to a location where it will probably be discharged to the waters of the State, the IRWD shall notify the Office of Emergency Services (OES) and obtain a control number as soon as possible, but no later than 2 hours after becoming aware of the discharge; and notification can be provided without substantially impeding clean-up or emergency measures. Table 2-3 provide the necessary contacts, both internal and external, to meet the regulatory notification requirements. During business hours, the Regulatory Compliance will make all notifications to regulatory agencies. The Collections division will handle after-hours notification to all regulatory agencies.

## **10.0** Notification and Reporting

WDR General Order 2022-0103-DWQ Section D-6, 6.3

The notification requirements of this section apply to all spills resulting from a failure or blockage in the IRWD's owned and /or operated sanitary sewer system regulated under this Order. Table 4 will aid field staff, data submitters and the LRO (s) in meeting the requirements for notification and reporting in the re-issued general order.

- A. Once the event is complete, Collection staff will provide the draft event summary to be submitted into CIWQS within the required timeframe (See Table 4).
- B. Regulatory Compliance will coordinate a review session and a submission meeting with Collection staff and the Legally Responsible Official (LRO) within the required timeframe (See Table 4).
- C. IRWD Regulatory Compliance Staff will help facilitate the upload of the final report into CIWQS with the LRO.

Group	Name	Number	Notes
IRWD Regulatory Compliance	Kyra Barboza	O:949-453-5852 C:714-227-8663	Regulatory Compliance Primary
IRWD Regulatory Compliance	Isabel Melendez	O: 949-453-5816 C: 949-698-0317	Regulatory Compliance Secondary
IRWD Collections	Brandon Joseph	714-797-2954	Collections Primary
IRWD Collections	Primary Standby	657-566-0210	Options if the Primary cannot be reached.
IRWD Collections	Secondary Standby	657-488-4229	

#### Table 2 - IRWD Contact Information

#### Table 3 - Agency Contacts

Agency	Number	Notes
California Office of Emergency Services (OES)	(800) 852-7550	Obtain a control number and contact name
Regional Water Quality Control Board (RWQCB)	<ul> <li>Santa Ana Region (R8):</li> <li>Ryan Harris – (951) 320-2008</li> <li>General Line – (951) 782-4130</li> <li>After Hours – (951) 782-4130</li> <li>San Diego Region (R9):</li> <li>General Line – (619) 516-1990</li> </ul>	Leave a voicemail and note the date and time.
Orange County Health Care Agency (OCHCA)	<ul> <li>General Line - (714) 433-6000</li> <li>After Hours - (714) 628-7008</li> </ul>	Verbally notify within 24 hrs if a private spill occurs.
Orange County Public Works (OCPW)	• General Line – (877) 897-7455	Call when discharge reaches water body or not fully captured.
Orange County Sanitation District (OCSD)	• Control Center – (714) 593-7025	
Environmental Engineering Consulting (EEC)	<ul> <li>General Line - (714) 667-2300</li> <li>Jim Kolk - (714) 642-8937 (cell)</li> <li>Joe Jenkins - (562) 447-4109 (cell)</li> </ul>	FOG Program consultants. Good resource to have on site especially for private lateral spills.
City Contacts	<ul> <li>Irvine - (949) 724-6000</li> <li>Tustin - (714) 549-6913</li> <li>Alex Waite - 714-573-3305 (City of Tustin code enforcement)</li> <li>Orange (714) 744-7444</li> <li>Newport Beach (949) 644-3717</li> <li>Lake Forest (949) 461-3400</li> </ul>	<ul> <li>Call when discharge may affect City property or businesses. These include things like endangering public health, blocking roads, or enters a storm drain to contact the responsible MS4.</li> <li>Collections will need to provide the proper context to determine who to contact, i.e. the county, city, etc.</li> </ul>

Spill Category	OES Notification	Monitoring	Draft Report	Certified Report
Category 1 Any volume of sewer discharging to surface water	<ul> <li>Within 2 hours of the IRWD's knowledge of the spill of 1,000 gallons or greater discharging or threatening to discharge to surface waters.</li> <li>Obtain a Control number from OES</li> </ul>	<ul> <li>Conduct spill- specific monitoring.</li> <li>Conduct water quality sampling within 18 hours of knowledge of a spill 50,000 gallons or greater to surface waters</li> </ul>	Due within 3 business days of knowledge or self-discovery of Category 1 spill.	<ul> <li>Due within 15 calendar days of the spill end date. Upon completion, the CIWQS will issue final spill event ID number.</li> <li>Submit Technical Report within 45 calendar days after the spill end date for spill greater than 50,000 gallons.</li> <li>Submit the Amended Report within 90 calendar days after spill end date</li> </ul>
<b>Category 2</b> Spills of 1,000 gallons or greater that do not discharge to waters of the State	<ul> <li>Within 2 hours of the IRWD's knowledge of the spill of 1,000 gallons or greater discharging or threatening to discharge to surface waters.</li> <li>Obtain a Control number from OES</li> </ul>	<ul> <li>Conduct spill- specific monitoring.</li> </ul>	<ul> <li>Due within 3 business days of the IRWD's knowledge of the spill</li> </ul>	<ul> <li>Due within 15 calendar days of the spill end date. Upon completion, the CIWQS will issue final spill event ID number.</li> <li>Submit Amended reports within 90 calendar days of Certified Report due date</li> </ul>

#### Table 4 - Monitoring and Reporting

# Spill Emergency Response Plan Update Part 2 – Field Guide

Spill Category	OES Notification	Monitoring	Draft Report	Certified Report
<b>Category 3</b> Spills of 50 gallons to less than 1,000 gallons that don't discharge to surface waters	• N/A	Conduct spill- specific monitoring.	• N/A	<ul> <li>Due 30 calendar days after the end of the month in which the spills occurred. After LRO certifies the spill, CIWQS will issue a spill identification number for each spill.</li> <li>Submit Amended reports within 90 calendar days of Certified Report due date</li> </ul>
<b>Category 4</b> Spills less than 50 gallons that don't discharge to surface waters	• N/A	Conduct spill- specific monitoring.	• N/A	<ul> <li>Within 30 calendar days after the end of the month in which the spills occurred, certify monthly the volume spilled and the total number of spills.</li> <li>Upload and certify a digital report of all Category 4 spills in CIWQS by 1 FEB after the end of the calendar year in which the spills occur.</li> </ul>

## **11.0 Receiving Water Sampling**

WDR General Order 2022-0103-DWQ Section E-1, 2.3

For IRWD sewage spills in which an estimated 50,000 gallons or greater are discharged into surface water, the IRWD shall conduct water quality sampling no later than 18 hours after the IRWD's knowledge of a potential discharge to a surface water.

In addition, the IRWD shall gather information during and after the spill event to assess the spill magnitude and update its notification and estimated spill volume. The water quality sampling results will enable the district to prioritize areas of concern regarding water quality impacts.

A. Receiving Water Monitoring

Through visual observation, spill volume-estimating and field calculation techniques, the IRWD shall gather and document the following information for spills discharging into receiving waters:

- 1. Estimated spill travel time to the receiving water
- 2. For spills entering a drainage system, estimated spill travel time from point of entry to the point of discharge into receiving water
- 3. Spill travel time can be calculated in the following ways:
  - i. Travel time based on design slope of in feet per second (fps)
  - ii. Timed water release in the cleaned pipe over the distance traveled
- 4. Estimated spill volume entering the receiving water
- 5. Photographs of the following:
  - i. Waterbody bank erosion
  - ii. Floating matter
  - iii. Water surface sheen (potentially from oil and grease)
  - iv. Discoloration of receiving water
  - v. Impact to the receiving water
- B. Water Quality Sampling and Analysis

Surface water samples will be collected using a grab sample technique. Employees must wear new sterile powder-free surgical gloves when collecting all samples.

- 1. Trigger for Sampling -Water quality sampling is required within 18 hours of initial SPILL notification for Category 1 Spills in which 50,000 gallons or greater are spilled into surface waters.
- 2. Safety and Access- Water quality sampling should only be performed if it is safe to do so and access is not restricted or unsafe. Unsafe conditions include traffic, heavy rains, slippery or steep creek banks, visibility issues, high-flowing creeks, and limited access due to soil conditions or poor terrain. If access restrictions or unsafe conditions prevent compliance with

these monitoring requirements, the IRWD shall provide documentation of the access restriction or safety hazards in the required report.

- 3. Where to Sample- The IRWD must use the best professional judgement to determine the upstream and downstream distances based on receiving water flow, accessibility to waterbody banks, and size of visible plume. Collect one sample each day for the duration of the spill. In addition, the IRWD shall collect receiving water samples from the following locations.
  - i. A point in the drainage conveyance system before the flow discharges into the receiving water. Label this sample DCS-001
  - ii. Point of Discharge into the receiving water where sewage initially enters the receiving water. Label this sample RSW-001
  - iii. Upstream Sample A point in the receiving water upstream of the point of sewage discharge. Label this sample RSW-001U
  - iv. Downstream Sample A point in the receiving water downstream of the point of discharge where the spill is thoroughly mixed with the receiving water. Label this sample RSW-001D

Determine the water velocity present in the body of water during the spill. Dropping debris in the water and timing how long the debris takes to travel a known distance is a good indicator of the water velocity present. Use this information to determine the next downstream sampling point. Then, multiply the water velocity by the spill duration to determine the furthest point downstream to sample.

- C. Sampling Procedure
  - 1. Put on the required PPE (safety glasses and latex gloves)
  - 2. <u>Collect Drainage Conveyance System Sample</u> Sample at a point in the drainage conveyance system before the flow discharges into receiving waters
    - a. Label this sample DCS-001 and take a picture of the location you are sampling.
    - b. Avoid any debris or scum layer from the drainage system.
    - c. Fill the bottle against the direction of flow, replace the cap, and secure the sample to avoid contamination.
    - d. Use a thermometer to measure the temperature of the sample and record the results
  - 3. <u>Collect Upstream Sample</u> Move approximately 100 feet upstream of the source.
    - a. Label the bottle RSW-001U and take a picture of your sampling location.
    - b. Sample away from the bank and avoid any debris or scum layer from the surface.
    - c. Fill the bottle against the direction of flow, replace the cap, and secure the sample to prevent contamination.

- d. Use a thermometer to measure the temperature of the upstream sample location and record the results.
- 4. <u>Collect Point of Discharge Sample-</u> Move approximately 10 feet downstream of the source location.
  - a. Label the bottle RSW-001 and take a picture of your sampling location.
  - b. Sample away from the bank and avoid any debris or scum layer from the surface.
  - c. Fill the bottle against the direction of flow, replace the cap, and secure the sample to prevent contamination.
  - d. Use a thermometer to measure the temperature of the source sample location and record the results.
- 5. <u>Collect Downstream Sample</u> Move approximately 100 feet downstream of the source.
  - a. Label this sample RSW-001D and take a picture of the location you are sampling.
  - b. Sample away from the bank and avoid any debris or scum layer from the surface.
  - c. Fill the bottle against the direction of flow, replace the cap, and secure the sample to prevent contamination.
  - d. Use a thermometer to measure the temperature of the downstream sample 1 and record the results
- D. **Required Water Quality Analyses** All samples will be immediately transported to the nearest certified water quality laboratory for analysis. The sample analysis, at a minimum, will include the following:
  - 1. Ammonia
  - 2. pH
  - 3. Electrical Conductivity
  - 4. Bacterial indicators, such as total and fecal coliform, enterococcus, and e-coli, per the regional Basin Plan or as directed by SWRCB
  - 5. Temperature

#### IRWD Water Quality Lab?? Add contact information here.

- E. Equipment and Supplies The following items and PPE are required for sampling:
  - 1. Cooler with Blue Ice
  - 2. Sterile sampling bottles
  - 3. Powder-free latex gloves

- 4. Safety glasses
- 5. Marking pen
- 6. Field log forms

## **12.0** Final Spill Volume Estimation

#### WDR General Order 2022-0103-DWQ Section E-1, 2.3

The final spill volume estimation is critical for CIWQS reporting and determines whether additional reporting to regulatory agencies is required. Additionally, the IRWD shall update its notification and reporting of estimated spill volume, including spill volume recovered, as further information is gathered during and after a spill event.

To assess the approximate spill magnitude and spread, the IRWD shall estimate the total spill volume using updated volume estimation techniques, calibration, and documentation for CIWQS reporting. IRWD will refer to volume estimation and other guidelines (see PART 1, Attachments) for to determining spill volume.

## 13.0 Documentation of Spill Events

#### WDR General Order 2022-0103-DWQ SectionD-6, 6.13

RIWD Collection Systems management staff will thoroughly investigate and document all spills to enable efficient wastewater collection system management, meet the General Order's reporting requirements, and assess the effectiveness of the emergency response plan. Once the first responder has mitigated the spill, they will complete the Sanitary Sewer Overflow Field Report Form and turn it in to the Collection Systems Supervisor. Collection Systems management will then assemble all available documentation for review and complete a draft report of the spill documenting all field activities. Collections Systems management will submit an internal report to the IRWD Regulatory Compliance Staff when finished. IRWD Regulatory Compliance Staff will enter all required information into the California Integrated Water Quality System (CIWQS) online reporting system, and the LRO will certify the report in CIWQS.

- A. Upon completion of the spill event, an IRWD electronic file for each individual spill will be prepared, including the following information where appropriate:
  - Initial service call information;
  - Spill Response Field Report;
  - Volume estimate;
  - Map showing the spill location;
  - Photographs of spill location;
  - CCTV inspection data, if applicable;
  - Water quality sampling and test results, if appropriate;
  - Spill event investigation results; and
  - Any other forms related to the spill.

#### B. Private Spill Documentation

IRWD Collection Systems management will complete the Private Spill Response Report form and provide a draft report to Regulatory Compliance. In addition, Collection Systems management will assemble all available documentation and review, complete, and submit an internal report of all available information to IRWD Regulatory Compliance Staff via e-mail. A separate electronic file will be prepared for each individual private spill. The file will include any relevant information from the above list.

(For additional references, please refer to SERP PART 1 (COMPLIANCE GUIDE).

### Attachment 1 – WDR Implementation guidance (SWRCB)

*The SERP implementation guidance provided by the State Water Board in this attachment is designed for helping sewer managers comply Order No. 2022-0103-DWQ.* 

1

## Newly-Reissued Statewide Sanitary Sewer Systems General Order Effective June 5, 2023

Diana Messina, P.E., Regulatory Manager State Water Resources Control Board

April 26, 2023 Roseville Training Event

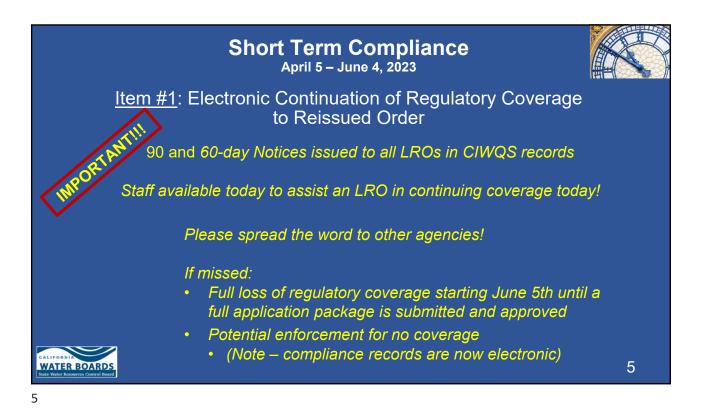
Statewide Sanitary Sewer Systems General Order





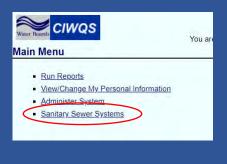
#### Today's Regulatory Presentations **Later Presentation** Get into the weeds with needed clarification • "Regulatory Basics" Overview of the Reissued Order • To understand the high-level changes and increased enforceability • To understand the Order Organization - Identifying Critical Sections • Why the Spill Emergency Response Plan is a Short-term compliance item? • Examine approaches to the expanded Legally Responsible Official Designation • Open Question and Answer Forum Sit back, listen, ask questions, provide your examples. Copy of presentation will be made available to all attendees 3 WATER BOARDS Statewide Sanitary Sewer Systems General Order

	Short-Term Compliance Due Dates For Existing Enrollees						
	<b>April 5 – June 4, 2023</b> (60-day window)	Item 1: Electronic Continuation of Regulatory Coverage to Reissued Order	Current Legally Responsible Official Certifies in California Integrated Water Quality System (CIWQS)				
	June 5, 2023	Reissued Order is In Effect 2006 and 2013 Orders are rescinded					
	Due by June 5, 2023       Item 2: Existing SSMP must be uploaded into C         Item 3: Spill Emergency Response Plan must be implementation         Item 4: All Spill Reporting per Reissued Order         Item 5: Legally Responsible Official per Reissued		n must be updated for I Order				
CALIFORI WATE State Water F	R BOARDS Brownes Control Blant	Statewide Sanitary Sewer Systems General Order	4				



To Certify Continuation of Existing Regulatory Coverage (Available since April 5th in CIWQS)

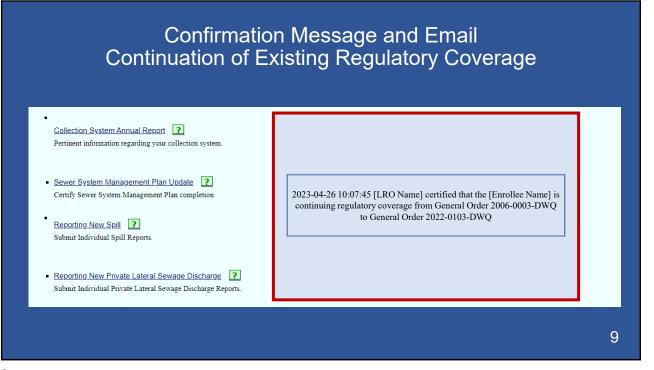
Current Legally Responsible Official logs into established CIWQS account





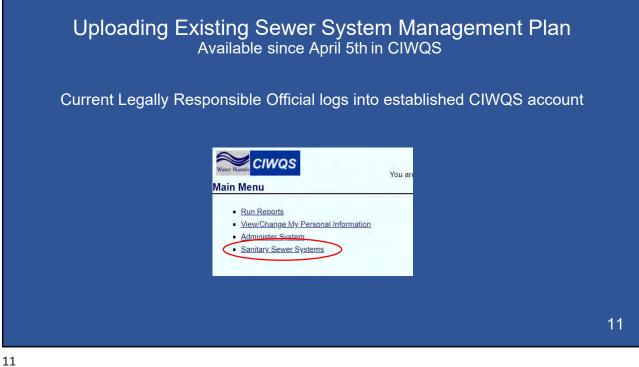
To Certify Continuation of Existing Regulatory Coverage

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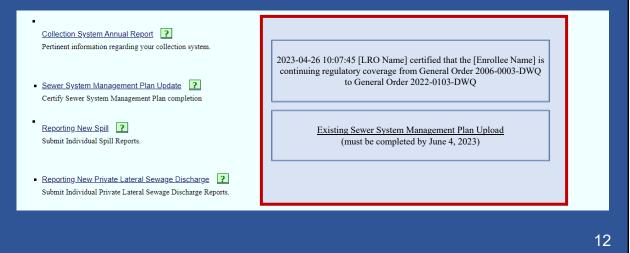












## Upload Existing Sewer System Management Plan documents

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Preparing for Longer-Term Compliance						
February 1, 2024	Annual Reporting of Cat 4 and Lateral Spills					
April 1, 2024	First Annual Report Submittal with 10-year performance graph	<ul> <li>Annual Report replaces existing Questionnaire</li> </ul>				
2024 or 2025	End of Audit Period Audit Reports due 6 months later	<ul> <li>Audit to identify gaps in SSMP</li> <li>Audit Report to be Uploaded into CIWQS</li> </ul>				
July – Dec 2025 2025 or 2026	Service Area Boundary Map Sewer System Management Plan Update	Both to be uploaded into CIWQS Updated Plan w/ additional system- specific elements required in Attachment E				
ALIFORNIA WATER BOARDS Fare Water Resource Control Board	Statewide Sanitary Sewer Systems General O	order 17				



## Diving Deeper Into the Newly-Reissued **Statewide Sanitary Sewer Systems General Order**

Effective June 5, 2023

Welcome back! Diana Messina, P.E., Regulatory Manager State Water Resources Control Board

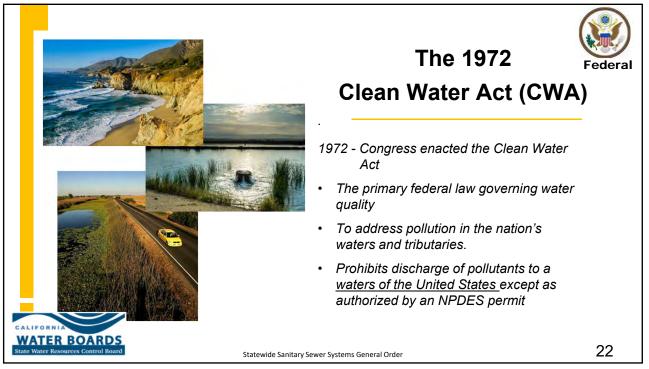


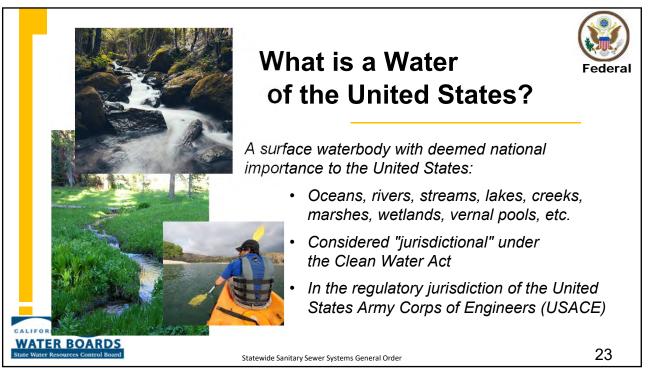
April 26, 2023 Roseville Training Event Statewide Sanitary Sewer Systems General Order

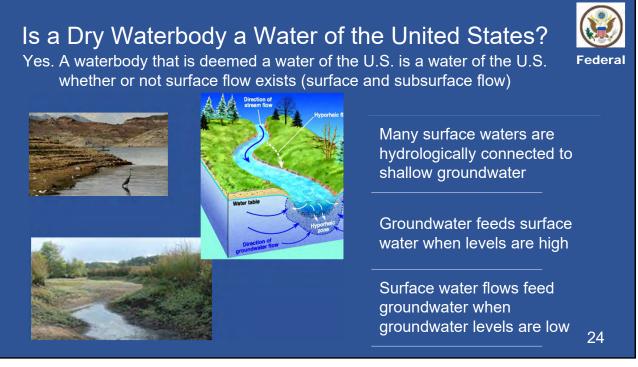




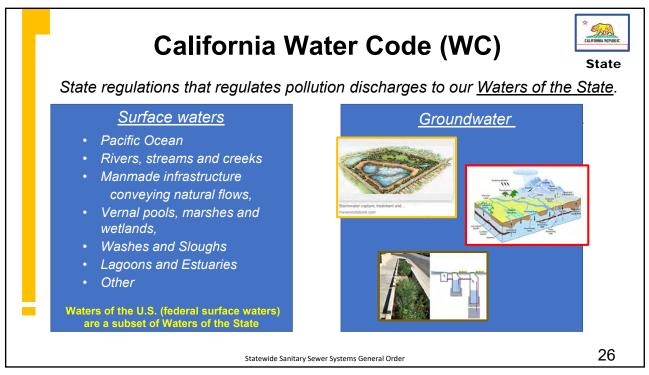


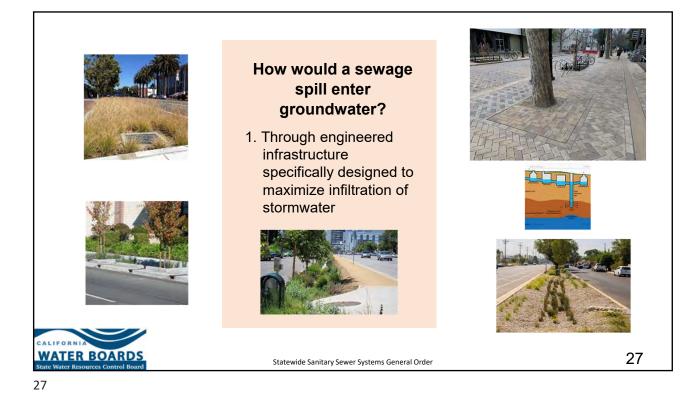


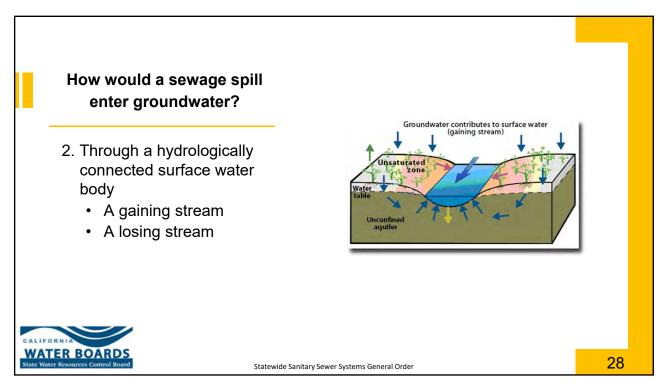




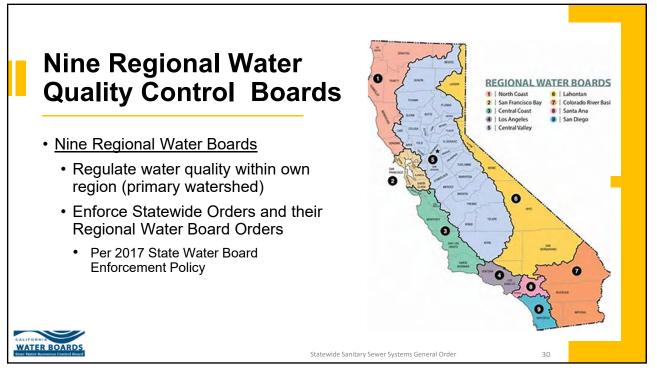




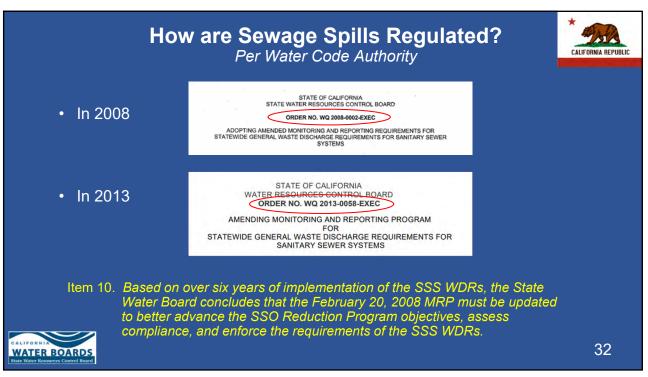




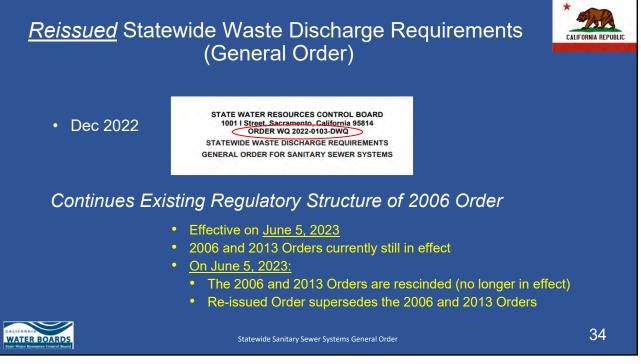








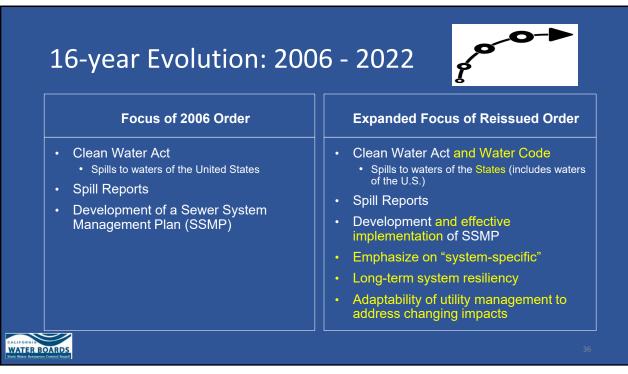




### <u>Reissued</u> Statewide Waste Discharge Requirements (General Order)

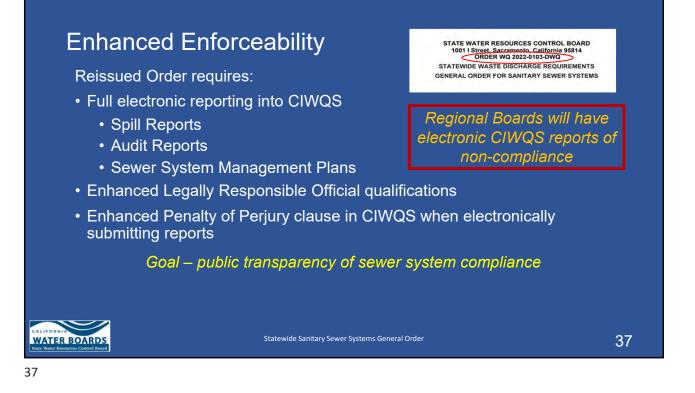
The reissued Order is not a new Order:

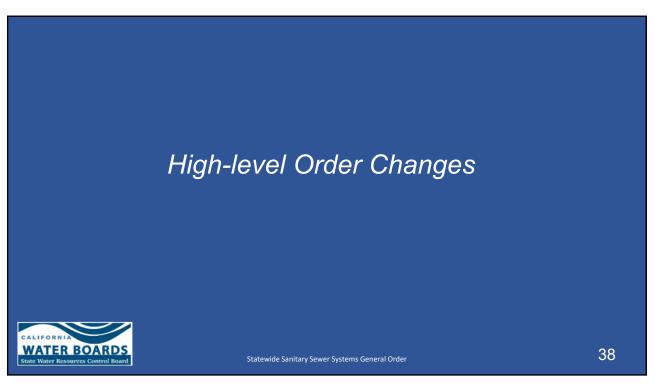
- Continues regulating the same type of public systems plus private systems, as applicable
- Updates the 17-year-old statewide Order to:
  - Clarifies existing Water Code authority:
    - Addresses spills to waters of the State (surface and groundwater)
    - Addresses climate change impacts on a system-specific level
  - Reduces some spill reporting frequencies
  - · Extend audit and planning periods



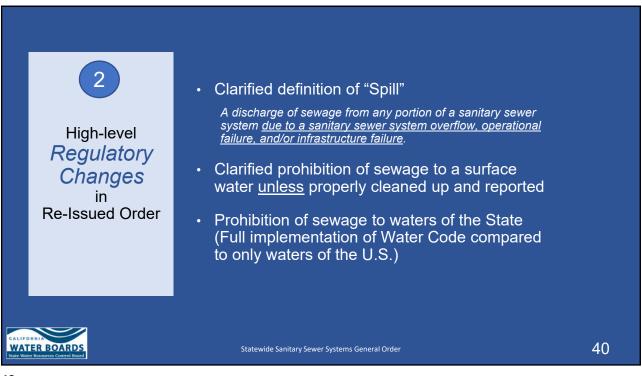
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WATER BOARDS

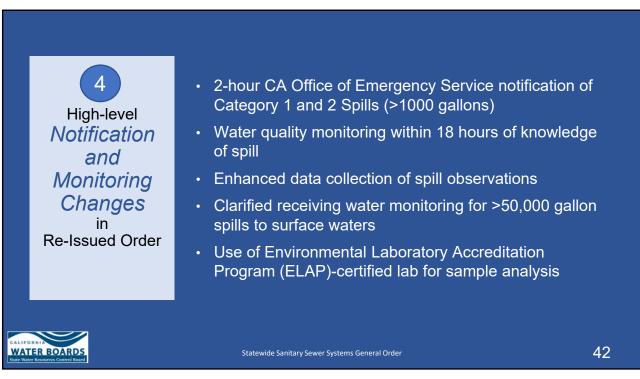






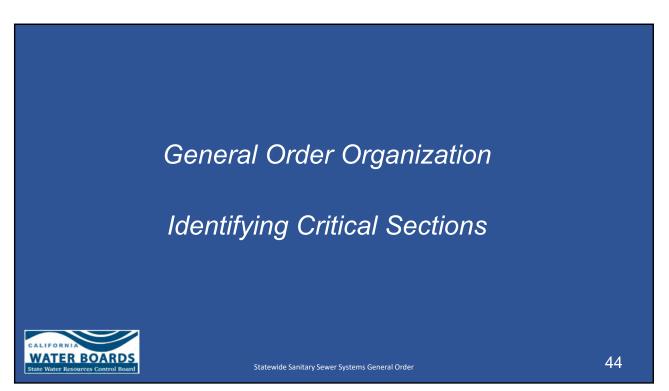


	3 High-level System Management Changes in Re-lssued Order	
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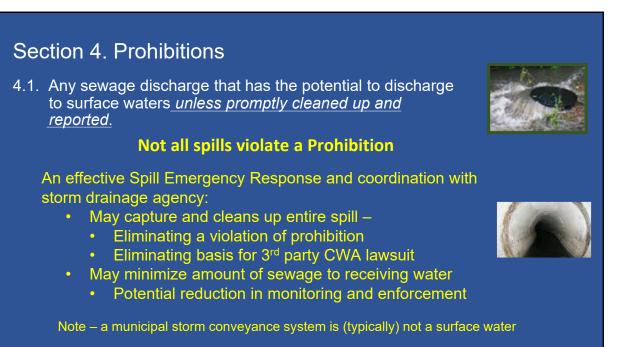
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	Table of Contents	clarification only
1.	Introduction	
2.	Regulatory Coverage and Application Requirements	
3.	Findings	
4.	Prohibitions	
5.	Specifications	
6.	Provisions	
	Table of Attachments	
Atta	chment A – Definitions	A-1
Atta	chment B – Application for Enrollment	B-1 <
Atta	chment C - Notice of Termination	C-1 <
Atta	chment D – Sewer System Management Plan – Required Elements	D-1
Atta	chment E1 – Notification, Monitoring, Reporting and Recordkeeping Re	quirementsE1-1
Atta	chment E2 – Summary of Notification, Monitoring and Reporting Require	ements E2-1

## **General Order Organization**





Regulatory Coverage and Application Requirements Findings Prohibitions Specifications Provisions Table of Attachments ttachment A – Definitions ttachment B – Application for Enrollment	
Prohibitions	
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ttachment B – Application for Enrollment	A-'
	B-*
ttachment C - Notice of Termination	C-
ttachment D – Sewer System Management Plan – Required Elements	D-*
ttachment E1 – Notification, Monitoring, Reporting and Recordkeeping Requireme	entsE1-



### Section 4. Prohibitions

4.2. Any sewage discharge directly or indirectly through a drainage conveyance system or other route, to waters of the State.



Importance of coordination with local storm drainage agency:

- Know where your spill is going
  - Spills to dedicated groundwater recharge is not a violation of Prohibition 4.1
  - Avoid erroneous report of spill as a federal violation
  - Eliminate potential basis for 3<sup>rd</sup> party CWA lawsuit

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#### 49

### Section 4. Prohibitions

4.3. Any sewage discharge that creates a nuisance or condition of pollution.



#### See definition in Attachment A

**Nuisance**: For the purpose of this General Order, a nuisance, as <u>defined in Water Code section</u> <u>13050(m)</u>, is anything that meets all of the following requirements:

- <u>Is injurious to health, or is indecent or offensive to the senses</u>, or an <u>obstruction to the free use of</u> property...;
- <u>Affects at the same time an entire community or neighborhood</u>, or <u>any considerable number of</u> <u>persons</u>...;
- Occurs during, or as a result of, the treatment or disposal of wastes.

1.       Introduction       4         2.       Regulatory Coverage and Application Requirements       5         3.       Findings       7         4.       Prohibitions       17         5.       Specifications       18         6.       Provisions       27         Table of Attachments         Attachment A – Definitions         A-1         Attachment B – Application for Enrollment         Attachment C - Notice of Termination         C-1         Attachment D – Sewer System Management Plan – Required Elements         D-1         Attachment E1 – Nolification, Monitoring, Reporting and Recordkeeping Requirements         E1-1         Attachment E2 – Summary of Notification, Monitoring and Reporting Requirements		Table of Contents
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4.       Prohibitions       17         5.       Specifications       18         6.       Provisions       27         Table of Attachments         Attachment A – Definitions         Attachment B – Application for Enrollment         A-1         Attachment B – Application for Enrollment         Attachment C - Notice of Termination         C-1         Attachment D – Sewer System Management Plan – Required Elements         D-1         Attachment E1 – Nolification, Monitoring, Reporting and Recordkeeping Requirements	2.	Regulatory Coverage and Application Requirements
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Attachment B – Application for Enrollment       B-1         Attachment C - Notice of Termination       C-1         Attachment D – Sewer System Management Plan – Required Elements       D-1         Attachment E1 – Notification, Monitoring, Reporting and Recordkeeping Requirements       E1-1		Table of Attachments
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	Atta	chment E2 - Summary of Notification, Monitoring and Reporting Requirements



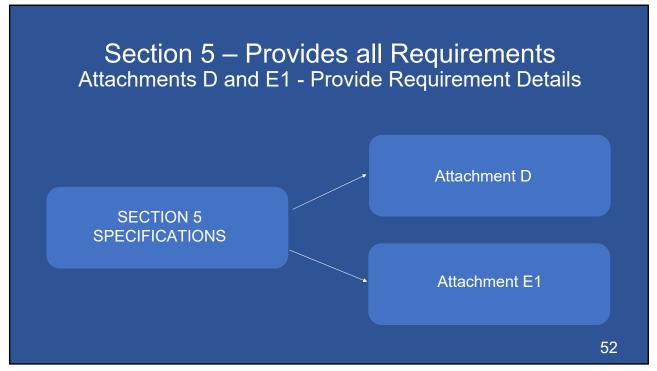


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2.	Regulatory Coverage and Application Requirements	
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5.	Specifications	
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Atta	chment C - Notice of Termination	C-1
Atta	hment D – Sewer System Management Plan – Required Elements	D-1
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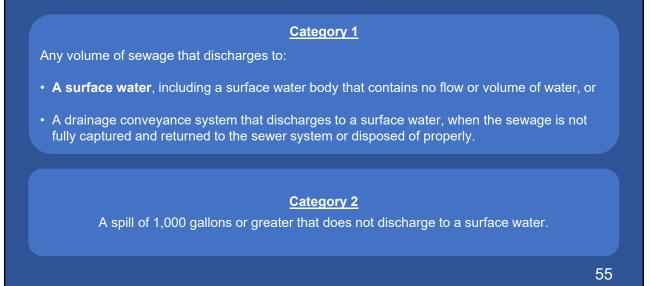
# Quick Overview of **Section 5. Specifications**

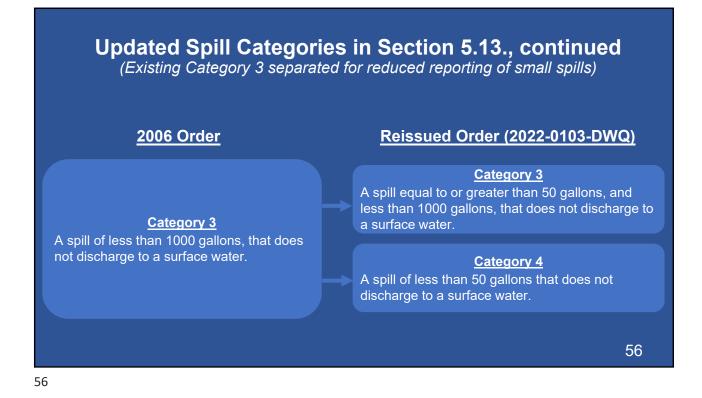
- 5.1 & 5.8: Designation of a Legally Responsible Official and Data Submitters
- 5.2 5.5: Sewer System Management Plan and Audit requirements
- 5.6: System Resilience
- 5.7: Allocation of Resources
- 5.9: Reporting Certification under penalty of perjury
- 5.10: System Capacity
- 5.11: System Performance Analysis (running 10-year)
- 5.12.: Spill Emergency Response Plan and Remedial Actions
- 5.13: Spill-specific Notification, Monitoring, Reporting and Recordkeeping Requirements (including Spill Categories)
- 5.14: Electronic Boundary Map
- 5.15 16: Voluntary Reporting
- 5.17-10: Other

IMPORTANT!!!

Implementation is "system-specific" (find/count)







## Notifications, Monitoring, Reporting and Recordkeeping Requirements

- <u>Attachment E1</u>: Contains all detailed requirements per Categories (fully replaces 2013 Order)
- Attachment E2: Summary of Spill-specific Requirements
- Five Tables for Quick Reference with section reference to Attachment E1



	Focus on	Short-Term Compliance			
	<b>April 5 – June 4, 2023</b> (60-day window)	✓ Item 1: Electronic Continuation of Regulatory Coverage to Reissued Order	Current Legally Responsible Official Certifies in CIWQS		
	June 5, 2023	is In Effect rs are rescinded			
	Due by June 5, 2023	<ul> <li>Item 2: Existing SSMP must be uploaded into CIWQS</li> <li>Item 3: Spill Emergency Response Plan must be updated for implementation</li> <li>Item 4: All Spill Reporting into CIWQS per Reissued Order, Attack</li> <li>Item 5: Legally Responsible Official per Reissued Order</li> </ul>			
CALIFORD WATE State Water R	R BOARDS Accuracy Control Board	Statewide Sanitary Sewer Systems General Order	59		

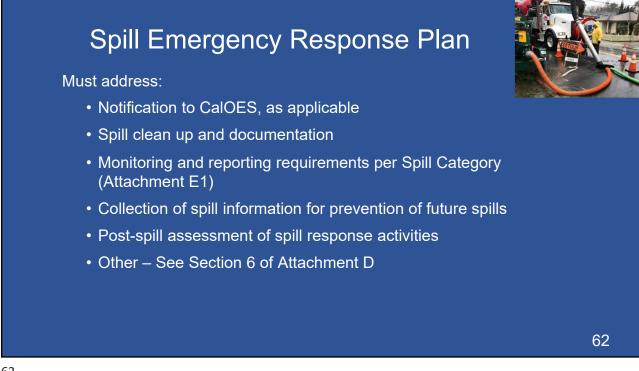


## Spill Emergency Response Plan



Must be updated annually to address for prompt detection and response to spills

- Notification of primary responders, regulatory agencies and affected entities
- Coordination with storm drain agencies and other utility agencies
  - Spill containment to prevent/minimize discharge to waters of the State
  - Appropriate clean up per drainage agency standards (and per NPDES permit)



## Why Emergency Response Plan must be Updated Now

(although a part of the SSMP)

- A quick effective response:
  - Can prevent a violation of one or more prohibitions
  - Will reduce spill volume to surface waters
  - May prevent sampling requirements
- Local utility agency coordination is a must-have
  - Immediate access to drainage conveyance system
  - Advanced coordination provides immediate action to block and clean up spill
  - Knowing if drainage leads to groundwater infiltration or retention prevents erroneously
     Category 1 spill reporting
- · Documentation provides defense from a 3rd party lawsuit
  - Sewage discharges to groundwater are not a federal violation
- Have an Environmental Laboratory Accreditation Program (ELAP) laboratory





## Section 5.1: Legally Responsible Official Designation

The Legally Responsible Official must:

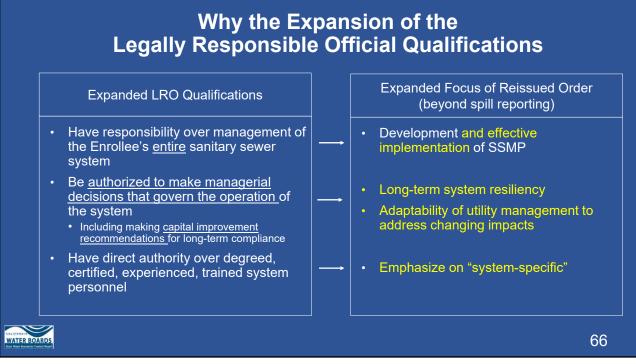
- Have the authority to ensure Enrollee complies with the Order
- Serve as the duly authorized representative

The Legally Responsible Official must:

- Have responsibility over management of the Enrollee's entire sanitary sewer system
- · Be authorized to make managerial decisions that govern the operation of the system
  - Including implicit or explicit <u>duty of making major capital improvement recommendations</u> to ensure long-term compliance
- Have direct authority over individuals that:
  - Possess a degree or certificate related to operations and maintenance of sanitary sewer systems, and/or
  - Have professional training and experience related to the management of sanitary sewer systems 65



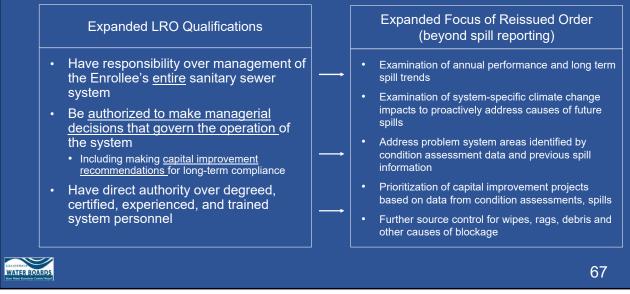
WATER BOA





# Why the Expansion of the Legally Responsible Official Qualifications

In Greater Detail



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	Longer-Term Compliance								
	February 1, 2024 April 1, 2024	Annual Reporting of Cat 4 and Lateral Spills First Annual Report Submittal	Annual Report replaces Questionnaire						
	2024 or 2025	End of Audit Period Audit Reports due 6 months later	<ul> <li>Audit to identify gaps in SSMP</li> <li>Audit Report to be Uploaded into CIWQS</li> </ul>						
	2025 or 2026 July – Dec 2025	Sewer System Management Plan Update Service Area Boundary Map	<ul> <li>Updated Plan w/ additional system- specific elements required in Attachment E</li> <li>Both to be uploaded into CIWQS</li> </ul>						
CALL W/	CALLER OR INTER WATER BOARDSS State Wider Baonitary Sewer Systems General Order 70								

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Population that Served as Basis for Initial SSMP Due Date	Required Plan Audit Due Dates per Order 2006-0003-DWO 3-yea						End of current 3-year Audit period*
> 100,000	5/2/2011	5/2/2013	5/2/2015	5/2/2017	5/2/2019	5/2/2021	5/2/2024
100,000 to 10,000	8/2/2011	8/2/2013	8/2/2015	8/2/2017	8/2/2019	8/2/2021	8/2/2024
10,000 to 2,500	5/2/2012	5/2/2014	5/2/2016	5/2/2018	5/2/2020	5/2/2022	5/2/2025
< 2,500	8/2/2012	8/2/2014	8/2/2016	8/2/2018	8/2/2020	8/2/2022	8/2/2025

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# Sewer System Management Plan Update Due Dates for Existing Enrollees

Population that Served as Basis for Initial SSMP Due Date	Original Required Plan Due Date	Required Plan Update Due Date	Required Plan Update Due Date	Upcoming (6-year) Plan Update Due Date
> 100,000	5/2/2009	5/2/2014	5/2/2019	5/2/2025
100,000 to 10,000	8/2/2009	8/2/2014	8/2/2019	8/2/2025
10,000 to 2,500	5/2/2010	5/2/2015	5/2/2020	5/2/2026
< 2,500	8/2/2010	8/2/2015	8/2/2020	8/2/2026
				72

# Sewer System Management Plan Crosswalk

Enrollee-specific Audit (2024 or 2025) to identify gaps for Plan Update (2025 or 2026)

Existing General Order	Reissued General Order
1.Goal	1. Sewer System Management Plan Goal and Introduction
2. Organization	2. Organization
3. Legal Authority	3. Legal Authority
4. Operations and Maintenance Program	4. Operation and Maintenance Program
5. Design and Performance Goals	5. Design and Performance Provisions
6. Overflow Emergency Response Plan	6. Spill Emergency Response Plan
7. Fats, Oils, and Grease (FOG) Control Program	7. Sewer Pipe Blockage Control Program
8. System Evaluation and Capacity Assurance Plan	8. System Evaluation, Capacity Assurance and Capital Improvements
9. Monitoring, Measurement, and Program Modifications	9. Monitoring, Measurement and Program Modifications
10. Sewer System Management Plan (SSMP) Program Audits	10. Internal Audits
11. Communication Program	11. Communication Program

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**Electronic Service Area Boundary Map** 

To be submitted between July – Dec 2025



- Detailing the boundary of the Enrollee's service area
- Mapping specifications on State Water Board program webpage by June 5, 2023
- The Legally Responsible Official shall submit the geospatial data:
  - Starting July 1, 2025, and no later than December 31, 2025

# Training and Customer Assistance taking place statewide...



- · Water Board staff will continue to assist in professional training of regulations:
  - California Water Environment Association
    - Develop and deliver cost-effective interactive online trainings
  - Order implementation workshops
- Looking to Consultants and Industry associations to
  - Develop guidance documents
  - Conduct Order implementation training events
  - Assist Enrollees to stay in ongoing compliance

Statewide Sanitary Sewer Systems General Order

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### **Attachment 2 — SERP Key Performance Indicators (KPIs)**

The KPIs developed in this attachment are designed for helping sewer managers charged with annually reviewing and assessing the SERP effectiveness and identifying any necessary updates to comply with ATT D-6 (Order No. 2022-0103-DWQ).

Compliance Point	WDR	No.	Key Performance Indicators (KPIs)	Target	Measured by
COMPLIA	NCE PC	DINT 1	(Allocate necessary resources for spill responses)	-	
1	5.7	<u>5.7.1</u>	% of \$ budgeted vs. \$ spent (emergency response operations)	100%	Annual review
1	5.7	<u>5.7.2</u>	% of \$ budgeted vs. \$ spent (emergency response equipment)	100%	Annual review
COMPLIA	NCE PC	DINT 2	(Update/Implement SERP)	-	
2-1	5.12	<u>5.12.1</u>	Was SERP approved by effective deadline (6/4/2023)?	Yes	N/A
2-1	5.12	<u>5.12.2</u>	Was annual review/assessment of SERP completed by required due date?	Yes	N/A
2-1	5.12	<u>5.12.3</u>	% review of all SERP activity/change log entries addressed	100%	Annual review
2-3	5.12	<u>5.12.4</u>	% recovery for all spills	>50%	Annual review
2-3	5.12	<u>5.12.5</u>	% of Category 1 spills prevented due to containment operations	>50%	Annual review
2-3	5.12	<u>5.12.6</u>	% of spills reaching drainage conveyance systems where sewage was fully recovered	>50%	Annual review
COMPLIA	NCE PC	DINT 3	(Compliance with Notification, Monitoring, Reporting and	Record	keeping)
3	5.13	<u>5.13.1</u>	% compliance with regulatory notification requirements	100%	Annual review
3	5.13	<u>5.13.2</u>	% of time response time goals were met	>90%	Annual review
3	5.13	<u>5.13.3</u>	Do all field records match data in CIWQS by LRO?	Yes	Annual review
3	ATT D-6	<u>D-6.1</u>	Are all outside agencies contacts up to date?	Yes	Annual review
3	ATT D-6	<u>D-6.2</u>	% of Category 1 spills requiring sampling completed within 18 hours	100%	Annual review
3	ATT D-6	<u>D-6.3</u>	% spill reporting requirement deadlines met	100%	Annual review

Compliance Point	WDR	No.	Key Performance Indicators (KPIs)	Target	Measured by		
COMPLIA	NCE PO	INT 4 (	Collaborate with Storm Drain Agencies and Ensure Easement Access)				
4	ATT D-3	<u>4.1</u>	% of easements inspected to ensure access	100%	Annual review		
4	ATT D-3	<u>4.2</u>	% of time easement access inhibited spill response activities	0%	Annual review		
4	ATT D-3	<u>4.3</u>	Were agreed-upon coordination practices adhered to?	Yes	Annual review		
COMPLIA	NCE PO	INT 5 (	(SERP training and practice drills)				
5	ATT D-4	<u>5.1</u>	% of SERP training and assessments performed for all appropriate field staff	100%	Annual review		
5	ATT D-4	<u>5.2</u>	% review /update of all required staff training records for completeness	100%	Annual review		
COMPLIA	NCE PO	INT 6.1	(Ensure Training/Implementation of SERP for staff and co	ntracto	rs)		
6.1	ATT D-6	<u>6.1.1</u>	Were all appropriate contractors trained in accordance with SERP	100%	Annual review		
COMPLIA	NCE PO	INT 6.2	(Address Emergency Operations/Traffic Control)				
6.2	ATT D-6	<u>6.2.1</u>	Were all emergency system operations/response activities performed in accordance with SERP	100%	Annual review		
COMPLIA	NCE PO	INT 6.3	(Implement technologies, practices, equipment, inter agence		dination)		
6.3	ATT D-6	<u>6.3.1</u>	% of spills where technologies and inter agency coordination implemented and effective	100%	Annual review		
6.3	ATT D-6	<u>6.3.2</u>	Were all established mutual aid agreements reviewed for effectiveness?	Yes	Annual review		
COMPLIA	NCE PO	<b>INT 6.4</b>	(Conduct Post-spill assessments)				
6.4	ATT D-6	<u>6.4.1</u>	% compliance with completing required post-spill assessments to comply with regulatory requirements	100%	Annual review		

Attachment 3 – Spill Category Determination Worksheet

### **Spill Category Determination Worksheet**

#### Step 1

Determine Responsibility:



Private (Source of Problem is within privately-owned system)

**Other Public Agency** (Source of Problem is within publicly owned system <u>NOT</u> operated by Your Agency)

**Your Agency** (Source of Problem is within YOUR<u>agency's system</u>.) If <u>YES</u>, answer the questions below in order, beginning with Category 1

#### Step 2

Answer the questions below, in order, beginning with Category 1. When you determine the correct category, check the box to the left)

Is a CATEGORY 1 (if answer to ANY question is Yes)					
Discharge to Surface Water?	🗌 Yes 🗌 No				
Discharge to Drainage Conveyance System that Discharges to Surface Water, but NOT Fully Captured?	Yes No				
Exfiltrated to Hydraulically Connected Surface Water?	🗌 Yes 🗌 No				
<b>Is CATEGORY 2 (if spill is NOT a Category 1, and answer to question is Yes)</b>					
Is Discharge Volume 1,000 Gallons or Greater?	Yes No				
Is CATEGORY 3 (if spill is NOT a Category 1, and answer to question is Yes)					
Is Discharge Volume 1,000 Gallons or Greater?	Yes No				
Is a CATEGORY 4 (if spill is NOT a Category 1 and answer to question is Yes)					
Is Discharge Volume is Less than 50 Gallons	Yes No				

SERP Part 1 – Attachment 1.3 Spill Category Determination Worksheet Updated 5/26/2023

Page 1 of 1

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# **Spill Start Time Estimation Worksheet**

Milestones			
Agency Notified	Date:	Time:	AM PM
Spill First Observed by Caller	Date:	Time:	AM PM
Caller Observed Not Spilling	Date:	Time:	AM PM
Spill First Observed by Agency	Date:	Time:	AM PM
Spill End Time	Date:	Time:	AM PM

### Caller/Witness Description of the Spill

#### First Responder Description of the Spill

Site Conditions			
Evidence of Solids YES NO	Distance Solids Traveled from Spilling Structure:		Feet
Other Observations:			
	Spill Rate:		GPM

Calculation Sheet (Can be used if volume can be determined without duration i.e., measured volume method)							
Spill Volume:	Gals						
Duration:	Minutes 🕂 Spill Rate:	GPM =	Minutes				
Spill End Time:	AM PM - Duration:	Minutes =	Spill Start Time				

SERP Part 1 – Attachment 1.4 Spill Start Time Estimation Worksheet

Updated 5/26/2023

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### **Spill Start Time Estimation Worksheet**

Describe how information was used to establish the basis for spill start time estimate					

Responsible Person			
Estimation Determined By:			Date:
Spill Event ID (From CIWQS)		Spill Name:	
Start Time:	AM	PM	Date:

#### Start Time:

Example:

The start time is sometimes difficult to establish. Many times, a combination of methods will need to be employed. Here are some approaches:

#### **Nearby Witnesses:**

Residents and/or witnesses' interviews can be used to establish the start time. Inquire as to their observations. Spills that occur in public rights-of-way (streets, shopping centers, etc.) are usually observed and reported promptly. Spills that occur out of the public view (fields, access roads, etc.) can go on longer.

#### **Observed Flow Rate + Volume:**

If the flow rate and volume spilled can be reasonably determined, this information can be used to work backwards to better determine the spill start time.

Time the spill was discovered	9:00 am	
Crews determined the spill rate	10 GPM	540 ÷ 10 =
Completely contain and measure the spill volume,	540 gallons	54 minutes total duration of spill time
Spill end time	9:26 am	9:26 am – 54 minutes = 🕤
Spill start time	8:32 am 🗲	

This assumes that the flow rate was the same throughout the entire spill. You can consider the diurnal flow patterns, if available, and fine-tune the start time.

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SERP Part 1 - Attachment 1.4 Spill Start Time Estimation Worksheet

#### **Telemetry Data:**

Lift stations and flow recorders utilize SCADA and Manholes and vaults can be monitored using Level Sensors. The data collected by these devices will indicate when flows have changed due to a blockage. A blockage upstream or downstream of a flow recorder will cause measured flows to increase or decrease. A blockage upstream of a lift station will reduce the flows into the station and cause the pumps to run less frequently. Comparing typical daily flows to the change in flows due to a blockage can help to determine spill start time.

#### Site Conditions:

Conditions at the spill site change over time. Initially there will be limited deposits of toilet paper and other sewage solids. After a few days to a week, the sewage solids form a light-colored residue. After a few weeks to a month, the sewage solids turn dark. The quantity of toilet paper and other materials of sewage origin increase over time. The sewer solids/tissue paper will dry over time. These observations can be used to help estimate the start time and to support assumptions. Taking photographs to document the observations can be helpful if questions arise later in the process. In addition, A low spill rate and a large amount of sewage spilled might indicate a longer duration.

#### Accounting for Flow Variation:

It is important to remember that spills may not be continuous. Blockages are not usually complete (some flow continues). Refer to agency diurnal flow patterns for typical flow variations. Response personnel should open the first manhole downstream from the blockage and, if flow is observed, measure, document and take pictures.

Spills that occur due to peak flows in excess of capacity will occur only during, and for a short period after, heavy rainfall. Use available rainfall data as appropriate.

#### Interviews:

Interview the caller and ask, "when did you first observe the spill." Also ask "can you recall the last time you observed it was not spilling." This will help you to establish a Start Time window. "...I first noticed the spill at 8:20 am. Last night when I came home from dinner at 7:30 pm last night it was not spilling." This information in conjunction with spill volume, spill rate, site data, personal experience, etc. can help to make the best estimation under the circumstance.

#### Is it Reasonable:

When you believe you have done all you can and you have reached a conclusion, ask yourself "... is it reasonable to believe this spill began at (time) based on all the other evidence.

#### **End Time:**

The end time is usually much easier to establish. Once the sewage is contained in the system (e.g., in the manhole, wet well, clean out, etc. the spill has ended.

**Attachment 5** — Spill Duration and Flow Worksheet

### **Duration and Flow Rate Worksheet**

Table A		
Spill Start Time (See Spill Start Time Estimation Worksheet)	1	AM PM
Spill End Time (See Spill Response Field Report, Page 4)	2	AM PM
Duration (Subtract 1 from 2)	3	Minutes
Spill Rate	4	GPM
Total Volume (Multiply #3 x #4)	5	Gallons

Required Photo & Video

Photo of Spilling Structure Attached

10-Second Video of Spilling Structure on File

Method to Determine Spill Rate	
Flow Monitoring	Single Family Home Flow Chart
Spill Rate Calculator	Photo Comparison
□ Eyeball Method (Only for Low Spill Rates ≤ 10 Gallons)	
Other:	
Notes:	
Attach Calculation Worksheets	

Responsible Person													
Estimation Deter	rmined By:				Date:								
Spill Event ID (Fi	rom CIWQS)			Spill Name:									
Start Time:			AM	I PM	Date:								

SERP Part 1 - Attachment 1.5 Duration and Flow Rate Worksheet

Updated 5/26/2023

Page 1 of 1

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Attachment 6 — Spill Measured Volume Estimation Worksheet

### **Measured Volume Spill Estimation Worksheet**

Spill Event ID (from CIWQS) \_\_\_\_\_, Spill Name: \_\_\_\_\_

\* Depths: Asphalt = 0.0013'

Concrete = 0.26' Pondi

Ponding = Average Measured Depth

Table A									
Area ID	Surface	Length	x	Width	x	% Wet	Depth*	=	Volume (c.f.)
			x		x			=	
			x		x			=	
			x		x			=	
			x		x			=	
			x		x			=	
		1	I	1	I	1	1		

☑ Attach Photo(s) of Wetted Perimeter

Total Volume:

Table B				
Total Volume:	x	7.48 (Gallons/Cubic Foot)	=	Gallons
Completed By:	 _ Da	te://		

SERP Part 1 - Attachment 1.6 Measured Volume Spill Estimation Worksheet

Updated 5/26/2023

Page **1** of **2** 

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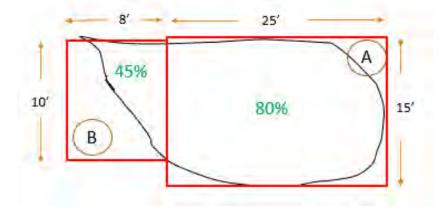
#### This method can be used when:

- The limits of the wetted area can be determined.
- The surfaces are dry prior to the spill.
- Sewage has left a wet stain on hard surfaces.
- Sewage has ponded and the depth can be measured.
- Sewage is contained in a structure like a storm drain or vault.

#### The Procedure on hard surfaces:

- Step 1. Sketch the perimeter of the spill/wetted area.
- Step 2. Identify the surface type.
  - i. Determine the depth of the wet area.
- Step 3. Break down the wetted area into shapes using rectangles and/or squares.
  - i. Use cones to mark the corners of the shape.
  - a. This improves measurements.
  - b. Helps ensure all portions of the wetted area are measured.
  - c. Helps ensure the same area is not measured twice.
- Step 4. Label Each Shape (This is the Area ID)
  - i. Use Letters so they are not confused with the measured dimensions.
- Step 5. Measure each shape.
- Step 6. Estimate the percentage of the shape that is wet.
- Step 7. Complete Table A
  - i. Transfer Total Volume to Table B
- Step 8. Complete Table B
- Step 9. Sign and date to indicate who completed the form.

#### Example



SERP Part 1 - Attachment 1.6 Measured Volume Spill Estimation Worksheet

Updated 5/26/2023 Page 2 of 2

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## **Upstream Connections Spill Volume Estimation Method**

#### **NOTES:**

- A Single-Family Residential Unit is One Equivalent Dwelling Unit (EDU)
- This Method Can Be used for a Single Home/Building or Multiple Homes/Buildings

#### **Procedure:**

#### **Step 1: Determine the Location of the Blockage**

i. This May Require CCTV Inspection

#### **Step 2: Determine the Use Type for Each Connection**

- i. Single Family Residential (1 EDU)
- ii. Multi-Family Residential (1 EDU for each Residence)
- iii. Commercial/Industrial (# of EDU's Per Agency Records)

#### **Step 3:** Count the Number of Connections Upstream from the Blockage

- i. If a Building is Known to Be Vacant, Do Not Include It
- Step 4: Determine the Number of EDUs for each Use Type (Enter into Table A)

#### Step 5: Determine Duration of the Spill (Difference Between Start Time and End Time)

- i. In Table B, Column E, Enter the Time the Spill Was Active for that Time Period
- ii. Multiply Column D x Column E and Enter into In Table B, Column F,

Table A	
Use Type	EDU
Single Family Residential	
Multi-Family Residential	
Commercial/Industrial	
Total EDU's	

iii. Total Column F for all Time Periods

Table B	Estim	ated Flow R	ate Per EDU (1	90 gpd)	Spill							
	А	В	С	D	E	1	F					
Time Period	Gallons Per Period	Hours Per Period	A÷B = Gals. Per Hour	C÷60 = Gals. Per Min.	Minute Was A	-	D x E= Gallons Spilled Per Period					
6am -Noon	75	6	12.5	.21								
Noon – 6pm	55	6	9.16	.15								
6pm - Midnight	50	6	8.33	.14								
Midnight -6am	10	6	1.67	.03								
	Total Estimated Spill Volume per EDU: (G)											

Table C	Calculation												
Spill Volume/EDU:	Gallons	x	Number of EDU's		=	Estimated Spill Volume	Gallons						
(From Cell G)			(From Table A)										

SERP Part 1 – Attachment 1.7 Upstream Connections Spill Volume Estimation Method

Updated 5/26/2023

Page 1 of 1

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Spill Event ID: \_\_\_\_\_ Spill Event Name: \_\_\_\_\_

Answer the questions below, in order, beginning with Category 1. When you determine the correct category, check the box to the left)

#### 1. Notification and Communication Procedures

a. Were notification procedures adhered to?

b. Were notification procedures effective?	Yes No

Yes No

#### 2. Response Procedures

a. Were response time goals met?	Yes No
b. Were safety procedures adhered to?	Yes No
c. Were safety procedures effective?	Yes No

SERI	P Part 1 -	- Atta	chmen	t 1.8 S	ewer Spill	Response	Evalu	ation	Works	sheet		Upd	ated	5/26/	/2023	Page	1 of 5

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#### 2. Response Procedures

d. Were initial response procedures adhered to?	Yes No
e. Were initial response procedures effective?	Yes No
f. Were containment procedures adhered to?	Yes No
g. Were containment procedures effective?	Yes No
h. Were clean up and recovery procedures adhered to?	Yes No
ii. Were clean up and recovery procedures adhered to:	
i. Were Sewer Back up procedures adhered to?	Yes No

SERP Part 1 – Attachment 1.8 Sewer Spill Response Evaluation Worksheet Updated 5/26/2023 Page 2 of 5

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#### 2. Response Procedures

j. Were Sewe	r Back up procedures effective?	Yes No
k. Were Chair	n of Custody procedures adhered to?	Yes No
l. Was Failur	e Analysis investigation performed and documented?	Yes No

#### 3. Reporting and Notification Procedures

a. Were reporting and notification timeline requirements met?	Yes No

#### 4. Documentation

a. Was Spill file created?	Yes No

SERP Part 1 – Attachment 1.8 Sewer Spill Response Evaluation Worksheet

Updated 5/26/2023

Page 3 of 5

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#### 4. Documentation

b. Was QA/QC performed to ensure field data matched CIWQS data?	Yes No

#### 5. Failure Analysis

c. Was Failure Analysis Performed?	Yes No
d. Were Any Work Programs Changed as a Result?	Yes No
d. Were Any Work Programs Changed as a Result?	Yes No
d. Were Any Work Programs Changed as a Result?	Yes No

SERP Part 1 - Attachment 1.8 Sewer Spill Response Evaluation Worksheet

Updated 5/26/2023 Page 4 of 5

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**Recommended Changes:** N/A

#### Attendees:

#### Facilitated by:

Date	/	/

#### SERP Part 1 – Attachment 1.8 Sewer Spill Response Evaluation Worksheet

Updated 5/26/2023

Page 5 of 5

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### **Training Record**

#### Notification and Communication Procedures

 Trainer:
 Trainer Position/Company:

Training Location/Environment:

Basis for Training & Materials Used:

1.	2.	
3.	4.	
5.	6.	
Comments		
(Basis Examples: SOP, Power Point, Manufacturer's Rec	commendations, on-the-job-tra	aining. Reference Title when applicable)
Training Description		Attachments: $\Box$

(Describe in detail what training entailed)

				Attachments $\Box$
Training Method: (Check all	that apply)			
□ Classroom/Instructor	□ Breakout Sessions	s 🛛 Tabletop Exercise	□ Drill	□ Hands-on
□ Coaching/Mentoring	□ Role Playing	□ Computerized/on-line	Training	
□ Other:				
				Attachments $\Box$

SERP Part 1 – Attachment 1.9 Training Record

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## **Training Record**

Method to Qualify Tra	inees: (Check all that apply)	
🗆 Exam/Quiz	$\Box$ Assessment of Ability	□ Attendance/Participation
Other:		
	(Maintain Qualifying Records wi	ith Training Records)
Trainer Signature:		Date:///

### **Signature Sheet**

Trainee Name (Print)	Signature	Qualified	Qualified By (initials)
		🗆 Yes 🗆 No	
		🗆 Yes 🛛 No	
		🗆 Yes 🗆 No	
		🗆 Yes 🗆 No	
		🗆 Yes 🗆 No	
		🗆 Yes 🗆 No	
		🗆 Yes 🗆 No	
		🗆 Yes 🗆 No	
		🗆 Yes 🗆 No	
		🗆 Yes 🗆 No	

Length of Training (Time) \_\_\_\_\_ hours

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# **Training Record**

Trainee Name (Print)	Signature	Qualified	Qualified By (initials)
		🗆 Yes 🗆 No	
		□ Yes □ No	
		□ Yes □ No	
		□ Yes □ No	
		□ Yes □ No	
		□ Yes □ No	
		□ Yes □ No	
		□ Yes □ No	
		□ Yes □ No	
		□ Yes □ No	
		□ Yes □ No	
		□ Yes □ No	
		□ Yes □ No	
		□ Yes □ No	

© 2023 Fischer Compliance LLC | The purpose of this form is to assist agencies in complying with the Statewide Waste Discharge Requirements General Order for Sanitary Sewer Systems (Order No. 2022-01013-DWQ). Attachment 10 – Cleaning Services Declination Waiver

### **Cleaning Services Declination Waiver**

Customer Name:					
Customer Address:					
Customer Phone: (H)	(W)	(C)			
On (date) at (time	e): approximately	gallons of ( <i>check one</i> ):			
$\Box$ Sewage $\Box$ Grey Water $\Box$ Toilet Bowl Water $\Box$ odor $\Box$ other Overflowed from or odor emanating from:					
□ Toilet □ Shower/Tub □ T ( <i>specify</i> ):		r 🗆 other			
The overflow affected the following area	a:				
□ Bathroom □ Hallway □ Kit □ Other ( <i>specify</i> ):	0	□Crawlspace			
The overflow affected the following materials:         Tile       Linoleum       Carpet       Wood Flooring       Area Rugs         Towels       Clothing         Other (specify):					
Photos were/were not taken ( <i>circle one</i> ): # of photos taken.					
The suspected cause of the overflow/od					

SERP Part 1 - Attachment 1.10 Cleaning Services Declination Waiver

Updated 5/26/2023

Page 1 of 2

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### **Cleaning Services Declination Waiver**

#### CUSTOMER – PLEASE READ AND SIGN BELOW:

I/We acknowledge that \_\_\_\_\_(AGENCY) has offered to provide professional cleaning and decontamination services to remediate the sewage backup and/or overflow described above and that I/We declined the offer.

I/We further understand and acknowledge that because I/We have declined the AGENCY's offer of assistance, the AGENCY will not be responsible for any necessary remediation activities and will not be responsible for any expenses incurred as a result of this incident.

I/We understand that by signing this form, I/We hereby waive any and all claims I may have against the AGENCY as a result of the sewage backup and/or overflow described above.

The information above was explained to the customer by (*please print*):

Employee Signature:	Title:	
Customer Signature:	Date:	
Customer Signature:	Date:	

Attachment 11 — Equipment Inventory and Critical Spare Parts List

# **Equipment Inventory – Critical Spare Parts List**

Critical?	Item ID (If Applicable)	Item Description	Manufacturer	Qty	<sup>1</sup> Lift Station Compatibility (List Stations Item Can Be Used)	Storage Location

<sup>© 2023</sup> Fischer Compliance LLC | The purpose of this form is to assist agencies in complying with the Statewide Waste Discharge Requirements General Order for Sanitary Sewer Systems (Order No. 2022-01973-DWQ).

Attachment 12 — Spill Data and Trends Worksheet

# **Spill Data and Trends Worksheet**

Asset ID	Spill Date	Spill Category	Age	Pipe Material	Pipe Dia.	Spill Cause	Cause Location	Previous Spills Same Location	Notification Category	Response Time (Minutes)	Response Time Goal (Minutes	Response Goal Outcome	Volume Spilled	Volume Recovered	% of Spill Recovered	2-Hour Notification Met?
														-		
			<u> </u>	1.00 1.00	I									1	Daga	

SERP Part 1– Attachment 1.12 Spill Data and Trends Worksheet

Updated 5/26/2023

Page \_\_\_\_

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Attachment 13— SPILL RESPONSE FIELD FORM

## **NOTIFICATION METHOD**

Public Discovery       Employee Discovery       Lift Station Alarm       Contractor Discovery         Other (please list)
Time call received AM PM Date
Address of call: Received by
Caller's name Caller's phone
Date and time caller noticed the spill AM PM
Did you follow the agency's interview script? 🗌 Yes 🗌 No
Caller's comments:
RESPOND AND ASSESS
First Responder's Name
Actively spilling? 🗌 Yes 🗌 No (if yes, remind customer to stop all water use)
Arrival Time: AM _ PM Photos and Video Taken of Spill Area _ Yes _ No
Additional Resources Needed 🗌 Yes 🗌 No (If Yes, Check All That Apply)
Supervisor Hydro-Vac Assistance/Personnel (x) Containment Items
Traffic Control Electrical/Controls Tech Mechanical Maintenance/Pump Tech

List resources, personnel and time requested below:

SERP Part 2 – Attachment 2.1 Spill Response Field Report

Page 1 of 7

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## **SPILL CATEGORY**

**Category 1** – Any volume that discharges to surface water, or a dry surface water body with no flow, or storm drain system and is not fully captured.

Category 2 – A spill of 1,000 gallons or greater that does not discharge to a surface water.

**Category 3** – A spill of 50 gallons and less than 1,000 gallons that does not discharge to a Surface water.

Category 4 – A spill of less than 50 gallons that does not discharge to a surface water

Private – A privately owned sewer system or lateral

If the spill is a category 1 or 2, immediately start your agency notification process. Category 1 and 2 have a 2 hour reporting window after knowledge of the spill.

## **CONTAINMENT**

Curb & Gutter Street Open Space Storm Drain System Drainage Channel
Inside Building Lawn/Landscaped Area Creek/Stream Wetland
Other:
CONTAINMENT METHOD (Check All That Apply):
Inlet Mats Sandbags Dirt Dam/Berm Rubber Berm Vacuum Retrieval
Spill Kit Naturally Contained Hand Dig Trench Dry Sweep Pneumatic Plugs
Divert Sewer System Absorbent Waddles
Other:
CONTAINMENT NOTES

SERP Part 2 – Attachment 2.1 Spill Response Field Report

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FAILURE LOCATION
Lower Lateral       Upper Lateral-Private       Gravity Main       Force Main         Lift Station       List Asset ID#'s
CORRECT CAUSE AND RESTORE FLOW (SELECT ALL THAT APPLY) Gravity Line Blockage - Hydro-Vac Power Rodder Hand Rods Excavation By-Pass Lift Station - Electrical Mechanical Pull Pump-DeRag By-Pass Generator Force Main - Hydro-Vac. By-Pass Excavation
□ Lateral - □ Cable Machine (EEL) □ Hand Rods □ Excavation Description of Actions taken to correct the cause and restore flow:
SPILL CAUSE (select all that apply)         Debris Rags       Root Intrusion       FOG       non-Dispersables         Lift Station – Electrical       Lift Station Failure-Mechanical       Vandalism         Debris Construction       Pipe / Structural Failure       Natural Disaster         Pipe/ Structural Failure       Capacity Exceeded- I&I       Agency Caused         Other:
SPILL RESPONSE ACTIVITIES (SELECT ALL THAT APPLY)         Mitigated Effects of the Spill       Contained all or Portion of Spill       Restored Flow         CCTV Inspection for Cause       Clean Sewage from Drainage Conveyance         Cleaned Spill Area       Captured and Removed All Washdown Water         Photographs and GPS Locations

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# **Description Of Spill Response Actions**

SPILL LOCATION AND SPREAD		
Spill Appearance Point:		
Building or Structure Force Main		-
Number of Spill Appearance Points:	If multiple points are in a single even	nt, photograp
the point closest to the spill origin.		
Building Storm Drain Drainage	r Surface Water	ed Surface
Destination 1: Longitude:	Latitude:	
Destination 2: Longitude:	Latitude:	
Estimated Spill Rate: GPM Meth	nod to Determine Spill Rate:	
ESTIMATED TRAVEL TIME: N/A		
From Point of Entry to Drainage System to Point	of Discharge to Receiving Waters:	Minutes
• Distance from Spill Point to Storm Drain Co	nveyance System: Ft	N/A
<ul><li>From Spill Point to Receiving Waters:</li><li>Distance from Spill Point to Receiving Water</li></ul>		
Travel Time Estimation Method:		
	Undered 5/26/2022	Page 4 of 7

SERP Part 2 – Attachment 2.1 Spill Response Field Report

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REQUIRED PHOTOS:					
Spill Appearance Point(s) Affected Area(s) Point(s) of Entry Surface Water					
Point(s) of Entry to Drainage Conveyance System					
If Entered surface water:					
Water Body Bank Erosion Water Sheen Floating Matter Discoloration					

# SPILL LOCATION AND SPREAD

Sketch the footprint of the spill and provide dimensions (in feet) for size and extent of spill. Include the Appearance Point, the destination(s) and containment. Indicate where GPS coordinates were taken.

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Estimate volume that reached a drainage conveyance system flowing to surface water	Gals.
Estimate volume recovered from drainage conveyance system flowing to surface water	Gals.
Estimate spill volume discharged directly to surface water (Category 1)	Gals.
Estimate spill volume recovered from surface water (Category 1)	Gals.
Estimate spill volume discharged to land	Gals.
Estimate spill volume recovered from discharge to land	Gals.
Spill Rate (GPM) Total Spill VolumeGals. Total Volume Recovered	Gals.
Contact OES and obtain a Control Number 1-800-852-7550	
Time Called AM PM Control Number	
Notes:	

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# Attachment 2

Certification of Existing Regulatory Coverage from the State Water Resource Control Board





Date: May 17, 2023

Jose Zepeda Irvine Ranch Water District PO Box 57000 Irvine, CA 92619

# NOTICE OF APPLICABILITY; CONTINUATION OF REGULATORY COVERAGE; STATEWIDE SANITARY SEWER SYSTEMS GENERAL ORDER, 2022-0103-DWQ

Dear Jose Zepeda

Thank you for certifying your Continuation of Existing Regulatory Coverage form in the California Integrated Water Quality System (CIWQS) database. This Notice of Applicability serves as confirmation of the continuation of regulatory coverage from Order 2006-0003-DWQ to Order 2022-0103-DWQ for:

- Agency name: Irvine Ranch Water District
- Sanitary Sewer System name: Michelson WRP CS
- Waste Discharge Identification Number (WDID): 8SSO10587
- Certification date: May 17, 2023

As of the June 5, 2023 effective date, General Order 2022-0103-DWQ serves as the new statewide waste discharge requirements regulating sanitary sewer systems. The General Order, including all Attachments, is enforceable by the State Water Resources Control Board and the applicable Regional Water Quality Control Board. As of June 5, 2023, Order 2006-0003-DWQ is rescinded (except for enforcement purposes) and previously-held regulatory coverage under Order 2006-0003-DWQ is terminated.

If you have any questions regarding the statewide Sanitary Sewer Systems General Order or this Notice of Applicability, please email your questions to <u>SanitarySewer@waterboards.ca.gov</u>.

Sincerely,

Karen Mogus, Deputy Director Division of Water Quality

E. JOAQUIN ESQUIVEL, CHAIR | EILEEN SOBECK, EXECUTIVE DIRECTOR





Date: May 17, 2023

Jose Zepeda Irvine Ranch Water District PO Box 57000 Irvine, CA 92619

# NOTICE OF APPLICABILITY; CONTINUATION OF REGULATORY COVERAGE; STATEWIDE SANITARY SEWER SYSTEMS GENERAL ORDER, 2022-0103-DWQ

Dear Jose Zepeda

Thank you for certifying your Continuation of Existing Regulatory Coverage form in the California Integrated Water Quality System (CIWQS) database. This Notice of Applicability serves as confirmation of the continuation of regulatory coverage from Order 2006-0003-DWQ to Order 2022-0103-DWQ for:

- Agency name: Irvine Ranch Water District
- Sanitary Sewer System name: Los Alisos WRP CS
- Waste Discharge Identification Number (WDID): 9SSO10669
- Certification date: May 17, 2023

As of the June 5, 2023 effective date, General Order 2022-0103-DWQ serves as the new statewide waste discharge requirements regulating sanitary sewer systems. The General Order, including all Attachments, is enforceable by the State Water Resources Control Board and the applicable Regional Water Quality Control Board. As of June 5, 2023, Order 2006-0003-DWQ is rescinded (except for enforcement purposes) and previously-held regulatory coverage under Order 2006-0003-DWQ is terminated.

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Karen Mogus, Deputy Director Division of Water Quality

E. JOAQUIN ESQUIVEL, CHAIR | EILEEN SOBECK, EXECUTIVE DIRECTOR





Date: May 17, 2023

Jose Zepeda Irvine Ranch Water District PO Box 57000 Irvine, CA 92619

# NOTICE OF APPLICABILITY; CONTINUATION OF REGULATORY COVERAGE; STATEWIDE SANITARY SEWER SYSTEMS GENERAL ORDER, 2022-0103-DWQ

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Thank you for certifying your Continuation of Existing Regulatory Coverage form in the California Integrated Water Quality System (CIWQS) database. This Notice of Applicability serves as confirmation of the continuation of regulatory coverage from Order 2006-0003-DWQ to Order 2022-0103-DWQ for:

- Agency name: Irvine Ranch Water District
- Sanitary Sewer System name: IRWD EI Toro CS
- Waste Discharge Identification Number (WDID): 9SSO11514
- Certification date: May 17, 2023

As of the June 5, 2023 effective date, General Order 2022-0103-DWQ serves as the new statewide waste discharge requirements regulating sanitary sewer systems. The General Order, including all Attachments, is enforceable by the State Water Resources Control Board and the applicable Regional Water Quality Control Board. As of June 5, 2023, Order 2006-0003-DWQ is rescinded (except for enforcement purposes) and previously-held regulatory coverage under Order 2006-0003-DWQ is terminated.

If you have any questions regarding the statewide Sanitary Sewer Systems General Order or this Notice of Applicability, please email your questions to <u>SanitarySewer@waterboards.ca.gov</u>.

Sincerely,

Karen Mogus, Deputy Director Division of Water Quality

E. JOAQUIN ESQUIVEL, CHAIR | EILEEN SOBECK, EXECUTIVE DIRECTOR





Date: May 17, 2023

Jose Zepeda Irvine Ranch Water District PO Box 57000 Irvine, CA 92619

# NOTICE OF APPLICABILITY; CONTINUATION OF REGULATORY COVERAGE; STATEWIDE SANITARY SEWER SYSTEMS GENERAL ORDER, 2022-0103-DWQ

Dear Jose Zepeda

Thank you for certifying your Continuation of Existing Regulatory Coverage form in the California Integrated Water Quality System (CIWQS) database. This Notice of Applicability serves as confirmation of the continuation of regulatory coverage from Order 2006-0003-DWQ to Order 2022-0103-DWQ for:

- Agency name: Irvine Ranch Water District
- Sanitary Sewer System name: IRWD OCSD Regional 1 CS
- Waste Discharge Identification Number (WDID): 8SSO11513
- Certification date: May 17, 2023

As of the June 5, 2023 effective date, General Order 2022-0103-DWQ serves as the new statewide waste discharge requirements regulating sanitary sewer systems. The General Order, including all Attachments, is enforceable by the State Water Resources Control Board and the applicable Regional Water Quality Control Board. As of June 5, 2023, Order 2006-0003-DWQ is rescinded (except for enforcement purposes) and previously-held regulatory coverage under Order 2006-0003-DWQ is terminated.

If you have any questions regarding the statewide Sanitary Sewer Systems General Order or this Notice of Applicability, please email your questions to <u>SanitarySewer@waterboards.ca.gov</u>.

Sincerely,

Karen Mogus, Deputy Director Division of Water Quality

E. JOAQUIN ESQUIVEL, CHAIR | EILEEN SOBECK, EXECUTIVE DIRECTOR





Date: May 17, 2023

Jose Zepeda Irvine Ranch Water District PO Box 57000 Irvine, CA 92619

# NOTICE OF APPLICABILITY; CONTINUATION OF REGULATORY COVERAGE; STATEWIDE SANITARY SEWER SYSTEMS GENERAL ORDER, 2022-0103-DWQ

Dear Jose Zepeda

Thank you for certifying your Continuation of Existing Regulatory Coverage form in the California Integrated Water Quality System (CIWQS) database. This Notice of Applicability serves as confirmation of the continuation of regulatory coverage from Order 2006-0003-DWQ to Order 2022-0103-DWQ for:

- Agency name: Irvine Ranch Water District
- Sanitary Sewer System name: IRWD OCSD Regional 2 CS
- Waste Discharge Identification Number (WDID): 8SSO11518
- Certification date: May 17, 2023

As of the June 5, 2023 effective date, General Order 2022-0103-DWQ serves as the new statewide waste discharge requirements regulating sanitary sewer systems. The General Order, including all Attachments, is enforceable by the State Water Resources Control Board and the applicable Regional Water Quality Control Board. As of June 5, 2023, Order 2006-0003-DWQ is rescinded (except for enforcement purposes) and previously-held regulatory coverage under Order 2006-0003-DWQ is terminated.

If you have any questions regarding the statewide Sanitary Sewer Systems General Order or this Notice of Applicability, please email your questions to <u>SanitarySewer@waterboards.ca.gov</u>.

Sincerely,

Karen Mogus, Deputy Director Division of Water Quality

E. JOAQUIN ESQUIVEL, CHAIR | EILEEN SOBECK, EXECUTIVE DIRECTOR

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April 28, 2025 Prepared by: A. Halligan / I. Swift Submitted by: W. Chambers Approved by: Paul A. Cook

## ACTION CALENDAR

## IRWD NATURAL TREATMENT SYSTEM LANDSCAPE MAINTENANCE SERVICES CONTRACT

## SUMMARY:

Landscape maintenance services are essential for the effective operation and preservation of IRWD's Natural Treatment System (NTS), which includes the San Joaquin Marsh, 43 other NTS facilities, the San Joaquin Marsh Campus, and several urban runoff diversion sites. The current three-year landscape maintenance contracts will expire in May 2025. Staff recommends that the Board authorize the General Manager to execute four, three-year contracts for landscape maintenance services, including a provision for a two-year extension, with Bemus Landscape, Inc., for a total amount of \$5,947,077.

## BACKGROUND:

Regular landscape maintenance is essential for the effective operation and preservation of IRWD's San Joaquin Marsh and NTS facilities, in accordance with the San Joaquin Marsh Operating Guidelines and NTS Master Plan. This maintenance includes vegetation management (native and non-native), irrigation system upkeep and repairs, trash removal, and clearing of minor sediment and debris accumulations. The current landscape maintenance services contracts, which cover a total area of approximately 533 acres, are set to expire in May 2025.

## **Bid Process:**

Anticipating the end of the District's existing landscape maintenance contracts, IRWD invited thirteen environmental consulting and landscape maintenance companies to participate in the Request for Proposal (RFP) process, which included a job-walk at the San Joaquin Marsh, the Marsh Campus, and one NTS facility, which were representative of the system and the contracts available for bid. Firms were asked to bid on any combination of the available contracts: the San Joaquin Marsh, the Marsh, the Marsh Campus, NTS North, and NTS South.

Of the thirteen companies invited, five submitted bids for various combinations of the four available contracts. These five firms were interviewed and then evaluated on quality of presentation, qualifications, experience with projects involving natural habitat restoration and wetland environments, and costs. Bemus Landscape, Inc., emerged as the preferred firm as their proposal offered the best combination of quality, approach, and cost. Bemus also submitted the lowest qualified total bid across all four contracts. The bid comparison summary is in the table shown on the following page.

Action Calendar: IRWD Natural Treatment System Landscape Maintenance Services Contract April 28, 2025 Page 2

Facility	Bemus Landscape Inc.	Endemic Environmental Services, Inc	LandCare L.L.C.	Natures Image, Inc.	Dudek
San Joaquin Marsh	\$2,361,321	\$424,059	\$2,134,866	\$2,541,022	NO BID RECEIVED
San Joaquin Marsh Campus	\$315,272	BID INVALID*	\$420,350	NO BID RECEIVED	NO BID RECEIVED
NTS North	\$1,571,724	BID INVALID*	\$2,155,411	\$2,853,509	\$3,293,732
NTS South	\$1,698,760	BID INVALID*	\$1,879,819	\$2,618,365	\$3,683,381
Total:	\$5,947,077	\$424,059	\$6,590,446	\$8,012,896	\$6,977,113

\*Invalid bids did not meet IRWD's minimum contracting requirements

The total recommended contract value of \$5,947,077 represents an approximate 7% increase over the current contracts. This increase is attributed to continued adherence to IRWD's Integrated Pest Management Plan requiring weed abatement with limited herbicide use, increased labor and materials costs, and the addition of Rattlesnake Reservoir and Baker Water Treatment Plant modular wetland units to the maintenance scope. The contracts include provisions for annual escalation based on wage/cost-of-living adjustments and an option for a two-year extension at the District's discretion. Detailed proposals are attached as Exhibits "A" through "D".

## FISCAL IMPACTS:

Funds for these contracts are included in the District's proposed FY 25/26 and FY 26/27 operational budgets.

## ENVIRONMENTAL COMPLIANCE:

The landscape maintenance activities performed under this contract will be in accordance with provisions of the San Joaquin Marsh Enhancement Plan Environmental Impact Report (EIR) and the NTS Master Plan EIR.

## COMMITTEE STATUS:

This item was not reviewed by a Committee.

## **RECOMMENDATION:**

THAT THE BOARD AUTHORIZE THE GENERAL MANAGER TO EXECUTE FOUR, THREE-YEAR CONTRACTS FOR LANDSCAPE MAINTENANCE SERVICES, INCLUDING A PROVISION FOR A TWO-YEAR EXTENSION, WITH BEMUS LANDSCAPE, INC., FOR A TOTAL AMOUNT OF \$5,947,077. Action Calendar: IRWD Natural Treatment System Landscape Maintenance Services Contract April 28, 2025 Page 3

# LIST OF EXHIBITS:

- Exhibit "A" San Joaquin Marsh Landscape Maintenance Proposal from Bemus Landscape, Inc.
- Exhibit "B" San Joaquin Marsh Campus Landscape Maintenance Proposal from Bemus Landscape, Inc.
- Exhibit "C" NTS North Landscape Maintenance Proposal from Bemus Landscape, Inc.
- Exhibit "D" NTS South Landscape Maintenance Proposal from Bemus Landscape, Inc.

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## LANDSCAPE MANAGEMENT PROPOSAL



# San Joaquin Marsh Irvine Ranch Water District | 2025

**BEMUS.COM** 



Introduction Letter	3
Staff Qualifications	5
Company Snapshot	6
Bemus Organization Chart	7
Bemus Team	8
LSA Resumes and Related Experience	10
Safety	17
Scope of Work	19
Work Plan	20
Sample Mapping	22
Supplemental Weekly Report	23
Licenses	24
90 Day Startup Plan	25
Water Management	26
Renovation Process	27

California State Contractor's License #492084:

Class A (General Engineering)

Class C-27 (Landscaping)

Class D-49 (Tree Service)



March 11, 2025

Irvine Ranch Water District Michelson Operations Center 3512 Michelson Drive Irvine CA 92612

Subject: San Joaquin Marsh

We appreciate the opportunity to submit our proposal for the landscape maintenance services for the San Joaquin Marsh and Wildlife Sanctuary (SJM). With over 50 years of experience in landscape management and a strong commitment to environmental stewardship, we are excited to collaborate with the Irvine Ranch Water District (IRWD) in maintaining and enhancing the SJM.

As a full-service landscape contractor, Bemus Landscape has built a reputation for delivering high-quality, sustainable services throughout Southern California. Our team of over 250 skilled professionals is dedicated to maintaining landscapes that not only beautify the region but also support ecological restoration and sustainability. Our approach aligns with IRWD's goals of maintaining healthy, resilient landscapes while fostering environmental protection.

In reviewing the scope of work and tasks outlined in the proposal, we are confident in our ability to meet and exceed the following requirements:

- 1. **Trash and Site Maintenance**: We will ensure regular removal of all trash, litter, and debris, as well as proper disposal of waste, following IRWD's guidelines. We will document and report the weight of all trash removed on a monthly basis.
- Invasive Species Control and IPM Compliance: Bemus Landscape will adhere to IRWD's Integrated Pest Management (IPM) Plan, identifying and mapping non-native species for each zone. A qualified biologist will oversee the removal process to ensure efficient and cost-effective management of invasive species.
- 3. Vegetation Maintenance and Irrigation Audits: Our team will ensure vegetation is maintained in line with IRWD's specifications, including trimming and clearing tasks. Additionally, we will conduct quarterly irrigation audits, test each irrigation station, and submit detailed reports with findings and maintenance updates.
- 4. **Environmental and Regulatory Compliance**: Bemus Landscape is committed to safeguarding the natural environment and complying with all environmental regulations. During sensitive periods, such as between March 15 and September 15, we will work closely with IRWD and biological consultants to minimize impact to wildlife and ensure full regulatory compliance.



5. **Clear Communication and Reporting**: We prioritize open, transparent communication. Our team will submit weekly field reports, including before-and-after photos and detailed descriptions of work completed. Additionally, we will provide updated schedules for upcoming work and notify IRWD staff of any changes to the planned activities.

Bemus Landscape's dedication to sustainability, innovation, and exceptional service has made us a trusted partner for landscape maintenance across Southern California. We look forward to the opportunity to bring this expertise to the SJM project and to work closely with IRWD to ensure the long-term success of the Marsh and Wildlife Sanctuary.

Thank you

Meqan Tejeda

Commercial Business Development Manager megan.tejeda@bemus.com (949) 769-1431



At Bemus Landscape, Inc., we pride ourselves on being at the forefront of our industry in terms of the professional qualifications and horticultural skills of our staff. Obtaining professional credentials is a requirement for many of our positions, and is strongly encouraged for all others. The Company pays all employee testing and licensing fees, as well as those related to continuing education requirements. A partial listing of credentials held by our employees is as follows:

## **Registered Consulting Arborists: 1**

RCA's bring a comprehensive and objective viewpoint to the diagnosis, appraisal, and evaluation of arboricultural issues. This is the highest credential issued by the American Society of Consulting Arborists. Very few landscape contractors have a RCA on staff.

## Certified Arborists: 6

CA's are experts in the care of trees. The CA credential is issued by the International Society of Arboriculture and is conferred upon those who have passed rigorous written and field tests. Most contractors do not employ more than one CA.

## Tree Risk Assessment Qualified: 2

A standardized, systematic process for assessing tree risk and providing information to tree owners and risk managers for making informed decisions that will promote the safety of people and property and enhance tree benefits, health, and longevity.

## Pest Control Advisors: 1

The State of California requires that all commercial pest control products be applied under the written advice of a PCA, which is the highest pest control credential that the state issues. Most landscape contractors do not have one on staff, and either hire the services of a consulting PCA or are simply not in compliance with the law. PCA credentials require years of study and practical experience, and PCA's are the utmost authorities in the safe, horticulturally sound, and environmentally sensitive use of pest control products and non-pesticide alternatives.

## **Qualified Applicator Licenses: 22**

A QAL is the license issued by the State of California that allows a person to supervise the safe and responsible application of pest control products. The QA works under the direction of the PCA. Very few landscape contractors have more than one or two QA's on staff.

## **Certified Landscape Irrigation Auditors: 3**

The CLIA is certified by the Irrigation Association, the nation's largest irrigation industry trade organization. CLIA's possess the training and skills necessary to analyze and audit the use of irrigation water, as well as recommend and implement solutions to minimize the use of water in a cost effective and horticulturally sound manner.

## Landscape Designers: 1

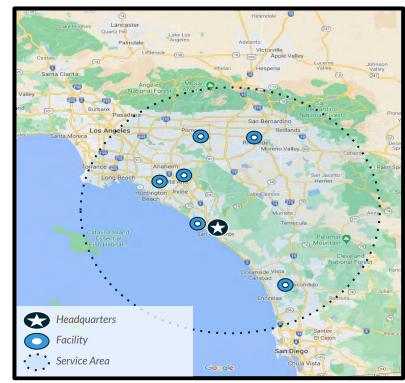
Our Landscape Designer specializes in aesthetically attractive and horticulturally sound designs rendered via the use of state of the art imaging software. Her technology skills are backed up by her plant knowledge.

## Other

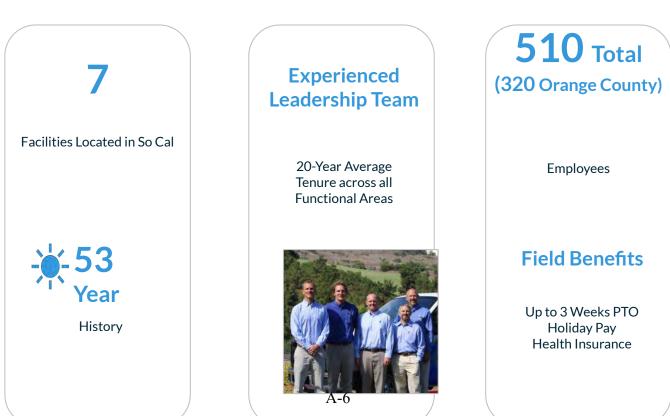
We have numerous other staff members who are certified by major irrigation equipment manufacturers and water districts in the proper implementation and management of satellite controller systems, smart times, reclaimed water management, and a variety of other disciplines.



# **Customer Portfolio and History**



Facilities & Service Area











# Corin Bemus, CEO

Corin Bemus is the CEO of Bemus Landscape, a family-operated company that has been a leader in Southern California's landscape industry since 1973. Under Corin's leadership, Bemus Landscape has grown into one of the region's top landscape firms, known for its innovation, sustainability, and commitment to quality. Corin is dedicated to fostering a culture of trust, employee growth, and exceptional service. He focuses on sustainable landscaping solutions that not only enhance landscapes but also contribute to environmental restoration. His leadership is guided by the company's purpose of "Serving Clients, Growing People," ensuring Bemus Landscape continues to set the standard for excellence in the industry.



# Spencer Bemus, Vice President - Tree Care

With 25 years of experience in the tree care industry, Spencer Bemus is a seasoned professional dedicated to enhancing the health and safety of urban forests. He holds certifications as an ISA Certified Arborist (#WE-9348A), ISA Tree Risk Assessment Qualified, and a Qualified Applicator License (#117807). Spencer has played an instrumental role in a riparian project in Encinitas for the past 10 years at Scott's Valley HOA. Additionally, he is a certified wildlife protector, further demonstrating his commitment to environmental conservation.



# Miles Coffin, Regional Operations Manager

With 12 years of experience in the landscape industry, Miles Coffin has spent the past 2 years working on the Scott's Valley Riparian project. As the Regional Operations Manager, he oversees day-to-day operations, ensuring efficient project execution, managing teams, and maintaining high-quality service standards. Miles is responsible for coordinating resources, managing budgets, and implementing best practices to ensure the success of landscape maintenance and restoration efforts. He holds a QWEL certification (MWDOC-1043) and a Qualified Applicator License (QAL #139436).





# Sergio Bortolamedi, Vice President of Sales

With over 15 years of experience in the commercial landscape industry, sustainability and high-level customer service have been Sergio's passion and driving force behind the success of Bemus Landscape. As Vice President of Sales for the past decade, he has played a strong role in sales while having a deep understanding of landscape maintenance operations. Sergio and his sales team have been instrumental in developing innovative solutions that prioritize sustainability and environmentally-conscious practices. His commitment to operational efficiency and client relationships has positioned Bemus Landscape as a key player in the industry.



# Megan Tejeda, Sr. Commercial Business Developer

With 25 years in the landscape industry, Megan Tejeda has a strong focus on driving growth and expanding customer bases. As Commercial Business Development Manager at Bemus Landscape for the past 3 years, she develops strategies to increase revenue, expand market presence, and build lasting business relationships. Previously, as an Account Manager, Megan played a key role in client relations, ensuring high-quality service and achieving sales and contract renewal goals.



# Jaime Cerda, Branch Manager

With 39 years of experience in landscape maintenance, Jaime Cerda has spent 24 years contributing his expertise to Bemus Landscape. He is an ISA Certified Arborist (#WE-8914A) and holds a Qualified Applicator License (#97571). Throughout his career, Jaime has built a strong foundation in the landscape industry, ensuring high standards of quality and service.



# Sual Alcaraz, Account Manager

With 5 years of experience in the landscape industry and 3 years with Bemus Landscape, Saul Alcaraz is an Account Manager committed to providing highquality service and building strong client relationships. In his role, he is responsible for managing client accounts, developing and implementing landscape management plans, overseeing service delivery, and ensuring client satisfaction. Saul works closely with internal teams to monitor project progress and provide regular updates to clients, all while maintaining a focus on organization and efficient time management. His ability to build relationships, combined with his knowledge of landscape management, makes him a valuable asset to the Bemus team. Although he has not yet worked directly on habitat restoration projects, his background in the landscape industry allows him to contribute to a range of service areas.



# **BLAKE SELNA**

PRINCIPAL / BIOLOGIST

# LSA



### EXPERTISE

- Biological Assessments
- Jurisdictional Delineations
- Regulatory Permitting
- Mitigation Planning,
- Monitoring, and Reporting
- Construction Monitoring
- Arborist Reports
- Habitat Restoration Plan Design and Implementation

### EDUCATION

B.S., Environmental and Resource Sciences, University of California, Davis, March 2000

### PROFESSIONAL EXPERIENCE

Principal, LSA, Irvine, California, 2000–Present

### PROFESSIONAL CERTIFICATIONS/ REGISTRATIONS

Certified Arborist No. WE-7397A, International Society of Arboriculture

ISA Tree Risk Assessment Qualification, International Society of Arboriculture

Certified Wetland Delineator, Wetland Training Institute

## **PROFESSIONAL RESPONSIBILITIES**

Working for LSA since 2000, Mr. Selna has gained extensive experience as a biologist and arborist. His expertise includes biological assessments, jurisdictional delineations, mitigation compliance, and regulatory permitting, as well as the design and implementation of habitat restoration and mitigation plans. Mr. Selna manages the Biology/Natural Resources Group in LSA's Irvine office, which is the hub of this discipline in Southern California. As a result, he has provided Principal oversight and management for projects of all shapes and sizes, covering the full range of species and habitats in Orange, Los Angeles, San Bernardino, Riverside, San Diego, and Imperial Counties. With his background as a field biologist, he has developed all of the relevant technical skills in wetland/waters delineation, regulatory permitting, habitat mapping, vegetation classification, wildlife surveys, focused and floristic-level plant surveys, wildlife monitoring, arborist evaluations, plant and tree salvage/transplantation plans, and construction monitoring, making him uniquely qualified to provide supervision, strategic analysis, and project advisories for technical teams created for each individual client's and project's needs. In addition to his technical skills, Mr. Selna has outstanding personnel, project, and contract management abilities.

## PROJECT EXPERIENCE

Mr. Selna has managed many aspects of Southern California environmental consultation, including biological resource analysis, preconstruction surveys and vegetation removal, large- and small-scale regulatory permitting efforts, habitat restoration, and mitigation of biological impacts. He is extremely familiar with surveying and restoring Southern California native habitats, including coast live oak woodland, coastal sage scrub, chaparral, needlegrass grassland, coastal grasslands and forblands, elderberry woodland, riparian woodland and scrub types, high desert riparian/alluvial scrub, Joshua tree and juniper woodland, desert scrub, seasonal ponds, and freshwater emergent marsh. Mr. Selna has designed and managed the implementation of more than 400 acres of restoration and mitigation of the aforementioned types, including more than 200 acres associated with landfill operations (more than 50 acres on-cap). Other notable mitigation projects include Joshua tree (Yucca brevifolia) translocation, endangered species translocation, wetland mitigation, and water quality protection features, including low-flow diversion and natural treatment of nuisance runoff.

Mr. Selna is very familiar with the County of Orange Central/Coastal Subregion NCCP/HCP, the Southern Subregion Habitat Conservation Plan, and the San Diego Creek and San Juan/Western San Mateo Creek Special Area Management Plans (SAMP), as well as the Orange County Transportation Authority Measure M2 NCCP/HCP/Environmental Mitigation Program. In

addition, he has worked within the regulatory frameworks of Los Angeles, San Diego, Riverside, and San Bernardino Counties.

As an International Society of Arboriculture Certified Arborist, Mr. Selna has prepared tree reports for projects in Newport Beach, Huntington Beach, Laguna Beach, Long Beach, Anaheim, Irvine, Santa Ana, Marina del Rey, San Juan Capistrano, Murrieta, Chino, Corona, Calabasas, Los Angeles, West Covina, Santa Clarita, Palmdale, unincorporated Los Angeles County, and the Angeles National Forest.



# PRINCIPAL / BIOLOGIST



## RELEVANT PROJECT EXPERIENCE

Mr. Selna has prepared and/or provided Principal review and oversight for the preparation of hundreds of biological resources analyses, with levels of complexity ranging from due diligence and constraints analyses to full-scale EIRs. As a Principal of LSA's Natural Resources group, Mr. Selna supervises the preparation of technical reports in support of Categorical Exemptions, IS/MNDs, and EIR sections. In addition, LSA is adept at preparing Caltrans Natural Environment Studies, Biological Assessments for USFWS consultation, jurisdictional delineations, regulatory permitting documentation, and habitat restoration plans. Mr. Selna has extensive experience with navigating the regulatory permitting process on behalf of clients of all types and sizes. The following projects provide a range of experience relevant to the IRWD NTS program. Additional projects, contact information, and reports available upon request.

### Irvine Ranch Water District, San Joaquin Marsh Restoration Project – The Duck Ponds Irvine, California

Although much time has elapsed, Mr. Selna retains extensive familiarity with the San Joaquin Marsh 'Duck Ponds.' LSA assisted The Irvine Company and Irvine Ranch Water District with the regulatory permitting and habitat restoration/creation design for the project. Shortly after his hiring in 2000, Mr. Selna counted the thousands of container plants around the Duck Ponds as part of the survivorship counts and was the primary data collector and habitat restoration monitor during the initial installation and establishment years of the project. LSA collected data annually until the site received acceptance from the United States Army Corps of Engineers.

### Irvine Ranch Water District, Carlson Marsh Regrade Project Irvine, California

Mr. Selna assisted the Irvine Ranch Water District with the acquisition of the regulatory permits necessary for the Carlson Marsh Regrade Project, in which the water circulation in the degraded marsh was restored and exotic plant species were eradicated. He coordinated a construction monitoring regimen for vegetation removal and excavation of pilot channels and a Habitat Mitigation and Monitoring Plan for the restoration of freshwater marsh and brackish marsh habitat impacted by the project. Mr. Selna worked closely with the grading contractor to create topography and habitat conditions conducive to the restoration of willow forest, mulefat scrub, herbaceous riparian marsh, and halophytic (saline) marsh habitats, based on specific site conditions throughout the 60-acre Carlson Marsh portion of the greater San Joaquin Marsh. The circulation project and 7.62-acre restoration component were resounding successes and Mr. Selna received resource agency approval documenting that the site met all required performance standards.

### City of Aliso Viejo, Dairy Fork Wetland Aliso Viejo, California

LSA assisted the City of Aliso Viejo with permitting for the creation of water quality basins along Dairy Fork Creek. LSA conducted a jurisdictional survey and general field assessment of the project area, prepared a Jurisdictional Delineation report, and prepared and submitted the associated permit applications to the resource agencies for approval. LSA also assisted with the CEQA exemption filed for this project. Following the successful permitting process, LSA provided construction monitoring and post-construction monitoring.

#### OC Flood, Santa Ana-Delhi Channel Improvement Newport Beach, California

As Principal in Charge/Project Manager, Mr. Selna is currently leading LSA's collaboration with OC Flood and its engineering consultants to rehabilitate the Santa Ana-Delhi Channel as it empties into Upper Newport Bay. The County has committed to the mitigation of historical impacts to the San Diego Creek Watershed and based on a previously prepared Environmental Impact Report (EIR), LSA prepared CEQA and technical studies addressing biological, transportation, air quality, noise, and cultural resource impacts. The project would improve the flood handling capabilities of the channel, as well as create over 6.5 acres of coastal salt marsh, freshwater/brackish marsh, riparian scrub, and coastal sage scrub habitats. This involves the creation of habitat for several specialstatus plant and animal species, as well as restoration of coastal wetland habitat complexes.



## ERIC KRIEG ASSOCIATE / BIOLOGIST

# LSA



### EXPERTISE

- Revegetation/Restoration
- Biological Assessments
- Construction Monitoring
- Flora and Fauna Surveys
- Mitigation Planning, Design, and Monitoring

### EDUCATION

M.S., Biology (Ecology and Conservation), Illinois State University, Normal, Illinois, 1996

B.S., Biology, Frostburg State University, Frostburg, Maryland, 1993

### PROFESSIONAL EXPERIENCE

Associate, LSA, Irvine, California, December 1997-Present

Environmental Laboratory Technician, Crosby Laboratories, Inc., Placentia, California, September-November 1997

Naturalist, Tucker Wildlife Sanctuary, Modjeska Canyon, California, May-September 1997

## PERMITS AND AUTHORIZATIONS

USFWS Permit No. TE-777965, Authority to survey for the threatened coastal California gnatcatcher

**CDFW Scientific Collecting** Permit No. SC-213020003

## PROFESSIONAL RESPONSIBILITIES

Eric Krieg's duties consist of habitat restoration and biological resource monitoring during project implementation and long-term monitoring. He has experience preparing restoration plans and overseeing all aspects of a plan's implementation, from custom seed collection and native plant propagation through installation, maintenance, and monitoring procedures. Mr. Krieg has been involved in restoring coastal sage scrub, native grassland, oak woodland, riparian, and wetland habitats for mitigation projects.

Mr. Krieg prepared final reports for agency approval (USACE, CDFW, California Coastal Commission, USFWS, and RWQCB). Mr. Krieg has performed numerous focused surveys for sensitive species, including the desert tortoise (Gapherus agassizii), cactus wren (Campylarhynchus brunneicapillus), burrowing owl (Athene cunicularia), coastal California gnatcatcher (Polioptila californica californica), and intermediate mariposa lily. He has permits to perform protocol presence/absence surveys of coastal California gnatcatchers.

Mr. Krieg has a substantial background in biological construction monitoring. This monitoring includes overseeing clearing and grubbing, and impact limits, as well as compliance with resource agencies permit conditions and State and federal environmental requirements. Mr. Krieg has monitored and served as Project Manager for large road construction projects, creek realignment projects, utility projects, large residential developments, and smaller infill development projects.

Mr. Krieg has gained a wide range of experience working with utility companies on a variety of projects. For 10 years, Mr. Krieg had on-call contracts with Southern California Edison (SCE) and assisted with deteriorated pole assessments, permitting, preconstruction surveys, construction monitoring, restoration, and other types of projects. As Project Manager for these undertakings, Mr. Krieg has worked on more than 2,000 projects with SCE.

Mr. Krieg has worked on many projects for Caltrans and was Task Manager for most of them. Currently, Mr. Krieg is the Project Manager of a large multi-year contract for Caltrans District 12, which he is managing the associated subs and LSA biologists working on all the task orders.

## PROJECT EXPERIENCE

### SOLID WASTE/RECYCLING

### Geosyntec, Alpha Olinda Landfill, 10(a) Permit Orange County, California

Mr. Krieg served as Project Manager for the Habitat Conservation Plan (HCP) and 10(a) Permit at Alpha Olinda Landfill. LSA worked with Geosyntec under its contract. Gnatcatcher surveys were performed in the proposed impact areas within coastal sage scrub. The 10(a) Permit application and HCP were prepared and sent to USFWS for approval and authorization. Mr. Krieg coordinated with OC Waste & Recycling to get the approved 10(a) Permit and get authorization to start the projects. A-12



## ERIC KRIEG ASSOCIATE / BIOLOGIST



### SPECIALIZED TRAINING

Wetland Delineation Training Class, Wetland Training Institute, Inc., November 2014

Construction Safety Orientation, Caltrans Division of Construction, January 2003

Desert Tortoise Council 8th Annual Surveying, Monitoring, and Handling Techniques, October 23–24, 1999

### OC Waste & Recycling, South Region Landfills Orange County, California

Mr. Krieg has assisted with several tasks for the past 9 consecutive years of on-call biological services contracts for OC Waste & Recycling's South Region Landfills, primarily at Prima Deshecha Landfill. He assisted with conducting a jurisdictional delineation, special-status plant species, and coastal California gnatcatcher (*Polioptila colifornica californica*) surveys.

### OC Waste & Recycling, Gothard Landfill, Gnatcatcher Surveys Orange County, California

Mr. Krieg performed protocol gnatcatcher surveys on the closed Gothard Landfill. Mr. Krieg coordinated with OC Waste & Recycling for the surveys and project coordination with USFWS and CDFW. Mr. Krieg served as task manager for the surveys.

### TRANSPORTATION

### Caltrans District 12, Laguna Canyon Road (SR-133) Widening and Drainage Improvement Project Orange County, California

Mr. Krieg served as Biological Task Manager for the Laguna Canyon Road (SR-133) Widening and Drainage Improvement Project. This project proposes several improvements along Laguna Canyon Road from the SR-73 Toll Road to just south of El Toro Road. This project included conducting protocol surveys (coastal California gnatcatcher [*Polioptila californica californica*], least Bell's vireo [*Vireo bellii pusillus*], southwestern willow flycatcher [*Empidonax traillii extimus*], and Pacific pocket mouse [*Perognathus longimembris pacificus*]), surveys for special-status plant and animal species, habitat assessment, a Jurisdictional Delineation and report, and preparation of a Natural Environmental Study and Biological Assessment. Throughout the project, coordination with Caltrans biologist occurred in order to keep them up to date on the fieldwork and survey results.

#### Orange County Transportation Authority, I-5 (Avenida Pico to County Line) San Clemente, California

Mr. Krieg performed protocol gnatcatcher surveys along I-5 from Avenida Pico to the San Diego County line. The surveys were conducted within suitable scrub habitat within the proposed impact limits and a 500-foot buffer. Mr. Krieg coordinated with USFWS and CDFW for the surveys.

### Caltrans District 12, On-Call Environmental Services Orange County, California

Mr. Krieg has been the Task Manager for several task orders, which involved the review and oversight for the preparation of a Caltrans Natural Environment Study, Jurisdictional Delineation, and Biological Assessment for a proposed highway safety improvement project from 2017 through 2019. Specific tasks included conducting multiple focused botanical surveys, general habitat suitability assessment surveys, vegetation and sensitive plant species mapping, and an oak tree impact evaluation. Mr. Krieg also managed and conducted the monitoring for slope stabilization projects along SR-241. As part of this work, he conducted focused surveys for costal California gnatcatchers (*Polioptila californica californica*) and prepared a construction monitoring report for USFWS.

### Caltrans District 12, SR-57 and Lambert Interchange Brea, California

Mr. Krieg is serving as Biological Task Manager for the construction monitoring for the SR-57 and Lambert interchange Project. The project includes widening SR-57 and improvements to Lambert to improve the overall interchange. The project includes a Contractor Education Program, preconstruction nesting bird surveys, the



# ERIC KRIEG ASSOCIATE / BIOLOGIST



monitoring of environmentally sensitive area(s) and safety fence installation, coastal California gnatcatcher (Polioptila californica californica) surveys, weekly construction monitoring, and report preparation. Mr. Krieg is performing these tasks himself as the biological monitor, and he was required to have gnatcatcher experience and be approved by USFWS. Mr. Krieg coordinated with both the Caltrans biologist and the Resident Engineer for schedule and project updates.

### Caltrans District 12, SR-241 Slope Stabilization and Drainage Improvement Project Orange County, California

Mr. Krieg served as the Biological Task Manager for the construction monitoring for the SR-241 Slope Stabilization and Drainage Improvement Project. The project included six locations along SR-241 that required some slope repairs to alleviate storm water problems along the road. The project included a Contractor Education Program, preconstruction nesting bird surveys, the monitoring of environmentally sensitive area(s) and silt fence installation, coastal California gnatcatcher (*Polioptila californica californica*) focused surveys, weekly construction monitoring, and report preparation. Mr. Krieg was either overseeing these tasks or performing them himself as the biological monitor, and he was required to have gnatcatcher experience and be approved by USFWS. Mr. Krieg coordinated with both the Caltrans biologist and the construction manager for schedule and project updates. All work was completed per the designated permits.

### Caltrans District 12, SR-241 Storm Water Mitigation Project Orange County, California

Mr. Krieg served as Biological Task Manager for construction monitoring of the Storm Water Mitigation Project. The project included five locations along SR-241 that required slope repairs to alleviate storm water problems along the road. Mr. Krieg oversaw and performed four sets of three coastal California gnatcatcher (*Polioptila californica californica*) surveys required before the start of construction at each site. Preconstruction nesting bird surveys were also performed during the gnatcatcher surveys. Monitoring for the removal of vegetation was also performed at each location. Mr. Krieg coordinated with the Caltrans biologist and the construction manager for schedule updates and project updates. All work was completed per the designated permits.

### UTILITIES

### Irvine Ranch Water District, IPM Plan Implementation Monitoring and Reporting Irvine, California

Mr. Krieg served as Project Manager for the Irvine Ranch Water District (IRWD) Integrated Pest Management (IPM) Plan Implementation Monitoring and Reporting Project. The project included IRWD's 34 natural treatment system facilities and the 300-acre San Joaquin Marsh. The IPM Plan aimed to treat pests within these facilities, while minimizing impacts on human health and the environment. Under this contract, LSA had been in charge of organizing an innovative approach to managing invasive plant maintenance activities that focused on nonchemical treatment methods. LSA biologists were responsible for routine site visits to map locations of invasive plant pest outbreaks, as well as determining effective treatment methods. In doing so, LSA had developed an interactive data viewer that allows relevant parties to access real-time data, thus streamlining communication between LSA, IRWD, and IRWD's landscape contractor.

#### SCE, On-Call Projects Southern California

Mr. Krieg was the Project Manager for SCE's on-call contract with LSA. The work included Biological Assessments, sensitive species surveys, deteriorated pole assessments, preconstruction surveys, construction monitoring, postconstruction surveys, and permitting. Most of the work was in Southern California, but some projects extend to the limits of SCE's coverage area. This project had multiple subcontractors with whom Mr. Krieg coordinated and managed the multiple project duties.



JESSICA LIEUW

BIOLOGIST





### EXPERTISE

- Biological Assessments
- Vegetation Mapping
- Wildlife Surveys
- Jurisdictional Delineations
- Bat Surveys

### EDUCATION

B.A., Environmental Science, Minor in Urban and Regional Planning, University of California, Irvine, California, 2017

### PROFESSIONAL EXPERIENCE

Biologist, LSA, Irvine, California, 2019–Present

Wetlands Specialist, Irvine Ranch Water District, Irvine, California, 2018–2019

Natural Resource Intern, Irvine Ranch Water District, Irvine, California, 2017–2018

# SPECIALIZED

Southwestern Desert Bats Class, Maturango Museum, 2022

California Rapid Assessment Method (CRAM), California Wetland Monitoring Workgroup, 2021

Wetland Delineation Training Course, Wetland Training Institute, Inc., 2019

Desktop GIS Continuing Education Course, Pace University, 2018

### **PROFESSIONAL RESPONSIBILITIES**

As a Biologist with LSA, Ms. Lieuw conducts biological surveys and monitoring throughout Southern California for a variety of projects, including preconstruction nesting bird surveys, habitat restoration monitoring, and bat habitat assessments, emergence surveys, and exclusions. She also has experience with biological assessments and jurisdictional delineations and has extensive experience working with native and nonnative wetland species in Southern California. She has also performed aquatic invertebrate/vertebrate surveys, sediment sampling, and water quality monitoring.

## PROJECT EXPERIENCE

### Irvine Ranch Water District, Integrated Pest Management Plan Implementation

### Irvine, California

Ms. Lieuw conducted site visits to over 30 natural treatment system facilities and the San Joaquin Marsh to map locations of invasive plant pests and determine effective treatment strategies. She also helped develop an interactive data viewer to display data and streamline communication and authored annual reports discussing treatment.

### Geosyntec, Santa-Ana Delhi Channel Improvement Project Newport Beach, California

Ms. Lieuw conducted and authored reports for a jurisdictional delineation, an assessment of wetland/stream function using the California Rapid Assessment Method, and a bat habitat assessment for the Santa-Ana Delhi Channel Improvement Project, in an area containing native habitat types including freshwater marsh, salt marsh, and coastal sage scrub.

### Aliso Viejo Community Association, Kathryn Thompson Mitigation Area Aliso Viejo, California

Ms. Lieuw provided biological consultation for fire fuel modification activities and vector control activities in the Kathryn Thompson Mitigation Area. Planned activities required the preparation of a Section 1602 Streambed Alteration Notification for the CDFW. Following the successful receipt of an agreement, Ms. Lieuw conducted nesting bird surveys and vegetation removal monitoring within the work area.

### Irvine Ranch Outdoor Education Center, Restoration Monitoring Orange County, California

Ms. Lieuw conducted a qualitative performance monitoring survey within multiple compensatory coastal sage scrub restoration areas on the 210-acre Irvine Ranch Outdoor Education Center. She also monitored vegetation removal to comply with fuel modification requirements.

### Caltrans District 12, SR-74 Plant Establishment Project Orange County, California

Ms. Lieuw conducted an assessment of stream function using the California Rapid Assessment Method and assisted in conducting a benthic macroinvertebrate survey within the San Juan Creek. She prepared technical reports documenting the findings from the surveys, which included assessing



# JESSICA LIEUW

BIOLOGIST



the benthic macroinvertebrate community assemblage as a bioindicator for water quality.

#### Caltrans District 12, SR-1 Bicycle and Safety Improvement Project Orange County, California

Ms. Lieuw conducted a jurisdictional delineation, general biological survey, and rare plant surveys for the SR-1 Bicycle and Safety Improvement Project located adjacent to coastal marsh and dune habitat. Rare plant species identified included coast woolly heads (*Nemacaulis denudata*), red sand verbena (*Abronia maritima*), spiny rush (*Juncus acutus*), and estuary seablite (*Suaeda esteroa*).

### Caltrans District 12, SR-74 Safety Improvement Project Arroyo Toad Surveys and Invasive Predator Removal

### Orange County, California

Ms. Lieuw conducted invasive predator removal of the American bullfrog (*Lithobates catesbeianus*) and red swamp crayfish (Procambarus clarkii) within San Juan Creek as part of a mitigation requirement for impacts to designated arroyo toad (*Bufo californicus*) critical habitat. American bullfrogs were removed using gigs or dip nets and humanely killed—adult American bullfrogs were dissected and examined for reproductive status and stomach contents. Incidental occurrences of arroyo toads were also recorded.

### HNTB, Yorba Linda Boulevard Widening Project Yorba Linda, California

Ms. Lieuw conducted species inventory surveys, a bat habitat assessment, focused bat surveys, vegetation mapping, and a jurisdictional/wetland delineation for the proposed widening of a bridge over the environmentally sensitive Santa Ana River. She also prepared the technical report assessing potential impacts to sensitive biological resources and including measures to avoid or mitigate for impacts to several special-status species, wetlands, and critical habitat with regard to CEQA.

### Monterey Park Retail Partners LLC, Mitigation Area Restoration Monitoring Monterey Park, California

Ms. Lieuw conducted a qualitative assessment of the coastal sage scrub restoration sites within Puente Hills Habitat Preservation Authority lands during the 120-day establishment period. She also performed a survivorship count of installed container plants following the 120-day establishment period to ensure that the site was meeting performance standards.

### Irvine Ranch Water District, Natural Resource Monitoring and Assessment Irvine, California

Ms. Lieuw monitored the flora and fauna of 36 urban runoff treatment wetlands through identification of native and nonnative plants, birds, invertebrates, and other biota. She assessed water quality at the influent and effluent of each wetland using YSI EXO sondes, as well as taking grab and composite water samples. She operated all-terrain vehicles, four wheel drive vehicles, amphibious vehicles, and tractors on rough terrain. Ms. Lieuw also headed the study of macroinvertebrates within treatment wetlands as a proxy for evaluating water and habitat quality. She planned and executed field sampling; processed samples in the laboratory; conducted statistical analysis; and prepared reports, presentations, and posters.

### OC Waste & Recycling, Trabuco Creek Mitigation Area Ordinary High Water Mark Delineation Orange County, California

Ms. Lieuw conducted an ordinary high water mark delineation prior to removal of invasive giant reed (Arundo donax) along Trabuco Creek. The mitigation area is part of a comprehensive mitigation package including giant reed removal, wetland creation, ephemeral drainage creation, and associated habitat restoration for Prima Deshecha Landfill.



#### Bemus Landscape Inc. Safety Training Program Overview

At **Bemus Landscape Inc.**, safety, respect, and accountability define the way we work. Our comprehensive **Safety Training Program** is designed to prevent injuries, reduce risks, and foster a culture of safety and professionalism across all roles—field, management, and office.

Every team member is expected to actively participate in and uphold our safety standards, which are rooted in regulatory compliance and continuous improvement.

#### 1. Injury and Illness Prevention Program (IIPPP)

This program outlines our company's system for identifying, reporting, and correcting unsafe conditions and practices, in alignment with OSHA requirements. It ensures each employee understands their role in maintaining a safe and healthy work environment.

#### 2. Heat Illness Prevention Program (HIPP)

Our HIPP provides essential training on recognizing heat-related symptoms, implementing rest and hydration strategies, and understanding emergency protocols for outdoor work during hot conditions.

#### 3. Code of Safe Practices

All employees are trained in our Code of Safe Practices, which includes specific expectations for personal behavior, equipment use, and hazard awareness on and off the job site.

#### 4. Hazard Communication Program (HAZCOM)

We train employees on how to safely handle and understand hazardous substances, including reading labels and Safety Data Sheets (SDS), in full compliance with OSHA's HAZCOM standard.

#### 5. Equipment-Specific Training

Before operating any equipment, employees receive hands-on training and must demonstrate safe and proper use. Training includes:

- Weed Wackers
- Stick Edgers
- Edge Trimmers
- Blowers
- Push Mowers (21")
- Ride-On Mowers (36", 48", 52")
- Skid Steers

This approach ensures that accountability is balanced with opportunities to learn an

#### 6. Pesticide Management Training

Applicable employees are trained in pesticide and herbicide safety in accordance with OSHA and the Department of Agriculture. This includes handling, application, emergency response, and storage practices. 17



#### 7. Defensive Driving Program

Drivers receive formal training on safe driving habits, hazard awareness, and vehicle control. This program is reinforced with retraining following any at-fault incidents.

#### 8. Flex & Stretch Program (Daily)

Before the start of each workday and **prior to dispatch**, all field employees participate in our Flex & Stretch routine. These daily warm-ups help prevent soft tissue injuries by preparing the body for physical work.

#### 9. Daily Gate Check Inspections

Each morning, we conduct **daily gate check inspections** to ensure vehicles, trailers, and equipment are in safe working condition before being dispatched to job sites.

#### 10. Near Miss Reporting

All employees are required to report near misses, regardless of severity. This proactive approach allows us to address hazards before they result in incidents.

#### 11. Weekly Tailgate Safety Meetings

We conduct **52 tailgate meetings each year**, with **a different safety topic covered each week**. These discussions are designed to raise awareness and proactively address seasonal, task-specific, or trending hazards.

#### 12. Workplace Violence Prevention

Employees are trained to recognize and report any signs of violence or aggressive behavior. Our zero-tolerance policy ensures a safe and respectful workplace for all.

#### 13. Sexual Harassment Prevention Training

All field employees, account managers, branch managers, and office staff receive mandatory training on preventing sexual harassment. We are committed to fostering a culture of respect and inclusion across the organization.

#### 14. Disciplinary Action & Retraining Protocol

Our program includes a **fair and structured disciplinary process** for addressing safety violations and near misses:

- Verbal Warning
- Written Warning & Mandatory Retraining
- Suspension
- Termination (if necessary based on severity or repeated violations)

This approach ensures that accountability is balanced with opportunities to learn an



## Regular Maintenance Activities at San Joaquin Marsh

#### Weekly Tasks:

- Submit weekly field forms documenting detailed maintenance per zone.
- Map and identify non-native species (focus on priority targets) for each zone, presenting to IRWD.
- Attend weekly meeting with IRWD to review completed and upcoming work.
- Remove trash and litter, replace trash can liners, and dispose of trash off-site.
- Remove debris from all structures (inlets, grates, ditches, kiosks, etc.).
- Control non-native and undesirable vegetation, including algae and mosquito fern.
- Trim vegetation along trails, roads, walkways, and structures to a minimum of 2 feet.
- Maintain 0% cover of cattails (Typha sp.) in all areas.
- Report vandalism and any damaged vegetation to IRWD.
- Ensure vegetation is cleared from streams (2 feet from the bank) and maintain a 10' vertical clearance in all streams.
- Trim viewing areas around ponds to below 2 feet for public access.
- Fill in cracks or potholes in roads/trails with appropriate materials.
- Clean dust and debris from kiosks, signs, benches, and other structures.

#### Monthly Tasks:

- Maintain mulched areas and replace mulch as needed.
- Remove vegetation from Pond C, leaving a 6' buffer of coyote bush and mulefat.
- Trim Tree Hill vegetation to prevent dense areas.
- Maintain trees and hardscapes as per specifications, keeping all areas clean and safe.

#### Quarterly Tasks:

• Audit irrigation systems, including testing, inspection, and documentation of performance.

#### Annual Tasks:

- Clear vegetation from all channels during winter.
- Remove vegetation from Ponds D & E basin bottom, with a 10' bulrush buffer around Pond D.
- Remove vegetation from islands in Ponds 1 & 2 annually (November).

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Bemus Landscape has teamed up with LSA to effectively manage the sites per the RFP. Our plan is to utilize a blend of experience, expertise, landscape best practices, and technology to effectively each of the sites.

Work Plan

Below is our detailed description of how we will fulfill each of the requirements of the Work Plan outlined in Section II:

A. Removal of Trash - Bemus Landscape will ensure consistent trash removal within site boundaries, including emptying trash cans, cleaning trash screens, and reporting the weight of trash removed monthly. Our team will dispose of all debris responsibly, adhering to the highest standards of environmental compliance.

B. Full Complinace of IPM Plan - Bemus Landscape will partner with LSA to ensure that site tasks are clearly identified by a qualifited biologist prior to work taking place. (SEE SAMPLE MAP). The biologist will visit each site the week prior to maintenance crew, and will provide a map with non-natives for removal (with recommended method, i.e.; hand removal vs herbicide spot treatment), nest activity, irrigation items, other items of note, to ensure IPM plan is followed with each visit. Before/After photos will be provided weekly, showing the work that was completed.

C. Removal of accumulared debris - We will review all structures at a minimum of one time per month, and daily during rain events. We understand the importance of keeping trash and debris out of waterways by managing the inlets and outlets.

D. Trimming of vegetation from trails, roads, etc. - Our monthly schedule and photo documentation will ensure that we are identifying, performing, and documenting the items that are necessaary for routine trimming.

E. Removal of Cattails - This will be a routine item that is identified and erradicated monthly / as needed to ensure 0% coverage.

F. Removal pond surface undesireables - This will be an ongoing maintenance item that will be managed and communicated monthly.

G. We will ensure vegetation is cleared from all site pernishings and designated areas. This will be included in weekly reporting.

H. Removal of vegetation from POnds - We have allocated labor to work the IRWD staff on annual removals.

I. Removal of vegetation from islands - We are prepared to remove vegetation from islands using a boat in November.

J. Trimming and/or removal of aquatic vegetation - These items will be pruned on a rotation schedule, and will communicated as necessary. During time of heavy growth, additional man power will be provided at no additional cost, to ensure that vegetation is kept to standards.

K. Pond C - We are prepared to remove vegetation form Pond C per specifications.

L. Vlewing areas will be pruned to specifications weekly to ensure views are maintained.

M. Tree Hill area will trimming to avoid dense vegetation.

N. All work must be in accordance with Landscape Maintenance Specifications - We are clear on the specifications, and will ensure we communicate clearly on our progress.

O. Obstructions in walkways will be identified weekly to ensure safety and consistency.

P. Auditing Irrigation - With our extensive experince managing irrigation systems, we will ensure the scheduled are set, inspections are performed, and repairs are made so to maximize efficiency. We mamange over 100 Calsense controllers and are familiar with all facets of programming and management.

Work Plan



Q. Special work restrictions - We will be working with biologist daily and wekly to ensure we are in complinace. We understand the sensitive nature of bird nesting season and will ensure that all work is performed with biologist recommendations.

R. Vegetation removal/earthwork - All major removals and earthwork will have biologist interaction. Our biologists will be on every site monthly to review items that require removal.

R. Reporting, Documentation, and Communication.

R.1. Vandalism - Our photo documentation and GPS location of all tasks and isseus allow us to share items outside our scope of work in a clear and concise way.

R.2. Submittal of weekly field form - Our weekly field form report will show items completed, and our schedule for the upcoming week. Items that need to be completed will have an overhead satelilite image showing GPS 'pins' with a list of tasks. These items will have descriptions and a legend to describe to items to be completed. This will be accompanied with photos of completed tasks.

R. 3. - Monthly schedule for following month - We use a landscape software that allows us to communicate our daily, weekly, and monthly schedule at the click of a button. This schedule is what our crews use to determine their daily schedule and tasks to be completed. We will share schedule, tasks, man power and any additioanl items that fall outside of the routine maintenance items.

R. 4. Irrigation reporting - We digitally log all inspections and repairs with GPS and photos. These reports will be shared with IRWD staff monthly.

R.5. We look forward to sharing our progress and upcoming schedule .

R.5.a - Our team of biologists will prepare weekly 'non-native species and maintenance maps' showing type of species, GPS location, and schedule for removal.

R.5.b - Corrections - We will ensure corrections are communicated weekly and completed within 7 days.

R.6 Submittal of monthly invoices - All invoicing requirements will be followed.

Man Power:

Foreman (1) - 40 hours per week

Gardener (5.5) - 220 hours per week

Irrigation Tech (1) - 8-12 hours per week / as needed

Account Manager - 16-24 hours per week / as needed

Biologist - 10-12 hours per week

Seasonal Variation - We are confident that we can balance our seasonal tasks with 3 full time workers and a part time irrigation tech.

Equipment List

Crew Truck - All of our crew trucks come equipped with a Truck, 18' landscape trailer, small equipment (hedgfe trimmers, blowers, weedeaters), spray tank, first aid kit, fire extinghuisher, and hand tools.

- 2 Gators (Utility Vehicles)

Spplemental equipment:

- Roll off truck for container removal.

- Large equipment - loadrers, backhoes brush hog, etc.



Biologist will provide a map each week identify tasks to be performed by maintenance crew. Map will include geolocation and task to be completed for the following items:

- Non-natives weeds
- Irrigation Issues
- Trash
- Other Miscellaneous Items
- Seasonal tasks
- Access items



Floral View

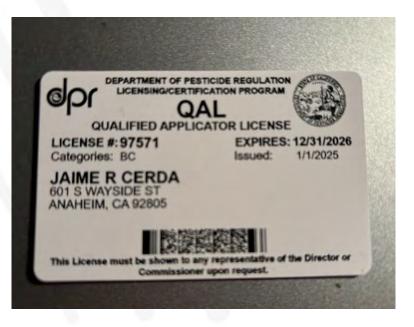


Supplemental weekly reports will be provided to show after photos as well as items accomplished throughout the week. These will be tied to GPS locations and progress throughout the various sites.











Description	30 Days	60 Days	90 Days	COMPLETE
Initial quality scoring to establish baseline for measuring improvement prior to job start, then quarterly thereafter. Establish annual IQ goals.		•		
- Deficiencies	•			
- Irrigation Audit Report	•			
- Rotation Map	•			
- Rotation Calendar	•			
- Propose immediate irrigation repairs, and complete as necessary	•			
Implement Water Management/Conservation Program.		•		
Make all necessary immediate repairs (pending approval).		•		
Perform initial job assessment and submit written/photo documented report to Management Company. Report will include:			•	
- Identify and report potential upgrades and opportunities for savings.			•	
- Pests and diseases identified.			•	
- Hazards, and liabilities.			•	
- Proposals/Budget Requests			•	
<ul> <li>Tree Care Management Plan and Inventory – This will include tree trimming schedule, fertilization schedule, identification of sick and hazardous trees performed by In House Arborist.</li> </ul>			•	
- Proposals/Budget Requests			•	
Property up to Bemus standards (80 IQ score or higher).			•	
Full implementation of ongoing management program.			•	
Full implementation of water conservation program.			•	
Weed free projects.				



**Water management** has come to the forefront of concerns for properties like yours. Bemus Landscape recognizes water as one of earth's most precious resources. We manage over 2 billion gallons of water a year and believe that it is our duty as a responsible business to proactively manage your water.

#### Our approach:

**System Evaluation:** The first step of responsible water management is to evaluate the system . At this stage we inspect and report on system deficiencies such as breaks, leaks and safety issues. After any initial repairs are done we continue to regularly inspect the system to make sure it is functioning properly.

**Manage Usage:** Once the system is fully functioning, we move to managing usage. With client provided water bills we compare ongoing actual usage with the water allocated by the local district. We adjust our programming to be as efficient as possible. In addition to ongoing management we keep an eye on the plant health in order to communicate any improvements that may be needed.

**Improvements:** Inefficient irrigation can create unnecessary costs in the form of wasted water, plant decline, asphalt damage, etc. We will work with you to provide solutions that allow you to maximize your system. These include possibilities such as drip conversions, specialized flow/shut off valves, and lower water using plants. Additionally these can be put into a Return on Investment calculation to allow you to make educated decisions.

#### **Additional Strategies:**

#### Rebate Programs

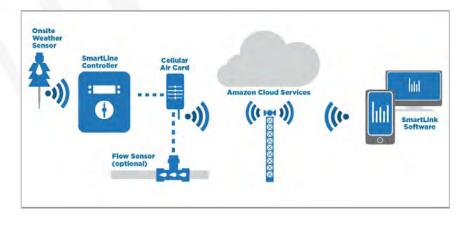
We facilitate the application process for rebates. We are very familiar with all water districts throughout Southern California and the programs that they offer. With the results of our initial inspection we can make recommendations for system upgrades.

#### Weather based / Smart Controllers

These systems have grown in popularity over the last 5 years. After the system is installed it starts with online management, then the local weather station provides daily weather and rainfall data. The servers access the weather data, computes evapotranspiration, and generates a watering schedule for each landscape profile. Results have shown healthier landscapes, better water management while reducing harmful runoff pollution and potential water savings of 20 to 50%.

Our Irrigation Manager monitors the irrigation control system as often as required, and makes continuous adjustments based on seasons, plant and zone attributes, run times, and flow readings.

We can use a ROI calculation to determine if it's feasible for the association to invest in the new technology for water management.





At Bemus Landscape, we like to take a systematic approach to the renovation process. We believe it is imperative to establish a long term plan based on the needs of the community.

Here is our process:

#### **Design Plant Palette**

Here we work with the Board of Directors/Landscape Committee to establish a the criteria of what plant material is most consistent with the architectural theme, adheres to same water requirements, and is aesthetically appealing. (See sample Plant Palette)

#### Design Photo Rendering(s)

After the Plant Palette has been completed, we will begin to work on the Photo Rendering. This will allow us to implement the Plant Palette into a visual image, showing what the completed product will look like. This allows the client to have a visual concept of the design , and helps avoid any misconceptions of the final product. (See sample Photo Renderings).

#### Installation

This is where the rubber hits the road. Here we begin the installation using the skills we have acquired over the last 39 years of landscape installation. We strip the existing landscape material, check the irrigation coverage, test the soil, apply the required nutrients, and then we begin our install. (The example image below represent a before and after photo rendering of a potential conversion)





## **REQUEST FOR PROPOSAL**

#### San Joaquin Marsh Landscape Maintenance

Date: February 6, 2025 Michelson Operations Center 3512 Michelson Drive Irvine, CA 92612

#### QUESTIONS DUE BY: 4:00 PM, FEBRUARY 24, 2025 PROPOSAL DUE BY: 4:00 PM, MARCH 13, 2025 BID BOND DUE BY: 4:00 PM, MARCH 13, 2025

#### Project: San Joaquin Marsh Landscape Maintenance Project Coordinator: Alvaro Alfaro

The Irvine Ranch Water District (IRWD or the District) invites environmental consulting firms and/or landscape contract companies to submit a proposal to complete the project herein described. The bid is to include all labor, material, equipment, traffic control, bond fees and insurance costs required for the project. The bid shall include both a lump-sum total and individual line items that include all work described in the scope of work. All bid documents and submissions will be conducted electronically through the District's ePurchasing website at <a href="https://irwd.ionwave.net/">https://irwd.ionwave.net/</a>. It is the prospective bidders responsibility to download bid documents and check for addenda or updates on a regular basis. For login or registration assistance, please contact purchasingdept@irwd.com.

The following information is provided for guidance in preparing your proposal:

#### I. PROJECT DESCRIPTION AND BACKGROUND INFORMATION

Established in 1961 as a California Water District, IRWD provides drinking water, sewage collection and treatment, recycled water, and urban runoff treatment to over 390,000 residents of Central Orange County, California. IRWD encompasses nearly 181 square miles extending from the Pacific coast to the foothills and has more than 110,000 domestic and recycled water connections. IRWD serves the City of Irvine and portions of the Cities of Costa Mesa, Lake Forest, Newport Beach, Tustin, Santa Ana, Orange and unincorporated Orange County.

In 1997, IRWD established the San Joaquin Marsh and Wildlife Sanctuary (SJM), an approximately 277-acre freshwater marsh and upland riparian habitat adjacent to its Michelson Water Recycling Plant. The SJM serves three primary functions: to treat and remove pollutants from urban runoff in the San Diego Creek Watershed; to provide mitigation habitat for wildlife and habitats impacted by development in Irvine; and to provide recreational opportunities for the public.

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#### II. <u>SCOPE OF WORK</u>

The area of responsibility will include all of the SJM including the area known as the Urban Forest, as outlined in the SJM Landscaping Zones attachment. The SJM must be staffed with a crew of an appropriate size to fulfill all requirements of the Work Plan (below) each week. This crew shall include a minimum of one foreman present Monday through Friday. Each week, these crews will focus on a specific Landscape Zone which they will have outlined with IRWD NTS staff during the prior week.

The SJM contract area must be staffed with a crew of an appropriate size to fulfill all requirements of the *Work Plan* (below). This crew shall include a minimum of one foreman present with the crew, Monday through Friday. Typical work hours shall be during IRWD's regular business hours of 6:00 am to 4:30 pm, Monday through Friday and with respect to local city noise ordinances, typically 7:00 am – 7:00 pm, unless other arrangements are made with IRWD NTS staff. Work outside of these hours is subject to authorization by IRWD in advance.

#### Work Plan

Contractor must fulfill all the requirements of the following Work Plan:

- A. Removal of all trash and litter within zone boundaries and outside perimeter including recording the weight of all trash. Trashcans must be emptied and liners replaced, all trash must be disposed of by Contractor.
- B. Full compliance with IRWD's Integrated Pest Management (IPM) Plan (Attachment B). In addition, the Contractor will be expected to map and identify all non-natives (some ubiquitous species may be excluded) (where applicable) and present these maps to the District each week in a coordination meeting (map must be in PDF electronic format and must also be made available to the District in geospatial data format). This mapping shall direct the work of the landscape Contractor to ensure non-native, invasive species are controlled and removed in a cost-efficient manner consistent with the IPM Plan. This effort shall be conducted by a qualified biologist.
- C. Removal of accumulated debris and sediment from all structures, including but not limited to inlet and outlet structures, sediment traps, storm drains, intake grates, and ditches.
- D. Trimming of vegetation from all trails/roads to their respective width classification, and other structures including, but not limited to: sampling sheds, pipes, irrigation boxes and heads, electrical boxes, bird boxes, signs, ditches, fences, walls, weir structures, kiosks, and benches to a minimum of two feet.
- E. Removal of all cattails (*Typha* sp.) within zone boundaries; 0% cover of cattails (*Typha* sp.) shall be maintained in all areas of SJM at all times.
- F. Clearing of vegetation from all channels once per year (during winter).
- G. Removal of accumulated dust and debris from all kiosks, signs, benches, trashcans, fences, gates, and sheds.
- H. Removal of all vegetation from Ponds D & E basin bottom, with the exception of a 10' wide bulrush buffer around Pond D once a year as directed by IRWD NTS staff.
- I. Removal of all vegetation from the islands in Ponds 1 & 2 once a year in November. This removal work will require the use of a boat to be supplied by the Contractor.
- J. Removal of all vegetation (including aquatic) from all streams to a minimum of two feet from the edge of the bank. Maintain a vertical clearance of 10' on all streams from the water level.
- K. Removal of all vegetation from Pond C, with the exception of a 6' wide coyote bush and mulefat buffer starting from the top of road.
- L. Keep all viewing areas around ponds trimmed below 2' for public viewing.
- M. For Tree Hill area, keep vegetation trimmed up to avoid any densely vegetated areas.

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- N. All work must be in accordance with IRWD's Landscape Maintenance Specifications (Attachment A) and Integrated Pest Management (IPM) Plan (Attachment B), which are attached to this document. Maintain all trees according to section 3 of the Landscape Maintenance Specifications.
- O. Fill in any cracks, potholes, or other obstructions in roads/trails as they occur with soil/gravel/DG as appropriate.
- P. Auditing of irrigation controllers on a *quarterly* basis, including testing of all irrigation stations, visual inspection of each head, master valve, and flow sensor, and submittal of an irrigation report to NTS Staff at end of each quarter. Each quarterly irrigation report should include a thorough description of necessary repairs and maintenance items that were completed as well as a confirmation of successful completion of testing of the irrigation system confirming appropriate coverage and functionality. Contractor will be expected to have the ability to complete all necessary irrigation repairs. Contractor shall use IRWD's CalSense platform for irrigation alerts and irrigation management at each zone.
- Q. Special work restrictions within the SJM between March 15 to September 15 are in place to avoid impacts to any federally listed endangered species, or other migratory birds which are known to occur in the SJM. Any vegetation removal or earthwork between March 15 and September 15 within habitat areas will require the Contractor to notify IRWD and will require a qualified biologist to ensure that applicable environmental rules are being adhered to. This qualified biologist shall have the authority to stop or otherwise divert work to avoid impacts as necessary. The Contractor shall not resume work until approval by the IRWD, the qualified biologist or designated representative is given.
- R. Reporting, Documentation, and Communication:
  - 1. Reporting of vandalism such as graffiti on same day as observation, via text or phone call.
  - 2. Submittal of fully completed weekly field form(s) (as provided by IRWD) to IRWD NTS staff before Monday at 8am. This form shall be completed in English with appropriate level of detail describing maintenance work, pictures of before and after repairs, and completion status for each zone included under this contract conducted during the previous week, including photographs (before and after) and daily reports. May be submitted as a single consolidated report for all zones covered under this contract for the reporting period. Additionally, the Contractor shall include in each report, planned activities for the upcoming week.
  - 3. By the last day of each month, provide IRWD NTS staff with an updated monthly schedule for the following month of what zones will be visited on each week, including name and contact information of English-speaking crew foreman, total number of staff, and approximate hours the crews will be at each zone. General information shall also be provided summarizing planned work activities and outstanding items to be addressed. Any changes to this schedule shall be immediately communicated to IRWD NTS staff.
  - 4. Submittal of irrigation audit report for each zone to IRWD NTS staff at end of each month.
  - 5. Attend coordination meetings with IRWD and other applicable contractors on a weekly basis (or other cadence as determined in coordination with IRWD; meetings will be generally 1 hour). Contractor shall coordinate with IRWD and identify and share any issues or concerns with the prompt and timely maintenance to address work requests by IRWD NTS staff and or biological consultant as designated by IRWD.
    - a. Prepare and submit non-native species and maintenance maps to the District each week for discussion in weekly coordination meeting (map must be in PDF electronic format and must also be made available to the District in geospatial data format).
    - b. Corrections to maintenance Work Plan deficiencies must be made within seven calendar days upon receipt of deficiency report. Completion of remediation of deficiencies must be documented and reported to IRWD NTS staff upon completion.
  - 6. Submittal of monthly invoices to <u>apinvoices@irwd.com</u> and IRWD NTS staff at end of month. All invoicing shall include at a minimum:
    - a. Contract Name
    - b. PO Number
    - c. Date of Services Performed

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- d. Location(s) Of Work Area
- e. Cost Description/Breakdowns

Generally expected tasks are summarized in the following table, however more detail is provided in the scope description above. Note that zones must be visited <u>at a minimum</u>, on a weekly basis, but also on a cadence and frequency sufficient to complete all of the following tasks

Table 1.1 - Regular Maintenance Activities at San Joaquin Marsh

Frequency	Activity
Frequency	Submit weekly field form documenting, in detail, maintenance for each zone from the
	previous week Map and identify all non-natives (with emphasis on priority target species) for each zone to
	be maintained in the following week, to be presented to IRWD Attend weekly meeting with IRWD to discuss completed work and next week's plan
	Remove all trash and litter and record the weight of trash to include in reporting. Empty
	and replace liners for all trash cans. Dispose of trash off-site.
	Remove accumulated debris/sediment from all structures (i.e. inlet/outlet, sediment traps,
	intake grates, ditches, kiosks) from zone being worked on.
	Remove non-natives (with emphasis on priority target species) and undesirable natives
	Remove algae, mosquito fem, floating vegetation to less than 100% stream surface from
	zone being worked on.
	Trim back vegetation from all trails, roads, concrete walkways, and other structures (i.e.
	pipes, irrigation boxes, irrigation heads, electrical boxes, bird boxes, signs, ditches, fences,
Weekly	weir structures, sampler enclosures) to a minimum of 2 feet
	Removal of all cattails ( <i>Typha</i> sp.) within zone boundaries; 0% cover of cattails ( <i>Typha</i> sp.)
	shall be maintained in all areas of SJM at all times.
	Reporting vandalism and graffiti to IRWD ASAP.
	Notify IRWD ASAP of any dead or dying trees, shrubs or ground cover. Prune and remove
	dead or damaged plant materials. Replace dead plants if needed in coordination with IRWD
	and with identification of root cause. Report any identified pest damage to IRWD ASAP.
	Removal of all vegetation (including aquatic) from all streams to a minimum of two feet
	from the edge of the bank. Maintain a vertical clearance of 10' on all streams from the
	water level.
	Keep all viewing areas around ponds trimmed below 2' for public viewing
	Fill in any cracks, potholes, or other obstructions in roads/trails as they occur with
	soil/gravel/DG as appropriate.
	Removal of accumulated dust and debris from all kiosk, signs, benches, trashcans, fences,
	gates, and sheds Maintain existing mulched areas and replace mulch as needed
	Removal of all vegetation from Pond C, with the exception of a 6' wide coyote bush and
	mulefat buffer starting from the top of road.
Monthly	For Tree Hill area, keep vegetation trimmed up to avoid any densely vegetated areas
	Maintain all trees according to section 3 of the Landscape Maintenance Specifications.
	Maintain all hardscape clean of debris, weeds, animal droppings, etc. Maintain all trails and
	pathways in a clean and safe condition.
	Audit irrigation, test all stations, visually inspect each head, master valve, flow sensor,
Quarterly	confirm appropriate coverage and function. Document and submit report monthly.
	Clearing of vegetation from all channels once per year (during winter)
	Removal of all vegetation from Ponds D & E basin bottom, with the exception of a 10'
Annual	wide bulrush buffer around Pond D as directed by NTS staff.
	Removal of all vegetation from the islands in Ponds 1 & 2 once a year in November
	puld be completed for each zone at the identified frequency, refer to contract for additional details.

1. All tasks should be completed for each zone at the identified frequency, refer to contract for additional details.

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- 2. From March 15 September 15, all work requires pre-survey by a qualified biologist for compliance with biological rules and regulations.
- 3. All work must be conducted in accordance with IRWD's IPM Plan (Attachment B) and Landscape Maintenance Specifications (Attachment A). Refer to contract, IPM Plan, and Landscape Maintenance Specifications for more details.

Contractor performance will be rated on the following key performance indicators (KPI):

Number	Key Result Area	Key Performance Indicator	Target
1	Maintenance	# of maintenance Work Plan deficiencies identified during	0
		regular weekly inspections (i.e. from Work Plan in Section II)	
2	Maintenance	# of irrigation alerts on CalSense controllers during regular	0
		inspections	
3	Maintenance	# of visits to one Landscape Zone per week	1
4	Accountability	Submittal of fully completed weekly field forms	Prior to 8 am
			Monday of
			following week
5	Accountability	Turn in work schedule for specific landscape zone after	Prior to 10 am
		consultation with NTS Staff	Thursday of prior
			week
6	Accountability	Submittal of irrigation audit forms	First business day
			after quarterly audit
7	Invoicing	Date of submittal of properly formatted invoices to AP	Last business day of
		invoices and NTS staff in accordance with Section II, Work	each month
		Plan Item Q	

Table 1.2 - Key Performance Indicators

#### III. SAFETY AND REGULATORY REQUIREMENTS

Safety shall be of the utmost importance at all times. The Contractor shall safeguard all District, and Contractor personnel, during the progress of the work by providing barricades, flagmen, traffic control and appropriate warning signs as required. Any equipment (such as tractors) shall be of the proper size necessary to safely accomplish the task.

Contractor equipment shall comply with all applicable federal, state, and local regulations, including but not limited to requirements for emissions, noise levels, and safety standards. It is the responsibility of the contractor to ensure that equipment is properly maintained and in compliance with these regulations throughout the term of the contract.

Contractor and all associated personnel shall be required to follow all IRWD rules, regulations and procedures as listed in the Emergency Evacuation Plans. These include but are not limited to speed limits. In the event of an emergency the Contractor and all associated personnel shall follow evacuation procedures in the Emergency Evacuation Plans. Coutractor shall be held responsible for all such training of all associated personnel.

The Contractor shall provide proof to the District's representative, that they, the Contractor have in place all safety programs that are required by the state and federal agencies. The Contractor must also prove that all associated personnel have been trained in these programs, by providing the District with training documentation. The Contractor will be required to provide to the District's representative a copy of the Safety Data Sheets for all chemicals that are brought on site. No hazardous materials will be approved for use or permitted in the building or at the job site. Work areas must be cleaned up at the end of each shift, and no storage of material or equipment will be allowed in the building. All trash and spent materials are to be disposed of off-site and in compliance with state and federal regulations. All washing and cleaning of

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Contractor equipment must be done off site. The Contractor shall protect all surfaces during refueling or other maintenance activities.

The Contractor **shall** perform all work during IRWD's regular business hours of 6:00 am to 4:30 pm, Monday through Friday and with respect to local city noise ordinances, typically 7:00 am – 7:00 pm, unless other arrangements are made with IRWD NTS staff. Work outside of these hours is subject to authorization by IRWD in advance.

#### IV. QUALITY CONTROL

All work shall be done by experienced and qualified personnel in accordance with the written request for proposal. The Contractor will be responsible for quality control of all associated employees' actions and the finished product. The District reserves the right to reject any and all work that it feels is defective and may require the Contractor to repair or replace such work, at no extra cost to the District.

#### V. <u>PROPOSAL CONTENTS</u>

The Contractor's proposal must include the following:

- 1. The following proposal components shall be included in each bid:
  - a. Scope of Work
  - b. Org Chart
  - c. Resumes/CVs for key staff
  - d. References
  - e. Proposed Schedule
  - f. Budget/Cost Proposal with breakdown of assumptions
  - g. Sub-Consultants/Partnerships (if applicable)
- 2. Cost proposal and breakdown.
  - a. This should include:
    - i. Full and complete cost per month for each year of the contract. Contractor must provide the information listed on attached bid sheet. Contractor must provide the information listed on attached bid sheet, and is also encouraged to submit supporting documentation providing an overview of assumptions of number of labor hours, equipment and materials costs, etc.
    - ii. Labor must be based on prevailing wage standard for each work task being performed. The attached "LABOR AND PREVAILING WAGE REQUIREMENTS" is incorporated in this Request for Proposal and will be incorporated in the contract.

NOTE: The prices quoted shall be fixed during the term of this contract and mid-contract price increases will not be allowed thereafter unless authorized by IRWD.

NOTE: The full contract amount will be treated as a "not to exceed" amount, and should additional sites be added to IRWD's NTS during the contract term, IRWD and the Contractor will mutually agree in writing on future costs for landscape maintenance of these sites. In such cases, IRWD may consider the authorization of a change order or similar process.

- 3. Demonstration of Contractor's technical expertise in habitat establishment and restoration, including the identification and mapping of non-native and invasive species. Particular focus should be on mapping non-native species for removal and how conformance with an existing IPM was achieved.
  - a. Provide at least three examples/projects that demonstrate this expertise. Include name of project, location, and a summary of the work completed.
  - b. Provide a list and CVs for all key staff. Include names of staff, how many years of experience they have related to habitat restoration and maintenance, and what types of similar projects they have worked on.

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- c. Contractor shall not make any changes in key staff unless authorized by IRWD. If replacement of key staff becomes necessary, Contractor shall provide a replacement with equivalent or better qualifications, subject to approval by IRWD.
- d. Assigned staff shall have adequate knowledge of habitat restoration projects, including installation and maintenance of riparian, grassland, and coastal sage scrub plant communities, as well as drought-tolerant landscaping and irrigation management and repairs. Contractor shall demonstrate that primary staff assigned to the Project shall have a minimum of 5 years of experience in native wetland and riparian type habitats as well as experience working around sensitive species such as the least bell's vireo (*Vireo bellii pusillus*).
- e. The Contractor shall demonstrate the ability to have an English-speaking/bilingual foreman overseeing crews that are assigned to the Project, and that foreman shall be on-site during the performance of all tasks, shall direct and supervise all work performed as specified herein, and shall be responsible for compliance with the contract scope and Landscape Maintenance Specifications (Attachment A). The name, phone number, and contact information of the Contractor project manager and foremen assigned to the maintenance activities described herein shall be provided to IRWD, and a backup shall be assigned in the case of any absences.
- 4. A detailed description of how the Contractor will fulfill each of the requirements of the Work Plan outlined in Section II with adherence to the attached Landscape Maintenance Specifications (Attachment A) and IPM Plan (Attachment B). This should include predicted monthly and/or seasonal work schedules, crew sizes, equipment lists, and any other information that provides a clear and specific picture of how the Contractor will approach the work. Although Contractor must perform maintenance work at each zone per the minimum maintenance frequency outlined in Table 1.1, the Contractor's Work Plan and schedule will be scored based on how well it addresses (in terms of labor allocation) seasonal variations in maintenance needs, ensuring that all tasks outlined in the scope and Table 1.1 are sufficiently completed and that all zones are upkept in good condition.
- 5. Proof of all applicable licenses required to perform the work described herein, including but not limited to an active Contractor's license and a Pest Control Qualified Applicator License issued by the State of California. The Contractor shall also provide any additional licenses necessary to ensure compliance with all applicable laws and regulations for the completion of the project.
- 6. All safety documentation required in Section 111.

Please note that IRWD may conduct interviews with each Contractor's proposed team and may contact recent clients. Following conclusion of the bidding period, IRWD will contact bidders to schedule oral interviews, which will also include a presentation component. Bidders will be expected to present a brief PowerPoint presentation outlining the contents of their bid and the qualifications of the proposed team. This presentation should not exceed 15 minutes. The presentation will be followed by a brief question and answer session. Selection of the Contractor will generally be based on the proposal contents, oral interview and presentation contents, prior experience of the firm, and specific experience and capabilities of the designated project team and staff. The Contractor nust be fully capable in all areas outlined under the scope of work. The Contractor selected must be able to begin work on June 1, 2025 and must be able to maintain the level of effort required to meet the proposed schedule.

This request does not commit IRWD to retain any Contractors or Consultants, to pay costs incurred in the preparation of proposals, or to proceed with the project. IRWD reserves the right to reject any or all proposals, to negotiate with any qualified applicant, and to appoint more than one Contractor to provide services on given portions of the project.

Proposals (including accompanying materials) will become the property of IRWD. Proposals will be held in confidence to the extent permitted by law. After award of a contract or after rejection of all proposals, the proposals will be public records, subject to disclosure under the California Public Records Act (Government Code Section 6250 et seq.). IRWD reserves the right to request additional information from prospective

Initial each page

Contractors prior to final selection and to consider information other than that submitted in the proposal or interview. IRWD may select for contract negotiations the Contractor that, in IRWD's judgment, will best meet IRWD's needs, irrespective of the comparison of fees and costs estimated by the applicants. IRWD may conduct such investigations, as IRWD deems necessary, to assist in bid evaluations, and to establish the responsibility, qualifications, and financial ability of the bidder.

#### VI. BOND REQUIREMENTS

Before the Contractor will be allowed to move any staff, material, or equipment, on to the job site and commence any work the following conditions must be met:

- Payment and Performance Bonds are required by successful bidder for "public work" projects over \$25,000, must equal to 100% of the contract amount.
- If the total lump-sum bid amount is \$100,000 or more, a bid bond at 10% of bid amount, shall be submitted in paper form in a sealed envelope titled "Bid Bond" and the project title, by bid closing date.

Delivery Address: Irvine Ranch Water District Attn: Purchasing Department 3512 Michelson Dr., Irvine, CA 92612

#### VII. PREVAILING WAGE

Pursuant to California Labor Code Sections 1725.5 and 1771.1, no contractor or subcontractor shall be qualified to bid on, be listed in a bid proposal or engage in the performance of any contract for public work unless registered with the Department of Industrial relations. It shall be mandatory upon the Contractor and all subcontractors to comply with all applicable California Labor Code provisions, which include but are not limited to prevailing wages (Labor Code Sections 1771, 1774 and 1775), employment of apprentices (Labor Code Sections 1777.5), certified payroll records (Labor Code Sections 1771.4 and 1776), hours of labor (Labor Code Sections 1813 and 1815) and debarment of contractors and subcontractors (Labor Code Section 1777.1).

#### VIII. INSURANCE REQUIREMENTS

Contractor shall always maintain the following policies of insurance with insurers possessing a policyholders' Rating of A- (or higher) and Financial Size Category of VII (or larger) in accordance with the latest edition of Best's Key Rating Guide, unless otherwise approved by IRWD. Contractor may not commence work until all required insurance documentation, including endorsements, is provided to IRWD.

#### Policy Amounts

- A. <u>Comprehensive General Liability Insurance</u>. Contractor shall maintain a comprehensive general liability insurance policy with coverage on an "occurrence" basis, including products and completed operations, property damage, bodily injury, personal injury, and, with limits no less than \$1,000,000 per occurrence, \$2,000,000 aggregate.
- B. <u>Automobile Liability Insurance</u>. Contractor shall maintain an automobile liability insurance policy covering bodily injury and property damage for all activities of the Contractor arising out of or connection with the Services, including coverage

Initial each page

for any owned, hired, and non-owned, rented, or leased vehicles, in an amount not less than \$1,000,000 combined single limit for each accident.

- C. <u>Workers' Compensation Insurance</u>. Contractor shall maintain a workers' compensation insurance policy (Statutory Limits), as required by law, and Employer's Liability Insurance (with limits not less than \$1,000,000). Contractor shall submit to IRWD, along with the certificate of insurance, a Waiver of Subrogation Endorsement in favor of IRWD, its directors, officers, employees, and agents.
- D. <u>Umbrella or Excess Policy</u>. Contractor may use umbrella or excess Policies to provide the liability limits as required in this Agreement.

<u>Additional Insured</u>. General liability, automobile liability and all other applicable policies, including excess/umbrella liability policies, shall provide, or be endorsed to provide, that IRWD, its directors, officers, employees, and agents, are additional insureds under such policies.

<u>Primary Non-Contributory</u>. For any claims related to this contract, the Contractor's insurance, including umbrella/excess coverage, must be primary and non-contributory. Any insurance or self-insurance maintained by IRWD, its directors, officers, employees, and agents will be excess of the Contractor's insurance and will not contribute to such insurance.

<u>Waiver of Subrogation</u>. All insurance coverage maintained pursuant to this Agreement must be endorsed to waive subrogation against IRWD, its directors, officers, employees, and agents, or must specifically allow Contractor to waive its right of recovery prior to a loss. This provision applies regardless of whether or not IRWD has received a waiver of subrogation endorsement from the insurer.

<u>Notice of Cancellation</u>. Contractor shall oblige its broker and insurers to provide IRWD with a 30-day notice of cancellation (except for nonpayment for which a ten-day notice is required) or nonrenewal of coverage for each required coverage. If the Contractor's insurers are unwilling to provide such notice, then Contractor shall notify IRWD immediately in the event of Contractor's failure to renew any of the required insurance coverages or insurer's cancellation or non-renewal.

<u>Requirements Not Limiting</u>. Requirements of specific coverage features or limits contained in this Section are not intended as a limitation on coverage, limits, or other requirements, or a waiver of any coverage normally provided by any insurance. If the Contractor maintains broader coverage and/or higher limits than the minimums shown above, IRWD requires and is entitled to the broader coverage and/or the higher limits maintained by the Contractor.

<u>Separation of Insureds</u>. A severability of interests provision must apply for all additional insureds ensuring that Contractor's insurance applies separately to each insured against whom claim is made or suit is brought, except with respect to the insurer's limits of liability. The policies may not contain any cross-liability exclusions.

Self-Insured Retentions. Any deductibles or self-insured retentions must be declared in writing.

<u>Timely Notice of Claims</u>. Contractor shall give IRWD prompt and timely notice of claims made, or suits instituted that arise out of or result from Contractor's performance under this Agreement, and that involve or may involve coverage under any of the required liability policies.

#### IX. COLLATERAL DAMAGE

Contractor shall be responsible for all damage to IRWD property, facilities or personnel caused by its employees, subcontractors or their equipment during the performance of the contract.

#### X. <u>PROJECT COMPLETION</u>

The project is complete when all work activity has been completed and all items on the punch list have been completed. All work must have passed inspection by the District's representative and the site must be left neat and clean. Payment may be withheld until monthly work is completed and approved by a District representative.

#### XI. AWARD OF CONTRACT

- 1. If the contract is to be awarded, it will be awarded to the Contractor who, after evaluation by the District, best meets the following criteria: 1) technical expertise, 2) approach to work, and 3) cost, as described in Section V. Bids and oral interviews/presentations will be scored on these criteria, based on a weighted scale.
- 2. If at the time that this contract is to be awarded, the total of the acceptable bid exceeds the funds then estimated by IRWD as available, then the District may reject all bids or take such other action that best serves the interest of the District.
- 3. IRWD reserves the right to reject any or all bids including, without limitation, the right to reject any other all non-conforming, non-responsive or conditional bids. IRWD reserves the right to reject the bid of any bidder if IRWD believes that it would not be in the best interest of the project to make an award to that bidder, whether because the bid is not responsive or the bidder is unqualified or of doubtful financial ability, or fails to meet any other pertinent standard or criteria established by IRWD. IRWD reserves the right to waive any irregularities; accept the whole, part of, or reject any or all responses; and select the firm which, in the sole opinion of the District, best meets the District's needs. IRWD also reserves the right to negotiate with potential Vendors so that the District's best interests are served.
- 4. IRWD may conduct such investigations, as IRWD deems necessary to assist in bid evaluations, and to establish responsibility, qualifications and financial ability of the bidder.
- 5. In the event of failure of the successful bidder to sign the Agreement, provide insurance certificates, and the required documents, IRWD may award the contract to the next responsive responsible bidder.
- 6. Contractor agrees to fully comply with and to require its subcontractors to fully comply with such Prevailing Wage Laws, to the extent such laws apply under Sections 1777.5 and 1777.6 of the Labor Code.
- 7. The Contractor selected for the award of contract must be able to begin work immediately upon award of the contract and must be able to maintain the level of staff necessary to meet the proposed schedule that was approved by the District's representative.
- 8. The contract shall commence upon execution by both parties and shall continue for a period of 3 (three) years with 2 (two) one-year renewals at the sole discretion of IRWD. Contractor performance (see Table 1.2) and cost will be the criteria used as a basis for any decision to extend the contract

#### XII. TERMINATION

This contract may be terminated by either party provided a 90-day notice is given. If Contractor consistently does not meet the KPI requirements (table 1.2) or of the *Work Plan*, the District reserves the right to terminate the contract with less than 90-day notice.

Initial each page

#### Bid Sheet - Labor Cost

#### Year One

#### Position\*

#### 1 Hour Labor Cost

Maintenance Worker	<u>\$ 52.40</u>
Lead Worker/Foreman	<u>\$</u> 52.40
Supervisor	<u>\$ 100.00</u>
Irrigation Technician	<u>\$</u> 74.17
Irrigation Specialist	<u>\$ 150.00</u>
Qualified Applicator	<sub>\$</sub> 100.00
Biological Consultant (if required)	<u>\$</u> 159.60

#### Year Two

#### Position\*

## **1 Hour Labor Cost**

Maintenance Worker	<u>\$ 53.97</u>
Lead Worker/Foreman	<u>\$ 53.97</u>
Supervisor	<u>\$ 103.00</u>
Irrigation Technician	\$ 76.40
Irrigation Specialist	<u>\$ 154.50</u>
Qualified Applicator	<u>\$</u> 103.00
Biological Consultant (if required)	<u></u> \$ 164.39

#### Year Three

#### Position\*

Maintenance Worker
Lead Worker/Foreman
Supervisor
Irrigation Technician
Irrigation Specialist
Qualified Applicator
Biological Consultant (if required)

#### **1 Hour Labor Cost**

<u>\$</u>	55.59
<u>\$</u> \$	55.59
\$	106.09
	78.69
\$	159.14
<u>\$</u> \$ \$	106.09
\$	169.32

\*Or equivalent alternate position title

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Bid Sheet						
Line #	Site/Bid Item	Site Size (ac)	Estimated Monthly Cost	Bid Amount Year 1	Bid Amount Year 2	Bid Amount Year 3
1	SJM all zones routine maintenance (weekly, monthly tasks)	276.9	\$49,933.00	\$599,195.00	\$617,171.00	\$635,686.00
2	SJM all zones quarterly irrigation audit	276.9		\$29,560.00	\$30,447.00	\$31,360.00
3	SJM annual vegetation clearing per Table 1.1	Approximately 40		\$33,564.00	\$34,571.00	\$35,608.00
4	*Weekly mapping, reporting, and meeting attendance	ана на населението на селото и с	\$8,470.00	\$101,640.00	\$104,689.00	\$107,830.00
*Provide an estimated monthly cost for these items in column 4.		Year 1 Total \$763,959.00	Year 2 Total \$786,878.00			

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#### LANDSCAPE MANAGEMENT PROPOSAL



# San Joaquin Marsh Campus Irvine Ranch Water District | 2025

**BEMUS.COM** 



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California State Contractor's License #492084:

Class A (General Engineering)

Class C-27 (Landscaping)

Class D-49 (Tree Service)



March 11, 2025

Irvine Ranch Water District Michelson Operations Center 3512 Michelson Drive Irvine CA 92612

Subject: San Joaquin Marsh Campus

We appreciate the opportunity to provide you with our proposal for the landscape maintenance and management of the San Joaquin Marsh Campus. At Bemus Landscape, Inc., we are excited about the opportunity to contribute to the long-term care of this vital environmental and educational resource. With over 50 years of experience in landscape management, we are confident in our ability to meet and exceed the expectations set forth in your Work Plan.

Founded in 1973, Bemus Landscape is a family-operated business with a strong foundation built on trust, quality, and dedication to the communities we serve. Our commitment to "Serving Clients, Growing People" is reflected in every aspect of our work, and we pride ourselves on our innovative approach to landscape maintenance. Through enhanced training, advanced technology, and a focus on sustainability, we offer cost-effective, high-quality landscape services that ensure the preservation and enhancement of our clients' properties.

In keeping with your project requirements, we are prepared to manage all aspects of the San Joaquin Marsh Campus, including:

- A dedicated team led by a foreman, available Monday through Friday.
- Comprehensive management of landscape features, including invasive species removal, vegetation trimming, debris management, and turf care.
- Monthly irrigation audits using the CalSense platform, ensuring proper irrigation management and system functionality.
- Strict adherence to your Integrated Pest Management (IPM) Plan and Landscape Maintenance Specifications, along with careful biological monitoring for sensitive habitat areas.
- Timely and accurate reporting, including weekly field forms, monthly schedules, and progress updates, all delivered in a format tailored to your requirements.

As a full-service landscape management company, we have the experience and capacity to tackle large-scale projects while maintaining the personal attention and commitment to quality that sets us apart. With our talented and well-trained team we are equipped to handle the demands of this project with the utmost care and efficiency.

We are particularly excited about the opportunity to work with IRWD, as it aligns with our dedication to sustainability and ecosystem restoration. Our efforts to incorporate environmentally conscious practices and cutting-edge technology will support the continued vitality of the San Joaquin Marsh & Wildlife Sanctuary.

Thank you for considering our proposal. We look forward to the opportunity to collaborate with IRWD on this important project.

Meqan Tejeda

Commercial Business Development Manager megan.tejeda@bemus.com (949) 769-1431



At Bemus Landscape, Inc., we pride ourselves on being at the forefront of our industry in terms of the professional qualifications and horticultural skills of our staff. Obtaining professional credentials is a requirement for many of our positions, and is strongly encouraged for all others. The Company pays all employee testing and licensing fees, as well as those related to continuing education requirements. A partial listing of credentials held by our employees is as follows:

#### **Registered Consulting Arborists: 1**

RCA's bring a comprehensive and objective viewpoint to the diagnosis, appraisal, and evaluation of arboricultural issues. This is the highest credential issued by the American Society of Consulting Arborists. Very few landscape contractors have a RCA on staff.

#### Certified Arborists: 6

CA's are experts in the care of trees. The CA credential is issued by the International Society of Arboriculture and is conferred upon those who have passed rigorous written and field tests. Most contractors do not employ more than one CA.

#### Tree Risk Assessment Qualified: 2

A standardized, systematic process for assessing tree risk and providing information to tree owners and risk managers for making informed decisions that will promote the safety of people and property and enhance tree benefits, health, and longevity.

#### Pest Control Advisors: 1

The State of California requires that all commercial pest control products be applied under the written advice of a PCA, which is the highest pest control credential that the state issues. Most landscape contractors do not have one on staff, and either hire the services of a consulting PCA or are simply not in compliance with the law. PCA credentials require years of study and practical experience, and PCA's are the utmost authorities in the safe, horticulturally sound, and environmentally sensitive use of pest control products and non-pesticide alternatives.

#### **Qualified Applicator Licenses: 22**

A QAL is the license issued by the State of California that allows a person to supervise the safe and responsible application of pest control products. The QA works under the direction of the PCA. Very few landscape contractors have more than one or two QA's on staff.

#### **Certified Landscape Irrigation Auditors: 3**

The CLIA is certified by the Irrigation Association, the nation's largest irrigation industry trade organization. CLIA's possess the training and skills necessary to analyze and audit the use of irrigation water, as well as recommend and implement solutions to minimize the use of water in a cost effective and horticulturally sound manner.

#### Landscape Designers: 1

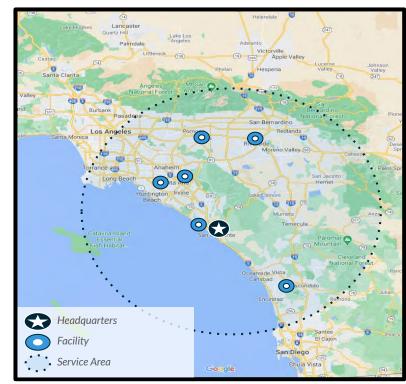
Our Landscape Designer specializes in aesthetically attractive and horticulturally sound designs rendered via the use of state of the art imaging software. Her technology skills are backed up by her plant knowledge.

#### Other

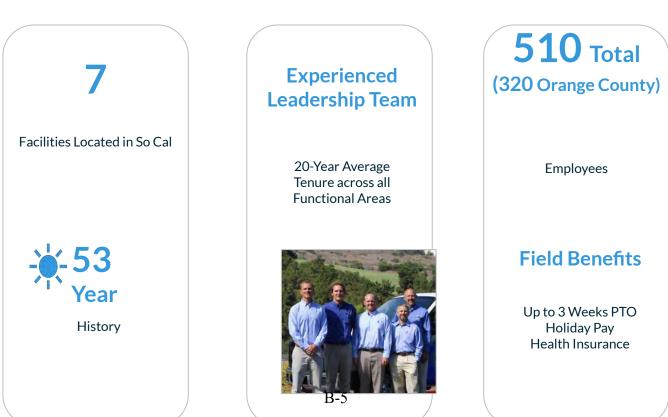
We have numerous other staff members who are certified by major irrigation equipment manufacturers and water districts in the proper implementation and management of satellite controller systems, smart times, reclaimed water management, and a variety of other disciplines.



# **Customer Portfolio and History**



Facilities & Service Area











# Corin Bemus, CEO

Corin Bemus is the CEO of Bemus Landscape, a family-operated company that has been a leader in Southern California's landscape industry since 1973. Under Corin's leadership, Bemus Landscape has grown into one of the region's top landscape firms, known for its innovation, sustainability, and commitment to quality. Corin is dedicated to fostering a culture of trust, employee growth, and exceptional service. He focuses on sustainable landscaping solutions that not only enhance landscapes but also contribute to environmental restoration. His leadership is guided by the company's purpose of "Serving Clients, Growing People," ensuring Bemus Landscape continues to set the standard for excellence in the industry.



# Spencer Bemus, Vice President - Tree Care

With 25 years of experience in the tree care industry, Spencer Bemus is a seasoned professional dedicated to enhancing the health and safety of urban forests. He holds certifications as an ISA Certified Arborist (#WE-9348A), ISA Tree Risk Assessment Qualified, and a Qualified Applicator License (#117807). Spencer has played an instrumental role in a riparian project in Encinitas for the past 10 years at Scott's Valley HOA. Additionally, he is a certified wildlife protector, further demonstrating his commitment to environmental conservation.



# Miles Coffin, Regional Operations Manager

With 12 years of experience in the landscape industry, Miles Coffin has spent the past 2 years working on the Scott's Valley Riparian project. As the Regional Operations Manager, he oversees day-to-day operations, ensuring efficient project execution, managing teams, and maintaining high-quality service standards. Miles is responsible for coordinating resources, managing budgets, and implementing best practices to ensure the success of landscape maintenance and restoration efforts. He holds a OWEL certification (MWDOC-1043) and a Qualified Applicator License (QAL #139436).





# Sergio Bortolamedi, Vice President of Sales

With over 15 years of experience in the commercial landscape industry, sustainability and high-level customer service have been Sergio's passion and driving force behind the success of Bemus Landscape. As Vice President of Sales for the past decade, he has played a strong role in sales while having a deep understanding of landscape maintenance operations. Sergio and his sales team have been instrumental in developing innovative solutions that prioritize sustainability and environmentally-conscious practices. His commitment to operational efficiency and client relationships has positioned Bemus Landscape as a key player in the industry.



# Megan Tejeda, Sr. Commercial Business Developer

With 25 years in the landscape industry, Megan Tejeda has a strong focus on driving growth and expanding customer bases. As Commercial Business Development Manager at Bemus Landscape for the past 3 years, she develops strategies to increase revenue, expand market presence, and build lasting business relationships. Previously, as an Account Manager, Megan played a key role in client relations, ensuring high-quality service and achieving sales and contract renewal goals.



# Jaime Cerda, Branch Manager

With 39 years of experience in landscape maintenance, Jaime Cerda has spent 24 years contributing his expertise to Bemus Landscape. He is an ISA Certified Arborist (#WE-8914A) and holds a Qualified Applicator License (#97571). Throughout his career, Jaime has built a strong foundation in the landscape industry, ensuring high standards of quality and service.



## Sual Alcaraz, Account Manager

With 5 years of experience in the landscape industry and 3 years with Bemus Landscape, Saul Alcaraz is an Account Manager committed to providing highquality service and building strong client relationships. In his role, he is responsible for managing client accounts, developing and implementing landscape management plans, overseeing service delivery, and ensuring client satisfaction. Saul works closely with internal teams to monitor project progress and provide regular updates to clients, all while maintaining a focus on organization and efficient time management. His ability to build relationships, combined with his knowledge of landscape management, makes him a valuable asset to the Bemus team. Although he has not yet worked directly on habitat restoration projects, his background in the landscape industry allows him to contribute to a range of service areas.



# **BLAKE SELNA**

PRINCIPAL / BIOLOGIST

# LSA



#### EXPERTISE

- Biological Assessments
- Jurisdictional Delineations
- Regulatory Permitting
- Mitigation Planning,
- Monitoring, and Reporting
- Construction Monitoring
- Arborist Reports
- Habitat Restoration Plan Design and Implementation

#### EDUCATION

B.S., Environmental and Resource Sciences, University of California, Davis, March 2000

#### PROFESSIONAL EXPERIENCE

Principal, LSA, Irvine, California, 2000–Present

#### PROFESSIONAL CERTIFICATIONS/ REGISTRATIONS

Certified Arborist No. WE-7397A, International Society of Arboriculture

ISA Tree Risk Assessment Qualification, International Society of Arboriculture

Certified Wetland Delineator, Wetland Training Institute

#### PROFESSIONAL RESPONSIBILITIES

Working for LSA since 2000, Mr. Selna has gained extensive experience as a biologist and arborist. His expertise includes biological assessments, jurisdictional delineations, mitigation compliance, and regulatory permitting, as well as the design and implementation of habitat restoration and mitigation plans. Mr. Selna manages the Biology/Natural Resources Group in LSA's Irvine. office, which is the hub of this discipline in Southern California. As a result, he has provided Principal oversight and management for projects of all shapes and sizes, covering the full range of species and habitats in Orange, Los Angeles, San Bernardino, Riverside, San Diego, and Imperial Counties. With his background as a field biologist, he has developed all of the relevant technical skills in wetland/waters delineation, regulatory permitting, habitat mapping, vegetation classification, wildlife surveys, focused and floristic-level plant surveys, wildlife monitoring, arborist evaluations, plant and tree salvage/transplantation plans, and construction monitoring, making him uniquely qualified to provide supervision, strategic analysis, and project advisories for technical teams created for each individual client's and project's needs. In addition to his technical skills, Mr. Selna has outstanding personnel, project, and contract management abilities.

#### PROJECT EXPERIENCE

Mr. Selna has managed many aspects of Southern California environmental consultation, including biological resource analysis, preconstruction surveys and vegetation removal, large- and small-scale regulatory permitting efforts, habitat restoration, and mitigation of biological impacts. He is extremely familiar with surveying and restoring Southern California native habitats, including coast live oak woodland, coastal sage scrub, chaparral, needlegrass grassland, coastal grasslands and forblands, elderberry woodland, riparian woodland and scrub types, high desert riparian/alluvial scrub, Joshua tree and juniper woodland, desert scrub, seasonal ponds, and freshwater emergent marsh. Mr. Selna has designed and managed the implementation of more than 400 acres of restoration and mitigation of the aforementioned types, including more than 200 acres associated with landfill operations (more than 50 acres on-cap). Other notable mitigation projects include Joshua tree (Yucca brevifolia) translocation, endangered species translocation, wetland mitigation, and water quality protection features, including low-flow diversion and natural treatment of nuisance runoff.

Mr. Selna is very familiar with the County of Orange Central/Coastal Subregion NCCP/HCP, the Southern Subregion Habitat Conservation Plan, and the San Diego Creek and San Juan/Western San Mateo Creek Special Area Management Plans (SAMP), as well as the Orange County Transportation Authority Measure M2 NCCP/HCP/Environmental Mitigation Program. In

addition, he has worked within the regulatory frameworks of Los Angeles, San Diego, Riverside, and San Bernardino Counties.

As an International Society of Arboriculture Certified Arborist, Mr. Selna has prepared tree reports for projects in Newport Beach, Huntington Beach, Laguna Beach, Long Beach, Anaheim, Irvine, Santa Ana, Marina del Rey, San Juan Capistrano, Murrieta, Chino, Corona, Calabasas, Los Angeles, West Covina, Santa Clarita, Palmdale, unincorporated Los Angeles County, and the Angeles National Forest.



# PRINCIPAL / BIOLOGIST



#### RELEVANT PROJECT EXPERIENCE

Mr. Selna has prepared and/or provided Principal review and oversight for the preparation of hundreds of biological resources analyses, with levels of complexity ranging from due diligence and constraints analyses to full-scale EIRs. As a Principal of LSA's Natural Resources group, Mr. Selna supervises the preparation of technical reports in support of Categorical Exemptions, IS/MNDs, and EIR sections. In addition, LSA is adept at preparing Caltrans Natural Environment Studies, Biological Assessments for USFWS consultation, jurisdictional delineations, regulatory permitting documentation, and habitat restoration plans. Mr. Selna has extensive experience with navigating the regulatory permitting process on behalf of clients of all types and sizes. The following projects provide a range of experience relevant to the IRWD NTS program. Additional projects, contact information, and reports available upon request.

#### Irvine Ranch Water District, San Joaquin Marsh Restoration Project – The Duck Ponds Irvine, California

Although much time has elapsed, Mr. Selna retains extensive familiarity with the San Joaquin Marsh 'Duck Ponds.' LSA assisted The Irvine Company and Irvine Ranch Water District with the regulatory permitting and habitat restoration/creation design for the project. Shortly after his hiring in 2000, Mr. Selna counted the thousands of container plants around the Duck Ponds as part of the survivorship counts and was the primary data collector and habitat restoration monitor during the initial installation and establishment years of the project. LSA collected data annually until the site received acceptance from the United States Army Corps of Engineers.

#### Irvine Ranch Water District, Carlson Marsh Regrade Project Irvine, California

Mr. Selna assisted the Irvine Ranch Water District with the acquisition of the regulatory permits necessary for the Carlson Marsh Regrade Project, in which the water circulation in the degraded marsh was restored and exotic plant species were eradicated. He coordinated a construction monitoring regimen for vegetation removal and excavation of pilot channels and a Habitat Mitigation and Monitoring Plan for the restoration of freshwater marsh and brackish marsh habitat impacted by the project. Mr. Selna worked closely with the grading contractor to create topography and habitat conditions conducive to the restoration of willow forest, mulefat scrub, herbaceous riparian marsh, and halophytic (saline) marsh habitats, based on specific site conditions throughout the 60-acre Carlson Marsh portion of the greater San Joaquin Marsh. The circulation project and 7.62-acre restoration component were resounding successes and Mr. Selna received resource agency approval documenting that the site met all required performance standards.

#### City of Aliso Viejo, Dairy Fork Wetland Aliso Viejo, California

LSA assisted the City of Aliso Viejo with permitting for the creation of water quality basins along Dairy Fork Creek. LSA conducted a jurisdictional survey and general field assessment of the project area, prepared a Jurisdictional Delineation report, and prepared and submitted the associated permit applications to the resource agencies for approval. LSA also assisted with the CEQA exemption filed for this project. Following the successful permitting process, LSA provided construction monitoring and post-construction monitoring.

#### OC Flood, Santa Ana-Delhi Channel Improvement Newport Beach, California

As Principal in Charge/Project Manager, Mr. Selna is currently leading LSA's collaboration with OC Flood and its engineering consultants to rehabilitate the Santa Ana-Delhi Channel as it empties into Upper Newport Bay. The County has committed to the mitigation of historical impacts to the San Diego Creek Watershed and based on a previously prepared Environmental Impact Report (EIR), LSA prepared CEQA and technical studies addressing biological, transportation, air quality, noise, and cultural resource impacts. The project would improve the flood handling capabilities of the channel, as well as create over 6.5 acres of coastal salt marsh, freshwater/brackish marsh, riparian scrub, and coastal sage scrub habitats. This involves the creation of habitat for several special-status plant and animal species, as well as restoration of coastal wetland habitat complexes.



# ERIC KRIEG ASSOCIATE / BIOLOGIST

# LSA



#### EXPERTISE

- Revegetation/Restoration
- Biological Assessments
- Construction Monitoring
- Flora and Fauna Surveys
- Mitigation Planning, Design, and Monitoring

#### EDUCATION

M.S., Biology (Ecology and Conservation), Illinois State University, Normal, Illinois, 1996

B.S., Biology, Frostburg State University, Frostburg, Maryland, 1993

# PROFESSIONAL

Associate, LSA, Irvine, California, December 1997– Present

Environmental Laboratory Technician, Crosby Laboratories, Inc., Placentia, California, September– November 1997

Naturalist, Tucker Wildlife Sanctuary, Modjeska Canyon, California, May–September 1997

#### PERMITS AND AUTHORIZATIONS

USFWS Permit No. TE-777965, Authority to survey for the threatened coastal California gnatcatcher

CDFW Scientific Collecting Permit No. SC-213020003

# PROFESSIONAL RESPONSIBILITIES

Eric Krieg's duties consist of habitat restoration and biological resource monitoring during project implementation and long-term monitoring. He has experience preparing restoration plans and overseeing all aspects of a plan's implementation, from custom seed collection and native plant propagation through installation, maintenance, and monitoring procedures. Mr. Krieg has been involved in restoring coastal sage scrub, native grassland, oak woodland, riparian, and wetland habitats for mitigation projects.

Mr. Krieg prepared final reports for agency approval (USACE, CDFW, California Coastal Commission, USFWS, and RWQCB). Mr. Krieg has performed numerous focused surveys for sensitive species, including the desert tortoise (Gapherus agassizii), cactus wren (Campylorhynchus brunneicapillus), burrowing owl (Athene cunicularia), coastal California gnatcatcher (Polioptila californica californica), and intermediate mariposa lily. He has permits to perform protocol presence/absence surveys of coastal California gnatcatchers.

Mr. Krieg has a substantial background in biological construction monitoring. This monitoring includes overseeing clearing and grubbing, and impact limits, as well as compliance with resource agencies permit conditions and State and federal environmental requirements. Mr. Krieg has monitored and served as Project Manager for large road construction projects, creek realignment projects, utility projects, large residential developments, and smaller infill development projects.

Mr. Krieg has gained a wide range of experience working with utility companies on a variety of projects. For 10 years, Mr. Krieg had on-call contracts with Southern California Edison (SCE) and assisted with deteriorated pole assessments, permitting, preconstruction surveys, construction monitoring, restoration, and other types of projects. As Project Manager for these undertakings, Mr. Krieg has worked on more than 2,000 projects with SCE.

Mr. Krieg has worked on many projects for Caltrans and was Task Manager for most of them. Currently, Mr. Krieg is the Project Manager of a large multi-year contract for Caltrans District 12, which he is managing the associated subs and LSA biologists working on all the task orders.

# PROJECT EXPERIENCE

#### SOLID WASTE/RECYCLING

#### Geosyntec, Alpha Olinda Landfill, 10(a) Permit Orange County, California

Mr. Krieg served as Project Manager for the Habitat Conservation Plan (HCP) and 10(a) Permit at Alpha Olinda Landfill. LSA worked with Geosyntec under its contract. Gnatcatcher surveys were performed in the proposed impact areas within coastal sage scrub. The 10(a) Permit application and HCP were prepared and sent to USFWS for approval and authorization. Mr. Krieg coordinated with OC Waste & Recycling to get the approved 10(a) Permit and get authorization to start the projects. B-11



#### ERIC KRIEG ASSOCIATE / BIOLOGIST



#### SPECIALIZED TRAINING

Wetland Delineation Training Class, Wetland Training Institute, Inc., November 2014

Construction Safety Orientation, Caltrans Division of Construction, January 2003

Desert Tortoise Council 8th Annual Surveying, Monitoring, and Handling Techniques, October 23–24, 1999

#### OC Waste & Recycling, South Region Landfills Orange County, California

Mr. Krieg has assisted with several tasks for the past 9 consecutive years of on-call biological services contracts for OC Waste & Recycling's South Region Landfills, primarily at Prima Deshecha Landfill. He assisted with conducting a jurisdictional delineation, special-status plant species, and coastal California gnatcatcher (*Polioptila colifornica californica*) surveys.

#### OC Waste & Recycling, Gothard Landfill, Gnatcatcher Surveys Orange County, California

Mr. Krieg performed protocol gnatcatcher surveys on the closed Gothard Landfill. Mr. Krieg coordinated with OC Waste & Recycling for the surveys and project coordination with USFWS and CDFW. Mr. Krieg served as task manager for the surveys.

#### TRANSPORTATION

#### Caltrans District 12, Laguna Canyon Road (SR-133) Widening and Drainage Improvement Project Orange County, California

Mr. Krieg served as Biological Task Manager for the Laguna Canyon Road (SR-133) Widening and Drainage Improvement Project. This project proposes several improvements along Laguna Canyon Road from the SR-73 Toll Road to just south of El Toro Road. This project included conducting protocol surveys (coastal California gnatcatcher [*Polioptila californica californica*], least Bell's vireo [*Vireo bellii pusillus*], southwestern willow flycatcher [*Empidonax traillii extimus*], and Pacific pocket mouse [*Perognathus longimembris pacificus*]), surveys for special-status plant and animal species, habitat assessment, a Jurisdictional Delineation and report, and preparation of a Natural Environmental Study and Biological Assessment. Throughout the project, coordination with Caltrans biologist occurred in order to keep them up to date on the fieldwork and survey results.

#### Orange County Transportation Authority, I-5 (Avenida Pico to County Line) San Clemente, California

Mr. Krieg performed protocol gnatcatcher surveys along I-5 from Avenida Pico to the San Diego County line. The surveys were conducted within suitable scrub habitat within the proposed impact limits and a 500-foot buffer. Mr. Krieg coordinated with USFWS and CDFW for the surveys.

#### Caltrans District 12, On-Call Environmental Services Orange County, California

Mr. Krieg has been the Task Manager for several task orders, which involved the review and oversight for the preparation of a Caltrans Natural Environment Study, Jurisdictional Delineation, and Biological Assessment for a proposed highway safety improvement project from 2017 through 2019. Specific tasks included conducting multiple focused botanical surveys, general habitat suitability assessment surveys, vegetation and sensitive plant species mapping, and an oak tree impact evaluation. Mr. Krieg also managed and conducted the monitoring for slope stabilization projects along SR-241. As part of this work, he conducted focused surveys for costal California gnatcatchers (*Polioptila californica californica*) and prepared a construction monitoring report for USFWS.

#### Caltrans District 12, SR-57 and Lambert Interchange Brea, California

Mr. Krieg is serving as Biological Task Manager for the construction monitoring for the SR-57 and Lambert interchange Project. The project includes widening SR-57 and improvements to Lambert to improve the overall interchange. The project includes a Contractor Education Program, preconstruction nesting bird surveys, the



# ERIC KRIEG ASSOCIATE / BIOLOGIST



monitoring of environmentally sensitive area(s) and safety fence installation, coastal California gnatcatcher (Polioptila californica californica) surveys, weekly construction monitoring, and report preparation. Mr. Krieg is performing these tasks himself as the biological monitor, and he was required to have gnatcatcher experience and be approved by USFWS. Mr. Krieg coordinated with both the Caltrans biologist and the Resident Engineer for schedule and project updates.

#### Caltrans District 12, SR-241 Slope Stabilization and Drainage Improvement Project Orange County, California

Mr. Krieg served as the Biological Task Manager for the construction monitoring for the SR-241 Slope Stabilization and Drainage Improvement Project. The project included six locations along SR-241 that required some slope repairs to alleviate storm water problems along the road. The project included a Contractor Education Program, preconstruction nesting bird surveys, the monitoring of environmentally sensitive area(s) and silt fence installation, coastal California gnatcatcher (*Polioptila californica californica*) focused surveys, weekly construction monitoring, and report preparation. Mr. Krieg was either overseeing these tasks or performing them himself as the biological monitor, and he was required to have gnatcatcher experience and be approved by USFWS. Mr. Krieg coordinated with both the Caltrans biologist and the construction manager for schedule and project updates. All work was completed per the designated permits.

#### Caltrans District 12, SR-241 Storm Water Mitigation Project Orange County, California

Mr. Krieg served as Biological Task Manager for construction monitoring of the Storm Water Mitigation Project. The project included five locations along SR-241 that required slope repairs to alleviate storm water problems along the road. Mr. Krieg oversaw and performed four sets of three coastal California gnatcatcher (*Polioptila californica californica*) surveys required before the start of construction at each site. Preconstruction nesting bird surveys were also performed during the gnatcatcher surveys. Monitoring for the removal of vegetation was also performed at each location. Mr. Krieg coordinated with the Caltrans biologist and the construction manager for schedule updates and project updates. All work was completed per the designated permits.

#### UTILITIES

#### Irvine Ranch Water District, IPM Plan Implementation Monitoring and Reporting Irvine, California

Mr. Krieg served as Project Manager for the Irvine Ranch Water District (IRWD) Integrated Pest Management (IPM) Plan Implementation Monitoring and Reporting Project. The project included IRWD's 34 natural treatment system facilities and the 300-acre San Joaquin Marsh. The IPM Plan aimed to treat pests within these facilities, while minimizing impacts on human health and the environment. Under this contract, LSA had been in charge of organizing an innovative approach to managing invasive plant maintenance activities that focused on nonchemical treatment methods. LSA biologists were responsible for routine site visits to map locations of invasive plant pest outbreaks, as well as determining effective treatment methods. In doing so, LSA had developed an interactive data viewer that allows relevant parties to access real-time data, thus streamlining communication between LSA, IRWD, and IRWD's landscape contractor.

#### SCE, On-Call Projects Southern California

Mr. Krieg was the Project Manager for SCE's on-call contract with LSA. The work included Biological Assessments, sensitive species surveys, deteriorated pole assessments, preconstruction surveys, construction monitoring, postconstruction surveys, and permitting. Most of the work was in Southern California, but some projects extend to the limits of SCE's coverage area. This project had multiple subcontractors with whom Mr. Krieg coordinated and managed the multiple project duties.



JESSICA LIEUW

BIOLOGIST





#### EXPERTISE

- Biological Assessments
- Vegetation Mapping
- Wildlife Surveys
- Jurisdictional Delineations
- Bat Surveys

#### EDUCATION

B.A., Environmental Science, Minor in Urban and Regional Planning, University of California, Irvine, California, 2017

#### PROFESSIONAL EXPERIENCE

Biologist, LSA, Irvine, California, 2019–Present

Wetlands Specialist, Irvine Ranch Water District, Irvine, California, 2018–2019

Natural Resource Intern, Irvine Ranch Water District, Irvine, California, 2017–2018

# SPECIALIZED

Southwestern Desert Bats Class, Maturango Museum, 2022

California Rapid Assessment Method (CRAM), California Wetland Monitoring Workgroup, 2021

Wetland Delineation Training Course, Wetland Training Institute, Inc., 2019

Desktop GIS Continuing Education Course, Pace University, 2018

#### **PROFESSIONAL RESPONSIBILITIES**

As a Biologist with LSA, Ms. Lieuw conducts biological surveys and monitoring throughout Southern California for a variety of projects, including preconstruction nesting bird surveys, habitat restoration monitoring, and bat habitat assessments, emergence surveys, and exclusions. She also has experience with biological assessments and jurisdictional delineations and has extensive experience working with native and nonnative wetland species in Southern California. She has also performed aquatic invertebrate/vertebrate surveys, sediment sampling, and water quality monitoring.

#### PROJECT EXPERIENCE

#### Irvine Ranch Water District, Integrated Pest Management Plan Implementation

#### Irvine, California

Ms. Lieuw conducted site visits to over 30 natural treatment system facilities and the San Joaquin Marsh to map locations of invasive plant pests and determine effective treatment strategies. She also helped develop an interactive data viewer to display data and streamline communication and authored annual reports discussing treatment.

#### Geosyntec, Santa-Ana Delhi Channel Improvement Project Newport Beach, California

Ms. Lieuw conducted and authored reports for a jurisdictional delineation, an assessment of wetland/stream function using the California Rapid Assessment Method, and a bat habitat assessment for the Santa-Ana Delhi Channel Improvement Project, in an area containing native habitat types including freshwater marsh, salt marsh, and coastal sage scrub.

#### Aliso Viejo Community Association, Kathryn Thompson Mitigation Area Aliso Viejo, California

Ms. Lieuw provided biological consultation for fire fuel modification activities and vector control activities in the Kathryn Thompson Mitigation Area. Planned activities required the preparation of a Section 1602 Streambed Alteration Notification for the CDFW. Following the successful receipt of an agreement, Ms. Lieuw conducted nesting bird surveys and vegetation removal monitoring within the work area.

#### Irvine Ranch Outdoor Education Center, Restoration Monitoring Orange County, California

Ms. Lieuw conducted a qualitative performance monitoring survey within multiple compensatory coastal sage scrub restoration areas on the 210-acre Irvine Ranch Outdoor Education Center. She also monitored vegetation removal to comply with fuel modification requirements.

#### Caltrans District 12, SR-74 Plant Establishment Project Orange County, California

Ms. Lieuw conducted an assessment of stream function using the California Rapid Assessment Method and assisted in conducting a benthic macroinvertebrate survey within the San Juan Creek. She prepared technical reports documenting the findings from the surveys, which included assessing



# JESSICA LIEUW

BIOLOGIST



the benthic macroinvertebrate community assemblage as a bioindicator for water quality.

#### Caltrans District 12, SR-1 Bicycle and Safety Improvement Project Orange County, California

Ms. Lieuw conducted a jurisdictional delineation, general biological survey, and rare plant surveys for the SR-1 Bicycle and Safety Improvement Project located adjacent to coastal marsh and dune habitat. Rare plant species identified included coast woolly heads (*Nemacaulis denudata*), red sand verbena (*Abronia maritima*), spiny rush (*Juncus acutus*), and estuary seablite (*Suaeda esteroa*).

#### Caltrans District 12, SR-74 Safety Improvement Project Arroyo Toad Surveys and Invasive Predator Removal

#### Orange County, California

Ms. Lieuw conducted invasive predator removal of the American bullfrog (*Lithobates catesbeianus*) and red swamp crayfish (Procambarus clarkii) within San Juan Creek as part of a mitigation requirement for impacts to designated arroyo toad (*Bufo californicus*) critical habitat. American bullfrogs were removed using gigs or dip nets and humanely killed—adult American bullfrogs were dissected and examined for reproductive status and stomach contents. Incidental occurrences of arroyo toads were also recorded.

#### HNTB, Yorba Linda Boulevard Widening Project Yorba Linda, California

Ms. Lieuw conducted species inventory surveys, a bat habitat assessment, focused bat surveys, vegetation mapping, and a jurisdictional/wetland delineation for the proposed widening of a bridge over the environmentally sensitive Santa Ana River. She also prepared the technical report assessing potential impacts to sensitive biological resources and including measures to avoid or mitigate for impacts to several special-status species, wetlands, and critical habitat with regard to CEQA.

#### Monterey Park Retail Partners LLC, Mitigation Area Restoration Monitoring Monterey Park, California

Ms. Lieuw conducted a qualitative assessment of the coastal sage scrub restoration sites within Puente Hills Habitat Preservation Authority lands during the 120-day establishment period. She also performed a survivorship count of installed container plants following the 120-day establishment period to ensure that the site was meeting performance standards.

#### Irvine Ranch Water District, Natural Resource Monitoring and Assessment Irvine, California

Ms. Lieuw monitored the flora and fauna of 36 urban runoff treatment wetlands through identification of native and nonnative plants, birds, invertebrates, and other biota. She assessed water quality at the influent and effluent of each wetland using YSI EXO sondes, as well as taking grab and composite water samples. She operated all-terrain vehicles, four wheel drive vehicles, amphibious vehicles, and tractors on rough terrain. Ms. Lieuw also headed the study of macroinvertebrates within treatment wetlands as a proxy for evaluating water and habitat quality. She planned and executed field sampling; processed samples in the laboratory; conducted statistical analysis; and prepared reports, presentations, and posters.

#### OC Waste & Recycling, Trabuco Creek Mitigation Area Ordinary High Water Mark Delineation Orange County, California

Ms. Lieuw conducted an ordinary high water mark delineation prior to removal of invasive giant reed (Arundo donax) along Trabuco Creek. The mitigation area is part of a comprehensive mitigation package including giant reed removal, wetland creation, ephemeral drainage creation, and associated habitat restoration for Prima Deshecha Landfill.



# Bemus Landscape Inc. Safety Training Program Overview

At **Bemus Landscape Inc.**, safety, respect, and accountability define the way we work. Our comprehensive **Safety Training Program** is designed to prevent injuries, reduce risks, and foster a culture of safety and professionalism across all roles—field, management, and office.

Every team member is expected to actively participate in and uphold our safety standards, which are rooted in regulatory compliance and continuous improvement.

# 1. Injury and Illness Prevention Program (IIPPP)

This program outlines our company's system for identifying, reporting, and correcting unsafe conditions and practices, in alignment with OSHA requirements. It ensures each employee understands their role in maintaining a safe and healthy work environment.

# 2. Heat Illness Prevention Program (HIPP)

Our HIPP provides essential training on recognizing heat-related symptoms, implementing rest and hydration strategies, and understanding emergency protocols for outdoor work during hot conditions.

# 3. Code of Safe Practices

All employees are trained in our Code of Safe Practices, which includes specific expectations for personal behavior, equipment use, and hazard awareness on and off the job site.

#### 4. Hazard Communication Program (HAZCOM)

We train employees on how to safely handle and understand hazardous substances, including reading labels and Safety Data Sheets (SDS), in full compliance with OSHA's HAZCOM standard.

#### 5. Equipment-Specific Training

Before operating any equipment, employees receive hands-on training and must demonstrate safe and proper use. Training includes:

- Weed Wackers
- Stick Edgers
- Edge Trimmers
- Blowers
- Push Mowers (21")
- Ride-On Mowers (36", 48", 52")
- Skid Steers

This approach ensures that accountability is balanced with opportunities to learn an

# 6. Pesticide Management Training

Applicable employees are trained in pesticide and herbicide safety in accordance with OSHA and the Department of Agriculture. This includes handling, application, emergency response, and storage practices. 16



# 7. Defensive Driving Program

Drivers receive formal training on safe driving habits, hazard awareness, and vehicle control. This program is reinforced with retraining following any at-fault incidents.

# 8. Flex & Stretch Program (Daily)

Before the start of each workday and **prior to dispatch**, all field employees participate in our Flex & Stretch routine. These daily warm-ups help prevent soft tissue injuries by preparing the body for physical work.

# 9. Daily Gate Check Inspections

Each morning, we conduct **daily gate check inspections** to ensure vehicles, trailers, and equipment are in safe working condition before being dispatched to job sites.

#### 10. Near Miss Reporting

All employees are required to report near misses, regardless of severity. This proactive approach allows us to address hazards before they result in incidents.

#### 11. Weekly Tailgate Safety Meetings

We conduct **52 tailgate meetings each year**, with **a different safety topic covered each week**. These discussions are designed to raise awareness and proactively address seasonal, task-specific, or trending hazards.

#### **12. Workplace Violence Prevention**

Employees are trained to recognize and report any signs of violence or aggressive behavior. Our zero-tolerance policy ensures a safe and respectful workplace for all.

#### **13. Sexual Harassment Prevention Training**

All field employees, account managers, branch managers, and office staff receive mandatory training on preventing sexual harassment. We are committed to fostering a culture of respect and inclusion across the organization.

# 14. Disciplinary Action & Retraining Protocol

Our program includes a **fair and structured disciplinary process** for addressing safety violations and near misses:

- Verbal Warning
- Written Warning & Mandatory Retraining
- Suspension
- Termination (if necessary based on severity or repeated violations)

This approach ensures that accountability is balanced with opportunities to learn an



# Weekly Tasks:

- **Maintenance Reporting:** Submit a detailed weekly field form to IRWD, documenting all maintenance activities performed.
- Turf Care: Mow the turf grass at least once a week.
- **Meetings:** Attend weekly coordination meetings with IRWD to discuss work progress and upcoming tasks.
- **Trash & Litter Removal:** Remove all trash and litter, recording the weight of the trash; empty and replace trash can liners.
- **Debris Removal:** Clear accumulated debris/sediment from various structures, including sediment traps, intake grates, and light fixtures.
- **Vegetation Management:** Remove non-native plant species (prioritize target species) and undesirable native plants. Trim vegetation around structures (e.g., trails, buildings, irrigation systems) to maintain a 2-foot clearance.
- Hardscape and Pathway Maintenance: Keep all hardscapes clean of debris, weeds, and animal droppings, ensuring pathways and roads remain safe and clear.
- **Damage & Vandalism Reporting:** Report vandalism, graffiti, and any damaged or dead plants to IRWD immediately.
- **Infrastructure Maintenance:** Fill in cracks or potholes in roads/trails, and remove dust and debris from kiosks, benches, signs, light fixtures, and sheds.

# Monthly Tasks:

- Mulch Replacement: Maintain and replenish mulch in all mulched areas as needed.
- **Irrigation Audits:** Test all irrigation stations, inspect heads, valves, and sensors, and submit an irrigation report confirming coverage and function.
- **Tree & Plant Care:** Maintain trees according to IRWD's specifications, including pruning and replacing any dead or damaged plants in coordination with IRWD.

# Additional Requirements:

- **Biological Compliance:** For work conducted between March 15 and September 15, schedule a pre-survey with a qualified biologist to ensure compliance with biological regulations.
- Integrated Pest Management (IPM): All tasks will align with IRWD's IPM Plan and Landscape Maintenance Specifications.
- **Timely Reporting:** Weekly field forms must be submitted to IRWD by 8 AM on Monday. Irrigation audit forms must be submitted by the last day of each month.



Bemus Landscape has teamed up with LSA to effectively manage the sites per the RFP. Our plan is to utilize a blend of experience, expertise, landscape best practices, and technology to effectively each of the sites.

Work Plan

Below is our detailed description of how we will fulfill each of the requirements of the Work Plan outlined in Section II:

A. Removal of Trash - Bemus Landscape will ensure consistent trash removal within site boundaries, including emptying trash cans, cleaning trash screens, and reporting the weight of trash removed monthly. Our team will dispose of all debris responsibly, adhering to the highest standards of environmental compliance.

B. Full Complinace of IPM Plan - Bemus Landscape will partner with LSA to ensure that site tasks are clearly identified by a qualifited biologist prior to work taking place. (SEE SAMPLE MAP). The biologist will visit each site the week prior to maintenance crew, and will provide a map with non-natives for removal (with recommended method, i.e.; hand removal vs herbicide spot treatment), nest activity, irrigation items, other items of note, to ensure IPM plan is followed with each visit. Before/After photos will be provided weekly, showing the work that was completed.

C. Removal of accumulared debris - We will review all structures at a minimum of one time per month, and daily during rain events. We understand the importance of keeping trash and debris out of waterways by managing the inlets and outlets.

D. Trimming of vegetation from trails, roads, etc. - Our monthly schedule and photo documentation will ensure that we are identifying, performing, and documenting the items that are necessaary for routine trimming.

E. We will ensure vegetation is cleared from all site pernishings and designated areas. This will be included in weekly reporting.

F. Mowing will be performed weekly per specifications.

G. Obstructions in walkways will be identified and repaired to ensure safety and consistency.

H. All work must be in accordance with Landscape Maintenance Specifications - We are clear on the specifications, and will ensure we communicate clearly on our progress.

I. Auditing Irrigation - With our extensive experince managing irrigation systems, we will ensure the scheduled are set, inspections are performed, and repairs are made so to maximize efficiency. We mamange over 100 Calsense controllers and are familiar with all facets of programming and management.

J. Vegetation removal/earthwork - All major removals and earthwork will have biologist interaction. Our biologists will be on every site monthly to review items that require removal.

K. Reporting, Documentation, and Communication.

K.1. Vandalism - Our photo documentation and GPS location of all tasks and isseus allow us to share items outside our scope of work in a clear and concise way.

K.2. Submittal of weekly field form - Our weekly field form report will show items completed, and our schedule for the upcoming week. Items that need to be completed will have an overhead satelilite image showing GPS 'pins' with a list of tasks. These items will have descriptions and a legend to describe to items to be completed. This will be accompanied with photos of completed tasks.



K. 3. - Monthly schedule for following month - We use a landscape software that allows us to communicate our daily, weekly, and monthly schedule at the click of a button. This schedule is what our crews use to determine their daily schedule and tasks to be completed. We will share schedule, tasks, man power and any additioanl items that fall outside of the routine maintenance items.

K. 4. Irrigation reporting - We digitally log all inspections and repairs with GPS and photos. These reports will be shared with IRWD staff monthly.

K.5. We look forward to sharing our progress and upcoming schedule .

K.5.a - Our team of biologists will prepare weekly 'non-native species and maintenance maps' showing type of species, GPS location, and schedule for removal.

K.5.b - Corrections - We will ensure corrections are communicated weekly and completed within 7 days.

K.6 Submittal of monthly invoices - All invoicing requirements will be followed.

Man Power:

Foreman (1) - 7 hours per week

Gardener (2) - 14 hours per week

Irrigation Tech (1) - 1-2 hours per week / as needed

Account Manager - 2-4 hours per week / as needed

Biologist - 1 hour per week

Seasonal Variation - We are confident that we can balance our seasonal tasks with 3 full time workers and a part time irrigation tech.

Equipment List

Crew Truck - All of our crew trucks come equipped with a Truck, 18' landscape trailer, small equipment (hedgfe trimmers, blowers, weedeaters), spray tank, first aid kit, fire extinghuisher, and hand tools.

- 36" Lawnmower



Biologist will provide a map each week identify tasks to be performed by maintenance crew. Map will include geolocation and task to be completed for the following items:

- Non-natives weeds
- Irrigation Issues
- Trash
- Other Miscellaneous Items
- Seasonal tasks
- Access items



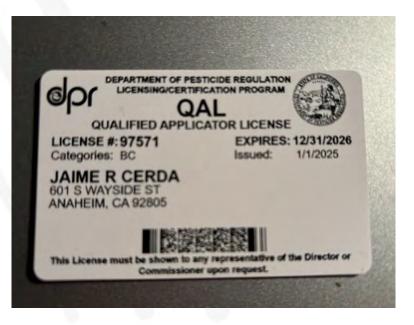


Supplemental weekly reports will be provided to show after photos as well as items accomplished throughout the week. These will be tied to GPS locations and progress throughout the various sites.











Description	30 Days	60 Days	90 Days	COMPLETE
Initial quality scoring to establish baseline for measuring improvement prior to job start, then quarterly thereafter. Establish annual IQ goals.		•		
- Deficiencies	•			
- Irrigation Audit Report	•			
- Rotation Map	•			
- Rotation Calendar	•			
- Propose immediate irrigation repairs, and complete as necessary	•			
Implement Water Management/Conservation Program.		•		
Make all necessary immediate repairs (pending approval).		•		
Perform initial job assessment and submit written/photo documented report to Management Company. Report will include:			•	
- Identify and report potential upgrades and opportunities for savings.			•	
- Pests and diseases identified.			•	
- Hazards, and liabilities.			•	
- Proposals/Budget Requests			•	
<ul> <li>Tree Care Management Plan and Inventory – This will include tree trimming schedule, fertilization schedule, identification of sick and hazardous trees performed by In House Arborist.</li> </ul>			•	
- Proposals/Budget Requests			•	
Property up to Bemus standards (80 IQ score or higher).			•	
Full implementation of ongoing management program.			•	
Full implementation of water conservation program.			•	
Weed free projects.				



**Water management** has come to the forefront of concerns for properties like yours. Bemus Landscape recognizes water as one of earth's most precious resources. We manage over 2 billion gallons of water a year and believe that it is our duty as a responsible business to proactively manage your water.

# Our approach:

**System Evaluation:** The first step of responsible water management is to evaluate the system . At this stage we inspect and report on system deficiencies such as breaks, leaks and safety issues. After any initial repairs are done we continue to regularly inspect the system to make sure it is functioning properly.

**Manage Usage:** Once the system is fully functioning, we move to managing usage. With client provided water bills we compare ongoing actual usage with the water allocated by the local district. We adjust our programming to be as efficient as possible. In addition to ongoing management we keep an eye on the plant health in order to communicate any improvements that may be needed.

**Improvements:** Inefficient irrigation can create unnecessary costs in the form of wasted water, plant decline, asphalt damage, etc. We will work with you to provide solutions that allow you to maximize your system. These include possibilities such as drip conversions, specialized flow/shut off valves, and lower water using plants. Additionally these can be put into a Return on Investment calculation to allow you to make educated decisions.

#### **Additional Strategies:**

#### Rebate Programs

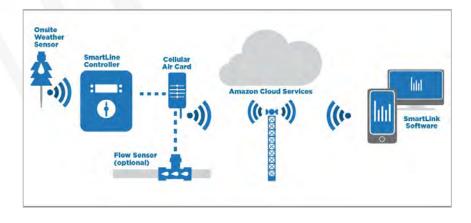
We facilitate the application process for rebates. We are very familiar with all water districts throughout Southern California and the programs that they offer. With the results of our initial inspection we can make recommendations for system upgrades.

#### Weather based / Smart Controllers

These systems have grown in popularity over the last 5 years. After the system is installed it starts with online management, then the local weather station provides daily weather and rainfall data. The servers access the weather data, computes evapotranspiration, and generates a watering schedule for each landscape profile. Results have shown healthier landscapes, better water management while reducing harmful runoff pollution and potential water savings of 20 to 50%.

Our Irrigation Manager monitors the irrigation control system as often as required, and makes continuous adjustments based on seasons, plant and zone attributes, run times, and flow readings.

We can use a ROI calculation to determine if it's feasible for the association to invest in the new technology for water management.





At Bemus Landscape, we like to take a systematic approach to the renovation process. We believe it is imperative to establish a long term plan based on the needs of the community.

Here is our process:

#### **Design Plant Palette**

Here we work with the Board of Directors/Landscape Committee to establish a the criteria of what plant material is most consistent with the architectural theme, adheres to same water requirements, and is aesthetically appealing. (See sample Plant Palette)

#### Design Photo Rendering(s)

After the Plant Palette has been completed, we will begin to work on the Photo Rendering. This will allow us to implement the Plant Palette into a visual image, showing what the completed product will look like. This allows the client to have a visual concept of the design , and helps avoid any misconceptions of the final product. (See sample Photo Renderings).

#### Installation

This is where the rubber hits the road. Here we begin the installation using the skills we have acquired over the last 39 years of landscape installation. We strip the existing landscape material, check the irrigation coverage, test the soil, apply the required nutrients, and then we begin our install. (The example image below represent a before and after photo rendering of a potential conversion)





# **REQUEST FOR PROPOSAL**

# San Joaquin Marsh Campus Landscape Maintenance

Date: February 6, 2025 Michelson Operations Center 3512 Michelson Drive Irvine, CA 92612

### QUESTIONS DUE BY: 4:00 PM, FEBRUARY 24, 2025 PROPOSAL DUE BY: 4:00 PM, MARCH 13, 2025 BID BOND DUE BY: 4:00 PM, MARCH 13, 2025

# Project: San Joaquin Marsh Campus Landscape Maintenance Project Coordinator: Alvaro Alfaro

The Irvine Ranch Water District (IRWD or the District) invites environmental consulting firms and/or landscape contract companies to submit a proposal to complete the project herein described. The bid is to include all labor, material, equipment, traffic control, bond fees and insurance costs required for the project. The bid shall include both a lump-sum total and individual line items that include all work described in the scope of work. All bid documents and submissions will be conducted electronically through the District's ePurchasing website at <a href="https://irwd.ionwave.net/">https://irwd.ionwave.net/</a>. It is the prospective bidders responsibility to download bid documents and check for addenda or updates on a regular basis. For login or registration assistance, please contact purchasingdept@irwd.com.

The following information is provided for guidance in preparing your proposal:

# I. PROJECT DESCRIPTION AND BACKGROUND INFORMATION

The IRWD San Joaquin Marsh Campus opened in January 2009. The location of the Campus at the San Joaquin Marsh & Wildlife Sanctuary provides a wide variety of educational programs. The Campus is approximately 266,298 square feet (6.1 acres) and is made up of three historical houses, the Duck Club, the Learning Center, the Sea and Sage House, and the Audubon House. The landscape consists of both native and nonnative ornamental trees and shrubs, 18,150 square feet of turf grass, and incorporates four Demonstration Gardens including, The Pollinator Garden, The Butterfly Garden, The Native Grasses Garden, and The California Native Garden.

# II. SCOPE OF WORK

1

Initial each page NP

The Contractor shall maintain the San Joaquin Marsh Campus in good order and appearance, in accordance with the requirements detailed in the following Work Plan. The SJM Campus contract area must be staffed with a crew of an appropriate size to fulfill all requirements of the *Work Plan* (below). This crew shall include a minimum of one foreman present with the crew, Monday through Friday. Typical work hours shall be during IRWD's regular business hours of 6:00 am to 4:30 pm, Monday through Friday and with respect to local city noise ordinances, typically 7:00 am – 7:00 pm, unless other arrangements are made with IRWD NTS staff. Work outside of these hours is subject to authorization by IRWD in advance.

# Work Plan

Contractor must fulfill all the requirements of the following Work Plan:

- A. Removal of all trash and litter within site boundaries and outside perimeter including recording the weight of all trash. Trash cans must be emptied and liners replaced, all trash must be disposed of by Contractor.
- B. Removal of all invasive non-native plant species (excluding planted, ornamental individuals) within site boundaries using integrated pest management (IPM) techniques starting with hand removal and escalating to herbicide application if necessary.
- C. Removal of accumulated debris and sediment from ditches, roads, parking area, and storm drains.
- D. Trimming of vegetation from all structures including, but no limited to: sampling sheds, pipes, irrigation boxes and heads, electrical boxes, kiosk, signs, fences, walls, light fixtures, shade structures, buildings, and benches to a minimum of two feet.
- E. Removal of accumulated dust and debris from all kiosks, signs, benches, trashcans, fences, light fixtures, shade structures, and buildings weekly.
- F. Mowing of turf grass a minimum of once per week.
- G. Fill in any cracks, potholes, or other obstructions in roads/trails as they occur with soil/asphalt/DG as appropriate.
- H. All work must be in accordance with IRWD's "Landscape Maintenance Specifications" (Attachment A) and Integrated Pest Management (IPM) Plan (Attachment B), which are attached to this document. Maintain all trees according to section 3 of the "Landscape Maintenance Specifications" (Attachment A).
- I. Auditing of irrigation controller on a monthly basis, including testing of all irrigation stations, visual inspection of each head, master valve, and flow sensor, and submittal of irrigation report to IRWD NTS staff at end of month. Each monthly irrigation report should include a thorough description of necessary repairs and maintenance items that were completed as well as a confirmation of successful completion of testing of the irrigation system confirming appropriate coverage and functionality. Contractor will be expected to have the ability to complete all necessary irrigation repairs. Contractor shall use IRWD's CalSense platform for irrigation alerts and irrigation management at each site.
- J. Any vegetation removal or earthwork between March 15 and September 15 within or adjacent to habitat areas will require the Contractor to notify IRWD, and such work must be approved and monitored by a qualified biologist. This qualified biological monitor shall have the authority to stop or otherwise divert work to avoid impacts as necessary. The Contractor shall not resume work until approval by IRWD staff or designated representative is given.
- K. Reporting, Documentation, and Communication:
  - 1. Reporting of vandalism such as graffiti on same day as observation, via text or phone call.
  - 2. Submittal of fully completed weekly field form (as provided by IRWD) to IRWD NTS staff before Monday at 8am. This form shall be completed in English with appropriate level of detail describing maintenance work, pictures of before and after and completion status for each site included under this contract conducted during the previous week, including photographs (before and after) and daily reports. May be submitted as a single consolidated report for all sites covered under this contract for the reporting period. Additionally, the Contractor shall include in each report, planned activities for the upcoming week.

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- 3. By the last day of each month, provide the IRWD NTS staff with an updated monthly schedule for the following month of what sites will be visited on each day, including name and contact information of English-speaking crew foreman, total number of staff, and approximate hours the crews will be at each site. General information shall also be provided summarizing planned work activities and outstanding items to be addressed. Any changes to this schedule shall be immediately communicated to IRWD NTS staff as it may necessitate changes in IRWD's water quality sampling schedule.
- 4. Submittal of irrigation audit report to IRWD NTS staff at end of each month.
- 5. Attend coordination meetings with IRWD and other applicable contractors on a weekly basis (or other cadence as determined in coordination with IRWD; meetings will be generally 1 hour). Contractor shall coordinate with IRWD and identify and share any issues or concerns with the prompt and timely maintenance to address work requests by IRWD NTS staff and or biological consultant as designated by IRWD.
  - a. Corrections to maintenance Work Plan deficiencies must be made within seven calendar days upon receipt of deficiency report. Completion of remediation of deficiencies must be documented and reported to IRWD NTS staff upon completion.
- 6. Submittal of monthly invoices to apinvoices@irwd.com and IRWD NTS Staff at end of month. All invoicing shall include at a minimum:
  - a. PO Number
  - b. Date of Services Performed
  - c. Location(s) Of Work Area
  - d. Cost Description/Breakdowns

Generally expected tasks are summarized in the following table, however more detail is provided in the scope description above. Note that sites must be visited <u>at a minimum</u>, on a weekly basis, but also on a cadence and frequency sufficient to complete all of the following tasks

Frequency	Activity
	Submit weekly field form documenting, in detail, maintenance from the previous weel
	Mowing of turf grass a minimum of once per week
	Attend weekly meeting with IRWD to discuss completed work and next week's plan
	Remove all trash and litter and record the weight of trash to include in reporting. Empt and replace liners for all trash cans.
	Remove accumulated debris/sediment from all structures (i.e. sediment traps, intake grates ditches, kiosks, light fixtures).
	Remove non-natives (with emphasis on priority target species) and undesirable native
	Limit leaf blowing to once a week
Weekly	Trim back vegetation from all trails, roads, buildings, concrete walkways, and other structures (i.e. pipes, irrigation boxes, irrigation heads, electrical boxes, bird boxes, signaditches, walls, fences) to a minimum of 2 feet
	Maintain all hardscape clean of debris, weeds, animal droppings, etc. Maintain all trails an pathways in a clean and safe condition.
	Report vandalism and graffiti to IRWD ASAP.
	Fill in any cracks, potholes, or other obstructions in roads/trails as they occur with soil/gravel/DG as appropriate.
	Removal of accumulated dust and debris from all kiosks, signs, benches, trashcans, fence gates, light fixtures, and sheds
	Notify IRWD ASAP of any dead or dying trees, shrubs or ground cover. Prune and remove dead or damaged plant materials. Replace dead plants if needed in coordination with IRWD and with identification of root cause. Report any identified pest damage to IRWD ASAP
Monthly	Maintain existing mulched areas and replace mulch as needed

Table 1.1 - Regular Maintenance Activities at San Joaquin Marsh Campus

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Audit irrigation, test all stations, visually inspect each head, master valve, flow sensor, confirm appropriate coverage and function. Document and submit report monthly.
Maintain all trees according to section 3 of the Landscape Maintenance Specifications.

- 1. All tasks should be completed for each site at the identified frequency, refer to contract for additional details.
- 2. From March 15 September 15, all work requires pre-survey by a qualified biologist for compliance with biological rules and regulations.
- 3. All work must be conducted in accordance with IRWD's IPM Plan (Attachment B) and Landscape Maintenance Specifications (Attachment A). Refer to contract, IPM Plan, and Landscape Maintenance Specifications for more details.

Contractor performance will be rated on the following key performance indicators (KPI):

Number	Key Result Area	Key Performance Indicator	Target
1	Maintenance	# of maintenance Work Plan deficiencies identified during regular weekly inspections (i.e. from contract Work Plan)	0
2	Maintenance	# of irrigation alerts during regular monthly inspections	0
3	Maintenance	# of visits per week	1
4	Accountability	Submittal of fully completed weekly field forms to NTS staff	8 am Monday (of following week)
5	Accountability	Submittal of irrigation audit forms	Last day of each month
6	Invoicing	Date of submittal of properly formatted invoices to AP invoices and NTS staff	First day of next month

Table 1.2 – Key Performance Indicators

# III. SAFETY AND REGULATORY REQUIREMENTS

Safety shall be of the utmost importance at all times. The Contractor shall safeguard all District, and Contractor personnel, during the progress of the work by providing barricades, flagmen, traffic control and appropriate warning signs as required. Any equipment (such as tractors) shall be of the proper size necessary to safely accomplish the task.

Contractor equipment shall comply with all applicable federal, state, and local regulations, including but not limited to requirements for emissions, noise levels, and safety standards. It is the responsibility of the contractor to ensure that equipment is properly maintained and in compliance with these regulations throughout the term of the contract.

Contractor and all associated personnel shall be required to follow all IRWD rules, regulations and procedures as listed in the Emergency Evacuation Plans. These include but are not limited to speed limits. In the event of an emergency the Contractor and all associated personnel shall follow evacuation procedures in the Emergency Evacuation Plans. Contractor shall be held responsible for all such training of all associated personnel.

The Contractor shall provide proof to the District's representative, that they, the Contractor, have in place all safety programs that are required by the state and federal agencies. The Contractor must also prove that all associated personnel have been trained in these programs, by providing the District with training documentation. The Contractor will be required to provide to the District's representative a copy of the Safety Data Sheets for all chemicals that are brought on site. No hazardous materials will be approved for use or permitted in the building or at the job site. Work areas must be cleaned up at the end of each shift, and no storage of material or equipment will be allowed in the building. All trash and spent materials are to be disposed of off-site and in compliance with state and federal regulations. All washing and cleaning of Contractor equipment must be done off site. The Contractor shall protect all surfaces during refueling or other maintenance activities.

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The Contractor **shall** perform all work during IRWD's regular business hours of 6:00 am to 4:30 pm, Monday through Friday and with respect to local city noise ordinances, typically 7:00 am -7:00 pm, unless other arrangements are made with IRWD NTS staff. Work outside of these hours is subject to authorization by IRWD in advance.

# IV. QUALITY CONTROL

All work shall be done by experienced and qualified personnel in accordance with the written request for proposal. The Contractor will be responsible for quality control of all associated employees' actions and the finished product. The District reserves the right to reject any and all work that it feels is defective and may require the Contractor to repair or replace such work, at no extra cost to the District.

# V. <u>PROPOSAL CONTENTS</u>

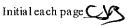
The Contractor's proposal must include the following:

- 1. The following proposal components shall be included in each bid:
  - a. Scope of Work
  - b. Org Chart
  - c. Resumes/CVs for key staff
  - d. References
  - e. Proposed Schedule
  - f. Budget/Cost Proposal with breakdown of assumptions
  - g. Sub-Consultants/Partnerships (if applicable)
- 2. Cost proposal and breakdown.
  - a. This should include:
    - i. Full and complete cost per site per month for each year of the contract. Contractor must provide the information listed on attached bid sheet. Contractor must provide the information listed on attached bid sheet, and is also encouraged to submit supporting documentation providing an overview of assumptions of number of labor hours, equipment and materials costs, etc.
    - ii. Labor must be based on prevailing wage standard for each work task being performed. The attached "LABOR AND PREVAILING WAGE REQUIREMENTS" is incorporated in this Request for Proposal and will be incorporated in the contract.

NOTE: The prices quoted shall be fixed during the term of this contract and mid-contract price increases will not be allowed thereafter unless authorized by IRWD.

NOTE: The full contract amount will be treated as a "not to exceed" amount, and should additional sites be added to IRWD's NTS during the contract term, IRWD and the Contractor will mutually agree in writing on future costs for landscape maintenance of these sites. In such cases, IRWD may consider the authorization of a change order or similar process.

- 3. Demonstration of Contractor's technical expertise in habitat establishment and restoration, including the identification and mapping of non-native and invasive species. Particular focus should be on mapping non-native species for removal and how conformance with an existing IPM was achieved.
  - a. Provide at least three examples/projects that demonstrate this expertise. Include name of project, location, and a summary of the work completed.
  - b. Provide a list and CVs for all key staff. Include names of staff, how many years of experience they have related to habitat restoration and maintenance, and what types of similar projects they have worked on.
  - c. Contractor shall not make any changes in key staff unless authorized by IRWD. If replacement of key staff becomes necessary, Contractor shall provide a replacement with equivalent or better qualifications, subject to approval by IRWD.



- d. Assigned staff shall have adequate knowledge of habitat restoration projects, including installation and maintenance of riparian, grassland, and coastal sage scrub plant communities, as well as drought-tolerant landscaping and irrigation management and repairs. Contractor shall demonstrate that primary staff assigned to the Project shall have a minimum of 5 years of experience in native wetland and riparian type habitats as well as experience working around sensitive species such as the least bell's vireo (*Vireo bellii pusillus*).
- e. The Contractor shall demonstrate the ability to have an English-speaking/bilingual foreman overseeing crews that are assigned to the Project, and that foreman shall be on-site during the performance of all tasks, shall direct and supervise all work performed as specified herein, and shall be responsible for compliance with the Contract scope and Landscape Maintenance Specifications (Attachment A). The name, phone number, and contact information of the Contractor's project manager and foremen assigned to the maintenance activities described herein shall be provided to IRWD, and a backup shall be assigned in the case of any absences.
- 4. A detailed description of how the Contractor will fulfill each of the requirements of the Work Plan outlined in Section II with adherence to the attached Landscape Maintenance Specifications (Attachment A) and IPM Plan (Attachment B). This should include predicted monthly and/or seasonal work schedules, crew sizes, equipment lists, and any other information that provides a clear and specific picture of how the Contractor will approach the work. Although Contractor must perform maintenance work at each site per the minimum maintenance frequency outlined in table 1.1, the Contractor's Work Plan and schedule will be scored based on how well it addresses (in terms of labor allocation) seasonal variations in maintenance needs, ensuring that all tasks outlined in the scope are sufficiently completed and that all sites are upkept in good condition.
- 5. Proof of all applicable licenses required to perform the work described herein, including but not limited to an active Contractor's license and a Pest Control Qualified Applicator License issued by the State of California. The Contractor shall also provide any additional licenses necessary to ensure compliance with all applicable laws and regulations for the completion of the project.
- 6. All safety documentation required in Section 111.

Please note that IRWD may conduct interviews with each Contractor's proposed team and may contact recent clients. Following conclusion of the bidding period, IRWD will contact bidders to schedule oral interviews, which will also include a presentation component. Bidders will be expected to present a brief PowerPoint presentation outlining the contents of their bid and the qualifications of the proposed team. This presentation should not exceed 15 minutes. The presentation will be followed by a brief question and answer session. Selection of the Contractor will generally be based on the proposal contents, oral interview and presentation contents, prior experience of the firm, and specific experience and capabilities of the designated project team and staff. The Contractor must be fully capable in all areas outlined under the scope of work. The Contractor selected must be able to begin work on June 1, 2025 and must be able to maintain the level of effort required to meet the proposed schedule.

This request does not commit IRWD to retain any Contractors or Consultants, to pay costs incurred in the preparation of proposals, or to proceed with the project. IRWD reserves the right to reject any or all proposals, to negotiate with any qualified applicant, and to appoint more than one Contractor to provide services on given portions of the project.

Proposals (including accompanying materials) will become the property of IRWD. Proposals will be held in confidence to the extent permitted by law. After award of a contract or after rejection of all proposals, the proposals will be public records, subject to disclosure under the California Public Records Act (Government Code Section 6250 et seq.). IRWD reserves the right to request additional information from prospective Contractors prior to final selection and to consider information other than that submitted in the proposal or interview. IRWD may select for contract negotiations the Contractor that, in IRWD's judgment, will best meet IRWD's needs, irrespective of the comparison of fees and costs estimated by the applicants. IRWD may conduct

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such investigations, as IRWD deems necessary, to assist in bid evaluations, and to establish the responsibility, qualifications, and financial ability of the bidder.

#### VI. BOND REQUIREMENTS

Before the Contractor will be allowed to move any staff, material, or equipment, on to the job site and commence any work the following conditions must be met:

- Payment and Performance Bonds are required by successful bidder for "public work" projects over \$25,000, must equal to 100% of the contract amount.
- If the total lump-sum bid amount is \$100,000 or more, a bid bond at 10% of bid amount, shall be submitted in paper form in a sealed envelope titled "Bid Bond" and the project title, by bid closing date.

Delivery Address:

Irvine Ranch Water District Attn: Purchasing Department 3512 Michelson Dr., Irvine, CA 92612

# VII. PREVAILING WAGE

Pursuant to California Labor Code Sections 1725.5 and 1771.1, no contractor or subcontractor shall be qualified to bid on, be listed in a bid proposal or engage in the performance of any contract for public work unless registered with the Department of Industrial relations. It shall be mandatory upon the Contractor and all subcontractors to comply with all applicable California Labor Code provisions, which include but are not limited to prevailing wages (Labor Code Sections 1771, 1774 and 1775), employment of apprentices (Labor Code Sections 1777.5), certified payroll records (Labor Code Sections 1771.4 and 1776), hours of labor (Labor Code Sections 1813 and 1815) and debarment of contractors and subcontractors (Labor Code Section 1777.1).

#### VIII. INSURANCE REQUIREMENTS

Contractor shall always maintain the following policies of insurance with insurers possessing a policyholders' Rating of A- (or higher) and Financial Size Category of VII (or larger) in accordance with the latest edition of Best's Key Rating Guide, unless otherwise approved by IRWD. Contractor may not commence work until all required insurance documentation, including endorsements, is provided to IRWD.

Policy Amounts

- A. <u>Comprehensive General Liability Insurance</u>. Contractor shall maintain a comprehensive general liability insurance policy with coverage on an "occurrence" basis, including products and completed operations, property damage, bodily injury, personal injury, and, with limits no less than \$1,000,000 per occurrence, \$2,000,000 aggregate.
- B. <u>Automobile Liability Insurance</u>. Contractor shall maintain an automobile liability insurance policy covering bodily injury and property damage for all activities of the Contractor arising out of or connection with the Services, including coverage for any owned, hired, and non-owned, rented, or leased vehicles, in an amount not less than \$1,000,000 combined single limit for each accident.
- C. <u>Workers' Compensation Insurance</u>. Contractor shall maintain a workers' compensation insurance policy (Statutory Limits), as required by law, and

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Employer's Liability Insurance (with limits not less than \$1,000,000). Contractor shall submit to IRWD, along with the certificate of insurance, a Waiver of Subrogation Endorsement in favor of IRWD, its directors, officers, employees, and agents.

D. <u>Umbrella or Excess Policy</u>. Contractor may use umbrella or excess Policies to provide the liability limits as required in this Agreement.

<u>Additional Insured</u>. General liability, automobile liability and all other applicable policies, including excess/umbrella liability policies, shall provide, or be endorsed to provide, that IRWD, its directors, officers, employees, and agents, are additional insureds under such policies.

<u>Primary Non-Contributory</u>. For any claims related to this contract, the Contractor's insurance, including umbrella/excess coverage, must be primary and non-contributory. Any insurance or self-insurance maintained by IRWD, its directors, officers, employees, and agents will be excess of the Contractor's insurance and will not contribute to such insurance.

<u>Waiver of Subrogation</u>. All insurance coverage maintained pursuant to this Agreement must be endorsed to waive subrogation against IRWD, its directors, officers, employees, and agents, or must specifically allow Contractor to waive its right of recovery prior to a loss. This provision applies regardless of whether or not IRWD has received a waiver of subrogation endorsement from the insurer.

<u>Notice of Cancellation</u>. Contractor shall oblige its broker and insurers to provide IRWD with a 30-day notice of cancellation (except for nonpayment for which a ten-day notice is required) or nonrenewal of coverage for each required coverage. If the Contractor's insurers are unwilling to provide such notice, then Contractor shall notify IRWD immediately in the event of Contractor's failure to renew any of the required insurance coverages or insurer's cancellation or non-renewal.

<u>Requirements Not Limiting</u>. Requirements of specific coverage features or limits contained in this Section are not intended as a limitation on coverage, limits, or other requirements, or a waiver of any coverage normally provided by any insurance. If the Contractor maintains broader coverage and/or higher limits than the minimums shown above, IRWD requires and is entitled to the broader coverage and/or the higher limits maintained by the Contractor.

<u>Separation of Insureds</u>. A severability of interests provision must apply for all additional insureds ensuring that Contractor's insurance applies separately to each insured against whom claim is made or suit is brought, except with respect to the insurer's limits of liability. The policies may not contain any cross-liability exclusions.

Self-Insured Retentions. Any deductibles or self-insured retentions must be declared in writing.

<u>Timely Notice of Claims</u>. Contractor shall give IRWD prompt and timely notice of claims made, or suits instituted that arise out of or result from Contractor's performance under this Agreement, and that involve or may involve coverage under any of the required liability policies.

# IX. COLLATERAL DAMAGE

Contractor shall be responsible for all damage to IRWD property, facilities or personnel caused by any associated employees, subcontractors or their equipment during the performance of the contract.

# X. PROJECT COMPLETION

The project is complete when all work activity has been completed and all items on the punch list have been completed. All work must have passed inspection by the District's representative and the site must be left neat and clean. Payment may be withheld until the work is completed and approved by a District representative.

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#### XI. AWARD OF CONTRACT

- If the contract is to be awarded, it will be awarded to the Contractor who, after evaluation by the District, best meets the following criteria: 1) technical expertise, 2) approach to work, and 3) cost, as described in Section V. Bids and oral presentations/interviews will be scored on these criteria, based on a weighted scale.
- 2. If at the time that this contract is to be awarded, the total of the acceptable bid exceeds the funds then estimated by IRWD as available, then the District may reject all bids or take such other action that best serves the interest of the District.
- 3. IRWD reserves the right to reject any or all bids including, without limitation, the right to reject any other all non-conforming, non-responsive or conditional bids. IRWD reserves the right to reject the bid of any bidder if IRWD believes that it would not be in the best interest of the project to make an award to that bidder, whether because the bid is not responsive or the bidder is unqualified or of doubtful financial ability, or fails to meet any other pertinent standard or criteria established by IRWD. IRWD reserves the right to waive any irregularities; accept the whole, part of, or reject any or all responses; and select the firm which, in the sole opinion of the District, best meets the District's needs. IRWD also reserves the right to negotiate with potential Vendors so that the District's best interests are served.
- 4. IRWD may conduct such investigations, as IRWD deems necessary to assist in bid evaluations, and to establish responsibility, qualifications and financial ability of the bidder.
- 5. In the event of failure of the successful bidder to sign the Agreement, provide insurance certificates, and the required documents, IRWD may award the contract to the next responsive responsible bidder.
- 6. Contractor agrees to fully comply with and to require its subcontractors to fully comply with such Prevailing Wage Laws, to the extent such laws apply under Sections 1777.5 and 1777.6 of the Labor Code.
- 7. The Contractor selected for the award of contract must be able to begin work immediately upon award of the contract and must be able to maintain the level of staff necessary to meet the proposed schedule that was approved by the District's representative.
- 8. The contract shall commence upon execution by both parties and shall continue for a period of 3 (three) years with 2 (two) one-year renewals at the sole discretion of IRWD. Contractor performance (see Table 1.2) and cost will be the criteria used as a basis for any decision to extend the contract.

# XII. TERMINATION

This contract may be terminated by either party provided a 90-day notice is given. If Contractor consistently does not meet the KPI requirements (table 1.2) or of the *Work Plan*, the District reserves the right to terminate the contract with less than 90-day notice.

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#### **Bid Sheet – Labor Cost**

#### Year One

# Position\*

# **1 Hour Labor Cost**

**1 Hour Labor Cost** 

53.97

53.97

103.00

154.50

103.00

164.39

76.40

\$

<u>\$</u>

\$

\$

\$

\$

\$

Maintenance Worker Lead Worker/Foreman	<u>\$ 52.40</u> \$ 52.40
Supervisor	\$ 100.00
Irrigation Technician Irrigation Specialist	<u>\$ 74.17</u> <u>\$ 150.00</u>
Qualified Applicator	\$ 100.00 1 150.60
Biological Consultant (if required)	<u></u> \$ 159.60

#### Year Two

#### Position\*

Maintenance Worker Lead Worker/Foreman Supervisor Irrigation Technician Irrigation Specialist Qualified Applicator Biological Consultant (if required)

# Year Three

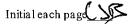
#### Position\*

Maintenance Worker Lead Worker/Foreman Supervisor Irrigation Technician Irrigation Specialist Qualified Applicator Biological Consultant (if required)

#### 1 Hour Labor Cost

55.59
55.59
106.09
78.69
159.14
106.09
169.32

\*Or equivalent alternate position title

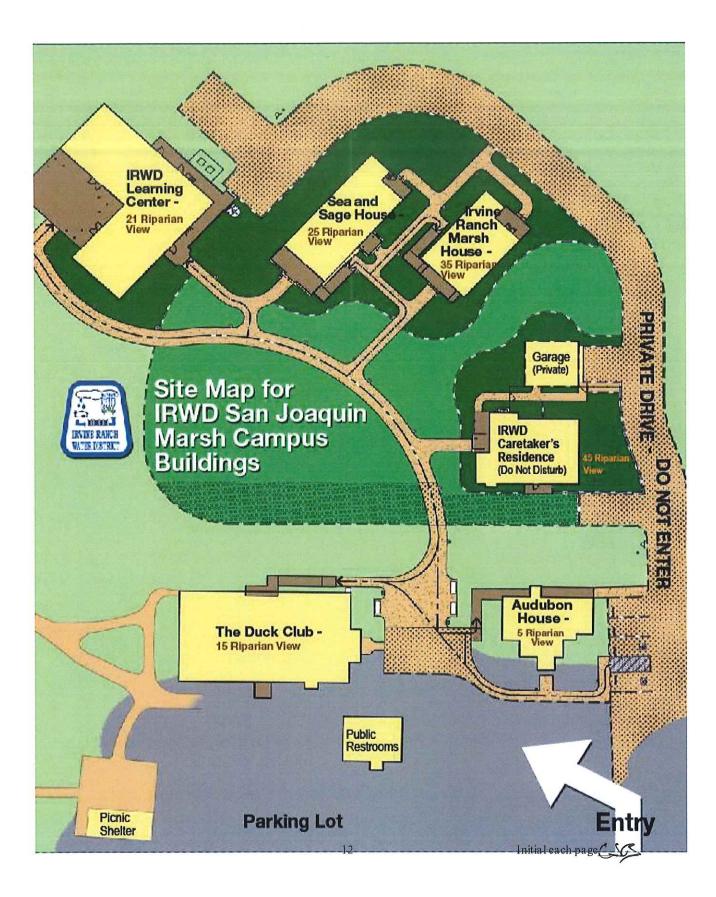


#### Cost Per Month/Year for Each Year of the Contract

<b>Year 1</b> Monthly Yearly	<u>\$</u> 8,500.00 <u>\$</u> 102,000.00
<b>Year 2</b> Monthly Yearly	<u>\$    8,755.00</u> <u>\$   105,060.00</u>
<b>Year 3</b> Monthly Yearly	<u>\$    9,018.00</u> <u>\$   108,212.00</u>

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# LANDSCAPE MANAGEMENT PROPOSAL



# Natural Treatment System North Irvine Ranch Water District | 2025

**BEMUS.COM** 



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California State Contractor's License #492084:

Class A (General Engineering)

Class C-27 (Landscaping)

Class D-49 (Tree Service)



March 11, 2025

Irvine Ranch Water District Michelson Operations Center 3512 Michelson Drive Irvine CA 92612

Subject: Natural Treatment System Landscape Maintenance North

We appreciate the opportunity to provide you with our proposal for the landscape maintenance services for the Natural Treatment System (NTS) North contract area, as outlined in your Request for Proposal (RFP). With over 50 years of experience in landscape management and a strong reputation for delivering sustainable, high-quality services, we are excited about the opportunity to collaborate with the Irvine Ranch Water District (IRWD) and support the continued success and growth of the Natural Treatment Systems.

Bemus Landscape is a full-service landscape contractor with a dedicated team of over 250 skilled professionals. Our commitment to environmental stewardship and sustainable landscaping practices has established us as a leader in Southern California. We specialize in creating and maintaining landscapes that not only enhance the aesthetic beauty of the region but also restore local ecosystems and contribute to the long-term health of the environment. Our focus on regenerative solutions aligns perfectly with the goals of IRWD, and we are well-equipped to manage the ongoing maintenance needs of this critical infrastructure.

In reviewing the work plan provided in the RFP, we are confident in our ability to meet and exceed the following key requirements:

- 1. **Trash Removal and Site Maintenance**: Bemus Landscape will ensure consistent trash removal within site boundaries, including emptying trash cans, cleaning trash screens, and reporting the weight of trash removed monthly. Our team will dispose of all debris responsibly, adhering to the highest standards of environmental compliance.
- 2. **Invasive Species Control and IPM Compliance**: Our team will strictly adhere to IRWD's Integrated Pest Management (IPM) Plan. We will map and identify non-native species at each NTS basin, providing weekly updates to IRWD in both PDF and geospatial formats. A qualified biologist will oversee these efforts to ensure effective and cost-efficient control of invasive species while maintaining the health of the ecosystem.
- 3. **Vegetation Maintenance and Irrigation Audits**: We are committed to maintaining the vegetation as specified, with particular attention to aquatic and terrestrial vegetation management. Our team will perform regular irrigation audits, ensuring system functionality and completing any necessary repairs. Detailed reports will be submitted monthly, along with documentation of completed work.



4. **Environmental and Regulatory Compliance**: Bemus Landscape understands the importance of environmental responsibility. Our team will work closely with IRWD staff and biological consultants to ensure that all work, especially during sensitive periods, complies with environmental regulations. We are committed to safeguarding the natural habitats while completing essential maintenance tasks.

5. **Clear Communication and Reporting**: We prioritize open and timely communication. Our team will submit weekly field reports, including before-and-after photos and detailed descriptions of completed tasks. We will provide monthly schedules and ensure that any changes to the work plan are communicated promptly to IRWD NTS staff.

Our company's dedication to excellence, sustainability, and community enhancement drives us to deliver outstanding results for every project we undertake. Bemus Landscape has built a reputation as a trusted partner for both commercial and residential clients across Southern California, and we are eager to bring that same level of dedication and expertise to the NTS South contract area.

Thank you for considering our proposal. We look forward to the opportunity to collaborate with IRWD on this important project.

Meqan Tejeda

Commercial Business Development Manager megan.tejeda@bemus.com (949) 769-1431



At Bemus Landscape, Inc., we pride ourselves on being at the forefront of our industry in terms of the professional qualifications and horticultural skills of our staff. Obtaining professional credentials is a requirement for many of our positions, and is strongly encouraged for all others. The Company pays all employee testing and licensing fees, as well as those related to continuing education requirements. A partial listing of credentials held by our employees is as follows:

# **Registered Consulting Arborists: 1**

RCA's bring a comprehensive and objective viewpoint to the diagnosis, appraisal, and evaluation of arboricultural issues. This is the highest credential issued by the American Society of Consulting Arborists. Very few landscape contractors have a RCA on staff.

# Certified Arborists: 6

CA's are experts in the care of trees. The CA credential is issued by the International Society of Arboriculture and is conferred upon those who have passed rigorous written and field tests. Most contractors do not employ more than one CA.

#### Tree Risk Assessment Qualified: 2

A standardized, systematic process for assessing tree risk and providing information to tree owners and risk managers for making informed decisions that will promote the safety of people and property and enhance tree benefits, health, and longevity.

#### Pest Control Advisors: 1

The State of California requires that all commercial pest control products be applied under the written advice of a PCA, which is the highest pest control credential that the state issues. Most landscape contractors do not have one on staff, and either hire the services of a consulting PCA or are simply not in compliance with the law. PCA credentials require years of study and practical experience, and PCA's are the utmost authorities in the safe, horticulturally sound, and environmentally sensitive use of pest control products and non-pesticide alternatives.

# **Qualified Applicator Licenses: 22**

A QAL is the license issued by the State of California that allows a person to supervise the safe and responsible application of pest control products. The QA works under the direction of the PCA. Very few landscape contractors have more than one or two QA's on staff.

#### **Certified Landscape Irrigation Auditors: 3**

The CLIA is certified by the Irrigation Association, the nation's largest irrigation industry trade organization. CLIA's possess the training and skills necessary to analyze and audit the use of irrigation water, as well as recommend and implement solutions to minimize the use of water in a cost effective and horticulturally sound manner.

#### Landscape Designers: 1

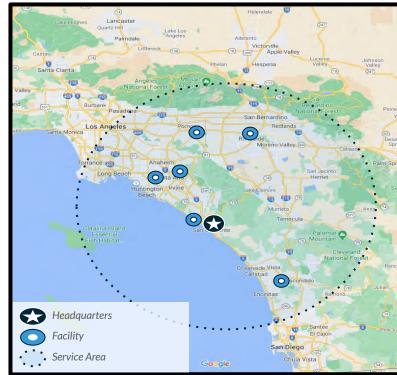
Our Landscape Designer specializes in aesthetically attractive and horticulturally sound designs rendered via the use of state of the art imaging software. Her technology skills are backed up by her plant knowledge.

#### Other

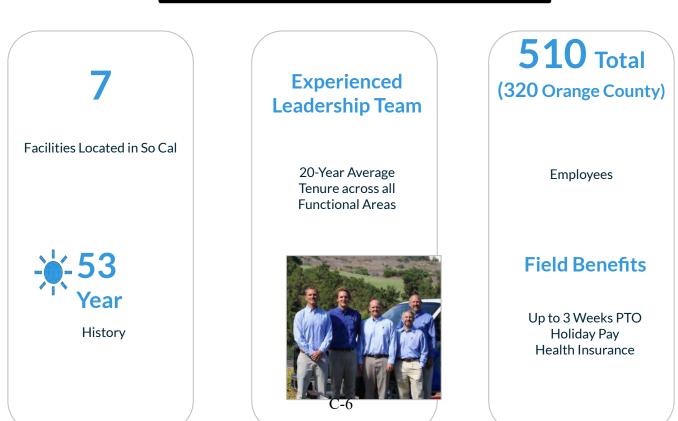
We have numerous other staff members who are certified by major irrigation equipment manufacturers and water districts in the proper implementation and management of satellite controller systems, smart times, reclaimed water management, and a variety of other disciplines.



# **Customer Portfolio and History**



Facilities & Service Area











# Corin Bemus, CEO

Corin Bemus is the CEO of Bemus Landscape, a family-operated company that has been a leader in Southern California's landscape industry since 1973. Under Corin's leadership, Bemus Landscape has grown into one of the region's top landscape firms, known for its innovation, sustainability, and commitment to quality. Corin is dedicated to fostering a culture of trust, employee growth, and exceptional service. He focuses on sustainable landscaping solutions that not only enhance landscapes but also contribute to environmental restoration. His leadership is guided by the company's purpose of "Serving Clients, Growing People," ensuring Bemus Landscape continues to set the standard for excellence in the industry.



# Spencer Bemus, Vice President - Tree Care

With 25 years of experience in the tree care industry, Spencer Bemus is a seasoned professional dedicated to enhancing the health and safety of urban forests. He holds certifications as an ISA Certified Arborist (#WE-9348A), ISA Tree Risk Assessment Qualified, and a Qualified Applicator License (#117807). Spencer has played an instrumental role in a riparian project in Encinitas for the past 10 years at Scott's Valley HOA. Additionally, he is a certified wildlife protector, further demonstrating his commitment to environmental conservation.



# Miles Coffin, Regional Operations Manager

With 12 years of experience in the landscape industry, Miles Coffin has spent the past 2 years working on the Scott's Valley Riparian project. As the Regional Operations Manager, he oversees day-to-day operations, ensuring efficient project execution, managing teams, and maintaining high-quality service standards. Miles is responsible for coordinating resources, managing budgets, and implementing best practices to ensure the success of landscape maintenance and restoration efforts. He holds a QWEL certification (MWDOC-1043) and a Qualified Applicator License (QAL #139436).





# Sergio Bortolamedi, Vice President of Sales

With over 15 years of experience in the commercial landscape industry, sustainability and high-level customer service have been Sergio's passion and driving force behind the success of Bemus Landscape. As Vice President of Sales for the past decade, he has played a strong role in sales while having a deep understanding of landscape maintenance operations. Sergio and his sales team have been instrumental in developing innovative solutions that prioritize sustainability and environmentally-conscious practices. His commitment to operational efficiency and client relationships has positioned Bemus Landscape as a key player in the industry.



# Megan Tejeda, Sr. Commercial Business Developer

With 25 years in the landscape industry, Megan Tejeda has a strong focus on driving growth and expanding customer bases. As Commercial Business Development Manager at Bemus Landscape for the past 3 years, she develops strategies to increase revenue, expand market presence, and build lasting business relationships. Previously, as an Account Manager, Megan played a key role in client relations, ensuring high-quality service and achieving sales and contract renewal goals.



# Jaime Cerda, Branch Manager

With 39 years of experience in landscape maintenance, Jaime Cerda has spent 24 years contributing his expertise to Bemus Landscape. He is an ISA Certified Arborist (#WE-8914A) and holds a Qualified Applicator License (#97571). Throughout his career, Jaime has built a strong foundation in the landscape industry, ensuring high standards of quality and service.



## Sual Alcaraz, Account Manager

With 5 years of experience in the landscape industry and 3 years with Bemus Landscape, Saul Alcaraz is an Account Manager committed to providing highquality service and building strong client relationships. In his role, he is responsible for managing client accounts, developing and implementing landscape management plans, overseeing service delivery, and ensuring client satisfaction. Saul works closely with internal teams to monitor project progress and provide regular updates to clients, all while maintaining a focus on organization and efficient time management. His ability to build relationships, combined with his knowledge of landscape management, makes him a valuable asset to the Bemus team. Although he has not yet worked directly on habitat restoration projects, his background in the landscape industry allows him to contribute to a range of service areas.



# **BLAKE SELNA**

PRINCIPAL / BIOLOGIST

# LSA



#### EXPERTISE

- Biological Assessments
- Jurisdictional Delineations
- Regulatory Permitting
- Mitigation Planning,
- Monitoring, and Reporting
- Construction Monitoring
- Arborist Reports
- Habitat Restoration Plan Design and Implementation

#### EDUCATION

B.S., Environmental and Resource Sciences, University of California, Davis, March 2000

#### PROFESSIONAL EXPERIENCE

Principal, LSA, Irvine, California, 2000–Present

#### PROFESSIONAL CERTIFICATIONS/ REGISTRATIONS

Certified Arborist No. WE-7397A, International Society of Arboriculture

ISA Tree Risk Assessment Qualification, International Society of Arboriculture

Certified Wetland Delineator, Wetland Training Institute

## PROFESSIONAL RESPONSIBILITIES

Working for LSA since 2000, Mr. Selna has gained extensive experience as a biologist and arborist. His expertise includes biological assessments, jurisdictional delineations, mitigation compliance, and regulatory permitting, as well as the design and implementation of habitat restoration and mitigation plans. Mr. Selna manages the Biology/Natural Resources Group in LSA's Irvine office, which is the hub of this discipline in Southern California. As a result, he has provided Principal oversight and management for projects of all shapes and sizes, covering the full range of species and habitats in Orange, Los Angeles, San Bernardino, Riverside, San Diego, and Imperial Counties. With his background as a field biologist, he has developed all of the relevant technical skills in wetland/waters delineation, regulatory permitting, habitat mapping, vegetation classification, wildlife surveys, focused and floristic-level plant surveys, wildlife monitoring, arborist evaluations, plant and tree salvage/transplantation plans, and construction monitoring, making him uniquely qualified to provide supervision, strategic analysis, and project advisories for technical teams created for each individual client's and project's needs. In addition to his technical skills, Mr. Selna has outstanding personnel, project, and contract management abilities.

## **PROJECT EXPERIENCE**

Mr. Selna has managed many aspects of Southern California environmental consultation, including biological resource analysis, preconstruction surveys and vegetation removal, large- and small-scale regulatory permitting efforts, habitat restoration, and mitigation of biological impacts. He is extremely familiar with surveying and restoring Southern California native habitats, including coast live oak woodland, coastal sage scrub, chaparral, needlegrass grassland, coastal grasslands and forblands, elderberry woodland, riparian woodland and scrub types, high desert riparian/alluvial scrub, Joshua tree and juniper woodland, desert scrub, seasonal ponds, and freshwater emergent marsh. Mr. Selna has designed and managed the implementation of more than 400 acres of restoration and mitigation of the aforementioned types, including more than 200 acres associated with landfill operations (more than 50 acres on-cap). Other notable mitigation projects include Joshua tree (Yucca brevifolia) translocation, endangered species translocation, wetland mitigation, and water quality protection features, including low-flow diversion and natural treatment of nuisance runoff.

Mr. Selna is very familiar with the County of Orange Central/Coastal Subregion NCCP/HCP, the Southern Subregion Habitat Conservation Plan, and the San Diego Creek and San Juan/Western San Mateo Creek Special Area Management Plans (SAMP), as well as the Orange County Transportation Authority Measure M2 NCCP/HCP/Environmental Mitigation Program. In

addition, he has worked within the regulatory frameworks of Los Angeles, San Diego, Riverside, and San Bernardino Counties.

As an International Society of Arboriculture Certified Arborist, Mr. Selna has prepared tree reports for projects in Newport Beach, Huntington Beach, Laguna Beach, Long Beach, Anaheim, Irvine, Santa Ana, Marina del Rey, San Juan Capistrano, Murrieta, Chino, Corona, Calabasas, Los Angeles, West Covina, Santa Clarita, Palmdale, unincorporated Los Angeles County, and the Angeles National Forest.



## BLAKE SELNA PRINCIPAL / BIOLOGIST



## RELEVANT PROJECT EXPERIENCE

Mr. Selna has prepared and/or provided Principal review and oversight for the preparation of hundreds of biological resources analyses, with levels of complexity ranging from due diligence and constraints analyses to full-scale EIRs. As a Principal of LSA's Natural Resources group, Mr. Selna supervises the preparation of technical reports in support of Categorical Exemptions, IS/MNDs, and EIR sections. In addition, LSA is adept at preparing Caltrans Natural Environment Studies, Biological Assessments for USFWS consultation, jurisdictional delineations, regulatory permitting documentation, and habitat restoration plans. Mr. Selna has extensive experience with navigating the regulatory permitting process on behalf of clients of all types and sizes. The following projects provide a range of experience relevant to the IRWD NTS program. Additional projects, contact information, and reports available upon request.

#### Irvine Ranch Water District, San Joaquin Marsh Restoration Project – The Duck Ponds Irvine, California

Although much time has elapsed, Mr. Selna retains extensive familiarity with the San Joaquin Marsh 'Duck Ponds.' LSA assisted The Irvine Company and Irvine Ranch Water District with the regulatory permitting and habitat restoration/creation design for the project. Shortly after his hiring in 2000, Mr. Selna counted the thousands of container plants around the Duck Ponds as part of the survivorship counts and was the primary data collector and habitat restoration monitor during the initial installation and establishment years of the project. LSA collected data annually until the site received acceptance from the United States Army Corps of Engineers.

#### Irvine Ranch Water District, Carlson Marsh Regrade Project Irvine, California

Mr. Selna assisted the Irvine Ranch Water District with the acquisition of the regulatory permits necessary for the Carlson Marsh Regrade Project, in which the water circulation in the degraded marsh was restored and exotic plant species were eradicated. He coordinated a construction monitoring regimen for vegetation removal and excavation of pilot channels and a Habitat Mitigation and Monitoring Plan for the restoration of freshwater marsh and brackish marsh habitat impacted by the project. Mr. Selna worked closely with the grading contractor to create topography and habitat conditions conducive to the restoration of willow forest, mulefat scrub, herbaceous riparian marsh, and halophytic (saline) marsh habitats, based on specific site conditions throughout the 60-acre Carlson Marsh portion of the greater San Joaquin Marsh. The circulation project and 7.62-acre restoration component were resounding successes and Mr. Selna received resource agency approval documenting that the site met all required performance standards.

#### City of Aliso Viejo, Dairy Fork Wetland Aliso Viejo, California

LSA assisted the City of Aliso Viejo with permitting for the creation of water quality basins along Dairy Fork Creek. LSA conducted a jurisdictional survey and general field assessment of the project area, prepared a Jurisdictional Delineation report, and prepared and submitted the associated permit applications to the resource agencies for approval. LSA also assisted with the CEQA exemption filed for this project. Following the successful permitting process, LSA provided construction monitoring and post-construction monitoring.

#### OC Flood, Santa Ana-Delhi Channel Improvement Newport Beach, California

As Principal in Charge/Project Manager, Mr. Selna is currently leading LSA's collaboration with OC Flood and its engineering consultants to rehabilitate the Santa Ana-Delhi Channel as it empties into Upper Newport Bay. The County has committed to the mitigation of historical impacts to the San Diego Creek Watershed and based on a previously prepared Environmental Impact Report (EIR), LSA prepared CEQA and technical studies addressing biological, transportation, air quality, noise, and cultural resource impacts. The project would improve the flood handling capabilities of the channel, as well as create over 6.5 acres of coastal salt marsh, freshwater/brackish marsh, riparian scrub, and coastal sage scrub habitats. This involves the creation of habitat for several specialstatus plant and animal species, as well as restoration of coastal wetland habitat complexes.



#### ERIC KRIEG ASSOCIATE / BIOLOGIST

# LSA



#### EXPERTISE

- Revegetation/Restoration
- Biological Assessments
- Construction Monitoring
- Flora and Fauna Surveys
- Mitigation Planning, Design, and Monitoring

#### EDUCATION

M.S., Biology (Ecology and Conservation), Illinois State University, Normal, Illinois, 1996

B.S., Biology, Frostburg State University, Frostburg, Maryland, 1993

#### PROFESSIONAL EXPERIENCE

Associate, LSA, Irvine, California, December 1997– Present

Environmental Laboratory Technician, Crosby Laboratories, Inc., Placentia, California, September– November 1997

Naturalist, Tucker Wildlife Sanctuary, Modjeska Canyon, California, May–September 1997

#### PERMITS AND AUTHORIZATIONS

USFWS Permit No. TE-777965, Authority to survey for the threatened coastal California gnatcatcher

CDFW Scientific Collecting Permit No. SC-213020003

## PROFESSIONAL RESPONSIBILITIES

Eric Krieg's duties consist of habitat restoration and biological resource monitoring during project implementation and long-term monitoring. He has experience preparing restoration plans and overseeing all aspects of a plan's implementation, from custom seed collection and native plant propagation through installation, maintenance, and monitoring procedures. Mr. Krieg has been involved in restoring coastal sage scrub, native grassland, oak woodland, riparian, and wetland habitats for mitigation projects.

Mr. Krieg prepared final reports for agency approval (USACE, CDFW, California Coastal Commission, USFWS, and RWQCB). Mr. Krieg has performed numerous focused surveys for sensitive species, including the desert tortoise (Gapherus agassizii), cactus wren (Campylorhynchus brunneicapillus), burrowing owl (Athene cunicularia), coastal California gnatcatcher (Polioptila californica californica), and intermediate mariposa lily. He has permits to perform protocol presence/absence surveys of coastal California gnatcatchers.

Mr. Krieg has a substantial background in biological construction monitoring. This monitoring includes overseeing clearing and grubbing, and impact limits, as well as compliance with resource agencies permit conditions and State and federal environmental requirements. Mr. Krieg has monitored and served as Project Manager for large road construction projects, creek realignment projects, utility projects, large residential developments, and smaller infill development projects.

Mr. Krieg has gained a wide range of experience working with utility companies on a variety of projects. For 10 years, Mr. Krieg had on-call contracts with Southern California Edison (SCE) and assisted with deteriorated pole assessments, permitting, preconstruction surveys, construction monitoring, restoration, and other types of projects. As Project Manager for these undertakings, Mr. Krieg has worked on more than 2,000 projects with SCE.

Mr. Krieg has worked on many projects for Caltrans and was Task Manager for most of them. Currently, Mr. Krieg is the Project Manager of a large multi-year contract for Caltrans District 12, which he is managing the associated subs and LSA biologists working on all the task orders.

## PROJECT EXPERIENCE

#### SOLID WASTE/RECYCLING

#### Geosyntec, Alpha Olinda Landfill, 10(a) Permit Orange County, California

Mr. Krieg served as Project Manager for the Habitat Conservation Plan (HCP) and 10(a) Permit at Alpha Olinda Landfill. LSA worked with Geosyntec under its contract. Gnatcatcher surveys were performed in the proposed impact areas within coastal sage scrub. The 10(a) Permit application and HCP were prepared and sent to USFWS for approval and authorization. Mr. Krieg coordinated with OC Waste & Recycling to get the approved 10(a) Permit and get authorization to start the projects.



#### ERIC KRIEG ASSOCIATE / BIOLOGIST



#### SPECIALIZED TRAINING

Wetland Delineation Training Class, Wetland Training Institute, Inc., November 2014

Construction Safety Orientation, Caltrans Division of Construction, January 2003

Desert Tortoise Council 8th Annual Surveying, Monitoring, and Handling Techniques, October 23–24, 1999

#### OC Waste & Recycling, South Region Landfills Orange County, California

Mr. Krieg has assisted with several tasks for the past 9 consecutive years of on-call biological services contracts for OC Waste & Recycling's South Region Landfills, primarily at Prima Deshecha Landfill. He assisted with conducting a jurisdictional delineation, special-status plant species, and coastal California gnatcatcher (*Polioptila colifornica californica*) surveys.

#### OC Waste & Recycling, Gothard Landfill, Gnatcatcher Surveys Orange County, California

Mr. Krieg performed protocol gnatcatcher surveys on the closed Gothard Landfill. Mr. Krieg coordinated with OC Waste & Recycling for the surveys and project coordination with USFWS and CDFW. Mr. Krieg served as task manager for the surveys.

#### TRANSPORTATION

#### Caltrans District 12, Laguna Canyon Road (SR-133) Widening and Drainage Improvement Project Orange County, California

Mr. Krieg served as Biological Task Manager for the Laguna Canyon Road (SR-133) Widening and Drainage Improvement Project. This project proposes several improvements along Laguna Canyon Road from the SR-73 Toll Road to just south of El Toro Road. This project included conducting protocol surveys (coastal California gnatcatcher [*Polioptila californica californica*], least Bell's vireo [*Vireo bellii pusillus*], southwestern willow flycatcher [*Empidonax traillii extimus*], and Pacific pocket mouse [*Perognathus longimembris pacificus*]), surveys for special-status plant and animal species, habitat assessment, a Jurisdictional Delineation and report, and preparation of a Natural Environmental Study and Biological Assessment. Throughout the project, coordination with Caltrans biologist occurred in order to keep them up to date on the fieldwork and survey results.

#### Orange County Transportation Authority, I-5 (Avenida Pico to County Line) San Clemente, California

Mr. Krieg performed protocol gnatcatcher surveys along I-5 from Avenida Pico to the San Diego County line. The surveys were conducted within suitable scrub habitat within the proposed impact limits and a 500-foot buffer. Mr. Krieg coordinated with USFWS and CDFW for the surveys.

#### Caltrans District 12, On-Call Environmental Services Orange County, California

Mr. Krieg has been the Task Manager for several task orders, which involved the review and oversight for the preparation of a Caltrans Natural Environment Study, Jurisdictional Delineation, and Biological Assessment for a proposed highway safety improvement project from 2017 through 2019. Specific tasks included conducting multiple focused botanical surveys, general habitat suitability assessment surveys, vegetation and sensitive plant species mapping, and an oak tree impact evaluation. Mr. Krieg also managed and conducted the monitoring for slope stabilization projects along SR-241. As part of this work, he conducted focused surveys for costal California gnatcatchers (*Polioptila californica californica*) and prepared a construction monitoring report for USFWS.

#### Caltrans District 12, SR-57 and Lambert Interchange Brea, California

Mr. Krieg is serving as Biological Task Manager for the construction monitoring for the SR-57 and Lambert interchange Project. The project includes widening SR-57 and improvements to Lambert to improve the overall interchange. The project includes a Contractor Education Program, preconstruction nesting bird surveys, the



## ERIC KRIEG ASSOCIATE / BIOLOGIST



monitoring of environmentally sensitive area(s) and safety fence installation, coastal California gnatcatcher (Polioptila californica californica) surveys, weekly construction monitoring, and report preparation. Mr. Krieg is performing these tasks himself as the biological monitor, and he was required to have gnatcatcher experience and be approved by USFWS. Mr. Krieg coordinated with both the Caltrans biologist and the Resident Engineer for schedule and project updates.

#### Caltrans District 12, SR-241 Slope Stabilization and Drainage Improvement Project Orange County, California

Mr. Krieg served as the Biological Task Manager for the construction monitoring for the SR-241 Slope Stabilization and Drainage Improvement Project. The project included six locations along SR-241 that required some slope repairs to alleviate storm water problems along the road. The project included a Contractor Education Program, preconstruction nesting bird surveys, the monitoring of environmentally sensitive area(s) and silt fence installation, coastal California gnatcatcher (*Polioptila californica californica*) focused surveys, weekly construction monitoring, and report preparation. Mr. Krieg was either overseeing these tasks or performing them himself as the biological monitor, and he was required to have gnatcatcher experience and be approved by USFWS. Mr. Krieg coordinated with both the Caltrans biologist and the construction manager for schedule and project updates. All work was completed per the designated permits.

#### Caltrans District 12, SR-241 Storm Water Mitigation Project Orange County, California

Mr. Krieg served as Biological Task Manager for construction monitoring of the Storm Water Mitigation Project. The project included five locations along SR-241 that required slope repairs to alleviate storm water problems along the road. Mr. Krieg oversaw and performed four sets of three coastal California gnatcatcher (*Polioptila californica californica*) surveys required before the start of construction at each site. Preconstruction nesting bird surveys were also performed during the gnatcatcher surveys. Monitoring for the removal of vegetation was also performed at each location. Mr. Krieg coordinated with the Caltrans biologist and the construction manager for schedule updates and project updates. All work was completed per the designated permits.

#### UTILITIES

#### Irvine Ranch Water District, IPM Plan Implementation Monitoring and Reporting Irvine, California

Mr. Krieg served as Project Manager for the Irvine Ranch Water District (IRWD) Integrated Pest Management (IPM) Plan Implementation Monitoring and Reporting Project. The project included IRWD's 34 natural treatment system facilities and the 300-acre San Joaquin Marsh. The IPM Plan aimed to treat pests within these facilities, while minimizing impacts on human health and the environment. Under this contract, LSA had been in charge of organizing an innovative approach to managing invasive plant maintenance activities that focused on nonchemical treatment methods. LSA biologists were responsible for routine site visits to map locations of invasive plant pest outbreaks, as well as determining effective treatment methods. In doing so, LSA had developed an interactive data viewer that allows relevant parties to access real-time data, thus streamlining communication between LSA, IRWD, and IRWD's landscape contractor.

#### SCE, On-Call Projects Southern California

Mr. Krieg was the Project Manager for SCE's on-call contract with LSA. The work included Biological Assessments, sensitive species surveys, deteriorated pole assessments, preconstruction surveys, construction monitoring, postconstruction surveys, and permitting. Most of the work was in Southern California, but some projects extend to the limits of SCE's coverage area. This project had multiple subcontractors with whom Mr. Krieg coordinated and managed the multiple project duties.



JESSICA LIEUW

BIOLOGIST





#### EXPERTISE

- Biological Assessments
- Vegetation Mapping
- Wildlife Surveys
- Jurisdictional Delineations
- Bat Surveys

#### EDUCATION

B.A., Environmental Science, Minor in Urban and Regional Planning, University of California, Irvine, California, 2017

#### PROFESSIONAL EXPERIENCE

Biologist, LSA, Irvine, California, 2019–Present

Wetlands Specialist, Irvine Ranch Water District, Irvine, California, 2018–2019

Natural Resource Intern, Irvine Ranch Water District, Irvine, California, 2017–2018

# SPECIALIZED

Southwestern Desert Bats Class, Maturango Museum, 2022

California Rapid Assessment Method (CRAM), California Wetland Monitoring Workgroup, 2021

Wetland Delineation Training Course, Wetland Training Institute, Inc., 2019

Desktop GIS Continuing Education Course, Pace University, 2018

#### **PROFESSIONAL RESPONSIBILITIES**

As a Biologist with LSA, Ms. Lieuw conducts biological surveys and monitoring throughout Southern California for a variety of projects, including preconstruction nesting bird surveys, habitat restoration monitoring, and bat habitat assessments, emergence surveys, and exclusions. She also has experience with biological assessments and jurisdictional delineations and has extensive experience working with native and nonnative wetland species in Southern California. She has also performed aquatic invertebrate/vertebrate surveys, sediment sampling, and water quality monitoring.

#### PROJECT EXPERIENCE

#### Irvine Ranch Water District, Integrated Pest Management Plan Implementation

#### Irvine, California

Ms. Lieuw conducted site visits to over 30 natural treatment system facilities and the San Joaquin Marsh to map locations of invasive plant pests and determine effective treatment strategies. She also helped develop an interactive data viewer to display data and streamline communication and authored annual reports discussing treatment.

#### Geosyntec, Santa-Ana Delhi Channel Improvement Project Newport Beach, California

Ms. Lieuw conducted and authored reports for a jurisdictional delineation, an assessment of wetland/stream function using the California Rapid Assessment Method, and a bat habitat assessment for the Santa-Ana Delhi Channel Improvement Project, in an area containing native habitat types including freshwater marsh, salt marsh, and coastal sage scrub.

#### Aliso Viejo Community Association, Kathryn Thompson Mitigation Area Aliso Viejo, California

Ms. Lieuw provided biological consultation for fire fuel modification activities and vector control activities in the Kathryn Thompson Mitigation Area. Planned activities required the preparation of a Section 1602 Streambed Alteration Notification for the CDFW. Following the successful receipt of an agreement, Ms. Lieuw conducted nesting bird surveys and vegetation removal monitoring within the work area.

#### Irvine Ranch Outdoor Education Center, Restoration Monitoring Orange County, California

Ms. Lieuw conducted a qualitative performance monitoring survey within multiple compensatory coastal sage scrub restoration areas on the 210-acre Irvine Ranch Outdoor Education Center. She also monitored vegetation removal to comply with fuel modification requirements.

#### Caltrans District 12, SR-74 Plant Establishment Project Orange County, California

Ms. Lieuw conducted an assessment of stream function using the California Rapid Assessment Method and assisted in conducting a benthic macroinvertebrate survey within the San Juan Creek. She prepared technical reports documenting the findings from the surveys, which included assessing



# JESSICA LIEUW

BIOLOGIST



the benthic macroinvertebrate community assemblage as a bioindicator for water quality.

#### Caltrans District 12, SR-1 Bicycle and Safety Improvement Project Orange County, California

Ms. Lieuw conducted a jurisdictional delineation, general biological survey, and rare plant surveys for the SR-1 Bicycle and Safety Improvement Project located adjacent to coastal marsh and dune habitat. Rare plant species identified included coast woolly heads (*Nemacaulis denudata*), red sand verbena (*Abronia maritima*), spiny rush (*Juncus acutus*), and estuary seablite (*Suaeda esteroa*).

#### Caltrans District 12, SR-74 Safety Improvement Project Arroyo Toad Surveys and Invasive Predator Removal

#### Orange County, California

Ms. Lieuw conducted invasive predator removal of the American bullfrog (*Lithobates catesbeianus*) and red swamp crayfish (Procambarus clarkii) within San Juan Creek as part of a mitigation requirement for impacts to designated arroyo toad (*Bufo californicus*) critical habitat. American bullfrogs were removed using gigs or dip nets and humanely killed—adult American bullfrogs were dissected and examined for reproductive status and stomach contents. Incidental occurrences of arroyo toads were also recorded.

#### HNTB, Yorba Linda Boulevard Widening Project Yorba Linda, California

Ms. Lieuw conducted species inventory surveys, a bat habitat assessment, focused bat surveys, vegetation mapping, and a jurisdictional/wetland delineation for the proposed widening of a bridge over the environmentally sensitive Santa Ana River. She also prepared the technical report assessing potential impacts to sensitive biological resources and including measures to avoid or mitigate for impacts to several special-status species, wetlands, and critical habitat with regard to CEQA.

#### Monterey Park Retail Partners LLC, Mitigation Area Restoration Monitoring Monterey Park, California

Ms. Lieuw conducted a qualitative assessment of the coastal sage scrub restoration sites within Puente Hills Habitat Preservation Authority lands during the 120-day establishment period. She also performed a survivorship count of installed container plants following the 120-day establishment period to ensure that the site was meeting performance standards.

#### Irvine Ranch Water District, Natural Resource Monitoring and Assessment Irvine, California

Ms. Lieuw monitored the flora and fauna of 36 urban runoff treatment wetlands through identification of native and nonnative plants, birds, invertebrates, and other biota. She assessed water quality at the influent and effluent of each wetland using YSI EXO sondes, as well as taking grab and composite water samples. She operated all-terrain vehicles, four wheel drive vehicles, amphibious vehicles, and tractors on rough terrain. Ms. Lieuw also headed the study of macroinvertebrates within treatment wetlands as a proxy for evaluating water and habitat quality. She planned and executed field sampling; processed samples in the laboratory; conducted statistical analysis; and prepared reports, presentations, and posters.

#### OC Waste & Recycling, Trabuco Creek Mitigation Area Ordinary High Water Mark Delineation Orange County, California

Ms. Lieuw conducted an ordinary high water mark delineation prior to removal of invasive giant reed (Arundo donax) along Trabuco Creek. The mitigation area is part of a comprehensive mitigation package including giant reed removal, wetland creation, ephemeral drainage creation, and associated habitat restoration for Prima Deshecha Landfill.



#### Bemus Landscape Inc. Safety Training Program Overview

At **Bemus Landscape Inc.**, safety, respect, and accountability define the way we work. Our comprehensive **Safety Training Program** is designed to prevent injuries, reduce risks, and foster a culture of safety and professionalism across all roles—field, management, and office.

Every team member is expected to actively participate in and uphold our safety standards, which are rooted in regulatory compliance and continuous improvement.

## 1. Injury and Illness Prevention Program (IIPPP)

This program outlines our company's system for identifying, reporting, and correcting unsafe conditions and practices, in alignment with OSHA requirements. It ensures each employee understands their role in maintaining a safe and healthy work environment.

#### 2. Heat Illness Prevention Program (HIPP)

Our HIPP provides essential training on recognizing heat-related symptoms, implementing rest and hydration strategies, and understanding emergency protocols for outdoor work during hot conditions.

#### 3. Code of Safe Practices

All employees are trained in our Code of Safe Practices, which includes specific expectations for personal behavior, equipment use, and hazard awareness on and off the job site.

#### 4. Hazard Communication Program (HAZCOM)

We train employees on how to safely handle and understand hazardous substances, including reading labels and Safety Data Sheets (SDS), in full compliance with OSHA's HAZCOM standard.

#### 5. Equipment-Specific Training

Before operating any equipment, employees receive hands-on training and must demonstrate safe and proper use. Training includes:

- Weed Wackers
- Stick Edgers
- Edge Trimmers
- Blowers
- Push Mowers (21")
- Ride-On Mowers (36", 48", 52")
- Skid Steers

This approach ensures that accountability is balanced with opportunities to learn an

## 6. Pesticide Management Training

Applicable employees are trained in pesticide and herbicide safety in accordance with OSHA and the Department of Agriculture. This includes handling, application, emergency response, and storage practices. 17



## 7. Defensive Driving Program

Drivers receive formal training on safe driving habits, hazard awareness, and vehicle control. This program is reinforced with retraining following any at-fault incidents.

## 8. Flex & Stretch Program (Daily)

Before the start of each workday and **prior to dispatch**, all field employees participate in our Flex & Stretch routine. These daily warm-ups help prevent soft tissue injuries by preparing the body for physical work.

## 9. Daily Gate Check Inspections

Each morning, we conduct **daily gate check inspections** to ensure vehicles, trailers, and equipment are in safe working condition before being dispatched to job sites.

#### 10. Near Miss Reporting

All employees are required to report near misses, regardless of severity. This proactive approach allows us to address hazards before they result in incidents.

#### 11. Weekly Tailgate Safety Meetings

We conduct **52 tailgate meetings each year**, with **a different safety topic covered each week**. These discussions are designed to raise awareness and proactively address seasonal, task-specific, or trending hazards.

## 12. Workplace Violence Prevention

Employees are trained to recognize and report any signs of violence or aggressive behavior. Our zero-tolerance policy ensures a safe and respectful workplace for all.

## 13. Sexual Harassment Prevention Training

All field employees, account managers, branch managers, and office staff receive mandatory training on preventing sexual harassment. We are committed to fostering a culture of respect and inclusion across the organization.

## 14. Disciplinary Action & Retraining Protocol

Our program includes a **fair and structured disciplinary process** for addressing safety violations and near misses:

- Verbal Warning
- Written Warning & Mandatory Retraining
- Suspension
- Termination (if necessary based on severity or repeated violations)

This approach ensures that accountability is balanced with opportunities to learn an



# A. Trabuco, Orchard Retarding Basin, and Eastfoot Retarding Basin:

## 1. Routine Maintenance:

- Focus routine maintenance efforts primarily on the NTS site area (channels/ponds, buffer).
- For the broader, flat area of the basin bottom:
  - Clear sediment from perimeter ditches, sediment traps, inlet aprons, and walkways.
  - Clear vegetation and debris around sampling sheds and other hardscape areas.
  - Perform regular weeding of invasive species across the basin bottom.

## 2. Vandalism/Incident Reporting:

• Report any observed vandalism, graffiti, etc., immediately to IRWD.

## 3. Mowing of Vegetation:

- **Pre-Rainy Season Mowing** (Sept 15 Oct 15): Mow vegetation in the larger basin bottom, outside the NTS site area. All material should be hauled off-site and disposed of properly.
- **Pre-Nesting Season Mowing** (February): Mow again, pending the results of a nesting survey.

## **B. Quail Springs:**

- 1. Gabion Maintenance:
  - **Monthly Task:** Remove all vegetation from the gabion each month.

# Regular Maintenance Activities for All Sites (Including Trabuco, Orchard Retarding Basin, Eastfoot Retarding Basin, and Quail Springs):

- 1. Weekly Tasks:
  - Submit detailed weekly field forms documenting maintenance completed for each site.
  - Map and identify all non-native species, particularly invasive ones, and plan removal for the next week.
  - Attend weekly meetings with IRWD to review completed work and plan for the following week.
  - Clean intake grates and remove trash at Muddy Canyon and Los Trancos, providing documentation/photos to IRWD.

## 2. Monthly Tasks:

- **Trash Removal:** Remove all trash, empty trash cans (replace liners), and clean trash screens.
- **Debris Removal:** Remove accumulated debris and sediment from structures (e.g., inlet/outlet, sediment traps, intake grates, ditches).
- **Non-native and Undesirable Species:** Remove non-native plants and undesirable natives like cattails and mulefat.
- Algae



- **Vegetation Trimming:** Trim vegetation along trails, roads, and concrete walkways to a minimum of two feet from structures.
- **Aquatic Vegetation Management:** Trim aquatic plants like bulrush and cattails to 10 feet from inlet/outlet structures and no more than a 4-foot width around pond margins. In channels, trim aquatic vegetation in 20-foot sections, alternating with 20-foot sections of open water.
- **Reshape Channels:** Ensure flow direction in and out of basins is maintained through the use of sandbags or sediment removal.
- **Irrigation Audits:** Conduct monthly irrigation audits and submit reports to IRWD detailing any repairs and adjustments made.

## 2. Quarterly Tasks:

- **Sand Canyon:** Remove trash from the shoreline extending 100 feet on either side of the dam face and dispose off-site, reporting the total weight of trash removed.
- Rattlesnake Reservoir: Check inlet structures and remove overgrown vegetation.

## 3. Biannual Tasks:

- **Tree and Shrub Fertilization:** Fertilize all trees and shrubs using IRWD's fertilizer pellets in spring and late fall.
- **Wetland Units Maintenance:** At Baker WTP, remove accumulated debris from modular wetland units and inspect for non-native plants, especially around emergency outlet structures.
- Mowing Pre-Rainy Season: Mow vegetation in the specified basins (Trabuco, Orchard Retarding Basin, Eastfoot Retarding Basin, Marshburn) before the rainy season (Sept 15 - Oct 15), with all materials hauled off-site.

## 4. Annual Task:

• Perform a **major vegetation removal** across all sites once a year, trimming back aquatic and terrestrial vegetation by 50%, in coordination with IRWD.

## General Guidelines for All Work:

- 1. Compliance with Biological Rules:
  - From **March 15 September 15**, all vegetation removal and earthwork must be surveyed by a qualified biologist to ensure compliance with biological regulations.



Bemus Landscape has teamed up with LSA to effectively manage the sites per the RFP. Our plan is to utilize a blend of experience, expertise, landscape best practices, and technology to effectively each of the sites.

Work Plan

Below is our detailed description of how we will fulfill each of the requirements of the Work Plan outlined in Section II:

A. Removal of Trash - Bemus Landscape will ensure consistent trash removal within site boundaries, including emptying trash cans, cleaning trash screens, and reporting the weight of trash removed monthly. Our team will dispose of all debris responsibly, adhering to the highest standards of environmental compliance.

B. Full Complinace of IPM Plan - Bemus Landscape will partner with LSA to ensure that site tasks are clearly identified by a qualifited biologist prior to work taking place. (SEE SAMPLE MAP). The biologist will visit each site the week prior to maintenance crew, and will provide a map with non-natives for removal (with recommended method, i.e.; hand removal vs herbicide spot treatment), nest activity, irrigation items, other items of note, to ensure IPM plan is followed with each visit. Before/After photos will be provided weekly, showing the work that was completed.

C. Fertilizer Pellets - We commit to using the District's fertilizer pelletes in accordance with the scope of work.

D. Removal of all non native species - Our team will strictly adhere to IRWD's Integrated Pest Management (IPM) Plan. We will map and identify non-native species at each NTS basin, providing weekly updates to IRWD in both PDF and geospatial formats. A qualified biologist will oversee these efforts to ensure effective and cost-efficient control of invasive species while maintaining the health of the ecosystem.

E. Removal of accumulated debris - We will review all structures at a minimum of one time per month, and daily during rain events. We understand the importance of keeping trash and debris out of waterways by managing the inlets and outlets.

F. Removal pond surface undesireables - This will be an ongoing maintenance item that will be managed and communicated monthly.

G. Trimming of vegetation from trails, roads, etc. - Our monthly schedule and photo documentation will ensure that we are identifying, performing, and documenting the items that are necessaary for routine trimming.

H. Trimming and shaping ornamentals - With our extensive experience maintaining ornamental landscape, we will ensure these itesm are pruned properly.

I. Trimming of terrestrial and emergent aquatic vegetation - These items will be pruned on a rotation schedule, and will communicated as necessary.

J. Trimming and/or removal of aquatic vegetation - These items will be pruned on a rotation schedule, and will communicated as necessary. During time of heavy growth, additional man power will be provided at no additional cost, to ensure that vegetation is kept to standards.

K. Reshiaoing channels - This will be an ongoing management item. We will identify items that require reshaping channels and will communicate plan and show photos of completed work.

L. Mantenance of aquatic vegetation - will be managed per specifications.

M. One major aquatic removal - We will bring in additional man power to perform large removals, so we do not fall behind our routine maintenance activities.

N. Prune and removal dead/damaged plant material - These items will be photo documented while we are on site, and communicated with locations and photos.

O. All work must be in accordance with Landscape Maintenance Specifications - We are clear on the specifications, and will ensure we communicate clearly on our progress.



P. Rain events - Our staff will be present during rain events to ensure we are identifying issues in real time.

Q. Auditing Irrigation - With our extensive experince managing irrigation systems, we will ensure the scheduled are set, inspections are performed, and repairs are made so to maximize efficiency. We mamange over 100 Calsense controllers and are familiar with all facets of programming and management.

R. Vegetation removal/earthwork - All major removals and earthwork will have biologist interaction. Our biologists will be on every site monthly to review items that require removal.

S. Reporting, Documentation, and Communication.

S.1. Vandalism - Our photo documentation and GPS location of all tasks and isseus allow us to share items outside our scope of work in a clear and concise way.

S.2. Submittal of weekly field form - Our weekly field form report will show items completed, and our schedule for the upcoming week. Items that need to be completed will have an overhead satelilite image showing GPS 'pins' with a list of tasks. These items will have descriptions and a legend to describe to items to be completed. This will be accompanied with photos of completed tasks.

S. 3. - Monthly schedule for following month - We use a landscape software that allows us to communicate our daily, weekly, and monthly schedule at the click of a button. This schedule is what our crews use to determine their daily schedule and tasks to be completed. We will share schedule, tasks, man power and any additioanl items that fall outside of the routine maintenance items.

S. 4. Irrigation reporting - We digitally log all inspections and repairs with GPS and photos. These reports will be shared with IRWD staff monthly.

S.5. We look forward to sharing our progress and upcoming schedule .

S.5.a - Our team of biologists will prepare weekly 'non-native species and maintenance maps' showing type of species, GPS location, and schedule for removal.

S.5.b - Corrections - We will ensure corrections are communicated weekly and completed within 7 days.

S.6 Submittal of monthly invoices - All invoicing requirements will be followed.

Man Power:

Foreman (1) - 40 hours per week

Gardener (2) - 80 hours per week

Irrigation Tech (1) - 4-6 hours per week / as needed

Account Manager - 16-24 hours per week / as needed

Biologist - 12-16 hours per week

Seasonal Variation - We are confident that we can balance our seasonal tasks with 3 full time workers and a part time irrigation tech.

#### Equipment List

Crew Truck - All of our crew trucks come equipped with a Truck, 18' landscape trailer, small equipment (hedgfe trimmers, blowers, weedeaters), spray tank, first aid kit, fire extinghuisher, and hand tools.

Gator as necessary for larger sites.

Spplemental equipment:

- Gator as necessary

- Roll off truck for container removal.

- Large equipment - loadrers, backhoes brush hog, etc.

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2025



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-							

SUN	MON	TUE	WED	THU	FRI	SAT
	1 Eastfoot Retarding Basin 1,2	2 Upper Eastfoot	3 Middle Eastfoot	4 Middle Eastfoot	5 Lower Eastfoot	6
7	8 Lower Eastfoot	9 Forge Meadow	10 Port Culver	11 Orchard Meadow	12 El Modena 1 Orchard Retarding Basin 1,2 Twisted Oak 1	13
4	15 Trabuco 1,2	16 Trabuco 1,2	17 Eastwood Basin	18 Cypress Meadows A	19 Cypress Meadows A	20
21	22 Cypress Meadows B	23 Cypress Meadows C	24 Cypress Meadows D	25 Quail Springs	26 Quail Springs	27
28	29 Quail Meadow 1 Turtle Ridge	30 Old Laguna				

\*This is a proposed sample monthly schedule



Biologist will provide a map each week identify tasks to be performed by maintenance crew. Map will include geolocation and task to be completed for the following items:

- Non-natives weeds
- Irrigation Issues
- Trash
- Other Miscellaneous Items
- Seasonal tasks
- Access items



Floral View

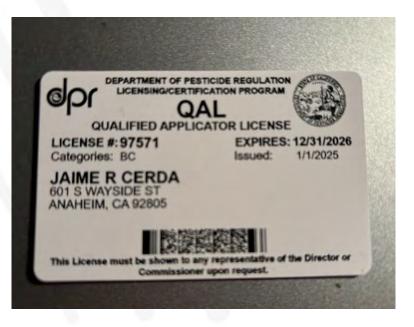


Supplemental weekly reports will be provided to show after photos as well as items accomplished throughout the week. These will be tied to GPS locations and progress throughout the various sites.











Description	30 Days	60 Days	90 Days	COMPLETE
Initial quality scoring to establish baseline for measuring improvement prior to job start, then quarterly thereafter. Establish annual IQ goals.		•		
- Deficiencies	•			
- Irrigation Audit Report	•			
- Rotation Map	•			
- Rotation Calendar	•			
- Propose immediate irrigation repairs, and complete as necessary	•			
Implement Water Management/Conservation Program.		•		
Make all necessary immediate repairs (pending approval).		•		
Perform initial job assessment and submit written/photo documented report to Management Company. Report will include:			•	
- Identify and report potential upgrades and opportunities for savings.			•	
- Pests and diseases identified.			•	
- Hazards, and liabilities.			•	
- Proposals/Budget Requests			•	
<ul> <li>Tree Care Management Plan and Inventory – This will include tree trimming schedule, fertilization schedule, identification of sick and hazardous trees performed by In House Arborist.</li> </ul>			•	
- Proposals/Budget Requests			•	
Property up to Bemus standards (80 IQ score or higher).			•	
Full implementation of ongoing management program.			•	
Full implementation of water conservation program.			•	
Weed free projects.				



**Water management** has come to the forefront of concerns for properties like yours. Bemus Landscape recognizes water as one of earth's most precious resources. We manage over 2 billion gallons of water a year and believe that it is our duty as a responsible business to proactively manage your water.

## Our approach:

**System Evaluation:** The first step of responsible water management is to evaluate the system . At this stage we inspect and report on system deficiencies such as breaks, leaks and safety issues. After any initial repairs are done we continue to regularly inspect the system to make sure it is functioning properly.

**Manage Usage:** Once the system is fully functioning, we move to managing usage. With client provided water bills we compare ongoing actual usage with the water allocated by the local district. We adjust our programming to be as efficient as possible. In addition to ongoing management we keep an eye on the plant health in order to communicate any improvements that may be needed.

**Improvements:** Inefficient irrigation can create unnecessary costs in the form of wasted water, plant decline, asphalt damage, etc. We will work with you to provide solutions that allow you to maximize your system. These include possibilities such as drip conversions, specialized flow/shut off valves, and lower water using plants. Additionally these can be put into a Return on Investment calculation to allow you to make educated decisions.

#### **Additional Strategies:**

#### Rebate Programs

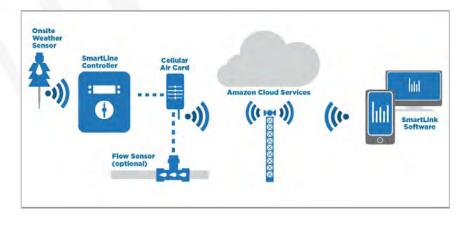
We facilitate the application process for rebates. We are very familiar with all water districts throughout Southern California and the programs that they offer. With the results of our initial inspection we can make recommendations for system upgrades.

#### Weather based / Smart Controllers

These systems have grown in popularity over the last 5 years. After the system is installed it starts with online management, then the local weather station provides daily weather and rainfall data. The servers access the weather data, computes evapotranspiration, and generates a watering schedule for each landscape profile. Results have shown healthier landscapes, better water management while reducing harmful runoff pollution and potential water savings of 20 to 50%.

Our Irrigation Manager monitors the irrigation control system as often as required, and makes continuous adjustments based on seasons, plant and zone attributes, run times, and flow readings.

We can use a ROI calculation to determine if it's feasible for the association to invest in the new technology for water management.





At Bemus Landscape, we like to take a systematic approach to the renovation process. We believe it is imperative to establish a long term plan based on the needs of the community.

Here is our process:

#### **Design Plant Palette**

Here we work with the Board of Directors/Landscape Committee to establish a the criteria of what plant material is most consistent with the architectural theme, adheres to same water requirements, and is aesthetically appealing. (See sample Plant Palette)

#### Design Photo Rendering(s)

After the Plant Palette has been completed, we will begin to work on the Photo Rendering. This will allow us to implement the Plant Palette into a visual image, showing what the completed product will look like. This allows the client to have a visual concept of the design , and helps avoid any misconceptions of the final product. (See sample Photo Renderings).

#### Installation

This is where the rubber hits the road. Here we begin the installation using the skills we have acquired over the last 39 years of landscape installation. We strip the existing landscape material, check the irrigation coverage, test the soil, apply the required nutrients, and then we begin our install. (The example image below represent a before and after photo rendering of a potential conversion)





# **REQUEST FOR PROPOSAL**

# Natural Treatment System Landscape Maintenance NORTH

Date: February 6, 2025 Michelson Operations Center 3512 Michelson Drive Irvine, CA 92612

## QUESTIONS DUE BY: 4:00 PM, FEBRUARY 24, 2025 PROPOSAL DUE BY: 4:00 PM, MARCH 13, 2025 BID BOND DUE BY: 4:00 PM, MARCH 13, 2025

## Project: Natural Treatment System Landscape Maintenance (North) Project Coordinator: Aimee Halligan

The Irvine Ranch Water District (IRWD or the District) invites environmental consulting firms and/or landscape contract companies to submit a proposal to complete the landscape maintenance project herein described. The bid is to include all labor, material, equipment, traffic control, bond fees and insurance costs required for the project. The bid shall include both a lump-sum total and individual line items that include all work described in the scope of work. All bid documents and submissions will be conducted electronically through the District's ePurchasing website at https://irwd.ionwave.net/. It is the prospective bidders responsibility to download bid documents and check for addenda or updates on a regular basis. For login or registration assistance, please contact purchasingdept@irwd.com.

The following information is provided for guidance in preparing your proposal:

## I. PROJECT DESCRIPTION AND BACKGROUND INFORMATION

Established in 1961 as a California Water District, IRWD provides drinking water, sewage collection and treatment, recycled water, and urban runoff treatment to over 390,000 residents of Central Orange County, California. IRWD encompasses nearly 181 square miles extending from the Pacific coast to the foothills and has more than 110,000 domestic and recycled water connections. IRWD serves the City of Irvine and portions of the Cities of Costa Mesa, Lake Forest, Newport Beach, Tustin, Santa Ana, Orange and unincorporated Orange County.

In 1997, IRWD established the San Joaquin Marsh and Wildlife Sanctuary (SJM), an approximately 277-acre freshwater marsh and upland riparian habitat adjacent to its Michelson Water Recycling Plant. The SJM serves three primary functions: to treat and remove pollutants from urban runoff in the San Diego Creek Watershed; to provide mitigation habitat for wildlife and habitats impacted by development in Irvine; and to provide recreational opportunities for the public.

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1 C-30 Following the success of the SJM, IRWD developed the Natural Treatment System (NTS) in 2005. The NTS uses the concept of the SJM and establishes small treatment wetlands throughout the San Diego Creek Watershed to remove pollutants on a regional basis. The NTS currently has 44 sites, of which 20 are covered by this landscape maintenance contract. The system is growing, and additional sites will be added in the foreseeable future.

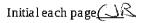
The NTS North contract area must be staffed with a crew of an appropriate size to fulfill all requirements of the *Work Plan* and Table 1.1 and 1.2 (below). This crew shall include a minimum of one foreman present with the crew, Monday through Friday. Typical work hours shall be during IRWD's regular business hours of 6:00 am to 4:30 pm, Monday through Friday and with respect to local city noise ordinances, typically 7:00 am - 7:00 pm, unless other arrangements are made with IRWD NTS staff. Work outside of these hours is subject to authorization by IRWD in advance.

## II. SCOPE OF WORK

The Contractor shall maintain the NTS sites in good order and appearance, in accordance with the requirements detailed in the following *Work Plan*, the *Landscape Maintenance Specifications* (see Attachment A), and in accordance with IRWD's *Integrated Pest Management (IPM) Plan* (see Attachment B). The scope of work detailed in the *Work Plan* is to be carried out across all NTS sites listed in Table 1.1.

No.	Name of Site	Approximate Address	Latitude	Longitude	Approximate Area (sq. ft.)	<u>Minimum</u> Maintenance Frequency
1	Forge Meadow	3801 Portola Parkway, Irvine	33.735694	-117.762969	103,500	Once a month
2	Port Culver	4527 Portola Parkway, Irvine	33.731644	-117.757375	75,800	Once a month
3	Orchard Meadow	4645 Portola Parkway, Irvine	33.728553	-117.748167	100,200	Once a month
4	Lower Eastfoot	100 Whispering Trail, Irvine	33.74075	-117.764994	92,700	Once a month
5	Middle Eastfoot	11165.5 Woody Knoll	33.748445	-117.763416	138,200	One a month
6	Upper Eastfoot	11051.75 Woody Knoll	33.751426	-117.762818	62,100	Once a month
7	El Modena <sup>1</sup>	382 S. Hewes Street, Orange	33.780403	-117.805394	70,100	Once a month
8	Trabuco <sup>1,2</sup>	57 Regal, Irvine	33.696869	-117.7585	787,000	Once a month
9	Cypress Meadows A	1203 Visions, Irvine	33.688683	-117.765292	263,100	Once a month
10	Cypress Meadows B	234 Rose Arch, Irvine	33.683185	-117.762488	90,000	Once a month
11	Cypress Meadows C	234 Rose Arch, Irvine	33.681478	-117.760483	114,400	Once a month
12	Cypress Meadows D	234 Rose Arch, Irvine	33.680306	-117.75782	138,600	Once a month
13	Eastfoot Retarding Basin <sup>1,2</sup>	10823.5 Rembrandt, Irvine	33.751038	-117.753076	434,400	Once a month

Table 1.1 – NTS Sites included in Scope of Work (see detailed map attached)



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14	Eastwood Basin	5095.5 Irvine Boulevard	33.712341	-117.75652	82,400	Once a month
15	Orchard Retarding Basin <sup>1,2</sup>	266.75 Crescent Moon	33.738414	-117.745209	77,300	Once a month
16	Twisted $Oak^1$	No address, see map	33.73421	-117.748493	14,300	Once a month
17	Old Laguna	16585.5 Laguna Canyon Road, Irvine	33.651461	-117.468039	122,500	Once a month
18	Quail Meadow <sup>1</sup>	See map	33.655956	-117.776756	61,200	Once a month
19	Quail Springs	33.5 Shady Canyon Drive, Irvine	33.657153	-117.780931	473,100	Once a month
20	Turtle Ridge	157.5 Shady Canyon, Irvine	33.633189	-117.823178	85,800	Once a month

1 These sites do not currently have irrigation.

2 See "Site Specific Requirements" section below for more information on maintenance at these sites.

Should additional sites be added during the contract period, IRWD and the Contractor will mutually agree in writing on future costs for landscape maintenance of these sites. In such cases, IRWD may consider the authorization of a change order or similar process.

#### Work Plan

Contractor must carry out the following tasks at a minimum each month:

- A. Removal of all trash within site boundaries (refer to attached aerial photos of sites for boundaries). If trash cans are present, trash must be emptied and liners replaced. Trash screens on outlets must be regularly cleaned and maintained to prevent discharge of debris greater than 5mm. Total weight of trash removed must be weighed and reported to IRWD NTS staff on a monthly basis. Trash must be disposed of by Contractor off-site.
- B. Full compliance with IRWD's IPM Plan (Attachment B). In addition, the Contractor will be expected to map and identify all non-natives (some ubiquitous species may be excluded) at each NTS basin (where applicable) and present these maps to the District each week in a coordination meeting (map must be in PDF electronic format and must also be made available to the District in geospatial data format). The mapping effort shall direct the work of the landscape Contractor to ensure non-native, invasive species are controlled and removed in a cost-efficient manner consistent with the IPM Plan. This effort shall be conducted by a qualified biologist.
- C. The Contractor will commit to using the District's fertilizer pellets in accordance with sections 3 and 3.6 in the Landscape Maintenance Specifications (Attachment A), if available.
- D. Removal of all non-native plant species (with emphasis on priority target species) and undesirable natives (cattails, mulefat, and woody vegetation (willows, cottonwood trees, etc.)) within site boundaries using integrated pest management techniques starting with hand removal and escalating to herbicide application only if necessary and justified via documented herbicide authorization memorandum. Herbicides may only be used if physical removal methods (hand removal, mulching, etc.) are ineffective and may only affect the target species (through use of selective herbicides and spot spraying).
- E. Removal of accumulated debris and sediment from all structures, including but not limited to inlet and outlet structures, sediment traps, intake grates, ditches and kiosks.
- F. Removal of algae, mosquito fern and other floating vegetation to less than 50% of pond surface.

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- G. Trimming of vegetation from all trails, roads, concrete walkways, and other structures including, but not limited to: pipes, irrigation boxes and heads, electrical boxes, bird boxes, signs, ditches, fences, weir structures, and sampler enclosures to a minimum of two feet.
- H. Trimming and shaping of roses (and fertilize, if necessary), morning glories, honeysuckles, and other vine species along fences.
- I. Trimming and/or removal of terrestrial and emergent aquatic vegetation (i.e. bulrush and cattails) to ten feet from inlet and outlet structures to allow access by IRWD NTS staff.
- J. Trimming and/or removal of aquatic vegetation in channels to 20 feet sections, followed by 20 feet sections of bare channels, continuing this pattern throughout channels as needed per site conditions.
- K. Reshaping channels to direct flow into and out of basin via sandbags and/or sediment removal, as needed.
- L. Maintenance of aquatic vegetation to no more than a four-foot width around margin of ponds.
- M. One major annual aquatic and terrestrial vegetation removal per site, including trimming back vegetation (i.e. bulrush and cattails, and other species as determined in consultation with IRWD) by approximately 50%.
- N. Prune and remove dead or damaged plant materials. Replace dead plants if needed in coordination with IRWD and with identification of root cause. Notify IRWD ASAP of any dead or dying trees, shrubs or ground cover.
- O. All work must be in accordance with IRWD's *Landscape Maintenance Specifications* (Attachment A) and IPM Plan (Attachment B), which are attached.
- P. During rain events, Contractor must provide regular maintenance crews to conduct inspections of sites to prevent damage and/or respond to IRWD NTS staff instructions to repair damage.
- Q. Auditing of irrigation at all sites on a monthly basis, including testing of all irrigation stations, visual inspection of each head, master valve, and flow sensor, and submittal of irrigation report to IRWD NTS staff at end of month. Each monthly irrigation report should include a thorough description of necessary repairs and maintenance items that were completed as well as a confirmation of successful completion of testing of the irrigation system confirming appropriate coverage and functionality. Contractor will be expected to have the ability to complete all necessary irrigation repairs. Contractor shall use IRWD's CalSense platform for irrigation alerts and irrigation management at each site.
- R. Any vegetation removal or earthwork between March 15 and September 15 within or adjacent to existing habitat will require the Contractor to notify IRWD and will require a qualified biologist to ensure that applicable environmental rules are being adhered to. This qualified biologist shall have the authority to stop or otherwise divert work to avoid impacts as necessary. The Contractor shall not resume work until approval by IRWD, the qualified biologist or IRWD designated representative is given.
- S. Reporting, Documentation, and Communication:
  - 1. Reporting of vandalism such as graffiti on same day as observation, via text or phone call.
  - 2. Submittal of fully completed weekly field form (as provided by IRWD) to IRWD NTS staff by Monday at 8am. This form shall be completed in English with appropriate level of detail describing maintenance work and completion status for each site included under this contract conducted during the previous week, including photographs (before and after) and daily reports. May be submitted as a single consolidated report for all sites covered under this contract for the reporting period. Additionally, the Contractor shall include in each report, planned activities for the upcoming week.
  - By the last day of each month, provide IRWD NTS staff with an updated monthly schedule for the following month of what sites will be visited on each day, including name and contact information of English-speaking crew foreman, total number of staff, and approximate hours the crews will be at each site. General information shall also be provided summarizing planned work activities and outstanding items to be addressed. Any changes to this schedule shall be immediately communicated to IRWD NTS staff as it may necessitate changes in IRWD's water quality sampling schedule.
  - 4. Submittal of irrigation audit report for each site to IRWD NTS staff at end of each month.

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- 5. Attend coordination meetings with IRWD and other applicable contractors on a weekly basis (or other cadence as determined in coordination with IRWD; meetings will be generally 1 hour). Contractor shall coordinate with IRWD and identify and share any issues or concerns with the prompt and timely maintenance to address work requests by IRWD NTS staff and or biological consultant as designated by IRWD.
  - a. Prepare and submit non-native species and maintenance maps to the District each week for discussion in weekly coordination meeting (map must be in PDF electronic format and must also be made available to the District in geospatial data format).
  - b. Corrections to any identified maintenance Work Plan deficiencies must be made within 7 calendar days upon receipt of deficiency report from IRWD. Completion of remediation of deficiencies must be documented and reported to IRWD NTS staff upon completion.
- 6. Submittal of monthly invoices to <u>apinvoices@irwd.com</u> and IRWD NTS Staff on last business day of month. All invoicing shall include at a minimum:
  - a. Contract Name
  - b. PO Number
  - c. Date of Services Performed
  - d. Location(s) Of Work Area
  - e. Cost Description/Breakdowns

## Site Specific Requirements:

In addition to the Work Plan detailed above, your proposal must also include the following the specific language for the specified NTS sites:

## A. Trabuco, Orchard Retarding Basin, and Eastfoot Retarding Basin:

- A majority of routine maintenance items overviewed in the Work Plan above are only conducted within the limited boundaries of the NTS site (channels/ponds, buffer) located within the bottom of the retarding basin. Within the broader, flat area of the basin bottom, outside of the NTS site, more limited routine maintenance is conducted, including clearing of sediment from perimeter vditches, sediment trap, inlet apron, and walkways (hardscape), clearing of vegetation and debris around sampling sheds and hardscape, and regular weeding of target invasive species from the basin bottom.
- 2. Vandalism, graffiti, etc. should also be reported to IRWD as soon as possible upon observation.
- 3. In addition, mowing of vegetation in the larger basin bottom, outside of the NTS site (channels/ponds, buffer), prior to rainy season, is to be completed between September 15<sup>th</sup> and October 15<sup>th</sup>. All material shall be hauled off-site and disposed. These sites shall also be mowed once more before the nesting season in approximately February, pending nesting surveys.

## **B.** Quail Springs:

1. Removal of all vegetation from gabion each month.

Generally expected tasks are summarized in the following table, however more detail is provided in the scope description above. Note that sites must be visited <u>at a minimum</u>, on a monthly basis, but also on a cadence and frequency sufficient to complete all of the following tasks

Frequency	Activity				
	Submit weekly field form documenting, in detail, maintenance for each site from the previous week				
Weekly	Map and identify all non-natives (with emphasis on priority target species) for each site to be maintained in the following week, to be presented to IRWD				
	Attend weekly meeting with IRWD to discuss completed work and next week's plan				

Table 1.2 - Regular Maintenance Activities at All NTS Sites (North and South)

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	Clean intake grates and remove trash at Muddy Canyon and Los Trancos and provide documentation photos to IRWD
	Remove all trash
	If trash cans are present, empty and replace liners
	Clean trash screens on outlets
	Record weight of trash, to be reported monthly per site
	Demous a commulated debrie (and impart from all structures (i.e. inlat/outlat, and impart trans
	Remove accumulated debris/sediment from all structures (i.e. inlet/outlet, sediment traps, intake grates, ditches, kiosks)
	Remove non-natives (with emphasis on priority target species) and undesirable natives
	Remove algae, mosquito fern, floating vegetation to less than 50% pond surface
	Trim back vegetation from all trails, roads, concrete walkways, and other structures (i.e.
	pipes, irrigation boxes, irrigation heads, electrical boxes, bird boxes, signs, ditches, fences,
	weir structures, sampler enclosures) to a minimum of 2 feet
	Trim and shape vine species along fences, fertilize if necessary
	Trim and remove aquatic vegetation (i.e. bulrush/cattails) to ten feet from inlet/outlet
	structures and to no more than a 4-foot width around pond margins
Monthly	Trim and remove aquatic vegetation (i.e. bulrush/cattails) in channels to 20 ft sections
	followed by 20ft sections of open water/bare channel, continuing the pattern throughout the
	channel
	Reshape channels to direct flow into and out of basin via sandbags, as needed
	Audit irrigation, test all stations, visually inspect each head, master valve, flow sensor,
	confirm appropriate coverage and function. Document and submit report monthly.
	Report vandalism and graffiti to IRWD ASAP
	Report any identified pest damage to IRWD ASAP
	Notify IRWD ASAP of any dead or dying trees, shrubs or ground cover. Prune and remove
	dead or damaged plant materials. Replace dead plants if needed in coordination with
	IRWD and with identification of root cause
	Maintain all hardscape clean of debris, weeds, animal droppings, etc. Maintain all trails
	and pathways in a clean and safe condition. Maintain existing mulched areas and replace mulch as needed
	At Quail Springs, remove all vegetation from gabions.
	At Sand Canyon, remove all trash from shoreline from dam face extending 100ft on either
Quarterly	side and haul material offsite. Report total weight of trash removed to IRWD within 24
• 9	hours. At Rattlesnake Reservoir, check inlet structures and remove overgrown vegetation.
	In spring and late fall, all trees and shrubs shall be fertilized using IRWD's fertilizer
	pellets.
	Once prior to the rainy season (~August) and once following the rainy season (~May) at
	Baker WTP, remove accumulated debris from modular wetland units and inspect, maintain,
Biannual	and remove non-native and undesirable plants from emergency outlet structure.
	Mow vegetation prior to rainy season, between Sept 15-Oct 15 and haul material offsite, at
	Trabuco, Orchard Retarding Basin, Eastfoot Retarding Basin, and Marshburn. Conduct a
	second mowing just prior to start of nesting season in approximately February.
Annual	Conduct one major aquatic and terrestrial vegetation removal per site, including trimming
	back vegetation by approximately 50%, in coordination with IRWD

1. All tasks should be completed for each site at the identified frequency, refer to contract for additional details.

2. From March 15 – September 15, all work requires pre-survey by a qualified biologist for compliance with biological rules and regulations.

3. All work must be conducted in accordance with IRWD's IPM Plan (Attachment B) and Landscape Maintenance Specifications (Attachment A). Refer to contract, IPM Plan, and Landscape Maintenance Specifications for more details.

Contractor performance will be rated on the following key performance indicators (KPI):

Number	Key Result Area	Key Performance Indicator	Target
1	Maintenance # of maintenance Work Plan deficiencies identified during		0
		regular weekly inspections (i.e. from <i>Work Plan</i> in Section II)	
2	Maintenance	# of irrigation alerts on CalSense controllers during regular	0
		monthly inspections	
3	Maintenance	Minimum # of site visits	See Table 1.1
4	Accountability	Submittal of monthly site maintenance schedule	Last business day of
			prior month
5	Accountability	Submittal of fully completed weekly field forms and photos	Prior to 8 am
			Monday of
			following week
6	Accountability	Submittal of irrigation audit forms	Fifth business day
			of each month
7	Accountability	Date of submittal of invoices to AP Invoices and NTS staff in	Last business day of
		accordance with Section II, Work Plan Item Q	each month

Table 1.3 – Key Performance Indicators

## III. SAFETY AND REGULATORY REQUIREMENTS

Safety shall be of the utmost importance at all times. The Contractor shall safeguard all District, and Contractor personnel, during the progress of the work by providing barricades, flagmen, traffic control and appropriate warning signs as required. Any equipment (such as tractors) shall be of the proper size necessary to safely accomplish the task.

Contractor equipment shall comply with all applicable federal, state, and local regulations, including but not limited to requirements for emissions, noise levels, and safety standards. It is the responsibility of the contractor to ensure that equipment is properly maintained and in compliance with these regulations throughout the term of the contract.

Contractor and associated personnel shall be required to follow all IRWD rules, regulations and procedures as listed in the Emergency Evacuation Plans. These include but are not limited to speed limits. In the event of an emergency the Contractor and all associated personnel shall follow evacuation procedures in the Emergency Evacuation Plans. Contractor shall be held responsible for all such training of all associated personnel.

The Contractor shall provide proof to the District's representative, that they, the Contractor, have in place all safety programs that are required by the state and federal agencies. The Contractor must also prove that all personnel have been trained in these programs, by providing the District with training documentation. The Contractor will be required to provide to the District's representative a copy of the Safety Data Sheets for all chemicals that are brought on site. No hazardous materials will be approved for use or permitted in the building or at the job site. Work areas must be cleaned up at the end of each shift, and no storage of material or equipment will be allowed in the building. All trash and spent materials are to be disposed of off site and in compliance with state and federal regulations. All washing and cleaning of Contractor equipment must be done off site. The Contractor shall protect all surfaces during refueling or other maintenance activities.

The Contractor **shall** perform all work during IRWD's regular business hours of 6:00 am to 4:30 pm, Monday through Friday and with respect to local city noise ordinances, typically 7:00 am - 7:00 pm, unless other

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arrangements are made with IRWD NTS staff. Work outside of these hours is subject to authorization by IRWD in advance.

## IV. QUALITY CONTROL

All work shall be done by experienced and qualified personnel in accordance with the written Request for Proposal. The Contractor will be responsible for quality control of any associated employees' actions and the finished product. The District reserves the right to reject any and all work that it feels is defective and may require the Contractor to repair or replace such work, at no extra cost to the District.

## V. <u>PROPOSAL CONTENTS</u>

The Contractor's proposal must include the following:

- 1. The following proposal components shall be included in each bid:
  - a. Scope of Work
  - b. Org Chart
  - c. Resumes/CVs for key staff
  - d. References
  - e. Proposed Schedule
  - f. Budget/Cost Proposal with breakdown of assumptions
  - g. Sub-Consultants/Partnerships (if applicable)
- 2. Cost proposal and breakdown.
  - a. This should include:
    - i. Full and complete cost per site per month for each year of the contract. Contractor must provide the information listed on attached bid sheet, and is also encouraged to submit supporting documentation providing an overview of assumptions of number of labor hours, equipment and materials costs, etc.
    - ii. Labor must be based on prevailing wage standard for each work task being performed. The attached "LABOR AND PREVAILING WAGE REQUIREMENTS" is incorporated in this Request for Proposal and will be incorporated in the contract.

NOTE: The prices quoted shall be fixed during the term of this contract and mid-contract price or rate increases will not be allowed thereafter unless authorized by IRWD.

NOTE: The full contract amount will be treated as a "not to exceed" amount, and should additional sites be added to IRWD's NTS during the contract term, IRWD and the Contractor will mutually agree in writing on future costs for landscape maintenance of these sites. In such cases, IRWD may consider the authorization of a change order or similar process.

- 3. Demonstration of Contractor's technical expertise in habitat establishment and restoration, including the identification and mapping of non-native and invasive species. Particular focus should be on mapping non-native species for removal and how conformance with an existing IPM was achieved.
  - a. Provide at least three examples/projects that demonstrate this expertise. Include name of project, location, and a summary of the work completed.
  - b. Provide a list and CVs for all key staff. Include names of staff, how many years of experience they have related to habitat restoration and maintenance, and what types of similar projects they have worked on.
  - c. Contractor shall not make any changes in key staff unless authorized by IRWD. If replacement of key staff becomes necessary, Contractor shall provide a replacement with equivalent or better qualifications, subject to approval by IRWD.
  - d. Assigned staff shall have adequate knowledge of habitat restoration projects, including installation and maintenance of riparian, grassland, and coastal sage scrub plant communities, as

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well as drought-tolerant landscaping and irrigation management and repairs. Contractor shall demonstrate that primary staff assigned to the Project shall have a minimum of 5 years of experience in native wetland and riparian type habitats as well as experience working around sensitive species such as the least bell's vireo (*Vireo bellii pusillus*).

- e. The Contractor shall demonstrate the ability to have an English-speaking/bilingual foreman overseeing crews that are assigned to the Project, and that foreman shall be on-site during the performance of all tasks, shall direct and supervise all work performed as specified herein, and shall be responsible for compliance with the Contract scope and Landscape Maintenance Specifications (Attachment A). The name, phone number, and contact information of the Contractor's project manager and foremen assigned to the maintenance activities described herein shall be provided to IRWD, and a backup shall be assigned in the case of any absences.
- 4. A detailed description of how the Contractor will fulfill each of the requirements of the Work Plan outlined in Section II with adherence to the attached Landscape Maintenance Specifications (Attachment A) and IPM Plan (Attachment B). This should include predicted monthly and/or seasonal work schedules, crew sizes, equipment lists, and any other information that provides a clear and specific picture of how the Contractor will approach the work. Although Contractor must perform maintenance work at each site per the minimum maintenance frequency outlined in table 1.1 and 1.2, the Contractor's Work Plan and schedule will be scored based on how well it addresses (in terms of labor allocation) seasonal variations in maintenance needs, ensuring that all tasks outlined in the scope and Table 1.2 are sufficiently completed and that all sites are upkept in good condition.
- 5. Proof of all applicable licenses required to perform the work described herein, including but not limited to an active Contractor's license and a Pest Control Qualified Applicator License issued by the State of California. The Contractor shall also provide any additional licenses necessary to ensure compliance with all applicable laws and regulations for the completion of the project.
- 6. All safety documentation required in Section III.

Please note that IRWD may conduct interviews with each Contractor's proposed team and may contact recent clients. Following conclusion of the bidding period, IRWD will contact bidders to schedule oral interviews, which will also include a presentation component. Bidders will be expected to present a brief PowerPoint presentation outlining the contents of their bid and the qualifications of the proposed team. This presentation should not exceed 15 minutes. The presentation will be followed by a brief question and answer session. Selection of the Contractor will generally be based on the proposal contents, oral interview and presentation contents, prior experience of the firm, and specific experience and capabilities of the designated project team and staff. The Contractor must be fully capable in all areas outlined under the scope of work. The Contractor selected must be able to begin work on June 1, 2025 and must be able to maintain the level of effort required to meet the proposed schedule.

This request does not commit IRWD to retain any Contractors or Consultants, to pay costs incurred in the preparation of proposals, or to proceed with the project. IRWD reserves the right to reject any or all proposals, to negotiate with any qualified applicant, and to appoint more than one Contractor to provide services on given portions of the project.

Proposals (including accompanying materials) will become the property of IRWD. Proposals will be held in confidence to the extent permitted by law. After award of a contract or after rejection of all proposals, the proposals will be public records, subject to disclosure under the California Public Records Act (Government Code Section 6250 et seq.). IRWD reserves the right to request additional information from prospective Contractors prior to final selection and to consider information other than that submitted in the proposal or interview. IRWD may select for contract negotiations the Contractor that, in IRWD's judgment, will best meet IRWD's needs, irrespective of the comparison of fees and costs estimated by the applicants. IRWD may conduct such investigations, as IRWD deems necessary, to assist in bid evaluations, and to establish the responsibility, qualifications, and financial ability of the bidder

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## VI. <u>BOND REQUIREMENTS</u>

Before the Contractor will be allowed to move any staff, material, or equipment, on to the job site and commence any work the following conditions must be met:

- Payment and Performance Bonds are required by successful bidder for "public work" projects over \$25,000, must equal to 100% of the contract amount.
- If the total lump-sum bid amount is \$100,000 or more, a bid bond at 10% of bid amount, shall be submitted in paper form in a sealed envelope titled "Bid Bond" and the project title, by bid closing date.

## **Delivery Address:**

Irvine Ranch Water District Attn: Purchasing Department 3512 Michelson Dr., Irvine, CA 92612

## VII. <u>PREVAILING WAGE</u>

Pursuant to California Labor Code Sections 1725.5 and 1771.1, no contractor or subcontractor shall be qualified to bid on, be listed in a bid proposal or engage in the performance of any contract for public work unless registered with the Department of Industrial relations. It shall be mandatory upon the Contractor and all subcontractors to comply with all applicable California Labor Code provisions, which include but are not limited to prevailing wages (Labor Code Sections 1771, 1774 and 1775), employment of apprentices (Labor Code Section 1777.5), certified payroll records (Labor Code Sections 1771.4 and 1776), hours of labor (Labor Code Sections 1813 and 1815) and debarment of contractors and subcontractors (Labor Code Section 1777.1).

## VIII. INSURANCE REQUIREMENTS

Contractor shall always maintain the following policies of insurance with insurers possessing a policyholders' Rating of A- (or higher) and Financial Size Category of VII (or larger) in accordance with the latest edition of Best's Key Rating Guide, unless otherwise approved by IRWD. Contractor may not commence work until all required insurance documentation, including endorsements, is provided to IRWD.

## Policy Amounts

- A. <u>Comprehensive General Liability Insurance</u>. Contractor shall maintain a comprehensive general liability insurance policy with coverage on an "occurrence" basis, including products and completed operations, property damage, bodily injury, personal injury, and, with limits no less than \$1,000,000 per occurrence, \$2,000,000 aggregate.
- B. <u>Automobile Liability Insurance</u>. Contractor shall maintain an automobile liability insurance policy covering bodily injury and property damage for all activities of the Contractor arising out of or connection with the Services, including coverage for any owned, hired, and non-owned, rented, or leased vehicles, in an amount not less than \$1,000,000 combined single limit for each accident.
- C. <u>Workers' Compensation Insurance</u>. Contractor shall maintain a workers' compensation insurance policy (Statutory Limits), as required by law, and Employer's Liability Insurance (with limits not less than \$1,000,000). Contractor shall submit to IRWD, along with the certificate of insurance, a Waiver of

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Subrogation Endorsement in favor of IRWD, its directors, officers, employees, and agents.

D. <u>Umbrella or Excess Policy</u>. Contractor may use umbrella or excess Policies to provide the liability limits as required in this Agreement.

<u>Additional Insured</u>. General liability, automobile liability and all other applicable policies, including excess/umbrella liability policies, shall provide, or be endorsed to provide, that IRWD, its directors, officers, employees, and agents, are additional insureds under such policies.

<u>Primary Non-Contributory</u>. For any claims related to this contract, the Contractor's insurance, including umbrella/excess coverage, must be primary and non-contributory. Any insurance or self-insurance maintained by IRWD, its directors, officers, employees, and agents will be excess of the Contractor's insurance and will not contribute to such insurance.

<u>Waiver of Subrogation</u>. All insurance coverage maintained pursuant to this Agreement must be endorsed to waive subrogation against IRWD, its directors, officers, employees, and agents, or must specifically allow Contractor to waive its right of recovery prior to a loss. This provision applies regardless of whether or not IRWD has received a waiver of subrogation endorsement from the insurer.

<u>Notice of Cancellation</u>. Contractor shall oblige its broker and insurers to provide IRWD with a 30-day notice of cancellation (except for nonpayment for which a ten-day notice is required) or nonrenewal of coverage for each required coverage. If the Contractor's insurers are unwilling to provide such notice, then Contractor shall notify IRWD immediately in the event of Contractor's failure to renew any of the required insurance coverages or insurer's cancellation or non-renewal.

<u>Requirements Not Limiting</u>. Requirements of specific coverage features or limits contained in this Section are not intended as a limitation on coverage, limits, or other requirements, or a waiver of any coverage normally provided by any insurance. If the Contractor maintains broader coverage and/or higher limits than the minimums shown above, IRWD requires and is entitled to the broader coverage and/or the higher limits maintained by the Contractor.

<u>Separation of Insureds</u>. A severability of interests provision must apply for all additional insureds ensuring that Contractor's insurance applies separately to each insured against whom claim is made or suit is brought, except with respect to the insurer's limits of liability. The policies may not contain any cross-liability exclusions.

Self-Insured Retentions. Any deductibles or self-insured retentions must be declared in writing.

<u>Timely Notice of Claims</u>. Contractor shall give IRWD prompt and timely notice of claims made, or suits instituted that arise out of or result from Contractor's performance under this Agreement, and that involve or may involve coverage under any of the required liability policies.

## IX. COLLATERAL DAMAGE

Contractor shall be responsible for all damage to IRWD property, facilities or personnel caused by its employees, subcontractors or their equipment during the performance of the contract.

## X. <u>PROJECT COMPLETION</u>

The project is complete when all work activity has been completed and all items on the punch list have been completed. All work must have passed inspection by the District's representative and the site must be left neat and clean. Payment may be withheld until monthly work is completed and approved by a District representative.

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## XI. AWARD OF CONTRACT

- 1. If the contract is to be awarded, it will be awarded to the Contractor who, after evaluation by the District, best meets the following criteria: 1) technical expertise, 2) approach to work, and 3) cost, as described in Section V. Bids and oral interviews/presentations will be scored on these criteria, based on a weighted scale, with emphasis given to qualifications.
- 2. If at the time that this contract is to be awarded, the total of the acceptable bid exceeds the funds then estimated by IRWD as available, then the District may reject all bids or take such other action that best serves the interest of the District.
- 3. IRWD reserves the right to reject any or all bids including, without limitation, the right to reject any other all non-conforming, non-responsive or conditional bids. IRWD reserves the right to reject the bid of any bidder if IRWD believes that it would not be in the best interest of the project to make an award to that bidder, whether because the bid is not responsive or the bidder is unqualified or of doubtful financial ability, or fails to meet any other pertinent standard or criteria established by IRWD. IRWD reserves the right to waive any irregularities; accept the whole, part of, or reject any or all responses; and select the firm which, in the sole opinion of the District, best meets the District's needs. IRWD also reserves the right to negotiate with potential Vendors so that the District's best interests are served.
- 4. IRWD may conduct such investigations, as IRWD deems necessary to assist in bid evaluations, and to establish responsibility, qualifications and financial ability of the bidder.
- 5. In the event of failure of the successful bidder to sign the Agreement, provide insurance certificates, and the required documents, IRWD may award the contract to the next responsive responsible bidder.
- 6. Contractor agrees to fully comply with and to require its subcontractors to fully comply with such Prevailing Wage Laws, to the extent such laws apply under Sections 1777.5 and 1777.6 of the Labor Code.
- 7. The Contractor selected for the award of contract must be able to begin work immediately upon award of the contract and must be able to maintain the level of staff necessary to meet the proposed schedule that was approved by the District's representative.
- The contract shall commence upon execution by both parties and shall continue for a period of three (3) years with two (2) one-year renewals at the sole discretion of IRWD. Contractor performance (see Table 1.2) and cost will be the criteria used as a basis for any decision to extend the contract.

## XII. TERMINATION

This contract may be terminated by either party provided a 90-day notice is given. If Contractor consistently does not meet the KPI requirements (table 1.2) or of the *Work Plan*, the District reserves the right to terminate the contract with less than 90-day notice.

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	Bid Sheet							
Line #	Site/Bid Item	Site Size (sq ft)	Estimated Monthly Cost	Bid Amount Year 1	Bid Amount Year 2	Bid Amount Year 3		
1	Forge Meadow	103,500						
	monthly maintenance		\$ 721.85	\$ 8662.21	\$ 8022.07 \$	9189.73		
2	Port Culver	75,800	, , L 1.00	OUDE.LI				
	monthly maintenance		\$ 528,66	\$ 6343.92	\$ 6534.23 \$	6730.26		
3	Orchard Meadow	100,200	·	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·			
	monthly maintenance		\$ 698.83	\$ 8386.02	\$ 8637.60	8896.73		
4	Lower Eastfoot	92,700						
	monthly maintenance		\$ 646.53	\$ 7758.32	\$7991.07	8230.81		
5	Middle Eastfoot	138,200						
	monthly maintenance		\$ 963.86	\$11566.35	\$11913.84	12270.74		
6	Upper Eastfoot	62,100						
	monthly maintenance		\$ 433.11	\$ 5197.32	\$ 5353.24	<u>\$ 5513.84</u>		
7	El Modena	70,100						
	monthly maintenance		<u>\$ 488.91</u>	\$ 5866.87	\$ 6042.87	<u>\$ 6224.16</u>		
8	Trabuco	787,000						
	monthly maintenance		\$ 5488.85	\$65866.24	\$67842.23	<u>\$69877.50</u>		
9	Cypress Meadows A	263,100						
	monthly maintenance		\$ 1834.96	\$22019.58	\$22680.17	\$23360.57		
10	Cypress Meadows B	90,000	6 (07 70	A 7500 05	4 7750 00	0 7001 07		
	monthly maintenance		\$ 627.70	\$ 7532.35	\$ 7758.32	\$ 7991.07		
11	Cypress Meadows C	114,400	5 707 07	0.0574.46	0.0001.00			
4.0	monthly maintenance	100.000	\$ 797.87	\$ 9574.46	\$ 9861.69	\$10157.54		
12	Cypress Meadows D	138,600	\$ 966.65	\$11599.82	\$11947.82	\$12306.25		
10	monthly maintenance	474.400	5 900.00	\$11599.82	\$11947.82	p12300.25		
13	Eastfoot Retarding Basin	434,400	6 3029.68	\$36356.16	\$37446.84	\$38570.25		
14	monthly maintenance Eastwood Basin	82,400	0.0029.00	530330.10		000070.20		
14	monthly maintenance	02,400	6 574.69	\$ 6896.29	\$ 7103.18	\$ 7316.27		
15	Orchard Retarding Basin	77,300	0074.00	0000.20	Q 7100.10	07010.27		
12	monthly maintenance	//,300	6539.12	\$ 6469.45	\$ 6663.54	\$ 6863.44		
16	Twisted Oak	14,300	5005.12	<b>V</b> 0 103, 10	0000001	00000.17		
10	monthly maintenance	14,500	\$ 99.73	\$ 1196.81	\$ 1232.71	\$ 1269.69		
17	Old Laguna	122,500		• • • • • • • • • • • • • • • • • • • •	+ + + + + + + + + + + + + + + + + + + +			
1/	monthly maintenance	000,221	\$ 854.36	\$ 10252.37	\$10559.94	\$10876.64		
18	Quail Meadow	61,200				· · ·		
10	monthly maintenance	01,200	\$ 426.83	\$ 5122.00	\$ 5275.56	\$ 5433.93		
19	Quail Springs	473,100						
10	monthly maintenance		\$ 3299.59	\$39595.07	\$40782.92	\$42006.41		
20	Turtle Ridge	85,800						
	monthly maintenance	55,000	\$ 598.40	\$ 7180.84	\$ 7396.27	\$ 7618.86		
21	Annual mowing at Trabuco	Approx.						
-		650,000		\$54,400.33	\$56032.34	\$57713.31		
22	Annual mowing at Orchard	Approx.						
_	Retarding Basin	47,000		\$3933.56	\$ 4051.57	\$ 4173.12		
23	Annual mowing at Eastfoot	Approx.						
	Retarding Basin	270,000		\$22597.00	\$23275.00	\$23973.00		
24	**Weekly mapping, reporting,		A40010-0	A	A. 10 - 10 - 1	A. 5000 - 00		
	and meeting attendance		\$12010.58	\$144127.00	\$148540.81	\$152904.33		
*1	Provide an estimated quarterly cost	for these item	s in column 4.	1				

\*Provide an estimated quarterly cost for these items in column 4. \*\*Provide an estimated monthly cost for this item in column 4.

Year 1 total \$508,500.40 Year 3 Total \$539,468.07

Year 2 Total \$523,755.41

# **Bid Sheet – Labor Cost**

#### Year 1

**1 Hour Labor Cost** 

**1 Hour Labor Cost** 

Maintenance Worker	\$52.40
Lead Worker/Foreman	\$52.40
Supervisor	\$100.00
Irrigation Technician	\$74.17
Irrigation Specialist	\$150.00
Qualified Applicator	\$100.00
Biologist	\$159.60
DioloBac	

#### Year 2

# \$53.97Maintenance WorkerLead Worker/ForemanSupervisorSupervisorIrrigation Technician\$76.40Irrigation SpecialistQualified ApplicatorBiologist\$164.39

#### Year 3

#### **Position\***

**Position\*** 

**Position\*** 

Maintenance Worker Lead Worker/Foreman Supervisor Irrigation Technician Irrigation Specialist Qualified Applicator Biologist

#### **1 Hour Labor Cost**

\$55.59
\$55.59
\$106.09
\$78.69
\$159.14
\$106.09
\$169.32

\*Or equivalent alternate position title

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#### LANDSCAPE MANAGEMENT PROPOSAL



# Natural Treatment System South Irvine Ranch Water District | 2025

**BEMUS.COM** 



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California State Contractor's License #492084:

Class A (General Engineering)

Class C-27 (Landscaping)

Class D-49 (Tree Service)



March 11, 2025

Irvine Ranch Water District Michelson Operations Center 3512 Michelson Drive Irvine CA 92612

Subject: Natural Treatment System Landscape Maintenance South

We appreciate the opportunity to provide you with our proposal for the landscape maintenance services for the Natural Treatment System (NTS) South contract area, as outlined in your Request for Proposal (RFP). With over 50 years of experience in landscape management and a strong reputation for delivering sustainable, high-quality services, we are excited about the opportunity to collaborate with the Irvine Ranch Water District (IRWD) and support the continued success and growth of the Natural Treatment Systems.

Bemus Landscape is a full-service landscape contractor with a dedicated team of over 250 skilled professionals. Our commitment to environmental stewardship and sustainable landscaping practices has established us as a leader in Southern California. We specialize in creating and maintaining landscapes that not only enhance the aesthetic beauty of the region but also restore local ecosystems and contribute to the long-term health of the environment. Our focus on regenerative solutions aligns perfectly with the goals of IRWD, and we are well-equipped to manage the ongoing maintenance needs of this critical infrastructure.

In reviewing the work plan provided in the RFP, we are confident in our ability to meet and exceed the following key requirements:

- 1. **Trash Removal and Site Maintenance**: Bemus Landscape will ensure consistent trash removal within site boundaries, including emptying trash cans, cleaning trash screens, and reporting the weight of trash removed monthly. Our team will dispose of all debris responsibly, adhering to the highest standards of environmental compliance.
- 2. **Invasive Species Control and IPM Compliance**: Our team will strictly adhere to IRWD's Integrated Pest Management (IPM) Plan. We will map and identify non-native species at each NTS basin, providing weekly updates to IRWD in both PDF and geospatial formats. A qualified biologist will oversee these efforts to ensure effective and cost-efficient control of invasive species while maintaining the health of the ecosystem.
- 3. **Vegetation Maintenance and Irrigation Audits**: We are committed to maintaining the vegetation as specified, with particular attention to aquatic and terrestrial vegetation management. Our team will perform regular irrigation audits, ensuring system functionality and completing any necessary repairs. Detailed reports will be submitted monthly, along with documentation of completed work.



4. **Environmental and Regulatory Compliance**: Bemus Landscape understands the importance of environmental responsibility. Our team will work closely with IRWD staff and biological consultants to ensure that all work, especially during sensitive periods, complies with environmental regulations. We are committed to safeguarding the natural habitats while completing essential maintenance tasks.

5. **Clear Communication and Reporting**: We prioritize open and timely communication. Our team will submit weekly field reports, including before-and-after photos and detailed descriptions of completed tasks. We will provide monthly schedules and ensure that any changes to the work plan are communicated promptly to IRWD NTS staff.

Our company's dedication to excellence, sustainability, and community enhancement drives us to deliver outstanding results for every project we undertake. Bemus Landscape has built a reputation as a trusted partner for both commercial and residential clients across Southern California, and we are eager to bring that same level of dedication and expertise to the NTS South contract area.

Thank you for considering our proposal. We look forward to the opportunity to collaborate with IRWD on this important project.

Meqan Tejeda

Commercial Business Development Manager megan.tejeda@bemus.com (949) 769-1431



At Bemus Landscape, Inc., we pride ourselves on being at the forefront of our industry in terms of the professional qualifications and horticultural skills of our staff. Obtaining professional credentials is a requirement for many of our positions, and is strongly encouraged for all others. The Company pays all employee testing and licensing fees, as well as those related to continuing education requirements. A partial listing of credentials held by our employees is as follows:

#### **Registered Consulting Arborists: 1**

RCA's bring a comprehensive and objective viewpoint to the diagnosis, appraisal, and evaluation of arboricultural issues. This is the highest credential issued by the American Society of Consulting Arborists. Very few landscape contractors have a RCA on staff.

#### Certified Arborists: 6

CA's are experts in the care of trees. The CA credential is issued by the International Society of Arboriculture and is conferred upon those who have passed rigorous written and field tests. Most contractors do not employ more than one CA.

#### Tree Risk Assessment Qualified: 2

A standardized, systematic process for assessing tree risk and providing information to tree owners and risk managers for making informed decisions that will promote the safety of people and property and enhance tree benefits, health, and longevity.

#### Pest Control Advisors: 1

The State of California requires that all commercial pest control products be applied under the written advice of a PCA, which is the highest pest control credential that the state issues. Most landscape contractors do not have one on staff, and either hire the services of a consulting PCA or are simply not in compliance with the law. PCA credentials require years of study and practical experience, and PCA's are the utmost authorities in the safe, horticulturally sound, and environmentally sensitive use of pest control products and non-pesticide alternatives.

#### **Qualified Applicator Licenses: 22**

A QAL is the license issued by the State of California that allows a person to supervise the safe and responsible application of pest control products. The QA works under the direction of the PCA. Very few landscape contractors have more than one or two QA's on staff.

#### **Certified Landscape Irrigation Auditors: 3**

The CLIA is certified by the Irrigation Association, the nation's largest irrigation industry trade organization. CLIA's possess the training and skills necessary to analyze and audit the use of irrigation water, as well as recommend and implement solutions to minimize the use of water in a cost effective and horticulturally sound manner.

#### Landscape Designers: 1

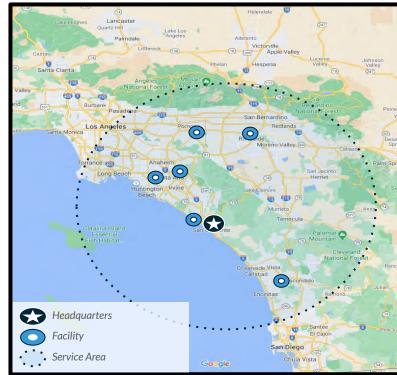
Our Landscape Designer specializes in aesthetically attractive and horticulturally sound designs rendered via the use of state of the art imaging software. Her technology skills are backed up by her plant knowledge.

#### Other

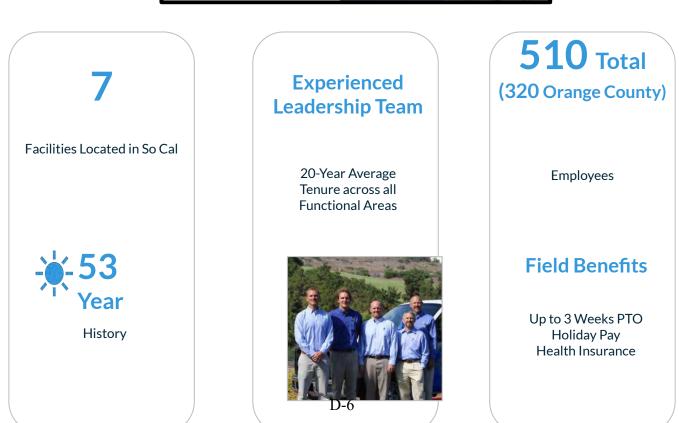
We have numerous other staff members who are certified by major irrigation equipment manufacturers and water districts in the proper implementation and management of satellite controller systems, smart times, reclaimed water management, and a variety of other disciplines.



# **Customer Portfolio and History**



Facilities & Service Area











# Corin Bemus, CEO

Corin Bemus is the CEO of Bemus Landscape, a family-operated company that has been a leader in Southern California's landscape industry since 1973. Under Corin's leadership, Bemus Landscape has grown into one of the region's top landscape firms, known for its innovation, sustainability, and commitment to quality. Corin is dedicated to fostering a culture of trust, employee growth, and exceptional service. He focuses on sustainable landscaping solutions that not only enhance landscapes but also contribute to environmental restoration. His leadership is guided by the company's purpose of "Serving Clients, Growing People," ensuring Bemus Landscape continues to set the standard for excellence in the industry.



# Spencer Bemus, Vice President - Tree Care

With 25 years of experience in the tree care industry, Spencer Bemus is a seasoned professional dedicated to enhancing the health and safety of urban forests. He holds certifications as an ISA Certified Arborist (#WE-9348A), ISA Tree Risk Assessment Qualified, and a Qualified Applicator License (#117807). Spencer has played an instrumental role in a riparian project in Encinitas for the past 10 years at Scott's Valley HOA. Additionally, he is a certified wildlife protector, further demonstrating his commitment to environmental conservation.



# Miles Coffin, Regional Operations Manager

With 12 years of experience in the landscape industry, Miles Coffin has spent the past 2 years working on the Scott's Valley Riparian project. As the Regional Operations Manager, he oversees day-to-day operations, ensuring efficient project execution, managing teams, and maintaining high-quality service standards. Miles is responsible for coordinating resources, managing budgets, and implementing best practices to ensure the success of landscape maintenance and restoration efforts. He holds a OWEL certification (MWDOC-1043) and a Qualified Applicator License (QAL #139436).





## Sergio Bortolamedi, Vice President of Sales

With over 15 years of experience in the commercial landscape industry, sustainability and high-level customer service have been Sergio's passion and driving force behind the success of Bemus Landscape. As Vice President of Sales for the past decade, he has played a strong role in sales while having a deep understanding of landscape maintenance operations. Sergio and his sales team have been instrumental in developing innovative solutions that prioritize sustainability and environmentally-conscious practices. His commitment to operational efficiency and client relationships has positioned Bemus Landscape as a key player in the industry.



# Megan Tejeda, Sr. Commercial Business Developer

With 25 years in the landscape industry, Megan Tejeda has a strong focus on driving growth and expanding customer bases. As Commercial Business Development Manager at Bemus Landscape for the past 3 years, she develops strategies to increase revenue, expand market presence, and build lasting business relationships. Previously, as an Account Manager, Megan played a key role in client relations, ensuring high-quality service and achieving sales and contract renewal goals.



# Jaime Cerda, Branch Manager

With 39 years of experience in landscape maintenance, Jaime Cerda has spent 24 years contributing his expertise to Bemus Landscape. He is an ISA Certified Arborist (#WE-8914A) and holds a Qualified Applicator License (#97571). Throughout his career, Jaime has built a strong foundation in the landscape industry, ensuring high standards of quality and service.



## Sual Alcaraz, Account Manager

With 5 years of experience in the landscape industry and 3 years with Bemus Landscape, Saul Alcaraz is an Account Manager committed to providing highquality service and building strong client relationships. In his role, he is responsible for managing client accounts, developing and implementing landscape management plans, overseeing service delivery, and ensuring client satisfaction. Saul works closely with internal teams to monitor project progress and provide regular updates to clients, all while maintaining a focus on organization and efficient time management. His ability to build relationships, combined with his knowledge of landscape management, makes him a valuable asset to the Bemus team. Although he has not yet worked directly on habitat restoration projects, his background in the landscape industry allows him to contribute to a range of service areas.



# **BLAKE SELNA**

PRINCIPAL / BIOLOGIST

# LSA



#### EXPERTISE

- Biological Assessments
- Jurisdictional Delineations
- Regulatory Permitting
- Mitigation Planning,
- Monitoring, and Reporting
- Construction Monitoring
- Arborist Reports
- Habitat Restoration Plan Design and Implementation

#### EDUCATION

B.S., Environmental and Resource Sciences, University of California, Davis, March 2000

#### PROFESSIONAL EXPERIENCE

Principal, LSA, Irvine, California, 2000–Present

#### PROFESSIONAL CERTIFICATIONS/ REGISTRATIONS

Certified Arborist No. WE-7397A, International Society of Arboriculture

ISA Tree Risk Assessment Qualification, International Society of Arboriculture

Certified Wetland Delineator, Wetland Training Institute

#### PROFESSIONAL RESPONSIBILITIES

Working for LSA since 2000, Mr. Selna has gained extensive experience as a biologist and arborist. His expertise includes biological assessments, jurisdictional delineations, mitigation compliance, and regulatory permitting, as well as the design and implementation of habitat restoration and mitigation plans. Mr. Selna manages the Biology/Natural Resources Group in LSA's Irvine office, which is the hub of this discipline in Southern California. As a result, he has provided Principal oversight and management for projects of all shapes and sizes, covering the full range of species and habitats in Orange, Los Angeles, San Bernardino, Riverside, San Diego, and Imperial Counties. With his background as a field biologist, he has developed all of the relevant technical skills in wetland/waters delineation, regulatory permitting, habitat mapping, vegetation classification, wildlife surveys, focused and floristic-level plant surveys, wildlife monitoring, arborist evaluations, plant and tree salvage/transplantation plans, and construction monitoring, making him uniquely qualified to provide supervision, strategic analysis, and project advisories for technical teams created for each individual client's and project's needs. In addition to his technical skills, Mr. Selna has outstanding personnel, project, and contract management abilities.

#### PROJECT EXPERIENCE

Mr. Selna has managed many aspects of Southern California environmental consultation, including biological resource analysis, preconstruction surveys and vegetation removal, large- and small-scale regulatory permitting efforts, habitat restoration, and mitigation of biological impacts. He is extremely familiar with surveying and restoring Southern California native habitats, including coast live oak woodland, coastal sage scrub, chaparral, needlegrass grassland, coastal grasslands and forblands, elderberry woodland, riparian woodland and scrub types, high desert riparian/alluvial scrub, Joshua tree and juniper woodland, desert scrub, seasonal ponds, and freshwater emergent marsh. Mr. Selna has designed and managed the implementation of more than 400 acres of restoration and mitigation of the aforementioned types, including more than 200 acres associated with landfill operations (more than 50 acres on-cap). Other notable mitigation projects include Joshua tree (Yucca brevifolia) translocation, endangered species translocation, wetland mitigation, and water quality protection features, including low-flow diversion and natural treatment of nuisance runoff.

Mr. Selna is very familiar with the County of Orange Central/Coastal Subregion NCCP/HCP, the Southern Subregion Habitat Conservation Plan, and the San Diego Creek and San Juan/Western San Mateo Creek Special Area Management Plans (SAMP), as well as the Orange County Transportation Authority Measure M2 NCCP/HCP/Environmental Mitigation Program. In

addition, he has worked within the regulatory frameworks of Los Angeles, San Diego, Riverside, and San Bernardino Counties.

As an International Society of Arboriculture Certified Arborist, Mr. Selna has prepared tree reports for projects in Newport Beach, Huntington Beach, Laguna Beach, Long Beach, Anaheim, Irvine, Santa Ana, Marina del Rey, San Juan Capistrano, Murrieta, Chino, Corona, Calabasas, Los Angeles, West Covina, Santa Clarita, Palmdale, unincorporated Los Angeles County, and the Angeles National Forest.



#### BLAKE SELNA PRINCIPAL / BIOLOGIST



#### RELEVANT PROJECT EXPERIENCE

Mr. Selna has prepared and/or provided Principal review and oversight for the preparation of hundreds of biological resources analyses, with levels of complexity ranging from due diligence and constraints analyses to full-scale EIRs. As a Principal of LSA's Natural Resources group, Mr. Selna supervises the preparation of technical reports in support of Categorical Exemptions, IS/MNDs, and EIR sections. In addition, LSA is adept at preparing Caltrans Natural Environment Studies, Biological Assessments for USFWS consultation, jurisdictional delineations, regulatory permitting documentation, and habitat restoration plans. Mr. Selna has extensive experience with navigating the regulatory permitting process on behalf of clients of all types and sizes. The following projects provide a range of experience relevant to the IRWD NTS program. Additional projects, contact information, and reports available upon request.

#### Irvine Ranch Water District, San Joaquin Marsh Restoration Project – The Duck Ponds Irvine, California

Although much time has elapsed, Mr. Selna retains extensive familiarity with the San Joaquin Marsh 'Duck Ponds.' LSA assisted The Irvine Company and Irvine Ranch Water District with the regulatory permitting and habitat restoration/creation design for the project. Shortly after his hiring in 2000, Mr. Selna counted the thousands of container plants around the Duck Ponds as part of the survivorship counts and was the primary data collector and habitat restoration monitor during the initial installation and establishment years of the project. LSA collected data annually until the site received acceptance from the United States Army Corps of Engineers.

#### Irvine Ranch Water District, Carlson Marsh Regrade Project Irvine, California

Mr. Selna assisted the Irvine Ranch Water District with the acquisition of the regulatory permits necessary for the Carlson Marsh Regrade Project, in which the water circulation in the degraded marsh was restored and exotic plant species were eradicated. He coordinated a construction monitoring regimen for vegetation removal and excavation of pilot channels and a Habitat Mitigation and Monitoring Plan for the restoration of freshwater marsh and brackish marsh habitat impacted by the project. Mr. Selna worked closely with the grading contractor to create topography and habitat conditions conducive to the restoration of willow forest, mulefat scrub, herbaceous riparian marsh, and halophytic (saline) marsh habitats, based on specific site conditions throughout the 60-acre Carlson Marsh portion of the greater San Joaquin Marsh. The circulation project and 7.62-acre restoration component were resounding successes and Mr. Selna received resource agency approval documenting that the site met all required performance standards.

#### City of Aliso Viejo, Dairy Fork Wetland Aliso Viejo, California

LSA assisted the City of Aliso Viejo with permitting for the creation of water quality basins along Dairy Fork Creek. LSA conducted a jurisdictional survey and general field assessment of the project area, prepared a Jurisdictional Delineation report, and prepared and submitted the associated permit applications to the resource agencies for approval. LSA also assisted with the CEQA exemption filed for this project. Following the successful permitting process, LSA provided construction monitoring and post-construction monitoring.

#### OC Flood, Santa Ana-Delhi Channel Improvement Newport Beach, California

As Principal in Charge/Project Manager, Mr. Selna is currently leading LSA's collaboration with OC Flood and its engineering consultants to rehabilitate the Santa Ana-Delhi Channel as it empties into Upper Newport Bay. The County has committed to the mitigation of historical impacts to the San Diego Creek Watershed and based on a previously prepared Environmental Impact Report (EIR), LSA prepared CEQA and technical studies addressing biological, transportation, air quality, noise, and cultural resource impacts. The project would improve the flood handling capabilities of the channel, as well as create over 6.5 acres of coastal salt marsh, freshwater/brackish marsh, riparian scrub, and coastal sage scrub habitats. This involves the creation of habitat for several specialstatus plant and animal species, as well as restoration of coastal wetland habitat complexes.



#### ERIC KRIEG ASSOCIATE / BIOLOGIST

# LSA



#### EXPERTISE

- Revegetation/Restoration
- Biological Assessments
- Construction Monitoring
- Flora and Fauna Surveys
- Mitigation Planning, Design, and Monitoring

#### EDUCATION

M.S., Biology (Ecology and Conservation), Illinois State University, Normal, Illinois, 1996

B.S., Biology, Frostburg State University, Frostburg, Maryland, 1993

#### PROFESSIONAL EXPERIENCE

Associate, LSA, Irvine, California, December 1997– Present

Environmental Laboratory Technician, Crosby Laboratories, Inc., Placentia, California, September– November 1997

Naturalist, Tucker Wildlife Sanctuary, Modjeska Canyon, California, May–September 1997

#### PERMITS AND AUTHORIZATIONS

USFWS Permit No. TE-777965, Authority to survey for the threatened coastal California gnatcatcher

CDFW Scientific Collecting Permit No. SC-213020003

#### PROFESSIONAL RESPONSIBILITIES

Eric Krieg's duties consist of habitat restoration and biological resource monitoring during project implementation and long-term monitoring. He has experience preparing restoration plans and overseeing all aspects of a plan's implementation, from custom seed collection and native plant propagation through installation, maintenance, and monitoring procedures. Mr. Krieg has been involved in restoring coastal sage scrub, native grassland, oak woodland, riparian, and wetland habitats for mitigation projects.

Mr. Krieg prepared final reports for agency approval (USACE, CDFW, California Coastal Commission, USFWS, and RWQCB). Mr. Krieg has performed numerous focused surveys for sensitive species, including the desert tortoise (Gapherus agassizii), cactus wren (Campylorhynchus brunneicapillus), burrowing owl (Athene cunicularia), coastal California gnatcatcher (Polioptila californica californica), and intermediate mariposa lily. He has permits to perform protocol presence/absence surveys of coastal California gnatcatchers.

Mr. Krieg has a substantial background in biological construction monitoring. This monitoring includes overseeing clearing and grubbing, and impact limits, as well as compliance with resource agencies permit conditions and State and federal environmental requirements. Mr. Krieg has monitored and served as Project Manager for large road construction projects, creek realignment projects, utility projects, large residential developments, and smaller infill development projects.

Mr. Krieg has gained a wide range of experience working with utility companies on a variety of projects. For 10 years, Mr. Krieg had on-call contracts with Southern California Edison (SCE) and assisted with deteriorated pole assessments, permitting, preconstruction surveys, construction monitoring, restoration, and other types of projects. As Project Manager for these undertakings, Mr. Krieg has worked on more than 2,000 projects with SCE.

Mr. Krieg has worked on many projects for Caltrans and was Task Manager for most of them. Currently, Mr. Krieg is the Project Manager of a large multi-year contract for Caltrans District 12, which he is managing the associated subs and LSA biologists working on all the task orders.

#### PROJECT EXPERIENCE

#### SOLID WASTE/RECYCLING

#### Geosyntec, Alpha Olinda Landfill, 10(a) Permit Orange County, California

Mr. Krieg served as Project Manager for the Habitat Conservation Plan (HCP) and 10(a) Permit at Alpha Olinda Landfill. LSA worked with Geosyntec under its contract. Gnatcatcher surveys were performed in the proposed impact areas within coastal sage scrub. The 10(a) Permit application and HCP were prepared and sent to USFWS for approval and authorization. Mr. Krieg coordinated with OC Waste & Recycling to get the approved 10(a) Permit and get authorization to start the projects. D-12



#### ERIC KRIEG ASSOCIATE / BIOLOGIST



#### SPECIALIZED TRAINING

Wetland Delineation Training Class, Wetland Training Institute, Inc., November 2014

Construction Safety Orientation, Caltrans Division of Construction, January 2003

Desert Tortoise Council 8th Annual Surveying, Monitoring, and Handling Techniques, October 23–24, 1999

#### OC Waste & Recycling, South Region Landfills Orange County, California

Mr. Krieg has assisted with several tasks for the past 9 consecutive years of on-call biological services contracts for OC Waste & Recycling's South Region Landfills, primarily at Prima Deshecha Landfill. He assisted with conducting a jurisdictional delineation, special-status plant species, and coastal California gnatcatcher (*Polioptila colifornica californica*) surveys.

#### OC Waste & Recycling, Gothard Landfill, Gnatcatcher Surveys Orange County, California

Mr. Krieg performed protocol gnatcatcher surveys on the closed Gothard Landfill. Mr. Krieg coordinated with OC Waste & Recycling for the surveys and project coordination with USFWS and CDFW. Mr. Krieg served as task manager for the surveys.

#### TRANSPORTATION

#### Caltrans District 12, Laguna Canyon Road (SR-133) Widening and Drainage Improvement Project Orange County, California

Mr. Krieg served as Biological Task Manager for the Laguna Canyon Road (SR-133) Widening and Drainage Improvement Project. This project proposes several improvements along Laguna Canyon Road from the SR-73 Toll Road to just south of El Toro Road. This project included conducting protocol surveys (coastal California gnatcatcher [*Polioptila californica californica*], least Bell's vireo [*Vireo bellii pusillus*], southwestern willow flycatcher [*Empidonax traillii extimus*], and Pacific pocket mouse [*Perognathus longimembris pacificus*]), surveys for special-status plant and animal species, habitat assessment, a Jurisdictional Delineation and report, and preparation of a Natural Environmental Study and Biological Assessment. Throughout the project, coordination with Caltrans biologist occurred in order to keep them up to date on the fieldwork and survey results.

#### Orange County Transportation Authority, I-5 (Avenida Pico to County Line) San Clemente, California

Mr. Krieg performed protocol gnatcatcher surveys along I-5 from Avenida Pico to the San Diego County line. The surveys were conducted within suitable scrub habitat within the proposed impact limits and a 500-foot buffer. Mr. Krieg coordinated with USFWS and CDFW for the surveys.

#### Caltrans District 12, On-Call Environmental Services Orange County, California

Mr. Krieg has been the Task Manager for several task orders, which involved the review and oversight for the preparation of a Caltrans Natural Environment Study, Jurisdictional Delineation, and Biological Assessment for a proposed highway safety improvement project from 2017 through 2019. Specific tasks included conducting multiple focused botanical surveys, general habitat suitability assessment surveys, vegetation and sensitive plant species mapping, and an oak tree impact evaluation. Mr. Krieg also managed and conducted the monitoring for slope stabilization projects along SR-241. As part of this work, he conducted focused surveys for costal California gnatcatchers (*Polioptila californica californica*) and prepared a construction monitoring report for USFWS.

#### Caltrans District 12, SR-57 and Lambert Interchange Brea, California

Mr. Krieg is serving as Biological Task Manager for the construction monitoring for the SR-57 and Lambert interchange Project. The project includes widening SR-57 and improvements to Lambert to improve the overall interchange. The project includes a Contractor Education Program, preconstruction nesting bird surveys, the



## ERIC KRIEG ASSOCIATE / BIOLOGIST



monitoring of environmentally sensitive area(s) and safety fence installation, coastal California gnatcatcher (Polioptila californica californica) surveys, weekly construction monitoring, and report preparation. Mr. Krieg is performing these tasks himself as the biological monitor, and he was required to have gnatcatcher experience and be approved by USFWS. Mr. Krieg coordinated with both the Caltrans biologist and the Resident Engineer for schedule and project updates.

#### Caltrans District 12, SR-241 Slope Stabilization and Drainage Improvement Project Orange County, California

Mr. Krieg served as the Biological Task Manager for the construction monitoring for the SR-241 Slope Stabilization and Drainage Improvement Project. The project included six locations along SR-241 that required some slope repairs to alleviate storm water problems along the road. The project included a Contractor Education Program, preconstruction nesting bird surveys, the monitoring of environmentally sensitive area(s) and silt fence installation, coastal California gnatcatcher (*Polioptila californica californica*) focused surveys, weekly construction monitoring, and report preparation. Mr. Krieg was either overseeing these tasks or performing them himself as the biological monitor, and he was required to have gnatcatcher experience and be approved by USFWS. Mr. Krieg coordinated with both the Caltrans biologist and the construction manager for schedule and project updates. All work was completed per the designated permits.

#### Caltrans District 12, SR-241 Storm Water Mitigation Project Orange County, California

Mr. Krieg served as Biological Task Manager for construction monitoring of the Storm Water Mitigation Project. The project included five locations along SR-241 that required slope repairs to alleviate storm water problems along the road. Mr. Krieg oversaw and performed four sets of three coastal California gnatcatcher (*Polioptila californica californica*) surveys required before the start of construction at each site. Preconstruction nesting bird surveys were also performed during the gnatcatcher surveys. Monitoring for the removal of vegetation was also performed at each location. Mr. Krieg coordinated with the Caltrans biologist and the construction manager for schedule updates and project updates. All work was completed per the designated permits.

#### UTILITIES

#### Irvine Ranch Water District, IPM Plan Implementation Monitoring and Reporting Irvine, California

Mr. Krieg served as Project Manager for the Irvine Ranch Water District (IRWD) Integrated Pest Management (IPM) Plan Implementation Monitoring and Reporting Project. The project included IRWD's 34 natural treatment system facilities and the 300-acre San Joaquin Marsh. The IPM Plan aimed to treat pests within these facilities, while minimizing impacts on human health and the environment. Under this contract, LSA had been in charge of organizing an innovative approach to managing invasive plant maintenance activities that focused on nonchemical treatment methods. LSA biologists were responsible for routine site visits to map locations of invasive plant pest outbreaks, as well as determining effective treatment methods. In doing so, LSA had developed an interactive data viewer that allows relevant parties to access real-time data, thus streamlining communication between LSA, IRWD, and IRWD's landscape contractor.

#### SCE, On-Call Projects Southern California

Mr. Krieg was the Project Manager for SCE's on-call contract with LSA. The work included Biological Assessments, sensitive species surveys, deteriorated pole assessments, preconstruction surveys, construction monitoring, postconstruction surveys, and permitting. Most of the work was in Southern California, but some projects extend to the limits of SCE's coverage area. This project had multiple subcontractors with whom Mr. Krieg coordinated and managed the multiple project duties.



JESSICA LIEUW

BIOLOGIST





#### EXPERTISE

- Biological Assessments
- Vegetation Mapping
- Wildlife Surveys
- Jurisdictional Delineations
- Bat Surveys

#### EDUCATION

B.A., Environmental Science, Minor in Urban and Regional Planning, University of California, Irvine, California, 2017

#### PROFESSIONAL EXPERIENCE

Biologist, LSA, Irvine, California, 2019–Present

Wetlands Specialist, Irvine Ranch Water District, Irvine, California, 2018–2019

Natural Resource Intern, Irvine Ranch Water District, Irvine, California, 2017–2018

# SPECIALIZED

Southwestern Desert Bats Class, Maturango Museum, 2022

California Rapid Assessment Method (CRAM), California Wetland Monitoring Workgroup, 2021

Wetland Delineation Training Course, Wetland Training Institute, Inc., 2019

Desktop GIS Continuing Education Course, Pace University, 2018

#### **PROFESSIONAL RESPONSIBILITIES**

As a Biologist with LSA, Ms. Lieuw conducts biological surveys and monitoring throughout Southern California for a variety of projects, including preconstruction nesting bird surveys, habitat restoration monitoring, and bat habitat assessments, emergence surveys, and exclusions. She also has experience with biological assessments and jurisdictional delineations and has extensive experience working with native and nonnative wetland species in Southern California. She has also performed aquatic invertebrate/vertebrate surveys, sediment sampling, and water quality monitoring.

#### PROJECT EXPERIENCE

#### Irvine Ranch Water District, Integrated Pest Management Plan Implementation

#### Irvine, California

Ms. Lieuw conducted site visits to over 30 natural treatment system facilities and the San Joaquin Marsh to map locations of invasive plant pests and determine effective treatment strategies. She also helped develop an interactive data viewer to display data and streamline communication and authored annual reports discussing treatment.

#### Geosyntec, Santa-Ana Delhi Channel Improvement Project Newport Beach, California

Ms. Lieuw conducted and authored reports for a jurisdictional delineation, an assessment of wetland/stream function using the California Rapid Assessment Method, and a bat habitat assessment for the Santa-Ana Delhi Channel Improvement Project, in an area containing native habitat types including freshwater marsh, salt marsh, and coastal sage scrub.

#### Aliso Viejo Community Association, Kathryn Thompson Mitigation Area Aliso Viejo, California

Ms. Lieuw provided biological consultation for fire fuel modification activities and vector control activities in the Kathryn Thompson Mitigation Area. Planned activities required the preparation of a Section 1602 Streambed Alteration Notification for the CDFW. Following the successful receipt of an agreement, Ms. Lieuw conducted nesting bird surveys and vegetation removal monitoring within the work area.

#### Irvine Ranch Outdoor Education Center, Restoration Monitoring Orange County, California

Ms. Lieuw conducted a qualitative performance monitoring survey within multiple compensatory coastal sage scrub restoration areas on the 210-acre Irvine Ranch Outdoor Education Center. She also monitored vegetation removal to comply with fuel modification requirements.

#### Caltrans District 12, SR-74 Plant Establishment Project Orange County, California

Ms. Lieuw conducted an assessment of stream function using the California Rapid Assessment Method and assisted in conducting a benthic macroinvertebrate survey within the San Juan Creek. She prepared technical reports documenting the findings from the surveys, which included assessing



# JESSICA LIEUW

BIOLOGIST



the benthic macroinvertebrate community assemblage as a bioindicator for water quality.

#### Caltrans District 12, SR-1 Bicycle and Safety Improvement Project Orange County, California

Ms. Lieuw conducted a jurisdictional delineation, general biological survey, and rare plant surveys for the SR-1 Bicycle and Safety Improvement Project located adjacent to coastal marsh and dune habitat. Rare plant species identified included coast woolly heads (*Nemacaulis denudata*), red sand verbena (*Abronia maritima*), spiny rush (*Juncus acutus*), and estuary seablite (*Suaeda esteroa*).

#### Caltrans District 12, SR-74 Safety Improvement Project Arroyo Toad Surveys and Invasive Predator Removal

#### Orange County, California

Ms. Lieuw conducted invasive predator removal of the American bullfrog (*Lithobates catesbeianus*) and red swamp crayfish (Procambarus clarkii) within San Juan Creek as part of a mitigation requirement for impacts to designated arroyo toad (*Bufo californicus*) critical habitat. American bullfrogs were removed using gigs or dip nets and humanely killed—adult American bullfrogs were dissected and examined for reproductive status and stomach contents. Incidental occurrences of arroyo toads were also recorded.

#### HNTB, Yorba Linda Boulevard Widening Project Yorba Linda, California

Ms. Lieuw conducted species inventory surveys, a bat habitat assessment, focused bat surveys, vegetation mapping, and a jurisdictional/wetland delineation for the proposed widening of a bridge over the environmentally sensitive Santa Ana River. She also prepared the technical report assessing potential impacts to sensitive biological resources and including measures to avoid or mitigate for impacts to several special-status species, wetlands, and critical habitat with regard to CEQA.

#### Monterey Park Retail Partners LLC, Mitigation Area Restoration Monitoring Monterey Park, California

Ms. Lieuw conducted a qualitative assessment of the coastal sage scrub restoration sites within Puente Hills Habitat Preservation Authority lands during the 120-day establishment period. She also performed a survivorship count of installed container plants following the 120-day establishment period to ensure that the site was meeting performance standards.

#### Irvine Ranch Water District, Natural Resource Monitoring and Assessment Irvine, California

Ms. Lieuw monitored the flora and fauna of 36 urban runoff treatment wetlands through identification of native and nonnative plants, birds, invertebrates, and other biota. She assessed water quality at the influent and effluent of each wetland using YSI EXO sondes, as well as taking grab and composite water samples. She operated all-terrain vehicles, four wheel drive vehicles, amphibious vehicles, and tractors on rough terrain. Ms. Lieuw also headed the study of macroinvertebrates within treatment wetlands as a proxy for evaluating water and habitat quality. She planned and executed field sampling; processed samples in the laboratory; conducted statistical analysis; and prepared reports, presentations, and posters.

#### OC Waste & Recycling, Trabuco Creek Mitigation Area Ordinary High Water Mark Delineation Orange County, California

Ms. Lieuw conducted an ordinary high water mark delineation prior to removal of invasive giant reed (Arundo donax) along Trabuco Creek. The mitigation area is part of a comprehensive mitigation package including giant reed removal, wetland creation, ephemeral drainage creation, and associated habitat restoration for Prima Deshecha Landfill.



#### Bemus Landscape Inc. Safety Training Program Overview

At **Bemus Landscape Inc.**, safety, respect, and accountability define the way we work. Our comprehensive **Safety Training Program** is designed to prevent injuries, reduce risks, and foster a culture of safety and professionalism across all roles—field, management, and office.

Every team member is expected to actively participate in and uphold our safety standards, which are rooted in regulatory compliance and continuous improvement.

#### 1. Injury and Illness Prevention Program (IIPPP)

This program outlines our company's system for identifying, reporting, and correcting unsafe conditions and practices, in alignment with OSHA requirements. It ensures each employee understands their role in maintaining a safe and healthy work environment.

#### 2. Heat Illness Prevention Program (HIPP)

Our HIPP provides essential training on recognizing heat-related symptoms, implementing rest and hydration strategies, and understanding emergency protocols for outdoor work during hot conditions.

#### 3. Code of Safe Practices

All employees are trained in our Code of Safe Practices, which includes specific expectations for personal behavior, equipment use, and hazard awareness on and off the job site.

#### 4. Hazard Communication Program (HAZCOM)

We train employees on how to safely handle and understand hazardous substances, including reading labels and Safety Data Sheets (SDS), in full compliance with OSHA's HAZCOM standard.

#### 5. Equipment-Specific Training

Before operating any equipment, employees receive hands-on training and must demonstrate safe and proper use. Training includes:

- Weed Wackers
- Stick Edgers
- Edge Trimmers
- Blowers
- Push Mowers (21")
- Ride-On Mowers (36", 48", 52")
- Skid Steers

This approach ensures that accountability is balanced with opportunities to learn an

#### 6. Pesticide Management Training

Applicable employees are trained in pesticide and herbicide safety in accordance with OSHA and the Department of Agriculture. This includes handling, application, emergency response, and storage practices. 17



#### 7. Defensive Driving Program

Drivers receive formal training on safe driving habits, hazard awareness, and vehicle control. This program is reinforced with retraining following any at-fault incidents.

#### 8. Flex & Stretch Program (Daily)

Before the start of each workday and **prior to dispatch**, all field employees participate in our Flex & Stretch routine. These daily warm-ups help prevent soft tissue injuries by preparing the body for physical work.

#### 9. Daily Gate Check Inspections

Each morning, we conduct **daily gate check inspections** to ensure vehicles, trailers, and equipment are in safe working condition before being dispatched to job sites.

#### 10. Near Miss Reporting

All employees are required to report near misses, regardless of severity. This proactive approach allows us to address hazards before they result in incidents.

#### 11. Weekly Tailgate Safety Meetings

We conduct **52 tailgate meetings each year**, with **a different safety topic covered each week**. These discussions are designed to raise awareness and proactively address seasonal, task-specific, or trending hazards.

#### 12. Workplace Violence Prevention

Employees are trained to recognize and report any signs of violence or aggressive behavior. Our zero-tolerance policy ensures a safe and respectful workplace for all.

#### 13. Sexual Harassment Prevention Training

All field employees, account managers, branch managers, and office staff receive mandatory training on preventing sexual harassment. We are committed to fostering a culture of respect and inclusion across the organization.

#### 14. Disciplinary Action & Retraining Protocol

Our program includes a **fair and structured disciplinary process** for addressing safety violations and near misses:

- Verbal Warning
- Written Warning & Mandatory Retraining
- Suspension
- Termination (if necessary based on severity or repeated violations)

This approach ensures that accountability is balanced with opportunities to learn an



## Weekly Activities:

- Los Trancos and Muddy Canyon:
  - Submit detailed maintenance field form for each site.
  - Identify and map non-native species, focusing on priority targets, for next week's maintenance.
  - Attend weekly meetings with IRWD to discuss progress and upcoming tasks.
  - Clean intake grates and remove trash, providing documentation to IRWD.

## Monthly Activities (Once a Month for Each Site):

- Upper Agua Chinon A, Upper Agua Chinon B, Floral View, Laguna Altura North, Laguna Altura South, Parasol Park, Marine Meadows, Portola Springs, Ridge Valley B, Ridge Valley A, Ridge Valley C, Marshburn 1, 2, Hidden Canyon, Aquila Springs, Sports Park, Illuna Springs, Los Olivos South, Lower Agua Chinon A, Los Olivos Meadow, Lower Agua Chinon B, Lower Agua Chinon C:
  - Remove all trash and maintain trash cans (empty and replace liners).
  - Clean trash screens and document trash weight.
  - Remove debris/sediment from structures (inlets, outlets, sediment traps, etc.).
  - Control non-native plants and undesirable species.
  - Manage algae and floating vegetation to ensure less than 50% pond surface coverage.
  - Trim vegetation around trails, structures, and roads to maintain accessibility.
  - Trim aquatic vegetation around inlets/outlets and along channels.
  - Audit irrigation system, test and document results.
  - Report vandalism, graffiti, pest damage, and dead plants to IRWD.
  - Maintain hardscapes and mulched areas.

## **Quarterly Activities:**

- **Sand Canyon**: Clean shoreline and remove trash, reporting weight to IRWD.
- Rattlesnake Reservoir: Check inlet structures and clear overgrown vegetation.

# Biannual Activities (As Requested, Approx. Biannually for Baker Water Treatment Plant):

- Fertilize trees and shrubs in spring and fall with IRWD-approved pellets.
- Inspect and maintain modular wetland units at **Baker WTP** before and after the rainy season.
- Mow vegetation at specified locations before and after the nesting season.

## Annual Activities:

• Perform a major aquatic and terrestrial vegetation removal, trimming about 50% of the vegetation at each site in coordination with IRWD.



Bemus Landscape has teamed up with LSA to effectively manage the sites per the RFP. Our plan is to utilize a blend of experience, expertise, landscape best practices, and technology to effectively each of the sites.

Work Plan

Below is our detailed description of how we will fulfill each of the requirements of the Work Plan outlined in Section II:

A. Removal of Trash - Bemus Landscape will ensure consistent trash removal within site boundaries, including emptying trash cans, cleaning trash screens, and reporting the weight of trash removed monthly. Our team will dispose of all debris responsibly, adhering to the highest standards of environmental compliance.

B. Full Complinace of IPM Plan - Bemus Landscape will partner with LSA to ensure that site tasks are clearly identified by a qualifited biologist prior to work taking place. (SEE SAMPLE MAP). The biologist will visit each site the week prior to maintenance crew, and will provide a map with non-natives for removal (with recommended method, i.e.; hand removal vs herbicide spot treatment), nest activity, irrigation items, other items of note, to ensure IPM plan is followed with each visit. Before/After photos will be provided weekly, showing the work that was completed.

C. Fertilizer Pellets - We commit to using the District's fertilizer pelletes in accordance with the scope of work.

D. Removal of all non native species - Our team will strictly adhere to IRWD's Integrated Pest Management (IPM) Plan. We will map and identify non-native species at each NTS basin, providing weekly updates to IRWD in both PDF and geospatial formats. A qualified biologist will oversee these efforts to ensure effective and cost-efficient control of invasive species while maintaining the health of the ecosystem.

E. Removal of accumulated debris - We will review all structures at a minimum of one time per month, and daily during rain events. We understand the importance of keeping trash and debris out of waterways by managing the inlets and outlets.

F. Removal pond surface undesireables - This will be an ongoing maintenance item that will be managed and communicated monthly.

G. Trimming of vegetation from trails, roads, etc. - Our monthly schedule and photo documentation will ensure that we are identifying, performing, and documenting the items that are necessaary for routine trimming.

H. Trimming and shaping ornamentals - With our extensive experience maintaining ornamental landscape, we will ensure these itesm are pruned properly.

I. Trimming of terrestrial and emergent aquatic vegetation - These items will be pruned on a rotation schedule, and will communicated as necessary.

J. Trimming and/or removal of aquatic vegetation - These items will be pruned on a rotation schedule, and will communicated as necessary. During time of heavy growth, additional man power will be provided at no additional cost, to ensure that vegetation is kept to standards.

K. Reshiaoing channels - This will be an ongoing management item. We will identify items that require reshaping channels and will communicate plan and show photos of completed work.

L. Mantenance of aquatic vegetation - will be managed per specifications.

M. One major aquatic removal - We will bring in additional man power to perform large removals, so we do not fall behind our routine maintenance activities.

N. Prune and removal dead/damaged plant material - These items will be photo documented while we are on site, and communicated with locations and photos.

O. All work must be in accordance with Landscape Maintenance Specifications - We are clear on the specifications, and will ensure we communicate clearly on our progress.



P. Rain events - Our staff will be present during rain events to ensure we are identifying issues in real time.

Q. Auditing Irrigation - With our extensive experince managing irrigation systems, we will ensure the scheduled are set, inspections are performed, and repairs are made so to maximize efficiency. We mamange over 100 Calsense controllers and are familiar with all facets of programming and management.

R. Vegetation removal/earthwork - All major removals and earthwork will have biologist interaction. Our biologists will be on every site monthly to review items that require removal.

S. Reporting, Documentation, and Communication.

S.1. Vandalism - Our photo documentation and GPS location of all tasks and isseus allow us to share items outside our scope of work in a clear and concise way.

S.2. Submittal of weekly field form - Our weekly field form report will show items completed, and our schedule for the upcoming week. Items that need to be completed will have an overhead satelilite image showing GPS 'pins' with a list of tasks. These items will have descriptions and a legend to describe to items to be completed. This will be accompanied with photos of completed tasks.

S. 3. - Monthly schedule for following month - We use a landscape software that allows us to communicate our daily, weekly, and monthly schedule at the click of a button. This schedule is what our crews use to determine their daily schedule and tasks to be completed. We will share schedule, tasks, man power and any additioanl items that fall outside of the routine maintenance items.

S. 4. Irrigation reporting - We digitally log all inspections and repairs with GPS and photos. These reports will be shared with IRWD staff monthly.

S.5. We look forward to sharing our progress and upcoming schedule .

S.5.a - Our team of biologists will prepare weekly 'non-native species and maintenance maps' showing type of species, GPS location, and schedule for removal.

S.5.b - Corrections - We will ensure corrections are communicated weekly and completed within 7 days.

S.6 Submittal of monthly invoices - All invoicing requirements will be followed.

Man Power:

Foreman (1) - 40 hours per week

Gardener (2) - 80 hours per week

Irrigation Tech (1) - 4-6 hours per week / as needed

Account Manager - 16-24 hours per week / as needed

Biologist - 12-16 hours per week

Seasonal Variation - We are confident that we can balance our seasonal tasks with 3 full time workers and a part time irrigation tech.

#### Equipment List

Crew Truck - All of our crew trucks come equipped with a Truck, 18' landscape trailer, small equipment (hedgfe trimmers, blowers, weedeaters), spray tank, first aid kit, fire extinghuisher, and hand tools.

Gator as necessary for larger sites.

Spplemental equipment:

- Gator as necessary

- Roll off truck for container removal.

- Large equipment - loadrers, backhoes brush hog, etc.

D-21



SUN	MON	TUE	WED	THU	FRI	SAT
	1 Upper Agua Chinon A Los Trancos 2 Muddy Canyon 2	2 Upper Agua Chinon B	3 Floral View	4 Laguna Altura North and South	5 Parasol Park	6
	8 Los Trancos 2 Muddy Canyon 2 Marine Meadows Portola Springs	9 Ridge Valley B	10 Ridge Valley A	11 Ridge Valley A	12 Ridge Valley A	13
4	15 Los Trancos 2 Muddy Canyon 2 Ridge Valley C	16 Ridge Valley C	17 Ridge Valley C	18 Marshburn 1,2	19 Marshburn 1, 2	20
21	22 Los Trancos 2 Muddy Canyon 2 Marshburn 1,2	23 Hidden Canyon	24 Aquila Springs	25 Sports Park	26 Illuna Springs	27
28	29 Los Olivos South Lower Agua Chinon A	30 Los Olivos Meadows Lower Agua Chinon B	31 Lower Agua Chinon C			

# \*This is a proposed sample schedule



Biologist will provide a map each week identify tasks to be performed by maintenance crew. Map will include geolocation and task to be completed for the following items:

- Non-natives weeds
- Irrigation Issues
- Trash
- Other Miscellaneous Items
- Seasonal tasks
- Access items



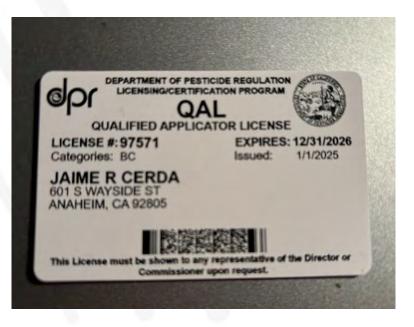


Supplemental weekly reports will be provided to show after photos as well as items accomplished throughout the week. These will be tied to GPS locations and progress throughout the various sites.











Description	30 Days	60 Days	90 Days	COMPLETE
Initial quality scoring to establish baseline for measuring improvement prior to job start, then quarterly thereafter. Establish annual IQ goals.		•		
- Deficiencies	•			
- Irrigation Audit Report	•			
- Rotation Map	•			
- Rotation Calendar	•			
- Propose immediate irrigation repairs, and complete as necessary	•			
Implement Water Management/Conservation Program.		•		
Make all necessary immediate repairs (pending approval).		•		
Perform initial job assessment and submit written/photo documented report to Management Company. Report will include:			•	
- Identify and report potential upgrades and opportunities for savings.			•	
- Pests and diseases identified.			•	
- Hazards, and liabilities.			•	
- Proposals/Budget Requests			•	
<ul> <li>Tree Care Management Plan and Inventory – This will include tree trimming schedule, fertilization schedule, identification of sick and hazardous trees performed by In House Arborist.</li> </ul>			•	
- Proposals/Budget Requests			•	
Property up to Bemus standards (80 IQ score or higher).			•	
Full implementation of ongoing management program.			•	
Full implementation of water conservation program.			•	
Weed free projects.				



**Water management** has come to the forefront of concerns for properties like yours. Bemus Landscape recognizes water as one of earth's most precious resources. We manage over 2 billion gallons of water a year and believe that it is our duty as a responsible business to proactively manage your water.

#### Our approach:

**System Evaluation:** The first step of responsible water management is to evaluate the system . At this stage we inspect and report on system deficiencies such as breaks, leaks and safety issues. After any initial repairs are done we continue to regularly inspect the system to make sure it is functioning properly.

**Manage Usage:** Once the system is fully functioning, we move to managing usage. With client provided water bills we compare ongoing actual usage with the water allocated by the local district. We adjust our programming to be as efficient as possible. In addition to ongoing management we keep an eye on the plant health in order to communicate any improvements that may be needed.

**Improvements:** Inefficient irrigation can create unnecessary costs in the form of wasted water, plant decline, asphalt damage, etc. We will work with you to provide solutions that allow you to maximize your system. These include possibilities such as drip conversions, specialized flow/shut off valves, and lower water using plants. Additionally these can be put into a Return on Investment calculation to allow you to make educated decisions.

#### **Additional Strategies:**

#### Rebate Programs

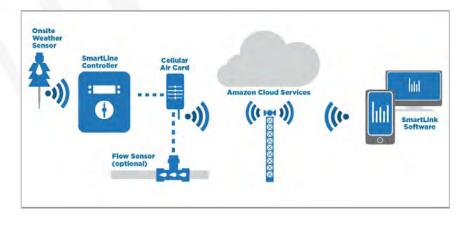
We facilitate the application process for rebates. We are very familiar with all water districts throughout Southern California and the programs that they offer. With the results of our initial inspection we can make recommendations for system upgrades.

#### Weather based / Smart Controllers

These systems have grown in popularity over the last 5 years. After the system is installed it starts with online management, then the local weather station provides daily weather and rainfall data. The servers access the weather data, computes evapotranspiration, and generates a watering schedule for each landscape profile. Results have shown healthier landscapes, better water management while reducing harmful runoff pollution and potential water savings of 20 to 50%.

Our Irrigation Manager monitors the irrigation control system as often as required, and makes continuous adjustments based on seasons, plant and zone attributes, run times, and flow readings.

We can use a ROI calculation to determine if it's feasible for the association to invest in the new technology for water management.





At Bemus Landscape, we like to take a systematic approach to the renovation process. We believe it is imperative to establish a long term plan based on the needs of the community.

Here is our process:

#### **Design Plant Palette**

Here we work with the Board of Directors/Landscape Committee to establish a the criteria of what plant material is most consistent with the architectural theme, adheres to same water requirements, and is aesthetically appealing. (See sample Plant Palette)

#### Design Photo Rendering(s)

After the Plant Palette has been completed, we will begin to work on the Photo Rendering. This will allow us to implement the Plant Palette into a visual image, showing what the completed product will look like. This allows the client to have a visual concept of the design , and helps avoid any misconceptions of the final product. (See sample Photo Renderings).

#### Installation

This is where the rubber hits the road. Here we begin the installation using the skills we have acquired over the last 39 years of landscape installation. We strip the existing landscape material, check the irrigation coverage, test the soil, apply the required nutrients, and then we begin our install. (The example image below represent a before and after photo rendering of a potential conversion)





#### **REQUEST FOR PROPOSAL**

#### Natural Treatment System Landscape Maintenance SOUTH

Date: February 6, 2025 Michelson Operations Center 3512 Michelson Drive Irvine, CA 92612

#### QUESTIONS DUE BY: 4:00 PM, FEBRUARY 24, 2025 PROPOSAL DUE BY: 4:00 PM, MARCH 13, 2025 BID BOND DUE BY: 4:00 PM, MARCH 13, 2025

#### Project: Natural Treatment System Landscape Maintenance (South) Project Coordinator: Aimee Halligan

The Irvine Ranch Water District (IRWD or the District) invites environmental consulting firms and/or landscape contract companies to submit a proposal to complete the landscape maintenance project herein described. The bid is to include all labor, material, equipment, traffic control, bond fees and insurance costs required for the project. The bid shall include both a lump-sum total and individual line items that include all work described in the scope of work. All bid documents and submissions will be conducted electronically through the District's ePurchasing website at <a href="https://irwd.ionwave.net/">https://irwd.ionwave.net/</a>. It is the prospective bidders responsibility to download bid documents and check for addenda or updates on a regular basis. For login or registration assistance, please contact purchasingdept@irwd.com.

The following information is provided for guidance in preparing your proposal:

#### I. PROJECT DESCRIPTION AND BACKGROUND INFORMATION

Established in 1961 as a California Water District, IRWD provides drinking water, sewage collection and treatment, recycled water, and urban runoff treatment to over 390,000 residents of Central Orange County, California. IRWD encompasses nearly 181 square miles extending from the Pacific coast to the foothills and has more than 110,000 domestic and recycled water connections. IRWD serves the City of Irvine and portions of the Cities of Costa Mesa, Lake Forest, Newport Beach, Tustin, Santa Ana, Orange and unincorporated Orange County.

In 1997, IRWD established the San Joaquin Marsh and Wildlife Sanctuary (SJM), an approximately 277-acre freshwater marsh and upland riparian habitat adjacent to its Michelson Water Recycling Plant. The SJM serves three primary functions: to treat and remove pollutants from urban runoff in the San Diego Creek Watershed; to provide mitigation habitat for wildlife and habitats impacted by development in Irvine; and to provide recreational opportunities for the public.

Following the success of the SJM, IRWD developed the Natural Treatment System (NTS) in 2005. The NTS uses the concept of the SJM and establishes small treatment wetlands throughout the San Diego Creek

1

Initial each page

Watershed to remove pollutants on a regional basis. The NTS currently has 44 sites, of which 21 are covered by this landscape maintenance contract. Three (3) other sites are also covered under the purview of this contract, but are variations from a typical NTS site, and require slightly different maintenance, which is further described in the Work Plan below. The system is growing, and additional sites will be added in the foreseeable future.

The NTS South contract area must be staffed with a crew of an appropriate size to fulfill all requirements of the *Work Plan* and Table 1.1 and 1.2 (below). This crew shall include a minimum of one foreman present with the crew, Monday through Friday. Typical work hours shall be during IRWD's regular business hours of 6:00 am to 4:30 pm, Monday through Friday and with respect to local city noise ordinances, typically 7:00 am - 7:00 pm, unless other arrangements are made with IRWD NTS staff. Work outside of these hours is subject to authorization by IRWD in advance.

#### II. <u>SCOPE OF WORK</u>

The Contractor shall maintain the NTS sites in good order and appearance, in accordance with the requirements detailed in the following *Work Plan*, the *Landscape Maintenance Specifications* (see Attachment A), and in accordance with IRWD's *Integrated Pest Management (IPM) Plan* (see Attachment B). The scope of work detailed in the *Work Plan* is to be carried out across all NTS sites listed in Table 1.1.

No.	Name of Site	Address	Latitude	Longitude	Approximate Arca (sq. ft.)	<u>Minimum</u> Maintenance Frequency
1	Upper Agua Chinon A	12040.25 Whispering Hills	33.687075	-117.696162	198,975	Once a month
2	Upper Agua Chinon B	12450.25 Dream Catcher	33.6805	-117.703287	166,789	Once a month
3	Aquila Springs	8321.25 Irvine Blvd	33.679551	-117.714845	50,800	Once a month
4	Floral View	383.50 Flora1 View	33.678646	-117.748877	189,319	Once a month
5	Hidden Canyon	100.5 Hidden Canyon	33.63595	-117.755505	122,200	Once a month
6	Illuna Springs	8521.25 Irvine Blvd	33.673722	-117.709222	116,700	Once a month
7	Laguna Altura North	81.5 Borghese, Irvine	33.649928	-117.758864	39,700	Once a month
8	Laguna Altura South	19.75 Romano, Irvine	33.642247	-117.759933	32,200	Once a month
9	Los Olivos Meadow	11100.5 Dana, Irvine	33.648801	-117.75375	138,800	Once a month
10	Los Olivos South	8665 1/2 Dana	33.639499	-117.74884	166,789	Once a month
11	Marine Meadows	6925.50 Marine Way	33.674639	-117.752581	134,777	Once a month
12	Marshburn <sup>1,2</sup>	See map	33.693697	-117,727267	611,400	Once a month
13	Parasol Park	3725.5 Trabuco Road	33.684343	-117.744138	168,835	Once a month
14	Portola Springs	300.5 Native Spring	33.696561	-117.734184	38,600	Once a month
15	Ridge Valley A	14250.75 Treble	33.689001	-117.741115	372,700	Once a month
16	Ridge Valley B	14250.75 Treble	33,690657	-117.739742	72,020	Once a month

Table 1.1 – NTS Sites included in Scope of Work (see detailed map attached)

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17	Ridge Valley C	14101.5 Chinon	33.692297	-117.738192	203,700	Once a month
18		7451.5 Marine	33.668	-117.74266		Once a month
	Sports Park	Way			85,000	
19		14250.75 Treble	33.667439	-117.724036		Once a month
	Lower Agua Chinon A				166,789	
20		14101.25 Chinon	33.667439	-117.724036		Once a month
	Lower Agua Chinon B				159,764	
21		14101.25 Chinon	33.667439	-117.724036		Once a month
	Lower Agua Chinon C				228,540	
22	Los Trancos <sup>2</sup>	See map	33.576844	-117.839898	200	Weekly
23	Muddy Canyon <sup>2</sup>	See map	33.565532	-117.827307	200	Weekly
24	Baker Water Treatment		33.65554	-117.6831	9,120	As requested
	Plant <sup>2</sup>					(approx.
						biannually)

1 This site does not currently have irrigation.

2 See "Site Specific Requirements" section below for more information on maintenance at these sites.

Should additional sites be added during the contract period, IRWD and the Contractor will mutually agree in writing on future costs for landscape maintenance of these sites. In such cases, IRWD may consider the authorization of a change order or similar process.

#### Work Plan

Contractor must carry out the following tasks:

- A. Removal of all trash within site boundaries (refer to attached aerial photos of sites for boundaries). If trash cans are present, trash must be emptied and liners replaced. Trash screens on outlets must be regularly cleaned and maintained to prevent discharge of debris greater than 5mm. Total weight of trash removed must be weighed and reported to IRWD NTS staff on a monthly basis. Trash must be disposed of by Contractor off-site.
- B. Full compliance with the IRWD's IPM Plan (Attachment B). In addition, the Contractor will be expected to map and identify all non-natives (some ubiquitous species may be excluded) at each NTS basin (where applicable) and present these maps to the District each week in a coordination meeting (map must be in PDF electronic format and must also be made available to the District in geospatial data format). The mapping effort shall direct the work of the landscape Contractor to ensure non-native, invasive species are controlled and removed in a cost-efficient manner consistent with the IPM Plan. This effort shall be conducted by a qualified biologist.
- C. The Contractor will commit to using the District's fertilizer pellets in accordance with sections 3 and 3.6 in the Landscape Maintenance Specifications (Attachment A), if available.
- D. Removal of all non-native plant species (with emphasis on priority target species) and undesirable natives (cattails, mulefat, and woody vegetation (willows, cottonwood trees, etc.)) within site boundaries using integrated pest management techniques starting with hand removal and escalating to herbicide application only if necessary and justified via documented herbicide authorization memorandum. Herbicides may only be used if physical removal methods (hand removal, mulching, etc.) are ineffective and may only affect the target species (through use of selective herbicides and spot spraying).
- E. Removal of accumulated debris and sediment from all structures, including but not limited to inlet and outlet structures, sediment traps, intake grates, ditches and kiosks.
- F. Removal of algae, mosquito fern and other floating vegetation to less than 50% of pond surface.
- G. Trimming of vegetation from all trails, roads, concrete walkways, and other structures including, but not limited to: pipes, irrigation boxes and heads, electrical boxes, bird boxes, signs, ditches, fences, weir structures, and sampler enclosures to a minimum of two feet.

Initial each page

- H. Trimming and shaping of roses (and fertilize, if necessary), morning glories, honeysuckles, and other vine species along fences.
- I. Trimming and/or removal of terrestrial and emergent aquatic vegetation (i.e. bulrush and cattails) to ten feet from inlet and outlet structures to allow access by IRWD NTS staff.
- J. Trimming and/or removal of aquatic vegetation in channels to 20 feet sections, followed by 20 feet sections of bare channels, continuing this pattern throughout channels as needed per site conditions.
- K. Reshaping channels to direct flow into and out of basin via sandbags and/or sediment removal, as needed.
- L. Maintenance of aquatic vegetation to no more than a four-foot width around margin of ponds.
- M. One major annual aquatic and terrestrial vegetation removal per site, including trimming back vegetation (i.e. bulrush and cattails, and other species as determined in consultation with IRWD) by approximately 50%.
- N. Prune and remove dead or damaged plant materials. Replace dead plants if needed in coordination with IRWD and with identification of root cause. Notify IRWD ASAP of any dead or dying trees, shrubs or ground cover.
- O. All work must be in accordance with IRWD's *Landscape Maintenance Specifications* (Attachment A) and IPM Plan (Attachment B), which are attached.
- P. During rain events, Contractor must provide regular maintenance crews to conduct inspections of sites to prevent damage and/or respond to the IRWD NTS staff instructions to repair damage.
- Q. Auditing of irrigation at all sites on a monthly basis, including testing of all irrigation stations, visual inspection of each head, master valve, and flow sensor, and submittal of irrigation report to IRWD NTS staff at end of month. Each monthly irrigation report should include a thorough description of necessary repairs and maintenance items that were completed as well as a confirmation of successful completion of testing of the irrigation system confirming appropriate coverage and functionality. Contractor will be expected to have the ability to complete all necessary irrigation repairs. Contractor shall use IRWD's CalSense platform for irrigation alerts and irrigation management at each site.
- R. Any vegetation removal or earthwork between March 15 and September 15 within or adjacent to existing habitat will require the Contractor to notify IRWD and will require a qualified biologist to ensure that applicable environmental rules are being adhered to. This qualified biologist shall have the authority to stop or otherwise divert work to avoid impacts as necessary. The Contractor shall not resume work until approval by IRWD, the qualified biologist or IRWD designated representative is given.
- S. Reporting, Documentation, and Communication:
  - 1. Reporting of vandalism such as graffiti on same day as observation, via text or phone call.
  - 2. Submittal of fully completed weekly field form (as provided by IRWD) to IRWD NTS staff by Monday at 8am. This form shall be completed in English with appropriate level of detail describing maintenance work and completion status for each site included under this contract conducted during the previous week, including photographs (before and after) and daily reports. May be submitted as a single consolidated report for all sites covered under this contract for the reporting period. Additionally, the Contractor shall include in each report, planned activities for the upcoming week.
  - 3. By the last day of each month, provide the IRWD NTS staff with an updated monthly schedule for the following month of what sites will be visited on each day, including name and contact information of English-speaking crew foreman, total number of staff, and approximate hours the crews will be at each site. General information shall also be provided summarizing planned work activities and outstanding items to be addressed. Any changes to this schedule shall be immediately communicated to IRWD NTS staff as it may necessitate changes in IRWD's water quality sampling schedule.
  - 4. Submittal of irrigation audit report for each site to IRWD NTS staff at end of each month.
  - 5. Attend coordination meetings with IRWD and other applicable contractors on a weekly basis (or other cadence as determined in coordination with IRWD; meetings will be generally 1 hour).

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Contractor shall coordinate with IRWD and identify and share any issues or concerns with the prompt and timely maintenance to address work requests by IRWD NTS staff and or biological consultant as designated by IRWD.

- a. Prepare and submit non-native species and maintenance maps to the District each week for discussion in weekly coordination meeting (map must be in PDF electronic format and must also be made available to the District in geospatial data format).
- b. Corrections to any identified maintenance Work Plan deficiencies must be made within 7 calendar days upon receipt of deficiency report from IRWD. Completion of remediation of deficiencies must be documented and reported to IRWD NTS staff upon completion.
- 6. Submittal of monthly invoices to <u>apinvoices@irwd.com</u> and NTS Staff on last business day of month. All invoicing shall include at a minimum:
  - a. Contract Name
  - b. PO Number
  - c. Date of Services Performed
  - d. Location(s) Of Work Area
  - e. Cost Description/Breakdowns

#### Site Specific Requirements:

In addition to the Work Plan detailed above, your proposal must also include the following the specific language for the specified NTS sites:

#### A. Marshburn:

a. A majority of routine maintenance items overviewed in the Work Plan above are only conducted within the limited boundaries of the NTS site (channels/ponds, buffer) located within the bottom of the retarding basin. Within the broader, flat area of the basin bottom, outside of the NTS site, more limited maintenance is conducted, including clearing of sediment from perimeter v-ditches, sediment trap, inlet apron, and walkways (hardscape), clearing of vegetation and debris around sampling sheds and hardscape, and regular weeding of target invasive species from the basin bottom. Vandalism, graffiti, etc. should also be reported to IRWD as soon as possible upon observation. In addition, mowing of vegetation in the larger basin bottom, outside of the NTS site (channels/ponds, buffer), prior to rainy season, is to be completed between September 15<sup>th</sup> and October 15<sup>th</sup>. All material shall be hauled off-site and disposed. This site shall also be mowed once more before the nesting season in approximately February, pending nesting surveys.

#### B. Los Trancos & Muddy Canyon:

a. On a weekly basis, clean off intake grates at both diversion sites at Los Trancos and Muddy Canyon; remove all trash from the path at Muddy Canyon and around the immediate grate area at both sites; and document the cleaned grate and path with photos that contain a date/time stamp and provide to IRWD NTS staff each day. Periodically Contractor shall also clear vegetation from around the grate and trail at Muddy Canyon, in coordination with IRWD NTS staff. Contractor shall immediately notify IRWD NTS staff if the diversion system is not functioning during dry weather (i.e. grate blocked, etc.).

#### C. Baker Water Treatment Plant

a. As requested, remove accumulated debris from a series of 3 modular wetland units located at the Baker Water Treatment Plant (WTP) located in Lake Forest. Typically, this maintenance is done approximately twice per year, before and after the rainy season. In addition, as requested, Contractor will maintain and remove non-native and undesirable plants from an emergency outlet structure located adjacent to the WTP, along Serrano Creek Trail, also approximately twice per year, typically before and after the rainy season. Once per year prior to the rainy season,

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Contractor will also inspect and replace straw wattles located at the v-ditches surrounding the modular wetland units. These wattles will be non-monofilament straw wattles.

Generally expected tasks are summarized in the following table, however more detail is provided in the scope description above. Note that sites must be visited <u>at a minimum</u>, on a monthly basis, but also on a cadence and frequency sufficient to complete all of the following tasks

Frequency	Activity			
	Submit weekly field form documenting, in detail, maintenance for each site from the previous week			
Weekly	Map and identify all non-natives (with emphasis on priority target species) for each site to be maintained in the following week, to be presented to IRWD			
	Attend weekly meetings with IRWD to discuss completed work and next week's plan			
	Clean intake grates and remove trash at Muddy Canyon and Los Trancos and provide documentation photos to IRWD			
-,	Remove all trash			
	If trash cans are present, empty and replace liners			
	Clean trash screens on outlets			
	Record weight of trash, to be reported monthly per site			
	Remove accumulated debris/sediment from all structures (i.e. inlet/outlet, sediment traps, intake grates, ditches, kiosks)			
	Remove non-natives (with emphasis on priority target species) and undesirable natives			
	Remove algae, mosquito fern, floating vegetation to less than 50% pond surface			
	Trim back vegetation from all trails, roads, concrete walkways, and other structures (i.e. pipes, irrigation boxes, irrigation heads, electrical boxes, bird boxes, signs, ditches, fences, weir structures, sampler enclosures) to a minimum of 2 feet			
	Trim and shape vine species along fences, fertilize if necessary			
Monthly	Trim and remove aquatic vegetation (i.e. bulrush/cattails) to ten feet from inlet/outlet structures and to no more than a 4-foot width around pond margins			
	Trim and remove aquatic vegetation (i.e. bulrush/cattails) in channels to 20 ft sections followed by 20ft sections of open water/bare channel, continuing the pattern throughout the channel			
	Reshape channels to direct flow into and out of basin via sandbags, as needed			
	Audit irrigation, test all stations, visually inspect each head, master valve, flow sensor, confirm appropriate coverage and function. Document and submit report monthly.			
	Report vandalism and graffiti to IRWD ASAP			
	Report any identified pest damage to IRWD ASAP			
	Notify IRWD ASAP of any dead or dying trees, shrubs or ground cover. Prune and remove dead or damaged plant materials. Replace dead plants if needed in coordination with IRWD and with identification of root cause			
	Maintain all hardscape clean of debris, weeds, animal droppings, etc. Maintain all trails and pathways in a clean and safe condition.			
	Maintain existing mulched areas and replace mulch as needed			

Table 1.2 - Regular Maintenance Activities at All NTS Sites (North and South)

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Quarterly	At Sand Canyon, remove all trash from shoreline from dam face extending 100ft on either side and haul material offsite. Report total weight of trash removed to IRWD within 24 hours. At Rattlesnake Reservoir, check inlet structures and remove overgrown vegetation.
	In spring and late fall, all trees and shrubs shall be fertilized using IRWD's fertilizer pellets.
Biannual	Once prior to the rainy season (~August) and once following the rainy season (~May) at Baker WTP, remove accumulated debris from modular wetland units and inspect, maintain, and remove non-native and undesirable plants from emergency outlet structure. Replace straw wattles near modular units prior to rainy season.
	Mow vegetation prior to rainy season, between Sept 15-Oct 15 and haul material offsite, at Trabuco, Orchard Basin, Eastfoot Basin and Marshburn. Conduct a second mowing just prior to start of nesting season in approximately February.
Annual	Conduct one major aquatic and terrestrial vegetation removal per site, including trimming back vegetation by approximately 50%, in coordination with IRWD.

1. All tasks should be completed for each site at the identified frequency, refer to contract for additional details.

2. From March 15 - September 15, all work requires pre-survey by a qualified biologist for compliance with biological rules and regulations.

3. All work must be conducted in accordance with IRWD's IPM Plan (Attachment B) and Landscape Maintenance Specifications (Attachment A). Refer to contract, IPM Plan, and Landscape Maintenance Specifications for more details.

Contractor performance will be rated on the following key performance indicators (KPI):

Number	Key Result Area	Key Performance Indicator	Target
1	Maintenance	# of maintenance Work Plan deficiencies identified during	0
		regular weekly inspections (i.e. from Work Plan in Section II)	
2	Maintenance	# of irrigation alerts on CalSense controllers during regular	0
		monthly inspections	
3	Maintenance	Minimum # of site visits	See Table 1.1
4	Accountability	Submittal of monthly site maintenance schedule	Last business day of
			prior month
5	Accountability	Submittal of fully completed weekly field forms and photos	Prior to 8 am
	· · · ·		Monday of
			following week
6	Accountability	Submittal of irrigation audit forms	Fifth business day
			of each month
7	Accountability	Date of submittal of invoices to AP Invoices and NTS staff in	Last business day of
		accordance with Section II, Work Plan Item Q	each month

Table 1.3 – Key Performance Indicators

#### III. SAFETY AND REGULATORY REQUIREMENTS

Safety shall be of the utmost importance at all times. The Contractor shall safeguard all District, and Contractor personnel, during the progress of the work by providing barricades, flagmen, traffic control and appropriate warning signs as required. Any equipment (such as tractors) shall be of the proper size necessary to safely accomplish the task.

Contractor equipment shall comply with all applicable federal, state, and local regulations, including but not limited to requirements for emissions, noise levels, and safety standards. It is the responsibility of the contractor to ensure that equipment is properly maintained and in compliance with these regulations throughout the term of the contract.

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Contractor and associated personnel shall be required to follow all IRWD rules, regulations and procedures as listed in the Emergency Evacuation Plans. These include but are not limited to speed limits. In the event of an emergency the Contractor and all associated personnel shall follow evacuation procedures in the Emergency Evacuation Plans. Contractor shall be held responsible for all such training of all associated personnel.

The Contractor shall provide proof to the District's representative, that they, the Contractor, have in place all safety programs that are required by the state and federal agencies. The Contractor must also prove that all personnel have been trained in these programs, by providing the District with training documentation. The Contractor will be required to provide to the District's representative a copy of the Safety Data Sheets for all chemicals that are brought on site. No hazardous materials will be approved for use or permitted in the building or at the job site. Work areas must be cleaned up at the end of each shift, and no storage of material or equipment will be allowed in the building. All trash and spent materials are to be disposed of off site and in compliance with state and federal regulations. All washing and cleaning of Contractor equipment must be done off site. The Contractor shall protect all surfaces during refueling or other maintenance activities.

The Contractor **shall** perform all work during IRWD's regular business hours of 6:00 am to 4:30 pm, Monday through Friday and with respect to local city noise ordinances, typically 7:00 am - 7:00 pm, unless other arrangements are made with IRWD NTS staff. Work outside of these hours is subject to authorization by IRWD in advance.

#### IV. QUALITY CONTROL

All work shall be done by experienced and qualified personnel in accordance with the written Request for Proposal. The Contractor will be responsible for quality control of all associated employees' actions and the finished product. The District reserves the right to reject any and all work that it feels is defective and may require the Contractor to repair or replace such work, at no extra cost to the District.

#### V. <u>PROPOSAL CONTENTS</u>

The Contractor's proposal must include the following:

- 1. The following proposal components shall be included in each bid:
  - a. Scope of Work
  - b. Org Chart
  - c. Resumes/CVs for key staff
  - d. References
  - e. Proposed Schedule
  - f. Budget/Cost Proposal with breakdown of assumptions
  - g. Sub-Consultants/Partnerships (if applicable)
- 2. Cost proposal and breakdown.
  - a. This should include:
    - i. Full and complete cost per site per month for each year of the contract. Contractor must provide the information listed on attached bid sheet, and is also encouraged to submit supporting documentation providing an overview of assumptions of number of labor hours, equipment and materials costs, etc.
    - ii. Labor must be based on prevailing wage standard for each work task being performed. The attached "LABOR AND PREVAILING WAGE REQUIREMENTS" is incorporated in this Request for Proposal and will be incorporated in the contract.

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NOTE: The prices quoted shall be fixed during the term of this contract and mid-contract price or rate increases will not be allowed thereafter unless authorized by IRWD.

NOTE: The full contract amount will be treated as a "not to exceed" amount, and should additional sites be added to IRWD's NTS during the contract term, IRWD and the Contractor will mutually agree in writing on future costs for landscape maintenance of these sites. In such cases, IRWD may consider the authorization of a change order or similar process.

- 3. Demonstration of Contractor's technical expertise in habitat establishment and restoration, including the identification and mapping of non-native and invasive species. Particular focus should be on mapping non-native species for removal and how conformance with an existing IPM was achieved.
  - a. Provide at least three examples/projects that demonstrate this expertise. Include name of project, location, and a summary of the work completed.
  - b. Provide a list and CVs for all key staff. Include names of staff, how many years of experience they have related to habitat restoration and maintenance, and what types of similar projects they have worked on.
  - c. Contractor shall not make any changes in key staff unless authorized by IRWD. If replacement of key staff becomes necessary, Contractor shall provide a replacement with equivalent or better qualifications, subject to approval by IRWD.
  - d. Assigned staff shall have adequate knowledge of habitat restoration projects, including installation and maintenance of riparian, grassland, and coastal sage scrub plant communities, as well as drought-tolerant landscaping and irrigation management and repairs. Contractor shall demonstrate that primary staff assigned to the Project shall have a minimum of 5 years of experience in native wetland and riparian type habitats as well as experience working around sensitive species such as the least bell's vireo (*Vireo bellii pusillus*).
  - e. The Contractor shall demonstrate the ability to have an English-speaking/bilingual foreman overseeing crews that are assigned to the Project, and that foreman shall be on-site during the performance of all tasks, shall direct and supervise all work performed as specified herein, and shall be responsible for compliance with the contract scope and Landscape Maintenance Specifications (Attachment A). The name, phone number, and contact information of the Contractor's project manager and foremen assigned to the maintenance activities described herein shall be provided to IRWD, and a backup shall be assigned in the case of any absences.
- 4. A detailed description of how the Contractor will fulfill each of the requirements of the Work Plan outlined in Section II with adherence to the attached Landscape Maintenance Specifications (Attachment A) and IPM Plan (Attachment B). This should include predicted monthly and/or seasonal work schedules, crew sizes, equipment lists, and any other information that provides a clear and specific picture of how the Contractor will approach the work. Although Contractor must perform maintenance work at each site per the minimum maintenance frequency outlined in table 1.1 and 1.2, the Contractor's Work Plan and schedule will be scored based on how well it addresses (in terms of labor allocation) seasonal variations in maintenance needs, ensuring that all tasks outlined in the scope and Table 1.2 are sufficiently completed and that all sites are upkept in good condition.
- 5. Proof of all applicable licenses required to perform the work described herein, including but not limited to an active Contractor's license and a Pest Control Qualified Applicator License issued by the State of California. The Contractor shall also provide any additional licenses necessary to ensure compliance with all applicable laws and regulations for the completion of the project.
- 6. All safety documentation required in Section III.

Please note that IRWD may conduct interviews with each Contractor's proposed team and may contact recent clients. Following conclusion of the bidding period, IRWD will contact bidders to schedule oral interviews, which will also include a presentation component. Selection of the Contractor will generally be based on the proposal contents, oral interview and presentation contents, Bidders will be expected to present a brief

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PowerPoint presentation outlining the contents of their bid and the qualifications of the proposed team. This presentation should not exceed 15 minutes. The presentation will be followed by a brief question and answer session. Selection of the Contractor will generally be based on the proposal contents, oral interview and presentation contents, prior experience of the firm, and specific experience and capabilities of the designated project team and staff. The Contractor must be fully capable in all areas outlined under the scope of work. The Contractor selected must be able to begin work on June 1, 2025 and must be able to maintain the level of effort required to meet the proposed schedule.

This request does not commit IRWD to retain any Contractors or Consultants, to pay costs incurred in the preparation of proposals, or to proceed with the project. IRWD reserves the right to reject any or all proposals, to negotiate with any qualified applicant, and to appoint more than one Contractor to provide services on given portions of the project.

Proposals (including accompanying materials) will become the property of IRWD. Proposals will be held in confidence to the extent permitted by law. After award of a contract or after rejection of all proposals, the proposals will be public records, subject to disclosure under the California Public Records Act (Government Code Section 6250 et seq.). IRWD reserves the right to request additional information from prospective Contractors prior to final selection and to consider information other than that submitted in the proposal or interview. IRWD may select for contract negotiations the Contractor that, in IRWD's judgment, will best meet IRWD's needs, irrespective of the comparison of fees and costs estimated by the applicants. IRWD may conduct such investigations, as IRWD deems necessary, to assist in bid evaluations, and to establish the responsibility, qualifications, and financial ability of the bidder

#### VI. BOND REQUIREMENTS

Before the Contractor will be allowed to move any staff, material, or equipment, on to the job site and commence any work the following conditions must be met:

- Payment and Performance Bonds are required by successful bidder for "public work" projects over \$25,000, must equal to 100% of the contract amount.
- If the total lump-sum bid amount is \$100,000 or more, a bid bond at 10% of bid amount, shall be submitted in paper form in a sealed envelope titled "Bid Bond" and the project title, by bid closing date.

#### **Delivery Address:**

Irvine Ranch Water District Attn: Purchasing Department 3512 Michelson Dr., Irvine, CA 92612

#### VII. PREVAILING WAGE

Pursuant to California Labor Code Sections 1725.5 and 1771.1, no contractor or subcontractor shall be qualified to bid on, be listed in a bid proposal or engage in the performance of any contract for public work unless registered with the Department of Industrial relations. It shall be mandatory upon the Contractor and all subcontractors to comply with all applicable California Labor Code provisions, which include but are not limited to prevailing wages (Labor Code Sections 1771, 1774 and 1775), employment of apprentices (Labor Code Sections 1777.5), certified payroll records (Labor Code Sections 1771.4 and 1776), hours of labor (Labor Code Sections 1813 and 1815) and debarment of contractors and subcontractors (Labor Code Section 1777.1).

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#### VIII. INSURANCE REQUIREMENTS

Contractor shall always maintain the following policies of insurance with insurers possessing a policyholders' Rating of A- (or higher) and Financial Size Category of VII (or larger) in accordance with the latest edition of Best's Key Rating Guide, unless otherwise approved by IRWD. Contractor may not commence work until all required insurance documentation, including endorsements, is provided to IRWD.

#### Policy Amounts

- A. <u>Comprehensive General Liability Insurance</u>. Contractor shall maintain a comprehensive general liability insurance policy with coverage on an "occurrence" basis, including products and completed operations, property damage, bodily injury, personal injury, and, with limits no less than \$1,000,000 per occurrence, \$2,000,000 aggregate.
- B. <u>Automobile Liability Insurance</u>. Contractor shall maintain an automobile liability insurance policy covering bodily injury and property damage for all activities of the Contractor arising out of or connection with the Services, including coverage for any owned, hired, and non-owned, rented, or leased vehicles, in an amount not less than \$1,000,000 combined single limit for each accident.
- C. <u>Workers' Compensation Insurance</u>. Contractor shall maintain a workers' compensation insurance policy (Statutory Limits), as required by law, and Employer's Liability Insurance (with limits not less than \$1,000,000). Contractor shall submit to IRWD, along with the certificate of insurance, a Waiver of Subrogation Endorsement in favor of IRWD, its directors, officers, employees, and agents.
- D. <u>Umbrella or Excess Policy</u>. Contractor may use umbrella or excess Policies to provide the liability limits as required in this Agreement.

<u>Additional Insured</u>. General liability, automobile liability and all other applicable policies, including excess/umbrella liability policies, shall provide, or be endorsed to provide, that IRWD, its directors, officers, employees, and agents, are additional insureds under such policies.

<u>Primary Non-Contributory</u>. For any claims related to this contract, the Contractor's insurance, including umbrella/excess coverage, must be primary and non-contributory. Any insurance or self-insurance maintained by IRWD, its directors, officers, employees, and agents will be excess of the Contractor's insurance and will not contribute to such insurance.

<u>Waiver of Subrogation</u>. All insurance coverage maintained pursuant to this Agreement must be endorsed to waive subrogation against IRWD, its directors, officers, employees, and agents, or must specifically allow Contractor to waive its right of recovery prior to a loss. This provision applies regardless of whether or not IRWD has received a waiver of subrogation endorsement from the insurer.

<u>Notice of Cancellation</u>. Contractor shall oblige its broker and insurers to provide IRWD with a 30-day notice of cancellation (except for nonpayment for which a ten-day notice is required) or nonrenewal of coverage for each required coverage. If the Contractor's insurers are unwilling to provide such notice, then Contractor shall notify IRWD immediately in the event of Contractor's failure to renew any of the required insurance coverages or insurer's cancellation or non-renewal.

<u>Requirements Not Limiting</u>. Requirements of specific coverage features or limits contained in this Section are not intended as a limitation on coverage, limits, or other requirements, or a waiver of any coverage normally provided by any insurance. If the Contractor maintains broader coverage and/or higher limits than the minimums

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shown above, IRWD requires and is entitled to the broader coverage and/or the higher limits maintained by the Contractor.

<u>Separation of Insureds</u>. A severability of interests provision must apply for all additional insureds ensuring that Contractor's insurance applies separately to each insured against whom claim is made or suit is brought, except with respect to the insurer's limits of liability. The policies may not contain any cross-liability exclusions.

Self-Insured Retentions. Any deductibles or self-insured retentions must be declared in writing.

<u>Timely Notice of Claims</u>. Contractor shall give IRWD prompt and timely notice of claims made, or suits instituted that arise out of or result from Contractor's performance under this Agreement, and that involve or may involve coverage under any of the required liability policies.

#### IX. <u>COLLATERAL DAMAGE</u>

Contractor shall be responsible for all damage to IRWD property, facilities or personnel caused by its employees, subcontractors or their equipment during the performance of the contract.

#### X. **PROJECT COMPLETION**

The project is complete when all work activity has been completed and all items on the punch list have been completed. All work must have passed inspection by the District's representative and the site must be left neat and clean. Payment may be withheld until monthly work is completed and approved by a District representative.

#### XI. AWARD OF CONTRACT

- 1. If the contract is to be awarded, it will be awarded to the Contractor who, after evaluation by the District, best meets the following criteria: 1) technical expertise 2) approach to work, and 3) cost, as described in Section V. Bids and oral interviews/presentations will be scored on these criteria, based on a weighted scale, with emphasis given to qualifications.
- 2. If at the time that this contract is to be awarded, the total of the acceptable bid exceeds the funds then estimated by IRWD as available, then the District may reject all bids or take such other action that best serves the interest of the District.
- 3. IRWD reserves the right to reject any or all bids including, without limitation, the right to reject any other all non-conforming, non-responsive or conditional bids. IRWD reserves the right to reject the bid of any bidder if IRWD believes that it would not be in the best interest of the project to make an award to that bidder, whether because the bid is not responsive or the bidder is unqualified or of doubtful financial ability, or fails to meet any other pertinent standard or criteria established by IRWD. IRWD reserves the right to waive any irregularities; accept the whole, part of, or reject any or all responses; and select the firm which, in the sole opinion of the District, best meets the District's needs. IRWD also reserves the right to negotiate with potential Vendors so that the District's best interests are served.
- 4. IRWD may conduct such investigations, as IRWD deems necessary to assist in bid evaluations, and to establish responsibility, qualifications and financial ability of the bidder.
- 5. In the event of failure of the successful bidder to sign the Agreement, provide insurance certificates, and the required documents, IRWD may award the contract to the next responsive responsible bidder.
- 6. Contractor agrees to fully comply with and to require its subcontractors to fully comply with such Prevailing Wage Laws, to the extent such laws apply under Sections 1777.5 and 1777.6 of the Labor Code.

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- 7. The Contractor selected for the award of contract must be able to begin work immediately upon award of the contract and must be able to maintain the level of staff necessary to meet the proposed schedule that was approved by the District's representative.
- 8. The contract shall commence upon execution by both parties and shall continue for a period of three (3) years with two (2) one-year renewals at the sole discretion of IRWD. Contractor performance (see Table 1.2) and cost will be the criteria used as a basis for any decision to extend the contract.

#### XII. TERMINATION

This contract may be terminated by either party provided a 90-day notice is given. If Contractor consistently does not meet the KPI requirements (table 1.2) or of the *Work Plan*, the District reserves the right to terminate the contract with less than 90-day notice.

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T 4	C:4. /D: J T4	Site St	Bid Sheet	Did Ama	Did America	Did America
Line #	Site/Bid Item	Site Size (sq ft)	Estimated Monthly Cost	Bid Amount Year 1	Bid Amount Year 2	Bid Amount Year 3
1	Upper Agua Chinon A	198,975	Monthly Cost	10411		i cui 5
1	monthly maintenance	170,770	\$ 1558.64	\$18703.78	\$19264.90	\$19842.85
2	Upper Agua Chinon B	166,789	A 4004 F0		A	444400 00
	monthly maintenance		\$1306.52	\$15678.28	\$16148.63	\$16633.09
3	Aquila Springs	50,800	\$ 397.94	\$ 4775.23	\$ 4918.49	\$ 5066.05
4	monthly maintenance Floral View	189,319	V 07777	Q 4770.20	Q 4910.49	0000.00
4	monthly maintenance	109,319	\$1483.01	\$17796.11	\$18330.00	\$18879.90
5	Hidden Canyon	122,200		······································	· ····	
-	monthly maintenance	,	\$ 957.24	\$11486.98	\$11831.49	\$12186.43
6	Illuna Springs	116,700	\$914.16	\$0,969.88	\$11,298.98	\$11637.94
	monthly maintenance		\$914.10	20,909.00	\$11,290.90	\$11037.94
7	Laguna Altura North	39,700	\$310.99	\$ 3731.83	\$3843.83	\$ 3959.10
8	monthly maintenance Laguna Altura South	32,200		,	,	
o	monthly maintenance	52,200	\$ 252.24	\$ 3026.82	\$ 3117.63	\$ 3211.16
9	Los Olivos Meadow	138,800	A1007.07	<b>6</b> 100.47.00	A10400 71	A40044.07
	monthly maintenance		\$1087.27	\$13047.29	\$13438.71	\$13841.87
10	Los Olivos South	166,789	\$1306.52	\$15687.28	\$16148.63	\$16633.09
11	monthly maintenance	124 777	01000102	0.0007.20	<b>\$101 10:00</b>	
11	Marine Meadows monthly maintenance	134,777	\$1055.76	\$12669.13	\$13049.20	\$13440.68
12	Marshburn	611,400		•		
14	monthly maintenance	011,100	\$4789.33	\$57472.01	\$59196.17	\$60972.06
13	Parasol Park	168,835	\$1322.55	\$15870.60	\$16346.72	\$16837.12
	monthly maintenance		\$1022.00	\$15870.00	\$10340.72	\$10037.12
14	Portola Springs	38,600	\$ 302.37	\$3628.43	\$3737.28	\$3849.40
15	monthly maintenance Ridge Valley A	372,700				
12	monthly maintenance	572,700	\$2919.50	\$35034.05	\$36085.07	\$37167.63
16	Ridge Valley B	72,020	\$564.16	<u>ბ</u> ცუვი იე	¢6070.00	67100.00
	monthly maintenance		ŞƏD4. TO	\$6769.93	\$6973.03	\$7182.22
17	Ridge Valley C	203,700	\$1595.66	\$19147.94	\$19722.38	\$20314.05
	monthly maintenance				•••••	<b></b>
18	Sports Park	85,000	\$665.84	\$7990.06	\$8229.76	\$8476.65
19	monthly maintenance Lower Agua Chinon A	166,789	A-100-1 -0			
15	monthly maintenance	100,782	\$1306.52	\$15678.28	\$16148.63	\$16633.09
20	Lower Agua Chinon B	159,764	\$1251.50	\$15017.92	\$15468.46	\$15932.52
	monthly maintenance		Q1201.00	010017.52	010400.40	010702.02
21	Lower Agua Chinon C	228,540	\$1790.24	\$21482.91	\$22127.40	\$22791.22
	monthly maintenance *Los Trancos	200				
22	weekly maintenance	200	\$391.67	\$4700.03	\$4841.03	\$4986.27
23	*Muddy Canyon	200	\$391.67	\$4700.03	\$4841.03	\$4986.27
-	weekly maintenance		3091.07	34700.03	\$4641.05	\$4980.27
24	Baker Water Treatment Plant	9,120		\$857.29	\$883.00	\$909.49
	biannual maintenance	L .				
25	Annual mowing at Marshburn	Approx.		\$42300.30	\$43569.91	\$44876.69
26	*Weekly mapping, reporting,	450,000	\$14282.25	6171207 00	0176500 61	0101004 47
<u>~</u> 0	and meeting attendance		\$14202.20	\$171387.00	\$176528.61	\$181824.47
*P	rovide an estimated monthly cost for	r these items	in column 4.	Year 1 Total	Year 2 Total	Year 3 Total
	0			\$549,600.32	\$566,088.83	\$583,070.98

Initial each page

## **Bid Sheet – Labor Cost**

#### Year 1

Position

Position

#### 1 Hour Labor Cost

Maintenance Worker	\$52.40	
Lead Worker/Foreman	\$52.40	
Supervisor	\$100.00	
Irrigation Technician	\$74.17	
Irrigation Specialist	\$150.00	
Qualified Applicator	\$100.00	
Biologist	\$159.60	
5		

#### Year 2

#### **1 Hour Labor Cost**

Maintenance Worker	\$53.97
Lead Worker/Foreman	\$53.97
Supervisor	\$103.00
Irrigation Technician	\$76.40
Irrigation Specialist	\$154.50
Qualified Applicator	\$103.00
Biologist	\$164.39
5	

#### Year 3

1 Hour Labor Cost		
\$55,59		
\$55.59		
\$10609		
\$78.69		
\$159.14		
\$106.09		
\$169.32		

\*Or equivalent alternate position title

## Initial each page

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April 28, 2025 Prepared by: S. Choi Submitted by: K. Burton Approved by: Paul A. Cook

#### ACTION CALENDAR

#### ADOPTION OF 2025 ORANGE COUNTY WATER AND WASTEWATER MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

#### SUMMARY:

The Disaster Mitigation Act of 2000 amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act to establish a framework for state, local, tribal, and territorial governments to engage in hazard mitigation planning as a prerequisite for receiving certain types of non-emergency disaster funding assistance. The requirements and procedures for implementing hazard mitigation planning provisions are outlined in Title 44, Chapter 1, Part 201 (44 CFR Part 201) of the Code of Federal Regulations.

Water and wastewater agencies are required to maintain a current and approved Hazard Mitigation Plan (HMP) to be eligible for certain federal grant programs, such as the:

- Hazard Mitigation Grant Program;
- Public Assistance Grant Program;
- Building Resilient Infrastructure and Communities Program;
- Safeguarding Tomorrow Revolving Loan Fund Program;
- Fire Management Assistance Grant Program; and
- Rehabilitation of High Hazard Potential Dam Grant Program.

Staff recommends that the Board adopt a resolution approving the 2025 Orange County Water and Wastewater Multi-Jurisdictional Hazard Mitigation Plan (MJHMP), subject to non-substantive changes.

#### **BACKGROUND:**

The HMP provides a framework to improve local resilience to hazard events and to reduce water and wastewater infrastructure vulnerabilities due to identified hazards of concern. The Federal Emergency Management Agency (FEMA) defines hazard mitigation as any action taken to reduce or eliminate the long-term risk to human life and property from human-caused and natural events such as earthquakes, severe weather, wildfires, and other hazards. Having an HMP can also satisfy eligibility requirements for FEMA grants.

In October 2020, staff, with support from Michael Baker International, developed IRWD's HMP. The plan was adopted by the Board in October 2021 and submitted to the California Office of Emergency Services (CalOES) and FEMA for review and was approved through December 2026. The HMP is required to be reviewed and updated every five years. Action Calendar: Adoption of 2025 Orange County Water and Wastewater Multi-Jurisdictional Hazard Mitigation Plan April 28, 2025 Page 2

Although IRWD's HMP update is not due until December 2026, IRWD partnered with the Water Emergency Response of Orange County (WEROC), which contracted with a consultant to work with member agencies in developing the MJHMP. This partnership allowed for multi-agency collaboration and put IRWD on the same update cycle as the other WEROC member agencies participating in Plan's development. Agencies participating in the 2025 MJHMP include:

- Costa Mesa Sanitary District;
- El Toro Water District;
- Irvine Ranch Water District;
- Laguna Beach County Water District;
- Mesa Water District;
- Moulton Niguel Water District;
- Municipal Water District of Orange County;
- Orange County Sanitation District;
- Orange County Water District;
- Santa Margarita Water District;
- Serrano Water District;
- South Coast Water District;
- South Orange County Wastewater Authority;
- Trabuco Canyon Water District; and
- Yorba Linda Water District.

#### Plan Submission & Approval Process:

On December 3, 2024, the MJHMP was submitted to CalOES in accordance with the project milestones. (Note: the title of the MJHMP says 2024 because this is when it was submitted to CalOES.) The submission included all necessary documentation for compliance. On January 16, 2025, CalOES completed its review and provided revision requests for every agency annex, which was implemented and resubmitted for final CalOES approval. On February 14, 2025, CalOES approved the required changes and transmitted the plan to FEMA for final review, a process that typically takes approximately 45 days. On April 14, 2025, FEMA completed their review of the MJHMP and determined the plan eligible for final Approval Pending Adoption.

#### **Ongoing Mitigation Planning:**

The MJHMP is a dynamic document that will evolve with the needs of IRWD. New priorities may be identified or a shift in goals may occur based on emerging risks, updated data, or evolving circumstances. To accommodate these changes, adjustments will be documented throughout the plan implementation process, and formal plan updates will be conducted every five years as required by FEMA. By maintaining an active and adaptive approach to hazard mitigation planning, the District will work to effectively reduce risks, enhance resilience, and ensure compliance with federal and state mitigation policies.

Action Calendar: Adoption of 2025 Orange County Water and Wastewater Multi-Jurisdictional Hazard Mitigation Plan April 28, 2025 Page 3

Staff recommends that the Board adopt a resolution, attached as Exhibit "A", approving the Orange County Water and Wastewater MJHMP, attached as Exhibit "B", subject to non-substantive changes approved by the General Manager. The FEMA Approvable Pending Adoption letter is attached as Exhibit "C".

#### FISCAL IMPACTS:

Not applicable.

#### ENVIRONMENTAL COMPLIANCE:

Not applicable.

#### COMMITTEE STATUS:

On October 9, 2024, the Engineering and Operations Committee was updated on IRWD's work with WEROC and other water / wastewater agencies to update the MJHMP.

#### **RECOMMENDATION:**

#### ADOPT THE FOLLOWING RESULUTION BY TITLE:

#### <u>RESOLUTION NO. 2025 – 10</u>

#### RESOLUTION OF THE BOARD OF DIRECTORS OF THE IRVINE RANCH WATER DISTRICT ADOPTING THE 2025 ORANGE COUNTY WATER AND WASTEWATER MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

#### LIST OF EXHIBITS:

- Exhibit "A" Resolution
- Exhibit "B" Orange County Water and Wastewater Multi-Jurisdictional Hazard Mitigation Plan with IRWD's Annex
- Exhibit "C" FEMA Approvable Pending Adoption Letter

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#### Exhibit "A"

#### RESOLUTION NO. 2025 - 10

#### RESOLUTION OF THE BOARD OF DIRECTORS OF THE IRVINE RANCH WATER DISTRICT ADOPTING THE 2025 ORANGE COUNTY WATER AND WASTEWATER MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

The Board of Directors of the Irvine Ranch Water District ("IRWD") recognizes that the threat from natural hazards poses a risk to water and wastewater facilities and the individuals they serve, and that impacts can result in regional economic and public health consequences.

IRWD and 14 other agencies participated in the development of the Orange County Water and Wastewater Multi-Jurisdictional Hazard Mitigation Plan ("MJHMP") in accordance with federal laws, including the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended; the National Flood Insurance Act of 1968, as amended; and the National Dam Safety Program Act, as amended.

The Orange County Water and Wastewater MJHMP identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in Orange County from the impacts of future hazards and disasters.

A public outreach strategy regarding the MJHMP was implemented by posting information on member agency websites, email and social media distribution, community surveys, and presentations at community meetings.

On December 3, 2024, the MJHMP was provided to the California Office of Emergency Services ("CalOES") Hazard Mitigation Division for review.

The MJHMP was revised based on CalOES requirements relating to Federal Hazard Mitigation Standards released in 2023 by the Federal Emergency Management Agency ("FEMA").

IRWD made all required changes, and the plan was approved by CalOES and submitted to FEMA for review on February 14, 2025.

IRWD requested FEMA to grant approval pending adoption in the event there are any required changes, and subject to the member agencies adopting resolutions approving and adopting the MJHMP once FEMA review states that all requirements are met. FEMA granted such approval on April 14, 2025.

THEREFORE, the Board of Directors of Irvine Ranch Water District does hereby resolve, determine, and order as follows:

The 2025 ORANGE COUNTY WATER AND WASTEWATER MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN is hereby adopted by IRWD.

#### ADOPTED, SIGNED, and APPROVED on April 28, 2025.

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

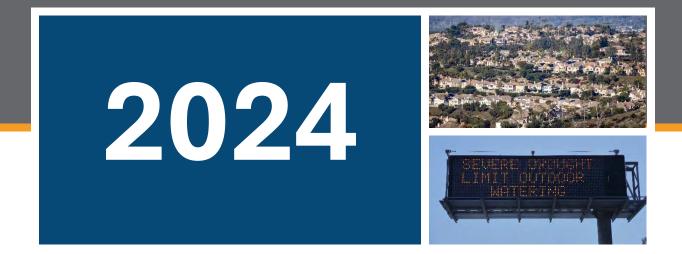
Secretary IRVINE RANCH WATER DISTRICT and of the Board of Directors thereof

APPROVED AS TO FORM: HANSON BRIDGETT LLP

By:

General Counsel

Exhibit "B"



# **Orange County Water and Wastewater** Multi-Jurisdictional Hazard Mitigation Plan

Municipal Water District of Orange County 18700 Ward St, Fountain Valley, CA 92708 Director of Emergency Management Vicki Osborn Email: weroc@mwdoc.com Tel: 714.963.3058



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## **SECTION 1: INTRODUCTION**

Across the United States, natural and human-caused disasters have led to increasing levels of death, injury, property damage, and interruption of business and government services. The impact to water and wastewater utilities and the individuals they serve can be immense and damages to their infrastructure can result in regional economic and public health consequences. The water and wastewater utilities are vulnerable to a variety of hazards that can result in damaged equipment, loss of power, disruption to services, contaminated water supply, and revenue losses. By planning for natural and human-caused hazards and implementing projects that mitigate risk, utilities can reduce costly damage and improve the reliability of service following a disaster.

As a best practice Orange County water and wastewater agencies have worked together for decades to improve regional and local reliability and resiliency through joint or collaborative capital improvement projects, planning processes, and emergency management practices. Throughout the county's history the need for, and development of, water and wastewater services has been driven by the principles of economies of scale, and limitations of risk by working together among the wholesale and retail water and wastewater agencies. Below is a brief history of this collaborative process that developed the framework for this multi-agency plan today.

- In 1921 the Orange County Joint Outfall Sewer (JOS) is formed. Santa Ana and Anaheim agree to construct an outfall extending into the Pacific Ocean.
- In 1928 the cities of Anaheim, Fullerton, and Santa Ana realized that groundwater supplies were insufficient to meet the demands of their growing communities, prompting them to join the Metropolitan Water District of Southern California (Metropolitan) in order to get access to water imported from the Colorado River.
- In 1931 local agencies again recognized the importance of economies in scale by forming the Orange County Water District (OCWD). One of the goals of OCWD is to protect Orange County's Santa Ana River water rights from upstream interest.
- Growth in Orange County continued into the 1940s and 1950s when it was realized that the next increment of supplies was needed. That is when portions of what is now Orange County (outside of those original three cities) joined Metropolitan. The Metropolitan was formed for much the same reason, in that it was more economical and less risky to pursue importation of water from the Colorado River and later Northern California as part of a large co-op rather than having each local entity rely on their own planning and development of water supplies.
- The supplemental water supplies of Metropolitan encouraged other Orange County water providers to collaborate, creating the Coastal Municipal Water District (Coastal) in 1941, and Orange County Municipal Water District (OCMWD) in 1951. OCMWD would go on to change its name to Municipal Water District of Orange County (MWDOC).
- Following a 1946 Board of Supervisor's Orange County Sewerage Survey Report, seven individual districts combine into the JOS. While individual cities continue to maintain sewage collection systems, county-wide collections and treatment became a regional operation. And after several reiterations, it became the Orange County Sanitation District (OC San).
- Later, as Orange County continued to develop and expand, these new developments were located further and further from the Metropolitan pipelines bringing water into Orange County. Economically it was again much more efficient, and less risky, for local members to band

together to participate in regional pipelines and jointly use the same water facilities to convey the Metropolitan water from where it was available to where it was needed. Even today, water reliability planning is conducted based on the needs of these original areas, each with its own supply reliability risk profile. The three areas are:

- 1. The Brea/La Habra service area receives approximately 80% of their supplies from Cal Domestic Water Company groundwater sources in San Gabriel Valley.
- 2. The OCWD service area receives approximately 75% of their supplies from groundwater sources.
- 3. The South Orange County service area has few local resources, thereby requiring the import of approximately 95% of their potable water demands.
- In 1983 the Volunteer Emergency Preparedness Organization (VEPO) was formed, creating a mutual aid agreement and communications system for Orange County's 33 water utilities to work together.
- Following the 1994 Northridge Earthquake and subsequent Standardized Emergency Management System in 1996, Orange County water agencies recognized the need to staff the VEPO program as a shared service to support its member agency's disaster readiness.
- VEPO was renamed to the Water Emergency Response Organization of Orange County (WEROC) in 1999 to better reflect its goal and purpose.
- The agency known today as the South Orange County Wastewater Authority (SOCWA) was formed in 2001 when the South East Regional Reclamation Authority (SERRA), Aliso Water Management Agency (AWMA), and South Orange County Reclamation Authority consolidated to meet the wastewater needs of more than 500,000 homes and businesses across South Orange County.
- In 2006, WEROC staff realized the importance of including wastewater agencies in its program, as many of its water utilities also provided wastewater services and because the sectors had similar resources that could support each other. With this change, the program welcomed in wastewater agencies and grew to support 37 agencies in total.
- In 2008, the internationally awarded Ground Water Replenishment System (GWR) was completed. This was a joint project of the OCWD and the OC San enhancing reliability for all of the county.
- In 2019, WEROC supported American Water Infrastructure Act (AWIA) compliance for nearly all agencies within the planning area to ensure timely and accurate completion of Risk Resilience Assessments (RRAs) and Emergency Response Plans (ERPs) in accordance with Environmental Protection Agency (EPA) requirements.
- In 2021, Orange County Local Agency Formation Commission (LAFCO) unanimously approved the annexation of the City of San Juan Capistrano water and wastewater facilities into the Santa Margarita Water District (SMWD), allowing SMWD to manage and operate water and wastewater services to customers within the City of San Juan Capistrano.

As has been demonstrated throughout the history of Orange County, the principles of banding together with neighboring interests to create joint regional infrastructure, connected systems, and

economies of scale have been applied time and time again. Working together to develop a Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) focused on the agencies (cities and special districts) that provide drinking water and wastewater services came from an already standing practice of regional planning and coordination to improve resiliency and response. Additionally, it gave the participating agencies the opportunity to focus on risk as it applies specifically to these joint considerations as well as their jurisdiction's individual services.

In 2005, WEROC started to work with its member agencies (MAs), the California Governor's Office of Emergency Services (Cal OES), and the Federal Emergency Management Agency (FEMA) to fund the first MJHMP through a Hazard Mitigation Planning Grant. In 2007, with the assistance of the Mitigation Grant, MWDOC along with 20 MAs prepared an MJHMP that identified critical water and wastewater facilities in the county and mitigation actions in the form of projects and programs to reduce the impact of natural and human-caused hazards on these facilities. The vision of this original MJHMP took into consideration regional and local infrastructure, how it worked together, and how it could be strengthened, while supporting other planning efforts such as the South Orange County Reliability Study and later the Orange County Reliability Study.

This plan builds on the original 2007 MJHMP and previous updates in 2012 and 2019. MWDOC was joined in this current update by 14 participating water and wastewater utilities (see **Section 1.2.2**), the current MAs, which serve communities in Orange County, California. The plan was prepared with input from county residents, Orange County emergency managers, and with the support of the Cal OES and FEMA. The process to develop the MJHMP update included two Planning Team meetings and coordination with representatives from MWDOC and each participating MA.

This MJHMP is a guide for MWDOC and the MAs over the next five years toward greater disaster resistance in harmony with the character and needs of the local community and the MAs. The plan focuses on participating water and wastewater facilities in the county and identifies mitigation actions to reduce the impact of natural and human-caused hazards on critical facilities. In addition, each agency will use current, approved planning documents that identify implementation strategies for capital improvement, risk reduction, system upgrades, and operations. These documents complement the MJHMP and include but are not limited to: Urban Water Management Plans, AWIA RRAs, All Hazards Standardized Emergency Management System (SEMS)/National Incident Management System (NIMS) ERPs, Capital Improvement Plans (CIPs), and Asset Management Plans.

The MJHMP is a working document that will grow and change as our communities and MAs do. This means at times participating agencies may identify a higher priority than noted in this plan, or a redirection of goals based on current information or updated decisions. In consideration of this concept, there may be projects or policies that need to be considered that were not included in this document. These changes will be documented during the MJHMP implementation, and formal updates to the plan will be made every five years as required to maintain a valid plan and FEMA grant eligibility.

## 1.1 Purpose of the Plan and Authority

Federal legislation has historically provided funding for disaster relief, recovery, and some hazard mitigation planning. The Disaster Mitigation Act of 2000 (DMA 2000) is the latest legislation to improve this planning process (Public Law 106-390). This legislation reinforces the importance of mitigation planning and emphasizes planning for disasters before they occur. As such, DMA 2000 establishes a pre-disaster hazard mitigation program and new requirements for the national post-

disaster Hazard Mitigation Grant Program (HMGP). The Pre-Disaster Mitigation Act of 2010 was signed into law in January of 2011 but does not impact the planning process. The 2010 Act reauthorizes the pre-disaster mitigation program.

Section 322 of DMA 2000 specifically addresses mitigation planning at the State and local levels. It identifies the requirements that allow HMGP funds to be used for planning activities and increases the amount of HMGP funds available to States that have developed a comprehensive, enhanced mitigation plan prior to a disaster. States and communities must have an approved mitigation plan in place prior to receiving pre- or post-disaster funds. Local mitigation plans must demonstrate that their proposed mitigation measures are based on a sound planning process that accounts for the risk to and the capabilities of the individual communities.

DMA 2000 is intended to facilitate cooperation between State and local authorities, prompting them to work together. It encourages and rewards local and State pre-disaster planning and promotes sustainability as a strategy for disaster resistance. This enhanced planning network is intended to enable local and State governments to articulate accurate needs for mitigation, resulting in faster allocation of funding and more effective risk reduction projects.

FEMA prepared the Final Rule, published in the Federal Register on September 16, 2009 (Code of Federal Regulations [CFR] at Title 44, Chapter 1, Part 201 [44 CFR Part 201 and 206]), which establishes planning and funding criteria for States and local communities.

According to the updated FEMA Local Hazard Mitigation Policy Guide (FEMA 2022) and 44 CFR § 201.6(a)(4), local governments may work together to create a multi-jurisdictional plan. For multi-jurisdictional plans, one community should be designated as the lead jurisdiction. For this update MWDOC is acting as the lead jurisdiction and is responsible for ensuring each participating jurisdiction meets the requirements laid out in the guidance. MWDOC is also taking on the role of coordinating the plan submission and adoption by all participating jurisdictions (the 15 current MAs).

For Federal approval, the following criteria must be met during the planning process:

- Complete documentation of the planning process.
- Detailed risk assessment of hazard exposures in the community and water and wastewater infrastructure.
- Comprehensive mitigation strategy, describing goals and objectives, proposed strategies, programs, and actions to avoid long-term vulnerabilities.
- A planned maintenance process will describe the method and schedule for monitoring, evaluating, and updating the MJHMP, and the integration of the plan into other planning mechanisms.
- The formal adoption of the governing bodies of each participating jurisdiction.
- Plan review by both Cal OES and FEMA.

As the cost of recovering from natural disasters continues to increase, the MAs realize the importance of identifying effective ways to reduce vulnerability to disasters. HMPs assist communities in reducing risk from natural hazards by identifying resources, information, and strategies for risk reduction, while guiding and coordinating mitigation activities.

The Orange County Water and Wastewater MJHMP provides a framework for participating water and wastewater utilities to plan for natural and human-caused hazards in Orange County. The resources and information within the plan will allow participating jurisdictions to identify and prioritize future mitigation projects, meet the requirements of Federal assistance programs and grant applications, and encourage coordination and collaboration in meeting mitigation goals.

This MJHMP is intended to serve many purposes, including:

- Enhance Public Awareness and Understanding. To help county residents better understand the natural and human-caused hazards that threaten public health, safety, and welfare; economic vitality; and the operational capability of important facilities.
- **Create a Decision Tool for Management.** To provide information so that water and wastewater managers and leaders of local government may act to address vulnerabilities.
- Enhance Local Policies for Hazard Mitigation Capability. To provide the policy basis for mitigation actions that will create a more disaster-resistant future.
- Integrate the HMP into Other Plans and Programs. To provide an opportunity for MWDOC and the MAs to assess their current planning efforts associated with water supply management, infrastructure enhancement, and facilities master planning and to promote the integration of hazard mitigation into these activities.
- **Provide Inter-Jurisdictional Coordination of Mitigation-Related Programming.** To ensure that proposals for mitigation initiatives are reviewed and coordinated among MWDOC and MAs.
- **Promote Compliance with State and Federal Program Requirements**. To ensure that MWDOC and the MAs can take full advantage of State and Federal grant programs, policies, and regulations.

To qualify for certain forms of Federal aid for pre- and post-disaster funding, local jurisdictions must comply with the Federal DMA 2000 and its implementing regulations. The MJHMP has been prepared to meet FEMA and Cal OES requirements, thus making MWDOC and the participating MAs eligible for funding and technical assistance for State and Federal hazard mitigation grant programs.

DMA 2000 requires local HMPs, including this plan, to be updated every five years. This means that this MJHMP is designed to carry the MAs through the next five years, after which its assumptions, goals, and objectives will be revisited, updated, and resubmitted for approval.

## 1.2 Multi-Jurisdictional Participation

#### **1.2.1** Overview of Water and Wastewater Systems in Orange County

Water distribution and wastewater collection and treatment in Orange County involves dozens of agencies and utilities working together, and relies on integrated, regional systems and facilities. There are several retail water and wastewater 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 (not participating in this update).

MWDOC is a wholesale water supplier and resource planning agency that serves all of Orange County (except Anaheim, Fullerton, and Santa Ana) through 28 retail water agencies. MWDOC purchases imported water from the Metropolitan for distribution to its MAs, which provide retail water services to the public. Local supplies meet more than half of Orange County's total water demand. To meet the remaining demand, MWDOC purchases imported water from Northern California (through the State Water Project) and the Colorado River. This water is provided by Metropolitan, which in addition to Orange County, also serves Ventura, Los Angeles, San Bernardino, Riverside, and San Diego counties (MWDOC 2016).

Local water supplies in Orange County vary regionally and include groundwater, recycled wastewater, and surface water. Water supply resources in MWDOC's service area include groundwater basins, which provide a reliable local source and are also used as reservoirs to store water during wet years and draw from storage during dry years. Recycled water and surface water provide an additional local source to some MWDOC retail agencies, with surface water captured mostly from Santiago Creek into Santiago Reservoir (MWDOC 2016).

The OCWD manages and replenishes the Orange County Groundwater Basin, ensures water reliability and quality, prevents seawater intrusion, and protects Orange County's rights to Santa Ana River water. The Orange County Groundwater Basin contains approximately 500,000 acre-feet (AF) of usable storage water and covers 270 square miles. The basin is a reliable source of water and provides approximately 75% of north and central Orange County's water supply, as South Orange County is virtually 100% dependent on imported water.

MWDOC and OCWD work cooperatively and continue to evaluate new and innovative programs, including seawater desalination, wetlands expansion, recharge facility construction, surface storage, new water use efficiency programs, and system interconnections for enhanced reliability.

Wastewater collection and treatment in Orange County is managed by two regional agencies: OC San and the SOCWA, which cover north and central Orange County and South Orange County, respectively. These districts are responsible for the trunk line collection, treatment, biosolids management, and ocean outfalls for treated wastewater disposal. OC San has two primary treatment facilities, and SOCWA has three primary treatment facilities. Their facilities treat wastewater from residential, commercial, and industrial sources. Costa Mesa Sanitary District (CMSD) is a smaller wastewater provider that primarily supports the City of Costa Mesa. With more than 200 miles of sewer mains, CMSD provides service to more than 47,000 connections within their service area.

#### 1.2.1.1 Potable Water Supplies – Current and Future

Potable water demand for Orange County was about 427,700 acre-feet per year (AF/yr) in 2020. In 2020 MWDOC provided service to approximately 2.34 million residents of the Orange County population, and that number is projected to rise to approximately 2.41 million people by 2025 (3% increase). While potable water demand in 2025 is projected to increase to 486,747 (AF/yr). This constitutes an increase of approximately 145 over 2020 demand. However some of this increase may be attributed to removal of some of the water restrictions put in place due to the drought conditions experienced in Orange County.

With planned local water supply projects plus the continued availability of Metropolitan water to replenish the Orange County Groundwater Basin, demand projections show a 12% decrease in demand for imported, full-service Metropolitan water by 2025. If the local projects do not get built, produce less than planned, or are merely delayed, then additional Metropolitan water will be needed.

#### **1.2.2** Participating Jurisdictions

Following is a list of the jurisdictions participating in the MJHMP update; refer to **Exhibit 1-1**:

- Municipal Water District of Orange County (MWDOC)
- Costa Mesa Sanitary District (CMSD)
- El Toro Water District (ETWD)
- Irvine Ranch Water District (IRWD)
- Laguna Beach County Water District (LBCWD)
- Mesa Water District
- Moulton Niguel Water District (MNWD)
- Orange County Sanitation District (OC San)
- Orange County Water District (OCWD)
- Santa Margarita Water District (SMWD)
- Serrano Water District
- South Coast Water District (SCWD)
- South Orange County Wastewater Authority (SOCWA)
- Trabuco Canyon Water District (TCWD)
- Yorba Linda Water District (YLWD)

It should also be noted that the cities participating in the previous version of the MJHMP (Buena Park, Garden Grove, La Habra, Newport Beach, Orange, and Westminster) are not participating in the latest update to the plan. However, both IRWD and CMSD are participating as MAs for the 2024 MJHMP update. The inclusion of IRWD involves the integration of their recently completed Local Hazard Mitigation Plan (LHMP) from 2021 into this document as an annex. In the case of CMSD, their annex is the first HMP that they have completed in conformance with DMA 2000.

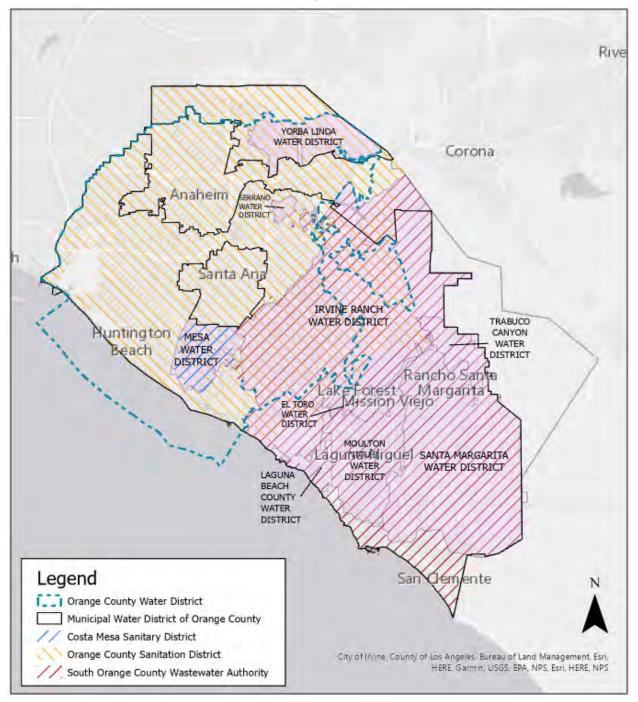
Retailers can be grouped into the following regions based on the availability of local groundwater resources:

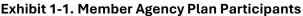
The Orange County Groundwater Basin provides approximately 75% of Orange County's north and central water supply. The rest of their supply is primarily imported water provided by Metropolitan; although Serrano Water District is partly served by local runoff captured in Irvine Lake. Participating MAs within the Orange County Groundwater Basin include the Mesa, Serrano, Yorba Linda, and Irvine Ranch Water Districts.

 South Orange County is almost 100% dependent on Metropolitan for its potable water supply. Parts of this area are within the San Juan Capistrano Groundwater Basin, which is managed by the San Juan Basin Authority. Local groundwater in the area is high in salts and accounts for less of the water supply than utilities in the Orange County Groundwater Basin. MAs include El Toro, Laguna Beach County, Moulton Niguel, Santa Margarita, South Coast, and Trabuco Canyon water districts.

Although located within Orange County, the participating MAs do not comprise or serve the entire county. In addition, the service areas for each of the MAs participating in the MJHMP do not necessarily align with incorporated or unincorporated boundaries or city boundaries. In many cases an MA may serve multiple cities and/or portions of cities/unincorporated areas. Profiles for each of the participating water and wastewater utilities are provided in the Jurisdictional Annexes. The MJHMP must be formally adopted by each jurisdiction's governing body, which may be the Board of Directors for each agency and district.

The resources and background information in the MJHMP are applicable county-wide, providing the groundwork for goals and recommendations for other local mitigation plans and partnerships. In the identification of shared action items, the plan fosters the development of partnerships and implementation of preventative activities. A unified MJHMP will ensure that any proposals for mitigation initiatives are reviewed and coordinated among the participating agencies and utilities.





#### 1.3 What Is New/What Has Changed from the 2019 MJHMP

Several sections of the 2024 MJHMP have been modified from the previous plan. Changes made to specific sections of the plan are summarized below:

- **Section One:** This section has been modified to clarify the multi-jurisdictional involvement and changes to MAs, update outdated or irrelevant information, and streamline the section.
- Section Two: This section includes an updated description of the planning process conducted for this plan update. This section has been completely revised and updated to discuss the process for the MJHMP update, including the Hazard Mitigation Planning Team (Planning Team), meetings, public outreach, and overall process for this update.
- Section Three: This section comprises the risk assessment. The hazards have been confirmed with minor updates to better reflect hazards that affect the planning area, as determined by the Planning Team. This includes the addition of extreme heat, and cyber threats, as well as a reorganization of hazards under primary headings for easier reading. In addition, climate change was incorporated into all-hazard profiles instead of a stand-alone profile to better connect how climate change may exacerbate future hazards. Each of the hazard profiles were updated to reflect hazard occurrences (if any) since the 2019 MJHMP was prepared. During this MJHMP update, additional infrastructure analysis was completed for MAs that had built new assets or added assets from other agencies (annexation of one district into another) These new facilities were overlaid on top of the hazard layers to verify potential vulnerability.
- Section Four. This section documents the mitigation strategy, which includes overarching hazard mitigation goals for the planning area. It was determined through the Planning Team meetings that the existing mitigation goals are still relevant for all participating MAs, and therefore this set of goals was maintained with minor edits. Some participating MAs identified additional goals specific to their agencies, which have been included in the respective annex. Updated mitigation actions and capabilities assessments specific to each MA are included in their respective annexes. An overview of hazard mitigation is provided, including the methodology for identifying and prioritizing mitigation actions.
- **Section Five.** This section documents the MJHMP maintenance process and includes a reference to a Monitoring and Implementation Workbook developed as part of the update.
- Section Six: This section documents the MJHMP references and has been updated to reflect new references used in this 2024 MJHMP.
- **Jurisdictional Annexes:** The annexes have been updated to include new information, updated asset inventories and risk assessment, and updated mitigation strategies.

**Appendices:** The appendices have been completely updated to include 2024 MJHMP update materials.

## **1.4** Plan Organization

The Orange County Regional Water and Wastewater MJHMP is organized into the following sections:

- Section One: Introduction. Provides an overview of the plan, a discussion of the plan's purpose and authority, a description of the multi-jurisdictional participation, a summary of how this update differs from previous versions of the plan and describes the plan's organization.
- Section Two: Planning Process Documentation. Describes the MJHMP planning process, as well as the meetings and outreach activities undertaken to engage the MAs and the public.
- Section Three: Risk Assessment. Identifies and profiles the hazards that threaten the area served by the MAs and identifies the vulnerability and risk to critical water and wastewater infrastructure associated with each hazard. Due to the vast planning area associated with the MAs participating in the plan, this section addresses the entire geographic area served by the MAs. The Jurisdictional Annexes detail the hazards, risk assessments, and mitigation strategies specific to each MA.
- Section Four: Mitigation Strategy. Includes multi-jurisdictional goals for the 2024 update and summarizes the mitigation action plan process. Mitigation actions and capabilities specific to each MA are detailed in the Jurisdictional Annexes.
- Section Five: Plan Maintenance. Discusses how the 2024 MJHMP will be monitored, evaluated, and updated over the next five years.
- Section Six: References. Identifies the resources used in preparation of the 2024 update.
- Appendices. Provides the 2024 update materials.
- Jurisdiction Annexes. Provides a profile of the jurisdiction, describes the hazards of concern, assesses the vulnerabilities to the MA, describes the existing capabilities and proposed mitigation strategies specific to each MA.

Sections one through six plus the appendices comprise the primary MJHMP. It describes the MJHMP planning process and hazard mitigation planning requirements for each MA. The information in this primary MJHMP is applicable to all the MAs. The Jurisdictional Annexes provide hazard mitigation planning information specific to each MA and supplements the information contained in the primary document.

## **SECTION 2: PLANNING PROCESS DOCUMENTATION**

This section describes each stage of the planning process used to update this 2024 MJHMP. The planning process provides a framework to document the plan's update and follows the FEMA-recommended steps. This update follows a prescribed series of planning steps, which includes organizing resources, assessing risk, updating the mitigation actions, updating the plan, reviewing and revising the plan, and adopting and submitting the plan for approval. Each step is described in this section.

Hazard mitigation planning in the United States is guided by the statutory regulations described in the DMA 2000 and implemented through 44 CFR Parts 201 and 206. FEMA's hazard mitigation plan guidelines outline a four-step planning process for the development and approval of HMPs. **Exhibit 2-1, DMA 2000 CFR Crosswalk**, lists the specific CFR excerpts that identify the requirements for approval.

DMA 2000 (44 CFR 201.6)	2024 MJHMP Update Section
(1) Organize Resources	Section 2 (this section)
201.6(c)(1)	Organize to prepare the plan
201.6(b)(1)	Involve the public
201.6(b)(2) and (3)	Coordinate with other agencies
(2) Assess Risks	Section 3
201.6(c)(2)(i)	Assess the hazard
201.6(c)(2)(ii) and (iii)	Assess the problem
(3) Develop the Mitigation Plan	Section 4
201.6(c)(3)(i)	Set goals
201.6(c)(3)(ii)	Review possible activities (actions)
201.6(c)(3)(iii)	Draft an action plan
(4) Plan Maintenance	Section 5
201.6(c)(5)	Adopt the plan
201.6(c)(4)	Implement, evaluate, and revise

#### Exhibit 2-1. DMA 2000 CFR Crosswalk

As documented in the corresponding sections, the planning process for the 2024 MJHMP was consistent with the requirements for hazard mitigation planning with customizations, as appropriate. All basic Federal guidance documents and regulations were met through the customized process.

## 2.1 Organizing Resources

One of the first steps in the planning process involved organization of resources, including identifying the Project Management Team, convening the Planning Team, and performing document review.

#### 2.1.1 Project Management Team

The Project Management Team was responsible for the day-to-day coordination of the update work program, including forming and assembling the Planning Team; scheduling Planning Team meetings; preparing, reviewing, and disseminating Planning Team meeting materials; coordinating, scheduling, and participating in community engagement activities and meetings; and coordinating document review. The Project Management Team was led by an emergency coordinator from the WEROC, administered by the MWDOC, who served as project manager and participated on the Planning Team. The project manager monitored planning progress and met with participating jurisdictions as needed to assist with obtaining and updating information for the plan.

The Project Management Team worked directly with the Consultant Project Management Team throughout development of the plan update. The Consultant Team, consisting of a variety of hazard mitigation/planning professionals, provided guidance and support to MWDOC and the Planning Team through facilitation of the planning process, data collection, community engagement, and meeting material and document development.

#### 2.1.2 Planning Team

The planning process for the MJHMP involved 12 water districts, two regional wastewater agencies, and one sanitary district; a total of 15 special districts participated in the planning process. Representatives from participating MAs provided input into the MJHMP update process. Each MA provided at least one representative to participate on the Planning Team and attend meetings. Each MA local team, made up of staff/officials, met separately and provided additional local-level input to the Consultant Team for inclusion into the MJHMP. The MA participated in the planning process by exchanging information, providing feedback on prior plan progress, discussing planning strategies, sharing goals, resolving issues, and monitoring progress. The MA benefited from working closely together because many of the hazards identified are shared by neighboring jurisdictions and participants were involved in the discussion of potential mitigation actions. Jurisdictional representatives included but were not limited to utility engineers, planners, public information officers (PIOs), and emergency management staff.

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

- Participation in Planning Team meetings.
- Coordination of jurisdiction-specific meetings to relay information and obtain input.
- Collection of valuable local information and other requested data.
- Decision on plan process and content.
- Development and prioritization of mitigation actions for the plan.
- Review and comment on plan drafts.
- Coordination and involvement in the public engagement process.

Exhibit 2-2, Members of the Planning Team, identifies the Planning Team members.

Name	Title/Position	Organization
Vicki Osborn	Director of Emergency Management	WEROC/MWDOC
Gabby Landeros	WEROC Specialist	WEROC/MWDOC
Janine Schunk	WEROC Coordinator	WEROC/MWDOC
Charles Busslinger	Principal Engineer	MWDOC
Harvey De La Torre	General Manager	MWDOC
Melissa Baum-Haley	Assistant Emergency Manager	MWDOC
Noelani Middenway	PIO	CMSD
Gina Terraneo	Senior Management Analyst	CMSD
Scott Carroll	General Manager	CMSD
Mark Esquer	District Engineer	CMSD

## Orange County Water & Wastewater Multi-Jurisdictional Hazard Mitigation Plan 2024

Name	Title/Position	Organization
Sherri Seitz	Public Relations/ Emergency Preparedness Administrator	El Toro Water District
Hannah Ford	Hannah Ford	El Toro Water District
Dennis Cafferty	General Manager/ District Engineer	El Toro Water District
Eric Akiyoshi	Engineering Manager	IRWD
Steve Choi	Director of Safety & Security	IRWD
Bryan Clinton	Operations Manager	IRWD
Robert Meripol	Safety & Security Supervisor	IRWD
Mitch Robinson	Senior Engineer	IRWD
Leo Lopez	Safety Officer	LBCWD
Christopher Regan	Assistant General Manager	LBCWD
		Mesa Water District
Kaying Lee Andrew Wiesner	Water Quality and Compliance Supervisor	
	District Engineer	Mesa Water District
Bob Mitchell	Water Operations Supervisor	Mesa Water District
Carrie Fesili	Water Operations Coordinator	Mesa Water District
Karyn Igar	Senior Civil Engineer	Mesa Water District
Tyler Jernigan	Water Operations Manager	Mesa Water District
Adrian Tasso	Assistant Director of Operations	MNWD
Cristina Garcia	Administrative Analyst	MNWD
Dan Horn	Water Distribution Supervisor	MNWD
David Larsen	Assistant Director of Engineering	MNWD
Kelsey Coleman	Communications Manager	MNWD
Len Barton	Safety and Emergency Manager	MNWD
Matthew Brown	Information Systems Officer	MNWD
Matthew Collings	Assistant General Manager	MNWD
Ronin Goodall	Assistant Director of Operations	MNWD
Rodney Woods	Director of Engineering	MNWD
Todd Dmytryshyn	Assistant Director of Engineering	MNWD
William Kidd	Information Systems Administrator	MNWD
Dan West	Superintendent of Operations	MNWD
John Frattali	Safety and Health Supervisor	OC San
Krystal Aleman	Security/ Emergency Planning Specialist	OC San
Paula Bouyounes	Risk and Safety Manager	OCWD
Chris Lopez	Safety Officer	SMWD
Daniel Peterson	Regulatory and Logistics Manager	SMWD
Eric Smith	Utilities Manager	SMWD
Jerry Vilander	General Manager	Serrano Water District
Blaise Bautsch	Safety and Health Program Manager	SCWD
Chris Newton	Operations Superintendent	SCWD
Kyle Gough	Transmission Main Manager	SCWD
Steve Dishon	Water Resources Manager	SCWD
Sunny Lee	Compliance and Risk Program Manager	SCWD
Sean Peacher	Environmental Compliance Safety Risk Manager	SOCWA
Ernie Leal	Chief Plant Operator	SOCWA
Jim Burror	Director of Operations	SOCWA
Amber Boone	Acting General Manager	SOCWA
Michael Perea	Assistant General Manager	TCWD
Lorrie Lausten	District Engineer	TCWD
David Rodriguez	Engineering Support	TCWD

Name	Title/Position	Organization
Alex Ramirez	Safety Officer	YLWD

Exhibit 2-3, Planning Team Roles, identifies each member's roles in the plan update.

#### Exhibit 2-3. Planning Team Roles

Member	Planning Team Role
Vicki Osborn, WEROC/MWDOC	Project Manager/Planning Team Representative – Organization of Planning Team and meetings, development of and participation in community outreach, hazard identification, capabilities assessment, goal development, mitigation actions and prioritization, plan coordination, and review.
Gabby Landeros, WEROC/MWDOC	Project Management Team – Historical knowledge and insight into 2012 plan, overall guidance on 2018 plan, hazard identification, capabilities assessment, goal development, mitigation actions and prioritization, plan review.
All Planning Team Members	Hazard identification, capabilities assessment, goal development, mitigation actions and prioritization, plan review.

#### 2.1.3 Vulnerable Populations Outreach

The County of Orange, and all cities within the county were provided the opportunity to participate in the MJHMP development process. Given the plan participants are special districts (Water and Sewer) they do not have the typical networks of residents that Cities/Counties do. In response MWDOC and the MAs relied on Orange County Operational Area resources like the Orange County Emergency Management Organization (OCEMO).

#### Orange County Emergency Management Organization

To support outreach across the planning area, MWDOC and the MAs used OCEMO as the primary method of outreach, engagement, and interface with vulnerable populations. , OCEMO includes all Orange County cities, colleges, school districts, special districts, water districts, State and county agencies, the hospital association, affiliates, and other approved agencies. Refer to **Appendix A** for outreach content and information.

MWDOC also provided an opportunity for State and county agencies and emergency services providers to be part of the Planning Team and provide comments. These opportunities occurred at the OCEMO, Orange County Operational Area Executive Board, and WEROC Quarterly Meetings which included the following organizations:

- State Water Resources Control Board, Division of Drinking Water
- Orange County Health Care Agency
- Orange County Fire Authority
- Orange County Sheriff's Department
- Orange County Public Works
- County of Orange, County Executive Office
- Orange County Department of Education
- Orange County Transportation Authority

Key members of the Emergency Management Council that interface with vulnerable populations within Orange County (and were invitees into the update process) include Orange County Health Care Agency, Orange County Social Services Agency, Orange County Probation Department, Orange County Community Resources, and the Orange County Transportation Authority. OCEMO also coordinates a Disabilities and Access and Functional Needs working group that assists emergency managers to understand and support the needs of these populations within the County. As part of the overall engagement strategy MWDOC and the MAs provided this working group opportunities to engage in the planning process and provided information that could be shared with their support networks. The following is a list of the member organizations on this working group:

- 211 OC
- Active Care Living
- American Red Cross
- CA Assisted Living
   Association
- CalOES
- CalOptima
- Child Care Coordinator, Social Services Agency
- CHOC Thompson
   Autism Center
- City of Aliso Viejo
- City of Laguna Beach
- City of Santa Ana
  Collaborating Organizations Active in
- Disaster (COAD) • Costa Mesa
- County ADA Office -
- CEO Risk Management
   County ADA Title II Manager

- Dayle McIntosh Center
- Earthquake Country
   Alliance
- Federal Aviation Administration
- HOPE Center for the Arts
- Irvine Police
   Department
- John Wayne Airport
- Laguna Woods Village
   Security
- OC Clerk of the Board
- OC Community
   Resources
- OC Health Care Agency
- OC Hospice
- OC Public Defender
- OC Social Services
   Agency
- OCCR Director of Office
   on Aging

- OCSD
- OCTA
- Orange County Community Services
- Orange County Deaf Equal Access Foundation
- Resident, Laguna Woods
- Sergeant, Seal Beach Police Department
- Silverado Care
- SoCal Animal Response Team
- Southern California
   Edison
- State Council on Developmental Disabilities
- UCI Autism Center
- UCI Health
- YMCA OC

## Collaborating Organizations Active In Disaster (COAD) Orange County (OC)

In addition to OCEMO, MWDOC and the MAs also invited the many organizations that participate in the COAD-OC. The purpose of COAD-OC is to establish and enhance partnerships among community-based and governmental organizations that will collaborate, communicate and coordinate response and recovery efforts for Orange County residents during times of disaster. The following is a list of organizations invited to participate in the update process:

- 211-OC
- American Red
   Cross, OC
- Arts Orange County
- Beacon Church
- BERT (Building Emergency Response Teams)
- Boys and Girls Club of Laguna Beach
- CA Law Enforcement Chaplain Consortium
   Ca So Baptist Convention

 CA Southern Baptist Disaster Response
 Calvary Chapel Costa
 Mesa
 Catholic Charities of
 OC
 CEDR Digital Corps.

- Christian Church, Pacific Southwest Region
- Committed Relief
- Covenant Presbyterian
- Dayle McIntosh
- ENLA Emergency Network of Los Angeles
- Families Forward
- FeedOC
- Foursquare International Disaster Relief Ministry
- Free Chapel
- Friends Disaster Services
- Friendship Baptist
- FSCEOCC
- Girls Inc.
- Giving Children
   Hope
- Global Network
   Ministries
- Good Shepherd Presbyterian
   Goodwill of Orange
   County
- Goodwill SoCal

- Habitat for
   Humanity
- HOPE AACR
- Infragard Los
   Angeles
   Inter Conventional
- Inter-Canyon League
- Islamic Shura
   Council
- KWVE Radio Los Angeles Food Bank Mariners Church/IDEC
- Meals on Wheels OC (formerly SeniorServ)
- Mobile Kitchens
- Nat Prot & Safety
   Consulting
- Neuage Corp
- Newport Mesa US Dis Health Center
- Newsong Church
   Irvine
- OC BSA
- OC Rescue Mission
- OneOC
- Operation BBQ Relief
   Orange County
   Community Foundation
  - Points of Light

- Project Independence
   Rose Drive Friends
   Church
- Saddleback Church Salvation Army So Cal
- Samaritans Purse
- Second Harvest Shepherd of the Hills
- SoCal Animal Response Team (SCART)
- St. Angela Merici
- Team Rubicon
- Temple Beth El of South Orange County
- The Crossing The OC Food Bank Tzu Chi Orange County
- UCI Law United Across Borders Foundation
- United Way
- VA VISN 22
- Waste Not OC Coalition
- Westbound
   Communications
- WISEPlace for Women

These organizations were provided notification of the Draft MJHMP's availability via the MA email distribution, notification lists, and social media. Distribution documentation is provided in **Appendix A**.

The Planning Team held three meetings. The meetings were designed to aid the MA in completing a thorough review of the hazards within their jurisdictions, identifying capabilities, understanding and assessing vulnerabilities, and identifying mitigation strategies. **Exhibit 2-4, Planning Team Meeting Summary,** provides a summary of the meetings. Meeting agendas and pertinent materials are provided in **Appendix A.** 

Date	Meeting	Discussion
June 17, 2024	Planning Team	Introductions Project goals and objectives
June 17, 2024	Meeting #1	Roles and responsibilities Data/information needs

## Exhibit 2-4. Planning Team Meeting Summary

Date	Meeting	Discussion
		Plan update and requirements Preliminary discussion of community engagement strategy Hazard identification and prioritization Meeting schedule
July 16, 2024, through July 30, 2024	Planning Team Meetings #2	Review of Compiled Data Tool that discusses hazards of concern, hazard priorities, additional critical facilities, capabilities assessment updates, and mitigation actions status.
October 16, 2024, through November 8, 2024	Planning Team Meetings #3	Review of the Administrative Draft HMP documents (the base plan and annexes) with MAs requesting assistance.
Date TBD	Planning Team Meetings #4	Meeting with specific MA to address comments from FEMA, as necessary.

In addition to the regularly scheduled meetings, Planning Team members coordinated individually with the plan update project manager, as necessary, to resolve any questions or discuss information requested at the Planning Team meetings. This was typically accomplished via telephone or email. Any MA that missed a scheduled planning meeting coordinated with the project manager separately to review what was discussed in the meeting and to obtain jurisdiction-specific information.

## 2.1.4 Public Outreach

A public outreach and engagement strategy was developed to inform the public and maximize public involvement in the plan-update process. The public outreach strategy included posting information on the MA websites, email and social media distribution, a community survey, and presentations at individual Board meetings and OCEMO meetings, as described below. Refer to **Appendix A.** 

## Member Agency Websites

Information regarding the MJHMP update was made available on each MA website. The webpages provided information on the plan, the plan update process, and how the public can be involved in the planning process, including a link to the community survey (discussed below). A link to the Draft MJHMP was also made available for review and comment.

#### Social Media

Social media notifications regarding the MJHMP's update, including a link to the community survey and public review draft distribution were sent to MA social media accounts. Based on the distribution across all 15 MAs' social media platforms (Facebook, Instagram, X, and LinkedIn) over 15,500 impressions occurred, which included 26 post reactions.

#### Community Survey

A community survey was developed to obtain input from the community about various hazard mitigation topics. The survey was designed to help the MA gauge the level of knowledge the community has about natural disaster issues and to obtain input about areas of Orange County that may be vulnerable to various types of natural disasters. The information provided was used to identify and coordinate projects focused on reducing the risk of injury or damage to property from future hazard events. A link to the survey was provided on each of the MAs' websites, as well as

information shared via social media and through newsletters and other communications. The survey received a total of 66 responses from customers of 12 MAs as well as several responses from individuals served by other agencies or unsure of their water agency.

Key takeaways from the responses include:

- Top three hazards identified by respondents include power outage, high winds, and earthquake.
- Over 40% of respondents are very concerned about climate change creating new hazards or worsening existing hazards.
- 62% of respondents are unaware of the access and functional needs of their neighbors in the event of a disaster.

Results from survey participants are provided in Appendix A.

#### Stakeholder Outreach

#### Water Board Meeting Presentations - Various Dates (Exhibit 2-5)

Between July 30, 2024, and November 25, 2024, the MWDOC Project Management Team attended Board of Directors meetings to discuss the MJHMP update and provide additional information to decision makers regarding the update process and what to expect when the plan is ready for final approval. The following is a list of in-person meetings attended where this information was shared:

Date	Agency	Meeting Type
8/15/2024	South Orange County Wastewater Authority	Engineering
8/26/2024	Orange County Grand Jury	Briefing
8/26/2024	Costa Mesa Sanitary District	Board
9/5/2024	South Orange County Wastewater Authority	Board
9/19/2024	MWDOC Managers	General Meeting
9/23/2024	Serrano Water District	Board
10/3/2024	Orange County Emergency Managers Organization	General Meeting
10/24/2024	South Coast Water District	Board
11/13/2024	Operational Area Executive Board	Board
11/13/2024	El Toro Water District - Community Advisory Group	Community Advisory Group
11/18/2024	WEROC Quarterly Meeting	Meeting open to WEROC MAs and any other members of Orange County planning partners
1/25/2025	MWDOC WEROC (on behalf of all agencies)	CERT Training for how volunteers can support water distribution points and delivery services for AFN communities. Cities included: Aliso Viejo, Anaheim, Brea, Buena Park, Costa
		Mesa, Cypress, Dana Point, Fullerton, Garden Grove, Huntington Beach, Irvine, La Habra, La Palma, Laguna Beach, Laguna Niguel, Lake

#### Exhibit 2-5. MA Meetings

Date	Agency	Meeting Type
		Forest, Newport Beach, Orange,
		Rancho Santa Margarita, San
		Clemente, San Juan Capistrano,
		Santa Ana, Seal Beach, Tustin,
		Westminster, and Yorba Linda

A copy of the presentation provided at these meetings is included in **Appendix A.** 

## Orange County Emergency Management Organization – October 3, 2024

The plan update project manager presented to the OCEMO during their monthly meeting. OCEMO is a subcommittee comprised of the County of Orange and all subdivisions that ensure the cooperative maintenance of the Operational Area Emergency Operations Plan, policies and procedures, training, and exercises. The presentation included information about hazard mitigation, the planning process, hazards affecting Orange County water and wastewater infrastructure, and the importance of OCEMO's involvement in the development process. As noted previously, the Draft MJHMP was disseminated to OCEMO's distribution list for review and comment. Refer to **Appendix A** for outreach materials and information shared during the planning process.

## El Toro Water District - Community Advisory Group

On behalf of the Board and staff of El Toro Water District, we would like to invite you to the next meeting of our Community Advisory Group (CAG). To enhance communication between the District and the community that we serve, the Board of Directors of ETWD in 1993 approved the formation of the CAG. The CAG provides a forum for establishing and maintaining open and effective communication with our customers.

ETWD's service area is quite diverse in terms of business and commercial interests including a large retirement community, a regional shopping mall, a regional hospital, numerous elementary and middle schools, a large number of single family and multi-family dwellings and mobile-home parks. As the District plans for the future it is essential that we understand what issues are important to our customers.

The CAG meeting topics are as diverse as the community we serve. Topics include but are not limited to discussions regarding annual budgets, future water supply, water use efficiency practices, regional coordination between local governments, water quality, regulatory and environmental mandates and relative legislative activity. At El Toro Water District, we place great value in the interests and concerns of the people we serve, and the CAG has been an important feature of our planning for the District.

We believe you will find the meetings as interesting as they are significant. We look forward to a continued informative exchange of information between you, elected officials and the ETWD staff.

The same presentation made at this group was also given at Costa Mesa Sanitary District

## Public Review Draft Hazard Mitigation Plan

The public review Draft MJHMP was made available for review and comment for a 15-day period beginning November 8, 2024, and concluding on November 23, 2024. The draft plan was made available on the MAs' webpages and at the MAs' offices and/or front counters. An online form was created allowing reviewers to easily submit comments and feedback to the Project Management

Team. Eight public comments were submitted to MWDOC and the MAs, however after reviewing the information provided no revisions to the Base Plan or annexes were deemed necessary.

## 2.1.5 Review and Incorporate Existing Information

The Planning Team and each MA local team reviewed and assessed existing plans and studies available from Federal, State, and local sources during the planning process. The types of documents reviewed and incorporated as part of the MJHMP update are listed in **Exhibit 2-6**, **Existing Plans and Studies.** Due to the number of MAs involved in the plan update, similar plans and studies specific to each district were reviewed and incorporated in the 2024 MJHMP. A complete list of references is included in **Section 6**, **References**.

Existing Plans and Studies	Relevant Topic
Orange County Water & Wastewater Multi-	Hazard Profiles; Capabilities Assessment; Mitigation
Jurisdictional HMP	Strategy
State of California Multi-Jurisdictional HMP (2023)	Hazard Profiles
Agency Urban Water Management Plans	Hazard Profiles; Capabilities Assessment
FEMA Hazard Mitigation How-to Guides	Plan Development; Plan Components
FEMA Local Mitigation Planning Handbook (May 2023)	Plan Development; Local Plan Integration Methods
FEMA Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards (September 2021)	Mitigation Strategy Development
Orange County Water and Wastewater GIS	Hazard Profiles; Risk/Vulnerability Assessments;
Layers with Critical Infrastructure Facilities	Mitigation Strategy
Seismic Hazard Assessment, Orange County	Hazard Profiles; Risk/Vulnerability Assessments;
Seismic Vulnerability, Mitigation and Recovery Planning Study (August 28, 2015)	Mitigation Strategy
Agency-Specific Reliability Studies	Hazard Profiles; Risk/Vulnerability Assessments; Mitigation Strategy
Agency-Specific Risk and Resilience	Hazard Profiles, Risk/Vulnerability Assessments,
Assessments	Mitigation Strategy

## Exhibit 2-6. Existing Plans and Studies

# 2.2 Assess Risks

In accordance with FEMA requirements, the Planning Team identified and prioritized the hazards affecting Orange County and assessed the associated vulnerability from those hazards. Results from this phase of the planning process aided subsequent identification of appropriate mitigation actions to reduce risk from these hazards (refer to **Section 3**).

## 2.2.1 Identify/Profile Hazards

The Planning Team reviewed the hazards profiled in the 2019 MJHMP as well as a list of FEMAidentified hazards to determine which hazards had the potential to impact Orange County and thus should be profiled as part of the plan update. This 2024 MJHMP continues to include natural and human-caused hazards that may threaten all or a portion of the county and individual MAs. It was noted that some location-specific hazards would not be applicable to every MA, but still warranted identification. Through discussions of the hazards, including the probability, location, maximum probable extent, and potential secondary impacts, a list of hazards was developed and prioritized. Content for each hazard profile is provided in **Section 3.** A key update to these hazard profiles is the integration of climate change into each hazard discussion. This approach was agreed upon by the Planning Team to ensure climate change was adequately addressed in relation to the hazards profiled.

#### 2.2.2 Assess Vulnerabilities

Hazard profiling exposes the unique characteristics of individual hazards and begins the process of determining which areas within Orange County are vulnerable to specific hazard events. The vulnerability assessment included input from the Planning Team and a refinement of the GIS overlaying method previously used for hazard risk assessments in the 2019 MJHMP. Using these methodologies, water and wastewater infrastructure impacted by the profiled hazards was identified and potential loss estimates were updated. Detailed information on the vulnerability assessments for each hazard is provided in **Section 3**.

## 2.3 Develop Mitigation Plans

The 2024 MJHMP was prepared in accordance with DMA 2000 and FEMA's latest HMP guidance documents. This plan provides an explicit strategy and blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs, and resources, and the MAs ability to expand on and improve existing tools. Developing the mitigation plan involved identifying goals, assessing existing capabilities, and identifying mitigation actions. This step of the planning process is detailed in **Section 4** and summarized below.

#### 2.3.1 Identify Goals

The Planning Team reviewed the goals identified in the 2019 MJHMP and determined that the existing goals in the plan were still relevant and meaningful to MWDOC and its MAs. Only minor modifications were included in the 2024 MJHMP goals, which focused on refinement of language. The mitigation goals are presented in **Section 4.2**. For some MAs, it was determined that additional goals specific to their agency were still warranted and are included in the Jurisdiction Annexes, where applicable.

## 2.3.2 Develop Capabilities Assessment

A capabilities assessment is a comprehensive review of all the various mitigation capabilities and tools currently available to the MA to implement the mitigation actions that are prescribed in the MJHMP. The Planning Team reviewed planning, regulatory, administrative, technical, financial, educational, and outreach capabilities to implement mitigation actions. Each MA reviewed capabilities information from the 2019 MJHMP and worked with their local teams to identify and updated the capabilities assessment specific to their agency. This review also identified potential improvements to better support future mitigation. The capabilities assessments for each MA are included in the Jurisdiction Annexes.

#### 2.3.3 Identify Mitigation Actions

As part of the planning process, the Planning Team worked to identify and develop mitigation actions to address the profiled hazards. The mitigation actions in the 2019 MJHMP were reviewed to determine whether they had been achieved, were still relevant, or were no longer relevant due to changing circumstances. Each MA considered the hazards applicable to their agency and identified and prioritized mitigation actions. The mitigation actions for each MA are included in the Jurisdiction Annexes.

## 2.3.4 Plan Review and Revisions

Once the Draft MJHMP was completed, a public review period was provided from November 7, 2024, through November 26, 2024, to allow public review and comments. Eight comments were received on the draft plan and reviewed by the Planning Team. The content of the comments did not warrant revisions to the plan.

## 2.3.5 Plan Adoption and Submittal

Upon completion of the public review period this 2024 MJHMP was submitted to Cal OES on (December 3, 2024). On (February 14, 2025), Cal OES approved the plan for transmittal to FEMA for review. FEMA completed their review and provided MWDOC and MAs with an Approvable Pending Adoption letter on (insert date). Final Board adoption by MWDOC and MAs occurred on or after (insert date). Appendix B includes copies of the resolutions of adoption from all participating MAs.

## 2.3.6 Plan Maintenance

Plan maintenance procedures, found in **Section 5**, include the measures each MA will take to ensure the 2024 MJHMP's continuous long-term implementation. The procedures also include the manner in which the plan will be regularly monitored, reported upon, evaluated, and updated to remain a current and meaningful planning document. **Appendix C** includes a "Progress Report Worksheet" intended to support future plan maintenance and implementation by MWDOC and MAs.

# **SECTION 3: RISK ASSESSMENT**

Risk assessment requires the collection and analysis of hazard-related data to enable local jurisdictions to identify and prioritize appropriate mitigation actions and strategies that will reduce losses from potential hazards. FEMA's LHMP How-to Guide recommends four steps for conducting a risk assessment:

- 1. Describe hazards that pose a threat to the planning area;
- 2. Identify community assets (for the purposes of this MJHMP this includes water and wastewater infrastructure) in the planning area;
- 3. Analyze risks associated with the hazards, including describing the potential impacts and estimating losses for each hazard; and
- 4. Summarize vulnerability to understand the most significant risks and vulnerabilities associated with the identified hazards.

The risk assessment must result in an evaluation of potential impacts and overall vulnerability for each participating jurisdiction to develop specific mitigation actions. The following identifies the hazards for the entire planning area and notes if the hazard is applicable to all jurisdictions or is unique to specific jurisdictions. Hazards applicable to all jurisdictions are described in this section and are not described separately in the Jurisdictional Annexes. Hazards unique to a jurisdiction are further discussed in the Jurisdictional Annexes.

## 3.1 Hazard Identification and Prioritization

## 3.1.1 Hazard Identification

Hazard identification is the process of identifying hazards that threaten an area including both natural and human-caused events. A natural event causes a hazard when it harms people or property. Such events would include floods, earthquakes, tsunami, coastal storms, landslides, and wildfires that strike populated areas. Human-caused hazard events are caused by human activity and include technological hazards and malevolent acts such as terrorism. Technological hazards are generally accidental and/or have unintended consequences (for example, an accidental hazardous materials release). Terrorism is defined by the CFR as "...unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives." Natural hazards that have harmed Orange County in the past are likely to happen in the future; consequently, the process of identifying hazards includes determining if the hazard has occurred previously.

The Planning Team reviewed the list of FEMA-identified hazards, the 2019 MJHMP, and other relevant information to determine the extent of hazards with the potential to affect the planning area; refer to **Exhibit 2-5, Existing Plans and Studies**. A discussion of potential hazards during the first Planning Team meeting resulted in the identification of the natural and human-cause hazards that pose a potential risk to all or a portion of the planning area and MAs. **Exhibit 3-1, Hazard Identification,** summarizes the Planning Team's discussion and identification of the hazards included in this 2024 MJHMP.

Hazards	Included in 2019 MJHMP?	Included in 2024 MJHMP?	Discussion Summary
Avalanche	No	No	Not applicable. Snowfall is not a typical occurrence in Orange County and there is no historical record of this hazard in the region.
Climate Change	Yes	Yes	Climate change is a phenomenon that could exacerbate hazards. Climate change and how it can potentially affect the severity, intensity, and frequency of a hazard is discussed in each individual hazard profile.
Coastal Erosion	Yes	Yes	Coastal erosion and storms occur within the coastal communities, which include development along the coast. These hazards are combined in <b>Section 3.2.1, Coastal</b> <b>Hazards</b> (Coastal Erosion, Coastal Storm, Sea Level Rise, and Tsunami).
Coastal Storm	Yes	Yes	Coastal erosion and storms occur within the coastal communities within the planning area. These hazards are combined in <b>Section 3.2.1, Coastal Hazards</b> .
Contamination/ Saltwater Intrusion	Yes	Yes	Water supplies are susceptible to contamination from human activities. In addition, saltwater intrusion is a concern within the planning area as it has occurred previously due to groundwater extraction. This hazard has been combined in <b>Section 3.2.5, Human-Caused</b> <b>Hazards</b> .
Cyber Threats (Terrorism)	No	Yes	The growing threat of cyber security and data breaches has increasingly become a potential hazard concern for jurisdictions throughout the planning area. Due to the potential effect on key infrastructure functions this hazard has been included in the plan update.
Dam/Reservoir Failure	Yes	Yes	Several dams and reservoirs are located throughout Orange County or in areas that could impact the county in the event of a failure. Infrastructure located within inundation areas could be impacted. This hazard includes dams and reservoirs.
Disease/Pest Management	No	No	Not applicable. Disease/pest management is not a hazard that impacts water/wastewater facilities and infrastructure.
Drought	Yes	Yes	Water supplies are dependent on groundwater and imported surface water, both of which are susceptible to drought. The county has experienced historical droughts, including the most recent State-declared drought emergency (2014-2017). See <b>Section 3.2.7</b> , <b>Severe</b> <b>Weather</b> .
Earthquake Fault Rupture	Yes	Yes	Alquist-Priolo fault zones occur within Orange County. The county has a long history of earthquakes, some resulting in considerable damage. This topic has been in <b>Section 3.2.6</b> , <b>Seismic Hazards</b> , which address Fault Rupture, Seismic Shaking, and Liquefaction.
Expansive Soils	Yes	Yes	Expansive soil conditions occur within portions of Orange County and can be exacerbated by periods of rain and drought. This topic is combined in <b>Section 3.2.4</b> ,

Exhibit 3-1.	Hazard	Identification
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# Orange County Water & Wastewater Multi-Jurisdictional Hazard Mitigation Plan 2024

Hazards	Included in 2019 MJHMP?	Included in 2024 MJHMP?	Discussion Summary
			<b>Geological Hazards,</b> which includes Expansive Soils, Land Subsidence, Landslides, and Mudflow.
Extreme Heat	No	Yes	Extreme heat is a hazard that typically affects all of Southern California. Recently portions of Orange County have experienced extreme heat events causing concern. In addition, climate change is anticipated to increase temperatures throughout the planning area. This hazard has been included in this MJHMP and is discussed in <b>Section</b> <b>3.2.7, Severe Weather Hazards</b> , which includes Drought, Extreme Heat, and Windstorms.
Flood	Yes	Yes	Portions of Orange County are located within floodplains and have experienced historic flooding. More localized flooding also occurs during rainstorms.
Geological Hazards	Yes	Yes	Orange County is located in an area of geological hazards, including seismic activity. This topic has been combined to include Expansive Soils, Land Subsidence, Landslides, and Mudflow.
Hailstorm	No	No	Not applicable. Hailstorms rarely occur within Orange County and there is no historical record of this hazard causing significant damage to the planning area.
Hazardous Materials	Yes	Yes	Water supplies could be compromised by accidental or intentional release of hazardous materials. This hazard is addressed in <b>Section 3.2.5, Human-Caused Hazards</b> .
Human-Caused Hazards	Yes	Yes	Human-caused hazards are a concern throughout the planning area and Southern California. This category has been expanded to include Contamination/Saltwater Intrusion, Hazardous Materials, Power Outage, Terrorism (Cyber Threat), and Terrorism (Mass Casualty Incident).
Hurricane	No	No	Not applicable.
Land Subsidence	Yes	Yes	Land subsidence conditions occur within Orange County. This topic is addressed in <b>Section 3.2.4, Geological</b> <b>Hazards.</b>
Landslide and Mudflow	Yes	Yes	Areas of the county are susceptible to landslides and mudflow, which can be exacerbated by other hazards including seismic ground shaking, drought conditions, and wildfires. See <b>Section 3.2.4, Geological Hazards.</b>
Lightning	No	No	Not applicable. Although lightning sometimes occurs during storm events, it is limited within the region and there is no historical record of this hazard significantly impacting the planning area.
Liquefaction	Yes	Yes	Liquefaction zones occur within Orange County. This topic has been combined in <b>Section 3.2.6, Seismic Hazards,</b> which includes Fault Rupture, Seismic Shaking, and Liquefaction.
Mass Casualty Incident (Terrorism)	Yes	Yes	Mass casualty incidents and terrorism have been identified as potential hazards of concern for the planning area. This hazard is addressed in <b>Section 3.2.5, Human-Caused</b> <b>Hazards.</b>

# Orange County Water & Wastewater Multi-Jurisdictional Hazard Mitigation Plan 2024

Hazards	Included in 2019 MJHMP?	Included in 2024 MJHMP?	Discussion Summary
Power Outage	Yes	Yes	Although typically associated with other hazards, power outages can directly impact water and wastewater systems and have been added to <b>Section 3.2.5, Human-Caused</b> <b>Hazards.</b>
Sea Level Rise	Yes	Yes	Sea level rise has been identified as a hazard affecting some of the coastal communities. This hazard has been included in the Coastal Hazards profile within this 2024 Multi-Jurisdictional HMP. <b>See Section 3.2.1, Coastal</b> <b>Hazards.</b>
Seismic Shaking	Yes	Yes	Orange County has a long history of earthquakes, some resulting in considerable damage. This topic is included the seismic hazards discussion, which includes Fault Rupture, Seismic Shaking, and Liquefaction. <b>See Section 3.2.6</b> , <b>Seismic Hazards</b> .
Severe Winter Storm	No	No	Not applicable. Severe winter storms are not common in Orange County, and there are no historical records of this hazard in the region.
Tornado	Yes	No	Tornadoes are not a typical occurrence in Orange County. This topic has been removed from this 2024 MJHMP.
Tsunami	Yes	Yes	Portions of the Orange County coastline are located within tsunami inundation areas. This topic is discussed in <b>Section 3.2.1, Coastal Hazards.</b>
Urban Fire	No	Yes	The potential for damage to key facilities and infrastructure has been identified as a potential threat within the planning area. It has been included in <b>Section 3.2.8,</b> <b>Wildland/Urban Fire.</b>
Volcano	No	No	Not applicable. There are no active volcanoes in Orange County or the surrounding area.
Wildfire	Yes	Yes	Portions of Orange County are located within fire hazard zones, which are adjacent to existing urban development. Due to the proximity of both development and critical infrastructure to fire hazard zones, this hazard has been profiled in this plan. <b>See Section 3.2.8, Wildland/Urban</b> <b>Fire.</b>
Wind	No	No	Regular wind is not a typical occurrence and does not cause severe damage within the area. High winds/Santa Ana winds are common throughout Orange County and are addressed in <b>Section 3.2.7, Severe Weather.</b>
Windstorm	Yes	Yes	High Winds/Santa Ana winds are a common occurrence in the planning area and can impact critical infrastructure and services that support water/wastewater operations, see <b>Section 3.2.7, Severe Weather.</b>

## 3.1.2 Hazard Prioritization

The Planning Team used a Microsoft Excel-based tool to prioritize the identified hazards by assigning each hazard a ranking based on probability of occurrence and the potential impact. These rankings were assigned based on a group discussion, knowledge of past occurrences, and familiarity with each MA's vulnerabilities. Four criteria were used to establish priority:

- 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 from 1 to 4 was assigned for each criterion. The four criteria were then weighted based on the Planning Team's opinion of each criterion's importance. **Exhibit 3-2, Hazard Rankings,** presents the results of the hazard rankings for the planning area.

		Impact				Hazard	
Hazard Type	Probability			Secondary Impact	Total Score	Planning Consideration	
Human-Caused Hazards:	4	3	4	4	57.6	High	
Power Outage							
Wildfire	4	3	3	4	52.0	High	
Human-Caused Hazards: Terrorism (Cyber Threat)	4	3	3	2	44.0	High	
Seismic Hazards: Seismic Shaking	3	3	4	4	43.2	High	
Seismic Hazards: Liquefaction	3	3	4	4	43.2	High	
Severe Weather: Windstorm	4	4	2	1	40.8	Medium	
Severe Weather: Extreme Heat	3	3	3	3	36	Medium	
Severe Weather: Drought	4	4	1	1	35.2	Medium	
Dam/Reservoir Failure	2	3	4	4	28.8	Medium	
Flood	3	3	2	1	25.8	Medium	
Coastal Hazards: Coastal Storm	3	2	2	2	24.0	Medium	
Coastal Hazards: Coastal Erosion	3	1	2	2	19.2	Medium	
Seismic Hazards: Earthquake Fault Rupture	2	1	4	2	18.4	Medium	
Geological Hazards: Landslide and Mudflow	2	2	2	3	18	Medium	
Coastal Hazards: Sea Level Rise	3	1	2	1	16.2	Medium	
Human-Caused Hazards: Contamination/Saltwater Intrusion	1	2	3	4	11.4	Low	
Human-Caused Hazards: Terrorism (MCI)	1	1	3	3	8.8	Low	
Human-Caused Hazards: Hazardous Materials	1	1	2	3	7.4	Low	
Urban Fire	1	1	2	1	5.4	Low	
Geological Hazards: Land Subsidence	1	1	1	2	5	Low	
Geological Hazards: Expansive Soils	1	1	1	2	5	Low	
Coastal Hazards: Tsunami	1	1	1	1	4	Low	

#### Exhibit 3-2. Hazard Rankings

Scores are based on a scale from 1 to 4, where 4 is the highest score and 1 is the lowest. The total score is based on an equation that weights categories by importance. Refer to **Exhibit 3-3** for additional information.

**Exhibit 3-3, Hazard Ranking Methodology,** provides additional detail regarding how the probability, affected area, and impact categories are weighted and how the total score is calculated for the hazard rankings.

Probability: Importance 2.0		Secor	dary I <u>mpacts</u>	s: Importance (	).5	
Based on estimated likelihood of occurre from historical data.	ence	Based on estimated secondary impacts to community at large.				
Probability	Score	Impact			Score	
Unlikely (less than 1% probability in next 100 years or has a recurrence interval of greater than every 100 years)	1	Negligible – no loss of function, downtime, and/or evacuations			1	
Somewhat Likely (between 1% and 10% probability in next year or has a recurrence interval of 11 to 100 years)	2	Limited – min downtime, an			2	
Likely (between 10% and 100% probability in next year or has a recurrence interval of 10 years or less)	3	Moderate – some loss of function, downtime, and/or evacuations			3	
Highly Likely (near 100% probability in next year or happens every year)	4	High – major loss of function, downtime, and/or evacuations			4	
Affected Area: Importance 0.8		Total Sco	ore = Probabil	ity x Impact, w	here:	
Based on size of geographical area of community affected by hazard.		Probability = (	Probability Sc	ore x Importanc	e)	
Affected Area Score		Impact = (Affected Area + Primary Impact + Secondary Impacts), where:				
Isolated	1	Affected Area = Affected Area Score x Importance				
Small	2	Primary Impa	Primary Impact = Primary Impact Score x Importa			
Medium	3		pacts = Secor	ndary Impacts S	core x	
Large	4	Importance				
Primary Impact: Importance 0.8		Haz	ard Planning	Consideration	-	
Based on percentage of damage to typic facility in community.	al	Total Score	Range	Distribution	Haza Leve	
Impact	Score	0.0	20.0	7	Lov	
Negligible – less than 10% damage	1	0.0	20.0		LOV	
Limited – between 10% and 25% damage	2	20.1	42.0	10	Medi	
Critical – between 25% and 50% damage	3	42.1	64.0	5	Hig	
Catastrophic – more than 50% damage	4				Ĵ	

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, and secondary impact levels of each hazard. Each level's score is reflected in the matrix. The total score for each hazard is the probability score multiplied by its importance factor times the sum of the impact level scores multiplied by their importance factors. Based on this total score, the hazards are separated into three categories based on the hazard level they pose to the communities: High, Medium, and Low.

It should be noted that climate change was not prioritized for the planning area. Instead a discussion regarding climate change considerations has been added to each hazard profile. Regardless of the prioritization (low, medium, or high), it was determined by the Planning Team that all the hazards identified in **Exhibit 3-2** would be profiled. Due to the vast geography and hazards

that impact the various MAs, it was recognized by the Planning Team that some hazards that ranked low overall, may be a high priority depending upon the MA.

### 3.1.3 Disaster Declarations

Exhibit 3-4. Hazard	Rankings
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Year	Declaration Number	Declaration Title	Incident Type	Affected the MAs
2025	DR-4856	California Wildfires and Straight-Line Winds	Wind/Wildfire	No
2023	EM-3591-CA	Severe Winter Storms, Flooding, and Mudslides	Flood	No
2023	EM-3592-CA	Severe Winter Storms, Flooding, Landslides, and Mudslides	Flood	No
2022	FM-5439-CA	Coastal Fire	Fire	No
2021	FM-5383-CA	Bond Fire	Fire	No
2021	FM-5381-CA	Blue Ridge Fire	Fire	Yes
2021	FM-5380-CA	Silverado Fire	Fire	No
2020	EM-3428-CA	Covid-19	Biological	No
2020	DR-4482-CA	Covid-19 Pandemic	Biological	Yes
2018	FM-5223-CA	Canyon 2 Fire	Fire	No
2018	DR-4344-CA	Wildfires	Fire	No

No federally declared disasters have impacted Orange County for the following hazards in the last five years: Seismic Hazards, Severe Weather, Dam/Reservoir Failure, Coastal Hazards, and Geological Hazards

In addition, no major human-caused hazard events involving Power Outage, Terrorism (Cyber Threat), Contamination/Saltwater Intrusion, Terrorism (MCI), or Hazardous Materials have occurred in the past 5 years in Orange County

For California Proclamations please refer to the 2023 California State Hazard Mitigation Plan

## 3.2 Hazard Profiles

This section contains profiles for the hazards identified in **Exhibit 3-2**. Due to the nature of the hazards, some hazards were combined for purposes of the profiles as noted in **Exhibit 3-2**. Information was obtained from various Federal, State, and local sources, as well as the Planning Team. A detailed list of references is provided in **Section 6**.

The service areas for each of the MAs participating in the MJHMP update do not always align with incorporated city or unincorporated county boundaries. In many cases, an MA may serve multiple cities and/or portions of cities/unincorporated areas. For the purposes of this MJHMP, the planning area refers to Orange County, since the MAs provide services and infrastructure throughout most of the county. Because much of the available hazard data is provided by jurisdictional boundary (county or city), it is not always possible to obtain or delineate data specific to the MA jurisdictional (service) boundary. The Jurisdictional Annexes detail the hazards, risk assessments, and mitigation strategies specific to each jurisdiction.

Each hazard profile addresses the following:

- **Description (Nature) of the Hazard:** Describes the hazard and its characteristics.
- **History/Past Occurrences:** Provides a history of the hazard and identifies previous occurrences. Where an occurrence is specific to an MA, this information is provided.
- Location/Geographic Extent: Describes the location (geographic) area affected by the hazard. If the hazard affects the entire planning area, it is noted. For geographically specific hazards, the specific MAs affected by the hazard are identified and discussed further in the Jurisdictional Annexes.
- **Magnitude/Severity:** Describes the extent (magnitude or severity) of each hazard. If a hazard has a uniform extent for all the MAs, it is noted. For geographically specific hazards, mapping is provided that illustrates the extent of the hazard for the entire planning area. Mapping for applicable hazards specific to an MA are provided in the Jurisdictional Annexes.
- **Probability of Future Occurrences:** Provides a discussion of the probability of future occurrences of the hazard based on the history of past occurrence, location, and severity. If the likelihood of occurrence is the same for all jurisdictions or varies amongst the jurisdictions, it is noted.
- **Climate Change Considerations:** Provides a discussion regarding the potential effects climate change may have on a specific hazard. In some instances there may be no obvious and direct effect, while in other instances, significant information is available regarding the connections between climate change and the hazard of concern.

#### 3.2.1 Coastal Hazards (Coastal Erosion, Coastal Storms, Sea Level Rise, Tsunamis)

The Coastal Hazards profile includes discussions regarding coastal erosion, coastal storms, sea level rise, and tsunamis.

## 3.2.1.1 Nature of Hazard

#### Coastal Erosion/Storms

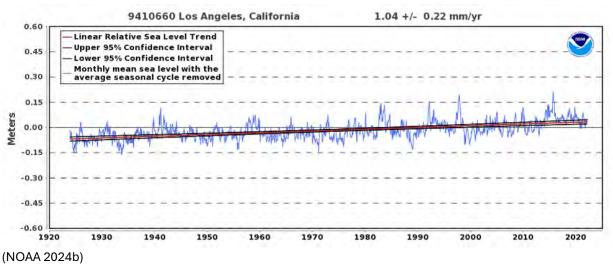
Erosion is a naturally occurring phenomenon all along California's coastline. Erosion can be severe during winter storms, which are often accompanied by high surf, particularly during El Niño events. Rising sea levels caused by climate change will increase coastal erosion by exacerbating the impact of high tides and waves. Climate change is also expected to increase the frequency and severity of storms. As a result, even areas that have not experienced significant erosion in the past may be at risk in the future.

Erosion can also be affected by engineered structures that impede the deposit of new sediment at beaches; these include inland dams, channelized rivers, harbors, jetties, and seawalls/revetments (MWDOC 2019). This has been the case in Orange County, where the channelization of the Santa Ana River has reduced the amount of sediment reaching the coast, while the construction of jetties at Anaheim Bay and breakwaters at Long Beach have changed deposit patterns (MWDOC 2019). This led to the formation of several chronic erosion hotspots along the county's coastline. In some cases, long-term beach replenishment efforts and management plans have been able to counteract or reverse some of these trends.

In addition to the gradual narrowing of sandy beaches, storms and erosion can damage steep coastal bluffs and cliffs. Landforms that appear to have been stable for years may retreat several feet in just a few hours. In either case, erosion can cause considerable damage to coastal infrastructure and property. As Orange County's beaches are centers for recreation and tourism, loss of land has economic consequences, as well.

#### Sea Level Rise

Sea level rise is the increase in the average height of the ocean's surface. It occurs when global temperatures rise and melt land ice, such as glaciers and the polar ice caps that have formed over land masses. The meltwater runs into the world's oceans, causing a global increase in ocean levels. Additionally, because most materials expand in size when they become warmer, increased temperatures cause ocean water to expand, further raising the height of the ocean's surface. **Exhibit 3-5** shows the sea level trend over the past 100 years.



#### Exhibit 3-5. Sea Level Trend (1920-2020)

**Risk Assessment** 

While sea level rise can happen naturally, such as at the end of an ice age, the driver of sea level rise at present is global climate change. Unlike many other hazards, sea level rise is very gradual and occurs over the course of decades. Sea level rise itself poses both indirect and direct threats. Indirectly, a higher average sea level means that there is less of a buffer between the ocean and coastal structures or facilities. This can make it easier for coastal flooding, which can occur during storms, high surf, or particularly strong tides, to affect coastal properties since the distance between the ocean and these properties is smaller. Similarly, sea level rise can exacerbate coastal erosion, as discussed above. If sea level rise becomes severe enough, low-lying coastal areas can be semi-permanently or permanently underwater, rendering these areas uninhabitable.

#### Tsunamis

The phenomenon we call "tsunami" is a series of traveling ocean waves of extremely long length generated primarily by earthquakes occurring below or near the ocean floor. In the deep ocean, the tsunami waves move across the deep ocean with a speed exceeding 500 miles per hour, and a wave height of only a few inches. Tsunami waves are distinguished from ordinary ocean waves by their great length between wave crests, often exceeding 60 miles or more in the deep ocean, and by the time between these crests, ranging from 10 minutes to an hour.

As they reach the shallow waters of the coast, the waves slow down, and the water can pile up into a wall of destruction up to 30 feet or more in height. The effect can be amplified where a bay, underwater features, or harbor or lagoon funnels the wave as it moves inland. Large tsunamis have been known to rise over 100 feet. Even tsunamis 1 to 3 feet high can be very destructive and cause many deaths and injuries.

There are many causes of tsunamis, but the most prevalent is earthquakes. In addition, landslides, volcanic eruptions, explosions, and even the impact of meteorites can generate tsunamis. Not all earthquakes generate tsunamis. To generate a tsunami, the fault where the earthquake occurs must be underneath or near the ocean and cause vertical movement of the sea floor over a large area, hundreds or thousands of square miles. By far the most destructive tsunamis are generated from large, shallow earthquakes with an epicenter or fault line near or on the ocean floor. The amount of vertical and horizontal motion of the sea floor, the area over which it occurs, the simultaneous occurrence of slumping of underwater sediments due to the shaking, and the efficiency with which energy is transferred from the Earth's crust to the ocean water are all part of the tsunami generation mechanism. The sudden vertical displacements over such large areas disturb the ocean's surface, displace water, and generate destructive tsunami waves. Although all oceanic regions of the world can experience tsunamis, the most destructive and repeated occurrences of tsunamis are in the Pacific Rim region.

Tsunami waves can travel at the speed of a commercial jet plane, over 500 miles per hour, moving from one side of the Pacific Ocean to the other in less than a day. This great speed makes it important to be aware of the tsunami as soon as it is generated. Scientists can predict when a tsunami will arrive at various locations by knowing the source characteristics of the earthquake that generated the tsunami and the characteristics of the sea floor along the path to the shore from the point of origin.

Offshore and coastal features can determine the size and impact of tsunami waves. Reefs, bays, entrances to rivers, undersea features and the slope of the beach all modify the tsunami as it converges on the coastline. People living near areas where large earthquakes occur may find that the tsunami waves can reach their shores within minutes of the earthquake. For these reasons, the

tsunami threat to many areas such as Alaska, the Philippines, Japan, and the U.S. West Coast can be immediate (as tsunamis from nearby earthquakes take only a few minutes to reach coastal areas) or less urgent (as tsunamis from distant earthquakes take from 3 to 22 hours to reach coastal areas). When a tsunami reaches the coastline and moves inland, the water level can rise several feet, flooding homes, businesses, and infrastructure from several thousand feet to miles inland, depending on the topography.

Scientists cannot accurately predict when earthquakes will occur, and as a result they cannot determine exactly when a tsunami will be generated or how destructive it will be. However, past tsunami height measurements are useful in predicting future tsunami impact and flooding limits at specific coastal locations and communities.

#### 3.2.1.2 History/Past Occurrences

#### Coastal Erosion/Storms

Problems with chronic erosion in Orange County have been recognized since at least 1945, when beach nourishment operations were undertaken to shore up the eroding Surfside-Sunset shoreline (MWDOC 2019). A 2006 U.S. Geological Survey (USGS) assessment of the entire California coast found that, between Los Angeles Harbor and Dana Point, the shoreline had receded since the early 1970s for 35% of the 29-miles coastline. Beach nourishment projects prevented further observable erosion during this period.

California typically experiences the most erosion during significant El Niño events. The three strongest El Niño events on record were during the winters of 1982-1983, 1997-1998, and 2015-2016. Historic erosion was reported all along the west coast in 2015-2016, according to the USGS (USGS 2017b). While the winter storms brought extreme wave action to California's shores, they featured surprisingly little rainfall. With California in the midst of a major drought, less sediment was washed to the ocean to replenish beaches. Portions of beaches in San Clemente and Laguna Beach were temporarily closed to the public due to hazardous conditions (Connelly 2016).

#### Sea Level Rise

NASA reports that the global average sea level has risen almost 7 inches in the last 100 years. Rising sea levels have been observed in Orange County, as well. Measurements taken at Newport Beach since 1955 show that the sea level there has risen an average of 2.22 millimeters, or 0.09 inches, per year (MWDOC 2019). NOAA maintains tidal gauges along the coast of California. The closest tidal gauge to Orange County is La Jolla and monitored water levels at the La Jolla tide gauge (<u>Station 9410230</u>) have shown an increase of 0.08 inch per year (2.04 millimeters per year) based on monthly mean sea levels from 1924 to 2021.

King tides have flooded Orange County coastal communities, including Seal Beach, Huntington Beach, Balboa Peninsula and Balboa Island in Newport Beach, and Sunset Beach in the past (OCR 2017). In the last 10 years, the National Centers for Environmental Information (NCEI) Storm Events Database reports four coastal flooding incidents that affected Orange County: in October and November of 2015 and in May and October of 2017. It is difficult to say how higher sea levels may have affected the severity of these events. The independent organization Climate Central estimates that La Jolla, California, located south of Orange County, experienced 60 days of coastal flooding between 2005 and 2014, based on observed impacts such as flooded roads. Of those events, only four would have occurred without climate-linked sea level rise (Climate Central n.d.).

## Tsunamis

Tsunamis can be categorized as Pacific-wide or "local." Typically, a Pacific-wide tsunami is generated by a major vertical shift in the ocean floor creating a wave that includes the entire column of water that has the potential to travel long distances. A "local" tsunami can be a component of a Pacific-wide tsunami in the immediate area of the earthquake or a wave that is confined to the area of generation, such as a landslide within a bay or harbor. Worldwide, tsunamis have resulted in the loss of thousands of lives, billions of dollars in damages, and the closure of many local economies.

All of the coastal areas in Orange County are susceptible to tsunamis, although most tsunamis have occurred in Northern California. The Channel Islands were impacted by a tsunami in the early 1800s. In the 1930s, four tsunamis struck the Los Angeles, Orange County, and San Diego coastal areas. In Orange County the tsunami wave reached heights of approximately 20 feet above sea level. In 1964, following the Alaska 8.2 earthquake, tidal surges of approximately 4 feet to 5 feet battered Huntington Harbor causing moderate damage.

According to the OC San Emergency Management Division, the following events generated response by their office (Ethan Miller Brown, OC San Emergency Management Division, pers. comm. Email correspondence. September 5, 2017):

- **April 1, 2014**. An 8.2 earthquake off the coast of Chile had the potential to generate a tsunami that could impact the Orange County coastline. The event was monitored, but no watch, advisory, or warning was issued for the county.
- September 16, 2015. An 8.3 earthquake off the coast of Chile triggered a Tsunami Advisory for the Orange County coastline. The Orange County Emergency Operations Center (EOC) was activated, and beaches were closed as a precaution; no evacuation orders were issued, and no damages occurred.
- January 15, 2022. A volcanic eruption near the Tonga Islands of the South Pacific generated a tsunami triggering a Tsunami Advisory for Orange County beaches, harbors, and piers (NOAA 2024c).

The National Oceanic and Atmospheric Administration (NOAA) reports one tsunami event in Orange County (MWDOC 2019):

• September 16-17, 2015. As described above, an 8.3 magnitude earthquake off the coast of Chile led the National Tsunami Warning Center to issue a tsunami advisory for a portion of California, including Orange County. All beaches, harbors, piers, and marinas in the cities of Seal Beach, Huntington Beach, Newport Beach, Laguna Beach, Dana Point, and San Clemente, including county and State beaches were closed. Tsunami wave heights were observed to be just under 1 foot along the Orange County coast. The Orange County EOC reported no significant coastal flooding, but to be aware of the high likelihood of strong currents and waves dangerous to persons in or near the water.

## 3.2.1.3 Location/Geographic Extent

#### Coastal Erosion/Storms

Orange County's coastline includes sand and cobble beaches, rocky cliffs and coastal bluffs, and intertidal areas. In general, beach erosion is more of an issue along Orange County's northern coast, while bluff retreat is a greater concern along the southern portion.

Beginning in 1964, the Orange County Erosion Control Project targeted Surfside-Sunset and West Newport Beach as locations in need of restoration. The U.S. Army Corps of Engineers spearheaded efforts to import sand and install retention devices in these areas.

A 2006 USGS study found that West Newport Beach had the largest measurable erosion rate in Orange County between the early 1970s and 1998.

As part of the Coastal Storm Modeling System (CoSMoS), data available from the USGS shows the projected location of the California shoreline under various scenarios of sea level rise. The Coastal Storm Modeling System (CoSMoS-COAST) shows that with a 3.3-foot rise in sea levels, Huntington State Beach will see the greatest erosion, followed by parts of Huntington City Beach, West Newport Beach, Surfside, and Bolsa Chica State Beach.

#### Sea Level Rise

Sea level rise presents a risk for all coastal communities with low-lying areas. In Orange County, Huntington Beach is particularly vulnerable. A 2017 report by the Union of Concerned Scientists, "When Rising Seas Hit Home," includes a mapping tool that shows what coastal areas will experience flooding at least 26 times a year under various sea level rise scenarios. Under a moderate scenario of a 4-foot rise, the area of north Orange County roughly bounded by the Santa Ana River and State Route 22 will see 14% of its land chronically inundated by 2100, even with existing levees. With a rise of 6 feet, 24% of the land will be chronically inundated. Affected areas include neighborhoods in Seal Beach, Huntington Beach, and Newport Beach.

NOAA offers another mapping tool to visualize areas vulnerable to flooding due to climate change. Its Sea Level Rise Viewer projects that, with a 1-foot rise in sea levels, there will be flooding through many parts of southeastern Huntington Beach, including neighborhoods between the Talbert Chanel and Huntington Beach Channel. A 2-foot rise will also start to affect parts of Sunset Beach and Balboa Island in Newport Beach, as well as less developed areas of Upper Newport Bay and Bolsa Chica Ecological Reserve.

From 1924 to 2021 NOAA's La Jolla tide gauge (Station 9410230) have shown an increase of 0.08 inch per year (2.04 millimeters per year) based on monthly mean sea levels.

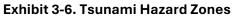
#### Tsunamis

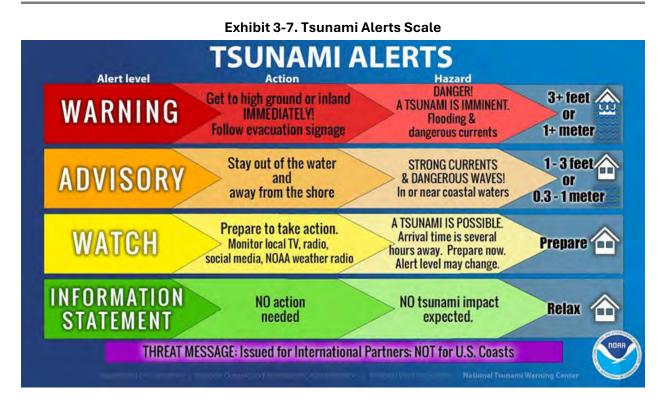
**Exhibit 3-6** illustrates the portions of the planning area within a tsunami hazard zone. Tsunami inundation maps are provided by the California Geological Survey and represent a combination of the maximum considered tsunamis for each area.

As illustrated on **Exhibit 3-6**, tsunami inundation areas are contained to the coastal areas of the planning area, extending into the areas of Seal Beach, Huntington Beach, Newport Beach, Laguna Beach, Dana Point, and San Clemente.

To better understand the severity of a tsunami event, NOAA provides an alert scale (**Exhibit 3-7**) that provides four alert levels each with an information statement, watch, advisory, and warning. These levels are based on the hazard level and actions necessary in response to the type of alert provided.







## 3.2.1.4 Magnitude/Severity

## Coastal Erosion/Storms

Erosion is usually described in terms of how much the beach width deceases per year. The 2006 USGS study, for example, found that erosion at West Newport Beach was at a rate of -2.2 meters per year. Overall, the shoreline of Los Angeles Harbor and Dana Point grew by an average of 0.5 meters per year, the highest rate in all of California, due largely to beach nourishment projects. Among those sections that did experience erosion, it happened at an average rate of -0.5 meters per year.

The volume of sand used to fight erosion can also indicate the magnitude of the problem. For example, from 1945 to 2009, more than 20 million cubic yards of sediment has been added to Surfside-Sunset Beach (Everest 2013).

In November 2023, the U.S. Army Corps of Engineers announced a new beach nourishment project that will dredge roughly 1.2 million cubic yards of sand off the coast of Surfside and Sunset beaches. These dredged materials will be deposited south of the Naval Weapons Station Seal Beach, allowing for sediment to be transported naturally to the Huntington, Bolsa Chica, and Newport Beaches.

#### Sea Level Rise

Sea level is measured by local tide gauges and satellite. Sea level rise describes projected changes in those measurements based on different climate models. NOAA's Sea Level Rise Viewer projects that the sea level at Newport Bay will rise by at least 0.75 feet and as much as 2.72 feet by 2050, based on different global scenarios. By 2100, the level may rise by as much as 10.14 feet under the most extreme scenario.

## Tsunamis

The magnitude/severity of a tsunami would be dependent on the severity and location of the event causing the tsunami. The California Geological Survey tsunami inundation maps (refer to **Exhibit 3-5**) identify the maximum extent of the tsunami inundation area within Orange County, which is primarily contained to the coastline. However, the inundation areas extend into several coastal communities with the largest potential inundation areas occurring within the cities of Seal Beach, Huntington Beach, Newport Beach, and Dana Point.

## 3.2.1.5 Probability of Future Occurrences

#### Coastal Erosion/Storm

Climate change all but ensures that the entire Orange County coast will experience some degree of erosion through the end of the century. The amount will depend on how much sea levels rise, which is contingent on global efforts to curb greenhouse gas emissions. An online mapping tool produced by Our Coast Our Future, a collaborative effort of 15 organizations including the USGS and California Coastal Commission, used CoSMoS data to predict that very few sections of the county's shoreline will maintain their current position assuming a 3.3-foot rise in sea level, even with the continuation of current beach nourishment efforts.

A new study released in 2017 using CoSMoS data found that, without human intervention, 31% to 67% of Southern California beaches may be completely eroded by 2100 if sea levels rise by 1 to 2 meters (USGS 2017a).

#### Sea Level Rise

According to the 4th Climate Change Assessment, thermal expansion was the largest contributor to sea level rise followed by melting ice from glaciers, ice caps, and loss of ice sheets covering Greenland and Antarctica. While the rate of sea level rise has been slow along the Orange County coast in the past, it is expected to accelerate in the future. According to the 4th Climate Change Assessment, by 2050 sea levels could be approximately 1 foot higher than they are now, and by 2100 sea levels could 5.5 feet higher or more (Hall et al. 2018).

Independent of all other factors, sea level rise is expected to cause temporary inundation of large sections of the planning area's beaches, particularly near the piers, during high wave events. However, no substantial permanent inundation is expected at this time. However, the effect of sea level rise is much greater in combination with various flood events, including coastal flooding and extreme high tides.

Climate Central's Surging Sea Risk Finder attempts to estimate the probability that coastal floods will reach elevations above the local high tide line. The tool does not have estimates for every tide gauge, and estimates for Orange County are based on data from the gauge at Los Angeles' Outer Harbor. It shows that, while there is currently less than a 1% chance of coastal flooding reaching areas 3 feet above the tide line in any given year, those chances increase to 6% annually by 2040 under a medium sea level rise scenario. By 2070, these areas will be flooding every year. Under an extreme scenario, annual flooding will happen as soon as 2040.

#### Tsunamis

The historic record indicates that there is a low probability of occurrence of a major tsunami in Orange County. However, there is the potential for future tsunami events to impact water and

wastewater infrastructure located within a tsunami inundation area. This probability is similar for each of the jurisdictions located within these areas.

#### 3.2.1.6 Climate Change Considerations

#### Coastal Erosion/Storms

Coastal erosion is caused primarily by tides and wave action from storms. While tides are not affected by climate change, some studies suggest that climate change is expected to cause a 10% to 20% increase in the intensity of the severe storms that affect Southern California, as discussed in greater detail in **Section 3.2.3**, **Flood** (Oskin 2014). This means that the significant wave events that already cause substantial erosion along low-lying coastal areas may become more intense, causing greater loss of beaches and coastal bluffs during these events. Sea level rise, which is caused by climate change, may exacerbate the issue. As the surface of the ocean becomes higher, wave and tidal action will be able to reach farther onto land. As a result, wave and tide events that currently do not reach far enough to cause any erosion may be able to do so in the future, and wave and tide events that already cause erosion will be able to affect areas farther from the water line.

#### Sea Level Rise

Sea level rise is a direct consequence of climate change and would likely not exist to any substantial degree if climate change was not occurring. Climate change does not create any particular considerations for sea level rise, as the hazard itself is a result of climate change.

#### Tsunamis

The displacement events that cause tsunamis are geologic in nature and unaffected by climate change to any known degree. However, as sea level rise increases the average height of the ocean, this will allow tsunami waves to reach farther inland. Even though climate change is not expected to affect the severity of tsunamis, sea level rise is likely to create the potential for tsunamis to cause greater damage.

#### 3.2.2 Dam/Reservoir Failure

#### 3.2.2.1 Description (Nature) of the Hazard

Dam failures can result from several natural or human-caused threats such as earthquakes, erosion of the face or foundation, improper silting, rapidly rising flood waters, malicious events, and structural/design flaws. Seismic activity can also compromise dam regulating structures, resulting in catastrophic flooding. A dam failure can cause loss of life, damage to property, the displacement of persons, and other ensuing hazards along the inundation path. Damage to electricity-generating facilities and transmission lines could also impact life support systems in communities outside of the immediate hazard areas.

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 and welfare for the affected population.

There are 33 dams in Orange County with ownership ranging from the Federal Government to homeowners' associations. These dams hold billions of gallons of water in reservoirs. The major

reservoirs are designed to protect Southern California from flood waters and to store domestic and recycled water.

In addition to reservoirs with dams in Orange County, there are many water storage tanks that are potentially susceptible to failure or damage by natural or human-caused events. These water tanks contain millions of gallons of water each and provide an important source of water storage. Their capacity is large enough to cause substantial damage down slope from a tank should one fail. Correspondingly, the history of failure of water storage tanks is considered.

Because dam failure can have severe consequences, FEMA and Cal OES require all dam owners to develop Emergency Action Plans (EAP) for warning, evacuation, and post-flood actions. Although there has been extensive coordination with Orange County officials in the development of an Orange County Response Plan, the responsibility for developing potential flood inundation maps and facilitation of emergency response is the responsibility of the dam owner.

#### 3.2.2.2 History/Past Occurrences

Orange County has never experienced a major dam failure, but there have been two deadly incidents involving dams built to supply water for the City of Los Angeles. In addition, the failure of a water tank caused considerable damage within the City of Westminster in 1998. These three disasters are detailed below.

#### St. Francis Dam, Disaster of 1928

In Los Angeles, the failure of the St. Francis Dam, and the resulting loss of over 500 lives was a scandal that resulted in the almost complete destruction of the reputation of its builder, William Mulholland. It was he who proposed, designed, and supervised the construction of the Los Angeles Aqueduct, which brought water from the Owens Valley to the city. The St. Francis Dam, built in 1926, was 180 feet high and 600 feet long. It was located near the City of Saugus in San Francisquito Canyon.

The dam failed on March 12, 1928 three minutes before midnight. Its waters swept through the Santa Clara Valley toward the Pacific Ocean about 54 miles away. The valley was devastated before the water finally made its way into the ocean between Oxnard and Ventura. At its peak the wall of water was said to be 78 feet high. At the time the water flowed through Santa Paula, 42 miles south of the dam, the water was estimated to be 25 feet deep. Almost everything in its path was destroyed: livestock, structures, railways, bridges, and orchards. In the end Ventura County lay below 70 feet of mud and damage estimates topped \$20 million.

#### Baldwin Hills Dam, Disaster of 1963

The Baldwin Hills Dam collapse sent a 50-foot wall of water down Los Angeles' Cloverdale Avenue on December 14, 1963. Five people were killed. Sixty-five hillside houses were ripped apart, and 210 homes and apartments were damaged. The flood swept northward in a V-shaped path roughly bounded by La Brea Avenue, Jefferson Boulevard, and La Cienega Boulevard.

The earthen dam that created a 19-acre reservoir to supply drinking water to West Los Angeles residents ruptured at 3:38 p.m. A pencil thin crack widened to a 75-foot gash allowing 292 million gallons to surge out in 77 minutes. The cascade caused an unexpected ripple effect that is still being felt in Los Angeles and beyond. It prompted the end of urban-area earthen dams as a major element of water storage systems, and a tightening of the Division of Safety of Dams control over reservoirs throughout the State.

#### Westminster Water Tank Failure, Disaster of 1998

In September of 1998, a 5-million-gallon municipal water storage tank in the City of Westminster ruptured because of corrosion and construction defects. There was no loss of life, but damage was extensive. The flow of water from the 32-year-old tank destroyed most of the storage facility as well as several private residences. Additionally, there were approximately 30 more homes inundated with water and silt. Through the Public Works Mutual Aid Agreement, the Orange County Public Works Department assisted the City of Westminster in the cleanup and temporary repair of the streets.

City employees, the Orange County Fire Authority, neighboring fire services, and the Red Cross were onsite for days assessing the damage and assisting residents. Water storage for the city was non-existent following this event while the other 5-million-gallon tank of similar age and construction was removed from service as a precautionary measure.

A new reservoir facility began providing services in March 2003, consisting of two 8-million-gallon water storage tanks, a 17-million-gallon-per-day booster station, and a new groundwater well with a capacity of 3,000 gallons per minute. All new construction has passed rigorous inspections and has obtained the required permits from the California Department of Public Health.

#### 3.2.2.3 Location/Geographic Extent

Exhibit 3-8 lists the larger reservoirs and dams in Orange County and their owners/operators.

Name of Facility	Owner/Operator		
Santiago Creek Dam/Reservoir (Irvine Lake)	IRWD		
Villa Park Dam	County of Orange		
Sulphur Creek Dam	County of Orange		
Peters Canyon Dam	County of Orange		
Walnut Canyon Dam/Reservoir	City of Anaheim		
San Joaquin Dam/Reservoir	IRWD		
Sand Canyon Dam/Reservoir	IRWD		
Rattlesnake Canyon Dam/Reservoir	IRWD		
Big Canyon Dam/Reservoir	City of Newport Beach		
Lake Mission Viejo	Lake Mission Viejo Association		
El Toro R-6 Dam/Reservoir	ETWD		
El Toro Reservoir/Rossmoor #1 Dam	ETWD		
Diemer Filtration Plant	Metropolitan Water District of Southern California		
Palisades Bradt Dam/Reservoir	SCWD		
Portola Dam/Reservoir	SMWD		
Syphon Canyon Dam/Reservoir	The Irvine Company		
Trabuco Dam/Reservoir	TCWD		
Dove Canyon Dam	Dove Canyon Master Association/TCWD		
Upper Oso Dam/Reservoir	SMWD		
Upper Chiquita Dam/Reservoir	SMWD		
Brea Dam	U. S. Army Corps of Engineers		
Fullerton Dam	U. S. Army Corps of Engineers		
Carbon Canyon Dam	U. S. Army Corps of Engineers		
Prado Dam	U.S. Army Corps of Engineers		

## Exhibit 3-8. Orange County Large Reservoirs and Dams

As mentioned above, the responsibility for developing maps showing areas that would be inundated in the event of a failure is the responsibility of the dam's owner. Not all of the dams and reservoirs in **Exhibit 3-8** would impact the planning area. Those that could impact the planning area, should they fail, are described below.

**Big Canyon Reservoir** is a 600-AF potable water storage facility constructed in 1959 and owned by the City of Newport Beach. It is in the San Joaquin Hills overlooking Newport Bay. Big Canyon Reservoir is retained on three sides by a homogenous earth-filled embankment dam, while the east side was formed by a slope cut. At its maximum section the dam embankment is 65 feet high. The spillway is an ungated concrete lined overflow structure located on the west side of the reservoir. The bottom of the reservoir and the cut slopes are lined with minimum 5-foot-thick clay blanket, and the entire inside surface, including the embankments and cut slopes, is overlain with a 3-inch-thick, porous, asphalt pavement. The reservoir is covered with a reinforced polypropylene weight-tensioned floating cover that was installed in 2004.

**Dove Canyon Dam** is an earth-filled dam completed in 1990. The dam is in the Dove Canyon residential community within the City of Rancho Santa Margarita, Orange County. The dam is owned by the Dove Canyon Master Association (DCMA). DCMA owns and operates recreational facilities situated immediately downstream of the dam crest on compacted backfill. The recreational facilities were included in the construction documents for the dam and approved by the State Division of Safety of Dams. The impounded reservoir is located on land owned by the TCWD and is used to store up to about 415 AF of runoff. TCWD and DCMA have an agreement to operate and maintain the dam and reservoir. TCWD utilizes storage in the reservoir to supplement its recycled water demands for landscape irrigation. The impounded water can be stored to an elevation of 1,090 feet, approximately 11 feet below the top of the dam crest's elevation of 1,101 feet above mean sea level (MSL).

**El Toro Reservoir** is an embankment-type dam owned and operated by ETWD. The reservoir is located in the City of Mission Viejo. The impounded reservoir has a storage capacity of 275 million gallons (850 AF) with a surface area of approximately 20.6 acres. The bottom and internal slopes of the reservoir are lined, and the reservoir surface has a floating cover. There is no surface water influent to the reservoir. The reservoir includes an emergency spillway and drainage facilities. Storage capacity in the El Toro Reservoir is owned through a regional partnership between ETWD, SMWD, and MNWD.

**Rossmoor #1 Dam** is an embankment-type dam, with a height of 36 feet and a length of approximately 305 feet. The dam is located in the City of Laguna Woods. The impounded Holding Pond is used to provide emergency storage of secondary effluent from the ETWD Water Recycling Plant and has a storage capacity of 14 million gallons (43 AF). The reservoir includes an emergency spillway and drainage facilities.

**Palisades Bradt Reservoir** provides up to 48 million gallons of potable water storage with a 146-foot-high, zoned, earthen embankment dam constructed in 1963. The bottom and internal slopes of the reservoir are lined, and the reservoir surface has a floating cover. The dam has a low-level outlet, an emergency outlet, and an emergency spillway. The upstream watershed that contributes inflow to the reservoir has an area of 19 acres.

**Peters Canyon Dam** is an earth-filled structure owned by Orange County that has a capacity of 626 AF at the spillway pipe elevation of 537 feet above MSL. Water storage varies from 200 AF to 600 AF depending on seasonal rain amounts. Alerting would come primarily from the Park Ranger

at Peters Canyon Regional Park who would notify the Sheriff's Department, Control One of dam failure or possible dam failure.

**Prado Dam** is owned and operated by the Army Corps of Engineers and provides flood control and water conservation storage for Orange, Riverside, and San Bernardino counties. Prado Dam is a major component of the Santa Ana Mainstem Project, which extends from the upper canyon in the San Bernardino Mountains downstream to the Pacific Ocean at Newport Beach, some 75 miles along the Santa Ana River. The entire system is designed to provide various levels of flood protection ranging from 100 to 190 years for areas most susceptible to damage from flooding. The dam collects upstream water releases from storage facilities and runoff from uncontrolled drainage areas. It primarily benefits Orange County by reducing the potential for flood-induced damage and by providing water conservation storage. The Prado Dam has been undergoing major improvements including raising the embankment and spillway, increasing the maximum discharge capacity, constructing new levees and dikes, relocating and protecting utility lines, increasing reservoir area, and increasing impoundment.

**Portola Dam** is located near the northern end of Canada Gobernadora in southern Orange County, within the Coto de Caza gated community. Canada Gobernadora flows north to south and confluences with San Juan Creek approximately 7.5 miles upstream of the Pacific Ocean. Portola Dam is an earth-filled structure situated about 8 miles north of San Juan Creek with a maximum recycled water (or domestic water blend) storage capacity of 586 AF and a high-water elevation of 936 feet.

The Canada Gobernadora valley channel area between the dam and San Juan Creek has been developed with a golf course and lined on each side by thousands of homes positioned just at or above the 100-year flood plain. If a Portola Dam break occurred, the flow would likely destroy streets crossing the flood plain; damage the water, sewer, and recycled water pipeline infrastructure in them; and affect some or many home locations near the stream channel. Streets in Coto de Caza certain to be affected are: Trigo Trail, Via Pajaro, Via Conejo, Vista Del Verde, San Miguel, Cantamar, and South Bend. Along with the golf course and the equestrian center, additional SMWD facilities that are anticipated to be damaged or destroyed by a dam break in Coto de Caza and farther downstream are:

- Coto Lift Station and force main
- South Ranch Lift Station and force main
- South county pipeline
- Ortega Lift Station (Talega) force mains
- Talega recycled water transmission main
- Chiquita Land Outfall pipeline

Per the compliance report, after entering San Juan Creek, the dam break inundation flood area would be about the same as the 100-year flood plain all the way down to the Pacific Ocean.

**Santiago Creek Dam** is an earth-fill dam with a 25,000 AF capacity reservoir (Irvine Lake). The dam is owned by IRWD. **Villa Park Dam** is a flood control dam located downstream from Santiago Dam. It is an earth-fill structure with a capacity of 15,600 AF and is owned by the Orange County Flood Control District. Initial alerting is expected from dam keepers who are on duty at both Santiago Creek Dam and Villa Park Dam.

**Trabuco Dam** is an earth-filled dam completed in 1984. The dam is located adjacent to the Robinson Ranch residential community within the City of Rancho Santa Margarita, Orange County. The dam and impounded reservoir are owned and operated by the TCWD. TCWD utilizes the reservoir to store up to approximately 135 AF of reclaimed water produced from the Robinson Ranch Wastewater Treatment Plant located adjacent to the reservoir. The reclaimed water can be stored to an elevation of 1,274 feet, approximately 6 feet below the top of the dam crest's elevation of 1,280 feet above MSL.

**Upper Oso Reservoir (UOR) and Dam** are located within the Cities of Mission Viejo and Rancho Santa Margarita near the northern end of the Oso Creek Watershed in southern Orange County. Upper Oso Dam is an earth-filled structure situated between El Toro Road and Los Alisos Boulevard nearly 10 miles north of the Trabuco Creek confluence point. UOR has a high-water elevation of 953 feet and stores up to 4,000 AF of recycled water for landscape irrigation that is mainly used within SMWD and MNWD.

Immediately downstream of the Upper Oso Dam, a long bridge for State Route 241 crosses the flood channel and may not experience problems during a major flood event. Just upstream of Los Alisos Boulevard, some commercial property lies adjacent to the Oso Creek channel and may be affected. About 3 miles downstream on Oso Creek and upstream of Olympiad Road, a large basin area was created (now a sports park) to capture and attenuate major discharges from UOR before they enter **Lake Mission Viejo (LMV)**.

LMV is created by a dam lying under Alicia Parkway. An Upper Oso Dam breach may also overflow LMV and damage the dam to point where it could release stored water and create a catastrophic flood hazard all the way to the Pacific Ocean.

Downstream of LMV, two golf courses have been developed within the Oso Creek channel area and numerous commercial properties are on adjacent sides. Housing tracts have been built above the 100-year flood plain, but, if a dam break occurred, the flow from UOR and LMV would likely destroy streets crossing the flood plain and damage the water, sewer, and recycled water pipeline infrastructure in them. In addition to the many pipelines crossing the flood plain, SMWD facilities that are anticipated to be damaged or destroyed by an Upper Oso Dam break are:

- Eastbrook Recycle Water Pump Station
- Lakeside Pump Station
- South County Pipeline
- Oso Creek Water Reclamation Plant
- Oso Creek Trunk Sewer
- Oso Barrier RW Pump Station and Pipelines

Due to proximity and elevation, a considerable number of the residential and commercial properties in many areas close to the banks of Oso Creek and farther downstream would likely be flooded for a short period of time and damaged. Streets in Mission Viejo and farther south that are likely to be affected by a dam failure are Los Alisos Boulevard, Santa Margarita Parkway, Olympiad Road, Alicia Parkway, Jeronimo Road, Marguerite Parkway, Casta del Sol, La Paz Road, Oso Parkway, Interstate 5, Camino Capistrano, Del Obispo Street, Stonehill Drive, and Pacific Coast Highway.

**Upper Chiquita Reservoir (UCR)** was constructed by SMWD to provide the South Orange County region with substantial new water reserves to meet customer demand during disruptions of water

deliveries. These interruptions can be unanticipated, like the break of the Allen McColloch Pipeline in 1999, or planned, like the shutdowns of the Diemer Filtration Plant in Yorba Linda to complete improvements or maintenance and repairs.

The UCR consists of an earth-fill dam structure and a covered, domestic water reservoir with a storage volume of 750 AF. The reservoir footprint is approximately 19.7 acres with a surface area of approximately 15.4 acres and has a High-Water Level (HWL) of 860 feet.

In addition to the dam and reservoir, the site contains the following facilities:

- Floating cover
- Access roads
- Spillway and drainage facilities
- Inlet/outlet facilities and pipelines
- Pump station
- Disinfection equipment
- Pipeline connection to the South Orange County Pipeline

The UCR site is located on the western side of Chiquita Canyon north of Oso Parkway and west of the current terminus of State Route 241 (SR-241) within the City of Rancho Santa Margarita, east of the community of Las Flores in southern Orange County.

A portion of the site is encumbered within the Transportation Corridor Agency's Chiquita Canyon Perimeter Conservation Easement. The closest developed areas are the Tesoro High School campus (located across Oso Parkway and south of the reservoir site) and the residential community of Las Flores (approximately 0.8-mile west of the site). Additional land uses in the proximity to the reservoir site include a neighborhood park, Crestview Park, located just over 300 feet west of the site, and the SMWD Las Flores Reservoir, located approximately 250 feet west of the site.

Under an extreme catastrophic dam failure scenario, the flood zone would exceed the FEMA 100year floodplain in the Canada Chiquita Channel. Under this extreme scenario, land use categories that would be affected include the Oso Parkway, SR-241, and the Tesoro High School. Once the flood waters reach the San Juan Creek the flood flows would be less than the FEMA 100-year flood.

The UCR is located on the western slope of Chiquita Canyon, just north of Oso Parkway in the City of Rancho Santa Margarita. Completed in October 2011, the 244 million-gallon UCR is the largest domestic water reservoir built in South Orange County in nearly 45 years. The UCR has:

- A storage capacity of approximately 244 million gallons of domestic water (750 AF) contained in a lined and covered reservoir.
- A surface area of approximately 17.8 acres.
- A regional partnership between SMWD (lead agency) and MNWD, City of San Juan Capistrano, City of San Clemente, and SCWD (storage owners).
- A service base of approximately 168,000 families receiving approximately 200 gallons of fresh water a day for one week.
- A reservoir design that conforms to the rigorous standards set forth by the State of California.

- Safety features, including piezometers (moisture sensors), to continually monitor water levels and test for irregularities.
- An earthen embankment that significantly reduces any visual impacts while traveling west along Oso Parkway near Highway 241.
- A location that is not visible from homes in local neighborhoods, including Las Flores and Wagon Wheel.

The UCR was included in the South Orange County Natural Community Conservation Plan, which designates habitat conservation and species protection measures to ensure an environmentally sensitive design.

## 3.2.2.4 Magnitude/Severity

Orange County's reservoirs range in capacity from 18 to 196,235 AF of water storage. Inundation maps and studies, when available, indicate the area that would be flooded and can be used to gauge the severity of a dam failure.

A compliance analysis and inundation study report was prepared for Upper Oso Dam in 1979 to allow for construction permitting by the State of California. This study indicated that if the dam was breached, a potential maximum flow rate exceeding 250,000 cubic feet per second may be expected when the water surface elevation drops to about 935 feet. Should such an event occur, the UOR could potentially empty in about a half hour.

A similar report for Portola Dam was done in 1980. This study indicated that if the dam was breached, a potential maximum flow rate of 22,645 cubic feet per second may be expected after about 3 hours once the water surface elevation is at elevation 920 feet. Should such an event occur, Portola Dam would potentially empty in just over 6 hours.

Failure of a reservoir or a dam could extend throughout most of the planning area, depending upon the size of the facility and associated failure.

## 3.2.2.5 Probability of Future Occurrences

There has been just one incident involving a water storage structure in the 110 years since construction of the first contemporary dam in Orange County. It is expected that future events will remain highly unlikely, with a less than 1% chance of happening in any given year. However, such occurrences have the potential to be highly destructive.

In the more than 50 years since the collapse of the Baldwin Hills Dam, there have been very few incidents in California due to stringent standards, regulations, and regular inspections. The near-catastrophic failure of the main spillway of the Oroville Dam in Northern California in 2017 is a reminder of the ongoing risk presented by dams.

## 3.2.2.6 Climate Change Considerations

While climate change is not expected to directly affect the risk of dam failure, the risk could increase due to an expected rise in the number of intense storms as a result of climate change, as discussed in **Section 3.2.3, Flood.** For example, an increase in the number of intense storms in the Santa Ana River Basin could place stress on the effectiveness of Prado Dam. More storms could lead to increased usage of the dams by necessity, and potentially require infrastructure to hold back larger amounts of water. As intense storms caused a near-failure of Prado Dam in 2005, it is

possible that increases in the number of intense storms may increase the risk of similar events in the future. This scenario can be applied to many of the dams and reservoirs located within the planning area. An increase in both the frequency and intensity of storms could potentially cause failure of the current infrastructure in place.

### 3.2.3 Flood

#### 3.2.3.1 Description (Nature) of the Hazard

Flooding may result from heavy rains raising water levels in rivers and streams; storms, tides, and weather patterns pushing ocean water into coastal areas; and when debris blocks normal storm water drainage systems. Other causes are discussed in more detail elsewhere in this plan, including sea level rise in **Section 3.2.1** and dam/reservoir failure in **Section 3.2.2**. Flooding can happen fast and with little warning, or water levels may rise slowly over the course of several days.

Orange County's terrain makes it naturally susceptible to flooding. Many of the rivers, creeks, and streams flow through natural floodplains on their way to the ocean. The county's rapid growth and transformation from an agricultural community to an urban community has changed flood control practices in the region. Drainage is managed through reservoirs, dams, diversion structures, and developed plains. In addition, seven pump stations (Huntington Beach, Cypress, Seal Beach, Los Alamitos, Rossmoor, Harbor-Edinger, and South Park) regulate storm water discharge to flood control channels. Although there is a county-wide system of flood control facilities, many of these are not designed for or capable of conveying runoff from major storms.

Orange County also has a warning system in place to detect potential flooding. The county began installing its ALERT (Automated Local Evaluation in Real Time) system in 1983. Operated by the county's Environmental Resources Section of the Resource Development and Management Department (RDMD) in cooperation with the National Weather Service, ALERT uses remote sensors located in rivers, channels, and creeks to transmit environmental data to a central computer in real time. Sensors are installed along the Santa Ana River, San Juan Creek, Arroyo Trabuco Creek, Oso Creek, Aliso Creek, as well as flood control channels and basins. The field sensors transmit hydrologic and other data (e.g., precipitation data, water levels, temperature, wind speed) to base station computers for display and analysis.

#### 3.2.3.2 History/Past Occurrences

Residents reported damaging floods caused by the Santa Ana River as early as 1770 (as recorded by explorer and missionary Father Juan Crespi). Major floods in Orange County along the Santa Ana River occurred in 1810, 1815, 1825, 1862, 1884, 1891, 1916, 1927, 1938, 1969, 1983, 1993, 1995, 1998, 2005, 2010, and 2017. Often these events involved additional hazards, such as landslides, mud flows, and high winds. **Exhibit 3-9, Presidential Disaster Declarations for Flooding in Orange County Since 1969**, lists Presidential Disaster Declarations since 1969 that involved flooding and affected Orange County.

Disaster Number	Incident Type	Title	Incident Begin Date	Incident End Date
3592	Flood	Severe winter storms, flooding, landslides, and mudslides.	3/9/2023	7/10/2023
3591	Flood	Severe winter storms, flooding, and mudslides.	1/8/2023	1/31/2023
4305	Flood	Severe winter storms, flooding, and mudslides.	1/18/2017	1/23/2017

#### Exhibit 3-9. Presidential Disaster Declarations for Flooding in Orange County Since 1969

# Orange County Water & Wastewater Multi-Jurisdictional Hazard Mitigation Plan 2024

Disaster Number	Incident Type	Title	Incident Begin Date	Incident End Date
1952	Flood	Severe winter storms, flooding, and debris/mud flows.	12/17/2010	1/4/2011
1585	Severe Storm(s)	Severe storms, flooding, landslides, and mud/debris flows.	2/16/2005	2/23/2005
1577	Severe Storm(s)	Severe storms, flooding, debris flows, and mudslides.	12/27/2004	1/11/2005
1203	Severe Storm(s)	Severe winter storms and flooding.	2/2/1998	4/30/1998
1046	Severe Storm(s)	Severe winter storms, flooding landslides, mud flow.	2/13/1995	4/19/1995
1044	Severe Storm(s)	Severe winter storms, flooding, landslides, mud flows.	1/3/1995	2/10/1995
979	Flood	Severe winter storms, mudslides, landslides, and flooding.	1/5/1993	3/20/1993
935	Flood	Rain/snow/wind storms, flooding, mudslides.	2/10/1992	2/18/1992
812	Flood	Severe storms, high tides, and flooding.	1/17/1988	1/22/1988
677	Coastal Storm	Coastal storms, floods, mudslides, and tornadoes.	1/21/1983	3/30/1983
615	Flood	Severe storms, mudslides, and flooding.	1/8/1980	1/8/1980
547	Flood	Coastal storms, mudslides, and flooding.	2/15/1978	2/15/1978
253	Flood	Severe storms and flooding.	1/26/1969	1/26/1969

The most significant flood events that affected the county are summarized below:

- **Great Flood of 1862.** The flood of January 1862, called the Noachian Deluge of California, was unusual in two ways: 1) the storm causing the flood occurred during a very severe drought spanning 1856 to 1864; and 2) the flood lasted 20 days, which is considered an extremely long duration. Under normal circumstances, major floods last only a few days. The only structure left standing along this portion of the Santa Ana River was the Aqua Mansa Chapel and residents gathered on a small point of high land to take refuge from the storm. Miraculously, there were no recorded deaths.
- **Great Flood of 1916.** On January 27, 1916, flood waters inundated a large area along the Santa Ana River, including Main Street in downtown Santa Ana, where the water was 3 feet deep. Adjacent farm lands, which later became the City of Westminster, also flooded. Three vehicular bridges and three railroad bridges were washed away by the flood and four people drowned.
- **Great Flood of 1938.** The flood of 1938 is considered the most devastating flood to occur in Orange County during the 20th Century and affected all of Southern California. The storm began on February 27 and lasted until March 3. In the Santa Ana Basin, 34 people died, and 182,300 acres were flooded. All buildings in Anaheim were damaged or destroyed. Two major railroad bridges, seven vehicular bridges, and the town of Atwood were destroyed. The Santa Ana River inundated the northwestern portion of Orange County and train service to and from Santa Ana was cancelled. The maximum discharge on March 3, 1938, was 46,300 cubic feet per second (cfs), with a gauge height at 10.20 feet. Damage exceeded \$50 million.
- **Great Flood of 1969.** The floods of January and February 1969 were the most destructive on record in Orange County. Previous floods had greater potential for destruction, but the county was relatively undeveloped when they occurred. During the flood of 1969, rain fell almost

continuously from January 18 to January 25, resulting in widespread flooding. Orange County was declared a national disaster area on February 5. A second storm hit on February 21 and lasted until February 25 bringing rain to the already saturated ground. This second storm culminated in a disastrous flood on February 25. The storm resulted in the largest peak outflow from Santiago Reservoir since its inception in 1933. The reservoir at Villa Park Dam reached its capacity for the first time since its construction in 1963; the dam had a maximum inflow of 11,000 cfs. The outlet conduit was releasing up to 4,000 cfs yet the spillway overflowed at 1:30 p.m. and continued for 36 hours. The maximum peak outflow from the dam reached 6,000 cfs. Although the safety of the dam was never threatened, the outflow caused serious erosion downstream in the cities of Orange and Santa Ana and in some parks and golf courses. A Southern Pacific Railroad bridge, water and sewer lines, a pedestrian over crossing, and three roads washed out. Approximately 2,000 Orange and Santa Ana residents were evacuated from houses bordering Santiago Creek.

- **Great Flood of 1983.** An intense downpour and high tides associated with El Niño (due to the presence of a low pressure system) caused intense shoreline flooding. Meanwhile the Santa Ana River crested its sides near the mouth of the ocean, creating a disaster for the low-lying areas of Huntington Beach. Floodwaters were 3 to 5 feet deep.
- **1992 Coastal Storms.** In 1992, several coastal storms affected many coastal utilities' storm drain and sewage treatment processes. SOCWA reported significant cracks and damage to its Aliso Creek Ocean outfall.
- **Great Floods of 1993.** An intense storm was concentrated in the Laguna Canyon Channel area extending from Lake Forest to downtown Laguna Beach. In spite of a valiant effort to save downtown merchants by sandbagging, the stores were flooded. Laguna Canyon Road was damaged extensively, as well as homes and small businesses in the Laguna Canyon Channel. There were no fatalities reported.
- **Great Flood of 1995.** A disaster was declared in Orange County after extremely heavy and intense rains exceeded the storm runoff capacity of local drainage systems in many Orange County cities and regional Flood Control District systems. As a result, widespread flooding of homes and businesses occurred throughout these cities. There were approximately 1,000 people evacuated, and extensive damage sustained to both private and public property.
- **Great Floods of 1997/1998.** El Niño storms that occurred during this period created extensive storm damage to private property and public infrastructure, with damages reaching approximately \$50 million. Storm conditions caused numerous county-wide mudslides, road closures, and channel erosion. Hillside erosion and mudslides forced the continual clearing of roads of fallen trees and debris. Protective measures, such as stabilizing hillside road slopes with rock or K-rail at the toe of slopes, were taken to keep the normal flow of transportation. Harbors, beaches, parks, and trails also sustained substantial storm damage.
- 2010/2011 Winter Storms. On January 26, California received Presidential Declaration for the severe winter storms, flooding, and debris and mudflows that occurred December 17, 2010, through January 4, 2011. At the time of the declaration the State of California incurred well over \$75 million in damages, while Orange County sustained more than \$36 million in damages. Orange County sustained extensive damage to private and public property, as well as critical infrastructure.

- **2017 Winter Storms.** Southern California experienced three storms over six days starting on January 18, 2016. The heavy rains, combined with already saturated soil, produced flash flooding across much of Orange County. Streets flooded with 1 to 3 feet of water in Huntington Beach, Santa Ana, and Newport Beach. Responders conducted rescue operations on the Santa Ana River in the cities of Orange and Huntington Beach. The storms resulted in a Presidential Disaster Declaration for 16 counties throughout the State (MWDOC 2019; Swegles 2017).
- 2019 Winter Storms. In January 2019 Southern California experienced intense and heavy rainstorms over the course of a week, bringing with it large amounts of rain to the region and planning area. A nearly 3-mile stretch of Pacific Coast Highway in both directions between Warner Avenue and Seapoint Street in Huntington Beach was closed due to flooding. Seal Beach, Huntington Beach, and Fountain Valley each reported roughly 2 inches of rain in 2 hours. Laguna Beach residents were advised to raise floodgates and place sandbags to divert water flow. Sandbags were made available to all residents at Orange County Fire Authority stations and at most cities' public works yards (Fausto 2019).
- **2021 Winter Storms.** On January 28 and 29, 2021, a powerful winter storm and atmospheric river brought heavy rain. A total of 1.5 inches of rain fell across Santiago Canyon in eastern Orange County. Many areas flooded, including Santiago Canyon where mud and debris flows covered roads and damaged homes (Weather.gov 2024).
- **2023 Winter Storms.** On January 14 and 16, 2023, widespread heavy rainfall came in two waves, with the first occurring the afternoon of January 14 into early January 15, and the second occurring the night of January 15 through 16. Rainfall in the first wave ranged from 1 to 2 inches for the coast, 1 to 2.5 inches in the valleys, 2 to 5 inches in the mountains and up to a half inch of rain in the deserts. The second, colder system again produced widespread moderate to heavy rainfall. There were impressive totals for both waves: 2 to 4 inches at the coast, 2 to 5 inches for the inland valleys and 3 to 8 or more inches for the mountains. A lot of flooding occurred in Orange County, San Diego County, and Riverside County (Weather.gov 2024).

# 3.2.3.3 Location/Geographic Extent

Orange County covers 789 square miles, and its landscape varies from mountainous terrain (in the northeast and southeast) to floodplains (in the central and western section). **Exhibit 3-10** identifies the 100- and 500-year FEMA floodplains within Orange County. A sizable portion of north Orange County, including some of the county's most densely populated areas, is within a 500-year floodplain, which denotes areas with a 1-in-500, or 0.2%, chance of flooding in any given year.

The Santa Ana River, flowing through the heart of Orange County to the Pacific Ocean, is the county's greatest flood threat. Other areas subject to flooding during severe storms include areas adjacent to Atwood Channel, Brea Creek Channel, Fullerton Creek Channel, Carbon Creek Channel, San Juan Creek Channel, and East Garden Grove-Wintersburg Channel. Areas adjacent to Santiago Creek and Collins Channel in the central portion of the county and large portions of the San Diego Creek Watershed in the City of Irvine and unincorporated areas of the county are also subject to inundation. In the southern portion of the county, canyon areas are subject to flooding. The continued development in these areas has made the flood hazard even greater.

According to the 2014 National Climate Assessment Report, as is common in coastal areas, many roads and bridges, high-priced homes, and wastewater systems are located in low-lying areas near

the ocean. Increases in storm water runoff have the potential to overwhelm the capacity of wastewater and drainage systems, flood control channels, and pump stations.

# 3.2.3.4 Magnitude/Severity

Flood severity is often described in terms of a 100-year flood, describing an event that is likely to occur once in a 100-year period. In other words, there is a 1% probability of an event this severe occurring in any given year. Flood Insurance Rate Map (FIRM) panels produced by FEMA identify areas subject to this level of risk as being within the 100-year floodplain. **Exhibit 3-10** shows these locations throughout Orange County, as well as a 500-year floodplain, which indicates a 0.2% annual chance of flooding.

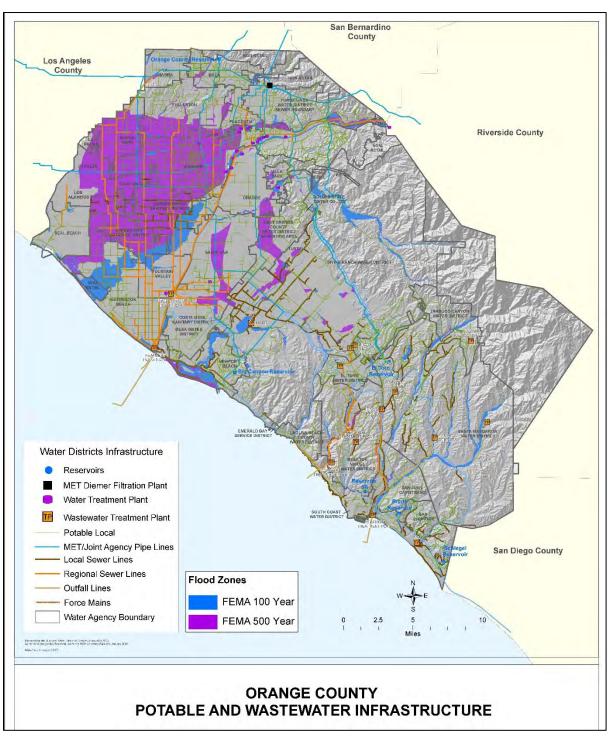
Floods can also be measured in terms of data collected by U.S. Geological Survey through a nationwide system of stream gauges. The primary gauge on the Santa Ana River is in the City of Santa Ana. During the Great Flood of 1938, this gauge measured a water level of 10.2 feet, compared to a normal height of about 1.44 feet. During both of the two most recent flood events in 2010/2011 and 2017, the river reached 7.6 feet.

The greatest flood in terms of water flow occurred in 1862, when the Santa Ana River saw an estimated flow rate of 317,000 cfs. This flood was three times greater than the Great Flood of 1938, which had an estimated flow of 110,000 cfs. Peak discharges measured on the Santa Ana River during declared flood disasters since 1993 have ranged from 8,220 to 31,700 cfs.

On December 22, 2010, during the peak of that winter's floods, a weather station in Silverado Canyon recorded more than 7 inches of rain in a single day, according to NOAA climate data. During other flood events in the last 25 years, the maximum daily rainfall recorded within Orange County has ranged from 2 to 4 inches.

# 3.2.3.5 Probability of Future Occurrences

As mentioned in **Section 3.2.3.4,** FIRM panels depict areas that have a 1% chance of flooding in any given year, identified as a 100-year floodplain, as well as a 0.2% chance, or a 500-year floodplain. Such areas within Orange County are depicted in **Exhibit 3-10.** 





# 3.2.3.6 Climate Change Considerations

Climate change is expected to affect California's precipitation patterns, likely influencing future flood events. A 2017 study found that the number of very intense precipitation days in California is projected to more than double by the end of the century, increasing 117%, making it likely that flood events will become more frequent (Polade et al. 2017). More flood events could increase the

frequency of maintenance and repair activities and require operational changes in the planning area functions. Portions of the infrastructure may require modification and retrofit to better accommodate changes anticipated from climate change. As a result, significant investment in future infrastructure may become necessary.

In contrast to the Atlantic and Gulf coasts, where coastal flooding is mainly associated with major storms, flooding along the Pacific Coast is the result of a number of more subtle factors, including tidal cycles, the El Niño climate pattern, distant wind-generated ocean swells, local storms, and the time of year.

### 3.2.4 Geological Hazards (Expansive Soils, Land Subsidence, Landslide and Mudflow)

### 3.2.4.1 Description (Nature) of the Hazard

### **Expansive Soils**

According to a scientific paper published in the Journal of Geotechnical Engineering (Day 1994), "expansive soil is a worldwide problem that causes extensive damage to civil engineering structures." Expansive soils are particularly problematic in the southwestern United States and especially in Southern California where there are large clay deposits compounded by "alternating periods of rainfall and drought." The problem with constructing on expansive soils is that the clay, often referred to as adobe, expands rapidly during the rainy season and contracts gradually during the dry season causing "shrink-swell." Shrink-swell is particularly problematic for "slab-on-grade" foundations, which can be placed directly on expansive soil that is constantly in a state of movement as the soil expands and contracts causing the foundation to fatigue and crack. Buildings with balloon frame construction are also susceptible to bowing and cracking when built on expansive soils. Shrink and swell can affect water/wastewater facilities particularly buildings or structures built using slab-on-grade or balloon frame construction techniques.

Expansive soil is also known to "creep" on unstable slopes eventually leading to landslides. Typically, this is found when expansive soil underlies compact topsoil. As the expansive soil expands-contracts, the compact topsoil slides or creeps downhill. Facilities built on unstable slopes with underlying expansive soils are prone to movement and can be damaged or destroyed in extreme circumstances.

### Land Subsidence

The United States Geological Survey (USGS) defines land subsidence as a gradual settling or sudden sinking of the ground surface because of subsurface movement of underlying geologic units. Scientists at the USGS have determined that nearly 17,000 square miles in 45 States have been directly affected by land subsidence, caused by aquifer-system compaction, drainage of organic soils, underground mining, hydro-compaction, natural compaction, sinkholes, and thawing permafrost. More than 80% of land subsidence is caused by overuse of groundwater, and the increasing development of land and water resources threatens to worsen existing land subsidence problems (while initiating) new ones (USGS 2024).

Land subsidence in California is mainly caused by groundwater pumping in areas where aquifer recharge is exceeded. Known as "over-drafting," the dewatering of aquifers has led to lower water tables and subsidence, resulting in damage to infrastructure and water quality, and in coastal areas has resulted in the intrusion of seawater. USGS notes "the compaction of unconsolidated aquifer systems that can accompany excessive groundwater pumping is by far the single largest

cause of subsidence" and "the overdraft of such aquifer systems has resulted in permanent subsidence and related ground failures," thus "the extraction of this resource for economic gain constitutes 'groundwater mining' in the truest sense of the term" (USGS 2024). Over-drafting is further exacerbated in hot geographic regions with a large population; this includes much of Southern California.

### Landside/Mudflow

Landslide is a general term for a falling mass of soil or rocks. Mudflow consists of material that is wet enough to flow rapidly and contains at least 50% sand, silt, and clay-sized particles. The primary effects of landslides/mudflows can include:

- Abrupt depression and lateral displacement of hillside surfaces over distances of up to several hundred feet.
- Disruption of surface drainage.
- Blockage of flood control channels and roadways.
- Displacement or destruction of improvements such as roadways, buildings, and water wells.

Landslides are a type of "mass wasting," which denotes any down-slope movement of soil and rock under the direct influence of gravity. The term "landslide" encompasses events such as rock falls, topples, slides, spreads, and flows. Landslides can be initiated by rainfall, earthquakes, volcanic activity, changes in groundwater, disturbance, and change of a slope by man-made construction activities or any combination of these factors. Landslides can occur underwater, causing tidal waves and damage to coastal areas. These landslides are called submarine landslides (USGS 2000).

Failure of a slope occurs when the force that is pulling the slope downward (gravity) exceeds the strength of the earth materials that compose the slope. They can move slowly (millimeters per year) or can move quickly and disastrously, as is the case with debris flows. Debris flows can travel downhill at speeds of up to 200 miles per hour (more commonly, 30 to 50 miles per hour), depending on the slope angle, water content, and type of earth and debris in the flow. These flows are initiated by heavy, usually sustained, periods of rainfall, but sometimes can happen because of short bursts of concentrated rainfall in susceptible areas. Burned areas charred by wildfires are particularly susceptible to debris flows, given certain soil characteristics and slope conditions.

A debris or mud flow is a river of rock, earth, and other materials, including vegetation that is saturated with water. This high percentage of water gives the debris flow a very rapid rate of movement down a slope. This high rate of speed makes debris flows extremely dangerous to people and property in its path. Earthquakes often trigger flows. Debris flows normally occur when a landslide moves down slope as a semi-fluid mass scouring, or partially scouring, soils from the slope along its path. Flows typically move rapidly and also tend to increase in volume as they scour out the channel. Flows often occur during heavy rainfall, can occur on gentle slopes, and can move rapidly for large distances.

Wildland fires on hills covered with chaparral are often a precursor to debris flows in burned out canyons. The extreme heat of a wildfire can create a soil condition in which the earth becomes impervious to water by creating a waxy-like layer just below the ground surface. Since 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 people and approach them at a high rate of speed with little warning.

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.

### 3.2.4.2 History/Past Occurrences

### **Expansive Soils**

In 1980, Krohn and Slosson (1980) made an assessment and cost estimate of the damage caused by expansive soils throughout the United States. They estimated that approximately \$7 billion in property damage was reportedly attributed to construction on expansive soils. While no recent figures have been identified, the increase in construction activity in areas of expansive soil, especially in Southern California, will undoubtedly cause this number to increase. J. David Rogers of the University of Missouri found that "expansive soils are the second leading cause of property damage in the United States."

There are no reported occurrences of expansive soils causing considerable damage within Orange County; although expansive soils are known to exist. Typically, expansive soils would be identified at a local level on a site-by-site or area basis and are addressed as part of the development review process.

### Land Subsidence

The relationship between subsidence and groundwater pumping was not fully recognized until 1928, when O. E. Meinzer, scientist with the United States Forest Service (USFS), realized that aquifers were compressible (Meinzer 1928). By the 1950s, the USGS made a concerted effort to measure the amount of ground subsidence. In 1952, Joseph Poland studied large discrepancies between the U.S. Coast and Geodetic Survey for the Santa Clara and San Joaquin valleys. Poland noted that the increased use of groundwater correlated with the amount of ground subsidence. Poland's work led to the verification of "consolidation theory" or compressible aquifers, as well as leading to the development of "definitions, methods of quantification, and confirmation of the interrelationship among hydraulic-head declines, aquitard (clay) compaction, and land subsidence" (Poland 1975).

Subsidence has historically occurred in Orange County associated with groundwater pumping and from peat decomposition. The areas of historic subsidence associated with groundwater pumping are illustrated in **Exhibit 3-11**. Localized subsidence possibly due to peat decomposition has also been reported in scattered areas inland from the coast between Sunset and Newport Beaches.

### Landside/Mudflow

The following identifies some of the more major landslide occurrences within Orange County. There have been no disaster declarations within Orange County associated with landslides/mudflows.

• **1978 Bluebird Canyon, Orange County.** The cost of recovery was \$52.7 million (in 2000 dollars) with 60 houses destroyed or damaged. Unusually heavy rains in March of 1978 may have contributed to initiation of the landslide. Although the 1978 slide area was approximately 3.5 acres, it is suspected to be a portion of a larger, ancient landslide.

- **1980 Southern California Landslides.** The damage was estimated at \$1.1 billion in year 2000 dollars. Heavy winter rainfall in 1979-1980 caused damage in six Southern California counties. In 1980, the rainstorm started on February 8 with five days of continuous rain and 7 inches of precipitation. Slope failures were beginning to develop by February 15, and then very high-intensity rainfall occurred on February 16. As much as 8 inches of rain fell in a 6-hour period in many locations. Records and personal observations in the field on February 16 and 17 showed that the mountains and slopes literally fell apart on those two days.
- **1983 San Clemente, Orange County.** The damage to California Highway 1 was estimated at \$65 million in year 2000 dollars. Litigation at that time involved approximately \$43.7 million (in 2000 dollars).
- **1994 Northridge, California Earthquake Landslides.** As a result of the magnitude 6.7 Northridge, California, earthquake, more than 11,000 landslides occurred over an area of 10,000 square kilometers. Most were in the Santa Susana Mountains and in mountains north of the Santa Clara River Valley. They destroyed dozens of homes, blocked roads, and damaged oil-field infrastructure. It caused deaths from Coccidioidomycosis (valley fever) due to spores released from soil by the landslide activity and blown toward the populated coastal areas.
- **1995** Los Angeles and Ventura Counties, Southern California. Above normal rainfall triggered damaging debris flows, deep-seated landslides, and flooding. Several deep-seated landslides were triggered by the March storms, the most notable was the La Conchita landslide, which in combination with a local debris flow, destroyed or badly damaged 11 to 12 homes in the small town of La Conchita, about 20 kilometers west of Ventura. There also was widespread debris flow and flood damage to homes, commercial buildings, and roads and highways in areas along the Malibu coast that had been devastated by wildfire 2 years before.
- **1998 Laguna Niguel and Orange County Landslide.** During the 1997/1998 El Niño season, heavy rainfall increased movement on the site of an ancient landslide in Laguna Niguel. The storms in December 1997 had accelerated the landslides' movement and in early 1998, a crumbling hillside forced the evacuation of 10 hilltop homes and more than 10 condominium units resting below. Ultimately four of the hilltop homes collapsed, falling down the hillside into the void created by the slide area. The condominium complex has since been demolished and the site remains open space.
- **2005 Blue Bird Canyon, Laguna Beach, Orange County Landslide.** On June 1, 2005, Bluebird Canyon in Laguna Beach experienced a landslide. Exceptionally heavy rainfall during the winter period was the underlying cause of the instability in an ancient landslide. A 30-acre piece of hillside between 50 to 60 feet deep broke free and fell on the homes below; 15 homes were destroyed, and 32 others had varying levels of damage. The approximate cost of damage was about \$35 million.
- 2005 SCWD Landslide Impact to the Joint Regional Transmission Line. Following a year of heavy rainfall, a slope failure occurred in Laguna Niguel in an area that included a section of the Joint Regional Transmission Pipeline. The pipeline had to be shut down and a temporary pipeline was routed around the slide area while evaluations of the stability of the area were made. Ultimately, the pipeline will be rerouted around the unstable area or located back in the slope after it has stabilized. Because the problem occurred in the winter/spring period and there are other pipelines into South Orange County, no water shortages were experienced.

- 2018 Cannon Cliff, Dana Point, Orange County Rockslide. Approximately 18 tons of rocks, including a two-ton boulder dropped from the cliff area under Cannons Restaurant and struck a public restroom across from Baby Beach at the north end of Dana Point Harbor. The rocks are part of a 4-to-5-million-year-old rock formation called the Capistrano Formation.
- **2021 Silverado Canyon, Orange County Mudflow.** A powerful storm contained a heavy burst of rain in eastern Orange County that struck the Bond Fire burn scar in Silverado Canyon. In 15 minutes, 0.20 inch of rain fell. A debris flow went over roads and into homes, damaging six homes and eight vehicles in Silverado. The flow also closed a stretch of Silverado Canyon Road.

Rain-induced landslides were reported in Santa Margarita in 1980, 1993, 1995, and 2005. In 1980 rains washed out an access road in Coto de Caza uncovering an 8-inch water line. The same series of storms also exposed a 21-inch trunk sewer line along the Oso Creek in Mission Viejo resulting in damages of \$300,000. In 1993, bank failures caused many pipelines to break that had to be replaced, relocated, or re-protected at a cost of nearly \$2.1 million. A slope failure in 1995 caused pipeline failures costing nearly \$30,000, and in 2005 a reservoir slope failure in Talega Valley cost \$350,000. Landslides, resulting in erosion along Aliso Creek, affected the SOCWA's Aliso Creek Effluent Transmission Main (a 36-inch pipeline carrying treated wastewater).

# 3.2.4.3 Location/Geographic Extent

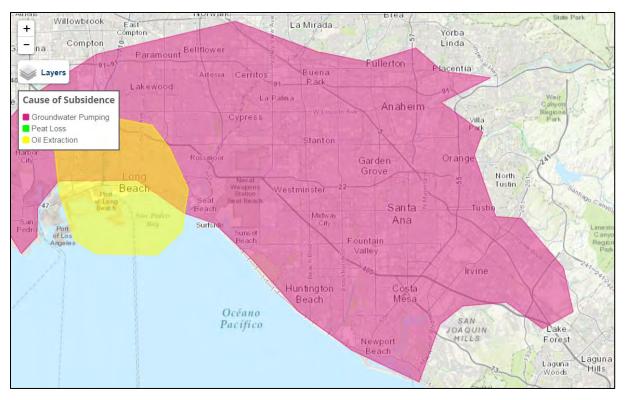
### **Expansive Soils**

According to the County of Orange General Plan Safety Element (Orange County, 2015), much of Orange County is covered by soil that may cause cracking in concrete foundations. The most prevalent problems occur from clay or "expansive" soils that contract and expand. Problems attributed to expansive soils are usually related to improperly designed or constructed foundations. Due to the diversity of soil conditions, structures are not completely safe from cracking, slipping, or sinking to some degree. Expansive soils are typically mitigated through structural and design regulations as well as through soil treatment techniques. The California Building Code specifically addresses expansive soils in Sections 1804.4, 1806.5, and 1815. The California Health and Safety Code Section 17954 states, "If the preliminary soil report indicates the presence of critically expansive soils or other soil problems which, if not corrected, would lead to structural defects, such ordinance shall require a soil investigation of each lot in the subdivision" and "The soil investigation shall be prepared by a civil engineer who is registered in this state." Expansive soils can impact the entire planning area.

### Land Subsidence

Currently, land subsidence affects much of the west coast. The area most affected by land subsidence in Orange County is between Newport Beach and Huntington Beach and 5 miles inland from this point. Referred to as Talbert Gap, this area formed a millennia ago from alluvial deposition from the Santa Ana River.

According to the USGS online map viewer, areas starting from Newport Beach up to Seal Beach, and out east to Placentia, experience subsidence impacts due to groundwater pumping. **Exhibit 3-11** shows the areas impacted by subsidence.



### Exhibit 3-11. Subsidence

#### Landside/Mudflow

**Exhibit 3-12** illustrates the portions of the planning area susceptible to landslides based upon topography, surface and subsurface geology, borehole data, historical groundwater levels, existing landslide features, slope gradient, rock-strength measurements, geologic structure, and probabilistic earthquake shaking estimates. These areas are primarily comprised of the southern coastal communities and the communities containing steeper topography or located adjacent to mountain areas.

The extent of landslides/mudflows varies throughout Orange County depending on the location and contributing conditions, such as an earthquake, heavy rain, or recent fires. Earthquake-induced landslides are relatively shallow falls and slides, in which highly disrupted masses of rock and soil travel down slopes at high speed. The Northridge Earthquake, in Los Angeles County, triggered more than 11,000 landslides in an area of 6,200 square miles. Most slides were shallow, brittle failures of surficial rock and soil.

Deep-seated landslides are triggered by cumulative rainfall during long periods (weeks to years). Resulting landslides are relatively deep earth flows and translational or rotational earth slides and rock slides. Translational landslides are typically a few meters to tens of meters deep, and rotational slides range in depth from several meters to tens of meters. Deep-seated translational and rotational landslides, including rock slides, tend to fail a little at a time and move more slowly than debris flows, but a few do accelerate to rapid movement. A previous landslide within Orange County due to oversaturated soils resulted in a 40-foot landslide below a 5-million-gallon water tank. Other landslides in the county have measured approximately 3.5 acres and 25 acres.





Similarly, short-duration, intense rainfall, and generally greater than 0.5 inch per hour precipitation has the potential to trigger post-fire debris flows. These flows can extend several miles. Documented debris flows from burned areas in Southern California and the western United States have ranged in volume from as small as 600 cubic meters to as much as about 300,000 cubic

meters. This larger volume is enough material to cover a football field with mud, rocks, and debris to about 65 meters deep.

### 3.2.4.4 Magnitude/Severity

#### **Expansive Soils**

Damages to property due to erosion and deposition are usually classified as cosmetic, functional, or structural. Cosmetic damage refers to slight problems where only the physical appearance of a structure is affected (e.g., cracking in plaster or drywall). Functional damages refer to situations where the use of a structure has been impacted due to subsidence. Structural damages include situations where entire foundations require replacement due to subsidence-caused cracking of supporting walls and footings.

Buildings and infrastructure across Orange County are vulnerable to the impacts of soil expansion, instability, and erosion-related hazards. Cities in Southern California have established guidelines for construction in areas of expansive soils. The MAs generally conduct soil surveys prior to construction of water and wastewater facilities and take the specific circumstances into consideration during design and construction. The magnitude and severity of expansive soils are similar throughout the planning area.

#### Land Subsidence

The Talbert Gap, as described above, has sustained nearly a century of underground water aquifer pumping, which was used to sustain intensive grazing and agriculture practices. By 1956 the water table had lowered to below sea level allowing saltwater from the Pacific Ocean to intrude through the Talbert Gap. Because of studies identifying subsidence and saltwater intrusion in Orange County, OCWD began a massive management program to minimize the loss of aquifer-stored water and reduce saltwater intrusion. Although subsidence is a concern within Orange County, programs have been implemented to address subsidence could continue to be impacted if it is not monitored and addressed.

#### Landside/Mudflow

Factors included in assessing landslide magnitude/severity include population and property distribution in the hazard area, the frequency of landslide or debris flow occurrences, slope steepness, soil characteristics, and precipitation intensity. The California Geological Survey landslide maps prepared as part of the Seismic Hazard Program (refer to **Exhibit 3-12**) indicate the extent of landslide susceptibility within Orange County, which includes the southernmost coastal areas and eastern areas of the county. These areas would also be more likely to experience mudflows due to the topography of the areas.

### 3.2.4.5 Probability of Future Occurrences

#### **Expansive Soils**

Expansive soils will continue to occur throughout the planning area. Potential impacts associated with these hazards will need to be addressed through site design and development review, including preparation and adherence to geotechnical constraints recommendations.

## Land Subsidence

In areas that have experienced decreased precipitation in the summer months and reduced surface water supplies, communities are often forced to pump more groundwater to meet their needs. Orange County has historically experienced long-term droughts, especially in recent years. Although specific areas of excessive pumping, such as Talbert Gap, have been addressed, there is still a high probability that communities within the planning area will continue to experience impacts of these events.

It is important that these communities consider future mitigation actions that will address this hazard, particularly in newly developing areas near water. In areas where groundwater pumping has caused subsidence, switching to surface water supplies can be instrumental. Changing climate norms are expected to affect soil resources and especially during hot, dry years annual grasses that stabilize and protect topsoil often fail to germinate or do not grow well. This leaves soil surfaces highly vulnerable to erosion from wind and precipitation and can further exacerbate the consequences of soil expansion and subsidence.

### Landside/Mudflow

A study conducted by Nature Geoscience in 2015 indicated that the projected upsurge of El Niño and La Niña events will increase the likelihood that coastal communities will experience erosion and flooding (Barnard, 2015). This is separate from sea level rise, which has also been identified as a cause of future hazard vulnerabilities. In addition to erosion and flooding, the onset of El Niño and La Niña events will also increase the magnitude and severity of mudflow events. The more recent wildfires also contribute to the probability of mudflows in the event of more intense rainfall over a short duration. Earthquakes of magnitude 4.0 and greater have been known to trigger landslides. The potential for an earthquake to induce a landslide is highly dependent on the location of the earthquake and magnitude in relation to a landslide area. Based on previous landslide and mudflow incidents, along with studies predicting future occurrences, it is reasonable to state that these hazards will continue to impact the jurisdictions identified within the landslide susceptibility areas of Orange County. According to the Planning Team ranking, landslides and mudflows are somewhat likely—having between a 1% and 10% probability in next year or a recurrence interval of 11 to 100 years.

# 3.2.4.6 Climate Change Considerations

### **Expansive Soils**

It is possible that expansive soils may be affected by climate change, as climate change is expected to bring about more frequent drought conditions and contribute to more intense storms, like El Niño. These extreme conditions could further increase the effects of expansive soils on structures since there could be a change in the physical expansion and contraction of soils in affected areas, potentially increasing damage to structures and infrastructure.

### Land Subsidence

As temperatures increase so too will the demand for water usage. The potential that precipitation events could decrease in frequency, while experiencing a potential increase in intensity, could result in less water being recharged into the aquifer/basin. If lower water levels occur within the groundwater aquifer the potential for land subsidence could increase within the affected parts of Orange County.

## Landside/Mudflow

Due to the wide variety of factors that can lead to landslides and mudflows, it is possible that climate change could indirectly affect the conditions for landslides and mudflows. Increased frequency and more intense storms may cause more moisture-induced landslides. Warmer temperatures and more frequent drought conditions may lead to more fires, destabilizing soil on slopes, and making future landslide and mudflow events more likely.

# 3.2.5 Human-Caused Hazards (Contamination/Saltwater Intrusion, Hazardous Materials, Power Outage, Terrorism [Cyber Threat], Terrorism [Mass Casualty Incident])

### 3.2.5.1 Description (Nature) of the Hazard

Human-caused hazards are distinct from natural hazards in that they result directly from the actions of people. Two types of human-caused hazards include: non-malicious and malicious. Non-malicious hazards refer to incidents that can arise from human activities such as the manufacturing, storage, transport, and use of hazardous materials, which include toxic chemicals, radioactive materials, and infectious substances. Non-malicious hazards are assumed to be accidental and their consequences unintended. Malicious, on the other hand, encompasses intentional and criminal acts involving weapons of mass destruction or conventional weapons. WMD can involve the deployment of biological, chemical, nuclear, and radiological weapons with the result of affecting a significant percentage of the population either directly or indirectly. Conventional weapons and techniques include the use of arson, incendiary explosives, armed attacks, intentional hazardous materials release, and cyber terrorism (attack via computer). Typically, conventional weapons have a very specific target and are limited in scope and effect.

### Groundwater Contamination

Groundwater contamination occurs when pollutants are released to the ground, navigate through the soil, and ultimately end up in the groundwater. Human activity is almost always the underlying cause of groundwater contamination. In areas where population density is high and human use of land is intensive, groundwater is especially vulnerable. Virtually any activity whereby chemicals or wastes may be released to the environment, either intentionally or accidentally, has the potential to pollute groundwater.

### Saltwater Intrusion

When fresh water is withdrawn from aquifers at a faster rate than it is replenished, a draw-down of the water table occurs with a resulting decrease in the overall hydrostatic pressure. When this happens near a coastal ocean area, saltwater from the ocean can intrude into the freshwater aquifer. The result is that freshwater supplies become contaminated with saltwater.

### Hazardous Materials

Hazardous materials can include toxic chemicals, radioactive materials, infectious substances, and hazardous wastes. The State of California defines a hazardous material as a substance that is toxic, ignitable, or flammable or reactive and/or corrosive. An extremely hazardous material is defined as a substance that shows high acute or chronic toxicity, carcinogenicity, bio-accumulative properties, persistence in the environment, or is water reactive (California Code of Regulations, Title 22). "Hazardous waste," a subset of hazardous materials, is material that is to be abandoned, discarded, or recycled and includes chemical, radioactive, and bio-hazardous waste (including medical waste). An accidental hazardous material release can occur wherever

hazardous materials are manufactured, stored, transported, or used. Such releases can affect nearby populations and contaminate critical or sensitive environmental areas. With respect to water or wastewater systems, concerns arise regarding exposure to these materials via contact or ingestion of drinking water and or discharge of contaminated water into the ocean where exposure to the marine environment and public would be of concern.

Non-malicious hazards can occur because of human carelessness, technological failure, and natural hazards. When caused by natural hazards, these incidents are known as secondary hazards, whereas intentional acts are terrorism. Hazardous materials releases, depending on the substance involved and type of release, can directly cause injuries and death and contaminate air, water, and soils. While the probability of a major release at any facility or at any point along a known transportation corridor is relatively low, the consequences of releases of these materials can be very serious.

The most common sources of contamination to water supply systems are naturally occurring chemicals and minerals (i.e., arsenic, radon, and uranium), local land use practices (i.e., fertilizers and pesticides), manufacturing processes, sewer overflows, and malfunctioning wastewater treatment systems (i.e., nearby septic systems). Although these contaminants present an environmental and human health risk concern, the EPA holds regulations in place to ensure water supply systems do not contain elevated levels of contaminants.

Some hazardous materials also present a radiation risk. Radiation is any form of energy propagated as rays, waves, or energetic particles that travel through the air or a material medium. Radioactive materials (e.g., uranium, plutonium, radium, and thorium) are composed of unstable atoms. An unstable atom gives off its excess energy until it becomes stable. The energy emitted is radiation. The process by which an atom changes from an unstable state to a more stable state by emitting radiation is called radioactive decay or radioactivity.

Radiological materials have many uses including:

- Use by doctors to detect and treat serious diseases,
- Use by educational institutions and companies for research,
- Use by the military to power large ships and submarines, and
- Use as a critical base material to help produce the commercial electrical power that is generated by a nuclear power plant.

Radioactive materials, if handled improperly, or radiation accidentally released into the environment can be dangerous because of the harmful effects of certain types of radiation on the human body and the human environment. The longer a person is exposed to radiation and the closer the person is to the radiation source, the greater the risk. Although radiation cannot be detected by the senses, scientists can easily detect it with sophisticated instruments that can detect even the smallest levels of radiation. Under extreme circumstances, an accident or intentional explosion involving radiological materials can cause very serious problems. Consequences may include death, severe health risks to the public, damage to the environment, and extraordinary loss of, or damage to, property.

### Power Outage

A power outage typically occurs during a natural hazard such as extreme weather conditions, earthquakes, flood, fire, or severe winds. An outage can 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. An outage may occur as a secondary effect of another hazard, or as the result of construction, an accident, or terrorism. Severe winds and flood can bring down trees and tree limbs onto power lines. And these types of events can cause serious safety hazards to the public and emergency responders.

### Terrorism (Cyber Threat)

Cyber threats are when an individual or a group threatens or attempts to disrupt the operations and functioning of computer systems belonging to private citizens, religious groups, educational institutions, government agencies, or businesses. These threats include online harassment, hacking, or in-person tampering with electronic equipment. Successful cyber threats can lead to service disruptions, infrastructure damage, and theft and may cause injury or death in severe instances. All of Orange County's water utilities Supervisory Control and Data Acquisition (SCADA) systems, which operate over telecommunication lines and/or radio systems. These systems are vulnerable to hacking and leave utilities open to malicious acts.

### Terrorism (Mass Casualty Incident)

Following several serious international and domestic terrorist incidents since the early 2000s, citizens across the United States have paid increased attention to the potential for deliberate, harmful terrorist actions by individuals or groups with political, social, cultural, and religious motives. There is no single, universally accepted definition of terrorism, and it can be interpreted in a variety of ways. However, terrorism is defined in the CFR as "the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives" (28 CFR § 0.85). The Federal Bureau of Investigation further characterizes terrorism as either domestic or international, depending on the origin, base, and objectives of the terrorist organization. However, the origin of the terrorist or person causing the hazard is far less relevant to mitigation planning than the hazard itself and its consequences. Terrorists can utilize a wide variety of agents and delivery systems.

Water supplies and infrastructure, such as dams, in Orange County are considered as potential terrorist targets. The weapon most likely used could include explosives with the goal of collapsing the dam. Such an event would result in a dam failure and an inundation event with little or no warning. The potential of using other types of weapons such as chemical or biological are considered low due to the large amount of material that would be required to contaminate the water system. This scenario would only apply to those dams where the reservoirs are used for drinking water.

A mass casualty incident describes an incident within the United States where emergency medical services resources, such as personnel and equipment, are overwhelmed by the number and severity of casualties. The more commonly recognized events of this type include building collapses, train and bus collisions, plane crashes, earthquakes, and other large-scale emergencies. The most common types are generally caused by terrorism, mass transportation accidents, or natural disasters. Events such as the Oklahoma City bombing in 1995, the September 11 attacks in 2001, and the 2017 Las Vegas Shooting are well-publicized examples of mass casualty incidents.

# 3.2.5.2 History/Past Occurrences

### Groundwater Contamination

Over the last several decades, Orange County's North Basin has experienced industrial solvent spills and leaks from manufacturing, metals processing businesses, and dry-cleaning facilities. As a result, a contamination plume several miles long and over a mile wide currently exists under the cities of Fullerton, Anaheim, and Placentia. The Orange County Groundwater Basin is a source of drinking water for the region, providing most of the water used in 22 cities. The contamination plume has already taken five wells off line, including three of Fullerton's 12 total wells. Those wells draw water from shallower sources closer to the surface and consequently are closer to the pollution. According to the EPA, they have completed the "first phase of the Comprehensive (site-wide) RI/FS, which involved the installation of additional monitoring wells to further characterize the entire site. This report is expected to be completed in December of 2024" (EPA Superfund n.d.).

### Saltwater Intrusion

In Orange County, by 1956, years of heavy pumping to sustain the region's agricultural economy had lowered the water table by 15 feet below sea level and saltwater from the Pacific Ocean had encroached as far as 5 miles inland. The area of intrusion is primarily across a 4-mile front between the cities of Newport Beach and Huntington Beach known as the Talbert Gap. The mouth of an alluvial fan formed millions of years ago by the Santa Ana River, the Talbert Gap has since been buried along the coast by several hundred feet of clay. In 1976, the Water Factory 21 Direct Injection Project, operated by OCWD, began injecting highly treated recycled water into the aquifer to prevent saltwater intrusion, while augmenting the potable groundwater supply. This system was shut down to make way for the Groundwater Replenishment System (GWRS) Project, which began operation in 2008. The GWRS provides highly treated water for injection into the seawater barrier system to prevent seawater intrusion into the Orange County Groundwater Basin. As of September 17, 2024, more than 444 billion gallons of water have been successfully treated and injected into the seawater barrier system.

### Hazardous Materials

Numerous facilities in Orange County generate hazardous waste in addition to storing and using large numbers of hazardous materials. Although the scale is usually small, emergencies involving the release of these substances can occur daily at both fixed sites and on Orange County's streets and roadways. Facilities that use, manufacture, or store hazardous materials in California must comply with several Federal and State regulations. The Superfund Amendments and Reauthorization Act (SARA Title III), which was enacted in 1986 as a legislative response to airborne releases of methyl isocyanides at Union Carbide plants in Bhopal, India, and in Institute, West Virginia. SARA Title III, also known as the Emergency Planning and Community-Right-To-Know Act (EPCRA), directs businesses that handle, store, or manufacture hazardous materials in specified amounts to develop ERPs and report releases of toxic chemicals. Additionally, Section 312 of Title III requires businesses to submit an annual inventory of hazardous materials to a State-administering utility. The California legislature passed Assembly Bill 2185 in 1987, incorporating the provisions of SARA Title III into a State program. The EPCRA requirements keep communities abreast of the presence and release of hazardous wastes at individual facilities.

Additional information about the chemicals handled by manufacturing or processing facilities is contained in the EPA's Toxic Release Inventory (TRI) database. The TRI is a publicly available EPA

database that contains information on toxic chemical emissions and waste management activities reported by certain industry groups as well as Federal facilities. This inventory was established under EPCRA and expanded by the Pollution Prevention Act of 1990. Facilities that exceed threshold emissions levels must report TRI information to the EPA, which is the Federal enforcement agency for SARA Title III.

Over the past several decades, industrial activities have contaminated Orange County's North Basin, which provides much of the water used in 22 Orange County cities, including parts of Fullerton, Anaheim, and Placentia. Over 5 square miles of contaminants, mostly volatile organic compounds (VOCs), have migrated through the soils and are now leaching into the underlying groundwater. These VOCs have impacted nearby water supply wells causing four of them to be taken out of service. The OCWD, under EPA oversight, is currently conducting an interim remedial investigation and feasibility study to determine the extent of groundwater contamination. The report is expected in December 2024 (EPA Superfund n.d.).

Chemical air emissions, surface water discharges, underground injections, and releases to land are considered chemical releases. The release of a biological agent capable of causing illness in people is considered an infectious release. The only known release of radiological agents into the air in Orange County was the result of an accident at San Onofre Nuclear Generating Station (SONGS). In 1981, an accidental "ignition" of hydrogen gases in a holding tank of the SONGS caused an explosion which bent the bolts of an inspection hatch on the tank, allowing radioactive gases in the tank to escape into a radioactive waste room. From there, the radioactive material was released into the atmosphere. The plant was shut down for several weeks following the event (MWDOC, 2019). This incident occurred during operation of the plant's Unit 1 generator, which has since been decommissioned. No serious injuries occurred.

On February 3, 2001, another accident occurred at SONGS when a circuit breaker fault caused a fire that resulted in a loss of offsite power. Published reports suggest that rolling blackouts during the same week in California were partially due to the shutdown of the SONGS reactors in response to the 3-hour fire. Although no radiation was released, and no nuclear safety issues were involved, the Federal Nuclear Regulatory Commission sent a Special Inspection Team to the plant to investigate the accident.

In June 2013, SONGS permanently closed after faulty replacement steam generators were installed at the nuclear facility. SONGS is currently undergoing the process to decontaminate and dismantle the nuclear facility. As of August 2017, a court settlement requires the operators of SONGS, Southern California Edison (SCE), to relocate the 3.55 million pounds of nuclear waste to another facility. One of the possible sites is the Palo Verde Nuclear Generating Station in Arizona, located approximately 330 miles away. Transportation of nuclear waste poses a concern of environmental and human health risk if radiation is released into the environment.

### Power Outage

Orange County has experienced many power outages in the past. There have been small to moderate incidents and several extreme incidents that have lasted hours in certain areas. Power outages are most commonly seen in Southern California when Santa Ana wind conditions occur.

One of the most severe events occurred in September 2011 and is referred to as the 2011 Southwest Blackout. This event affected southern Orange County, the San Diego-Tijuana area, Imperial Valley, Mexicali Valley, Coachella Valley, and parts of Arizona. The incident is known to have been an 11-minute system disturbance which led to cascading outages and 2.7 million customers left without power, some for up to 12 hours. The hardest hit areas of San Diego-Tijuana, experienced street gridlock due to loss of traffic signals, school and businesses closing, flights and public transportation delays, and water and sewage pumping station power loss.

In 2013, a blackout resulted in approximately 123,000 homes and businesses losing power for several hours. Faulty circuits affected people in a number of Orange County communities including Mission Viejo, Laguna Niguel, Ladera Ranch, Coto de Caza, Ortega, San Clemente, Talega, San Juan Capistrano, Dana Point, and Capistrano Beach.

# Terrorism (Cyber Threat)

**Exhibit 3-13** displays a list of water and wastewater utilities, jurisdictions, and local agencies located in Southern California that were victims of cyber threat events since 2019.

Date of Event	Target Organization	Description of Event				
3/11/2019	OC San	OC San was the victim of a phishing data breach. More than 1,000 employee records were accessed as part of the breach through the OC San deferred compensation plan.				
10/14/2019	Cucamonga Valley Water District	Cucamonga Valley Water District disclosed a data breach that occurred between August 26, 2019, and October 14, 2019. The breach occurred on a server that is used to accept one-time credit card payments from customers.				
12/24/2019	City of Seal Beach	City of Seal Beach was the victim of a ransomware attack that affected city computer systems. The attack was targeted at the city's information technology service provider, which allowed the hackers to encrypt city computers with the malware, primarily impacting city email and voicemail functions.				
4/23/2023	San Bernardino County Sheriff's Department	The San Bernardino County Sheriff's Department was hit with a cyberattack when a hyperlink loaded with malicious malware was clicked, which resulted in the sudden encryption of many of the department's systems and subsequent ransom demand to restore functionality. San Bernardino County paid a \$1.1 million ransom to the hacker, approximately half of which was covered by insurance as Orange County had anticipated the possibility of such an attack.				
8/3/2023	California's Prospect Medical Holdings	A California-based company's medical facility services throughout the United States were disrupted by cyber threat event. Seven hospitals in Orange and Los Angeles counties including two behavioral health facilities and a 130-bed acute care hospital in Los Angeles were effected.				
11/20/2023	Orange County District Attorney's Office	The Orange County District Attorney's Office was targeted by a cyberattack, prompting a shutdown of its information technology system. The District Attorney's Office immediately coordinated with partner agencies, including all law enforcement entities in Orange County, including the Orange County Sheriff's Department. It was unclear exactly what type of information may have been accessed by hackers.				

# Exhibit 3-13. Southern California Cyber Threat Events

**Exhibit 3-14** displays a list of water and wastewater utilities throughout the United States that were victims of a cyber threat event since 2019.

Water District     Sanitation District are the victims of a ransomwar       occurred on February 11, 2019.	rt Colline			
occurred on February 11, 2019.	Description of Event Fort Collins Loveland Water District and South Fort Collins			
	Sanitation District are the victims of a ransomware attack that			
2/27/2010 Doot Pool/ Durol Mator Kanaga Masta Mator System (MM/C) was backed	occurred on February 11, 2019.			
	-			
District employee able to use credentials to remotely tar				
facility processes and threaten safety of drinking				
	Texarkana Water Utility was the victim of a ransomware attack.			
8/2/2020 Water facility in the city Hackers broke into the computer system of a faci	•			
of Oldsmar water for the City of Oldsmar, Florida. They tried t	o increase the			
concentration of sodium hydroxide (NaOH).				
1/3/2021         Nevada Water and         Nevada-based WWS was a victim of an unknown	ransomware			
Wastewater System         variant that infected its SCADA system.				
4/30/2021 Mount Desert Sewage A sewage treatment plant in rural Maine suffered				
Treatment Plant ransomware attack shutting down the control cor				
5/24/2021 WSSC Water WSSC Water, which provides water to 2 million cu was hit with a ransomware attack on its non-esse				
business systems.	IIIIal			
1/7/2021Maine Water andMaine-based WWS was targeted with ZuCaNo rar	somware on			
Wastewater System its SCADA computer.				
1/8/2021 California Water and California-based WWS was hit with a Ghost variat	nt			
Wastewater System ransomware attack.				
8/4/2021 Limestone Sewage A sewage treatment plant in rural Maine suffered	а			
Treatment Plant ransomware attack that shut down its control cor				
7/15/2022 Narragansett Bay The Narragansett Bay Commission, a Rhode Islan				
Commission system operator, was hit with a ransomware attac				
7/26/2023 Johnstown Regional Federal and local law enforcement agencies investigation of the second	stigated an			
Sewage alleged phishing scam perpetrated against Johnst	town Regional			
Sewage.				
11/1/2023 St. Johns River Water St. Johns River Water Management District, a regu				
Management District in Florida that oversees the long-term supply of d	-			
confirmed that it responded to a cyberattack afte	-			
Av3ngers said it attacked the organization, provid	ing samples			
of what it stole.				
11/25/2023 Municipal Water The Municipal Water Authority of Aliquippa report	-			
Authority of Aliquippa hacked by the Cyber Av3ngers Iranian-backed cyb				
11/28/2023North Texas MunicipalThe North Texas Municipal Water District (NTMWIWater Districtsecurity incident that caused operational issues.				
ransomware gang said it was behind the attack, a				
NTMWD to its list of victims and claiming to have	-			
than 33,000 files containing customer information				
1/19/2024 Veolia North America Veolia North America, a subsidiary of transnation				
conglomerate Veolia, disclosed a ransomware at				
impacted systems in its Municipal Water Division				
disrupted its bill payment systems.				
2/29/2024 Chelan County Public The Chelan County Public Utility District was imp	acted by a			
Utility District cyber security event that kept a nationwide vendo	-			
mailing and emailing statements.				
3/1/2024 Muscatine Power and Muscatine Power and Water warned the public of	а			
Water ransomware attack discovered on January 26.				

Exhibit 3-14. U.S. Water and Wastewater Utilities Cyber Threat Events

Date of Event	Target Organization	Description of Event		
3/15/2024	Encina Wastewater	EWA was hit by the BlackByte ransomware group.		
	Authority (EWA)			

### Terrorism (Mass Casualty Incident)

While Orange County has not experienced any high-profile attacks by groups or individuals associated with international terrorist organizations, Orange County has several groups for advisory notification, investigation, and analysis of terrorist events and activities. These groups include:

- Orange County Joint Terrorism Task Force (OCJTTF). The OCJTTF was formed by the Orange County Sheriff's Department, FBI, and other local police agencies. The OCJTTF is one of 66 joint terrorism task force groups across the United States and the third largest in the Nation. Team members are tasked with collecting, analyzing, and sharing critical information and intelligence involving matters related to any terrorism investigation occurring in or affecting the Orange County area.
- Orange County Private Sector Terrorism Response Group (PSTRG). The PSTRG was formed in December 2001 to create a private sector partnership with the Terrorism Early Warning Group to effectively address private sector safety, incident management, employee education, and public health consequences of potential attacks on the critical infrastructure within Orange County. Two large groups involved with PSTRG are the Orange County Business Council, of which 80% of the major businesses in Orange County are members, and TechNet, a consortium of 28 high-tech firms. The objectives of the PSTRG include physical resource sharing, information exchange, virtual reach-back capabilities, and subject/industry matter experts cross-utilization. The PSTRG is an instrument that allows the Sheriff's Department to maximize all resources and prepare community members for the potential of terrorism and recovery in its aftermath.
- Orange County Intelligence Assessment Center (OCIAC). The OCIAC was built on the foundation established by the Orange County Sheriff Department's Terrorism Early Warning Group (TEWG) from 2001 to 2007 and is an Operational Area asset governed by the Orange County Chiefs and Sheriff's Association (OCCSA). The OCIAC is a proactive multi-agency, multi-discipline collaborative that provides comprehensive analysis, intelligence, timely information sharing, and infrastructure protection. Within the OCIAC, the Critical Infrastructure Protection Unit uses a multi-disciplinary team comprised of law enforcement, fire, medical, and private sector experts to conduct vulnerability assessments and provide relevant security updates and training resources to our public and private sector partners in a combined effort to protect Orange County's assets against terrorist attack, criminal activity, and natural disasters.
- Law Enforcement Mutual Aid. Orange County law enforcement has long recognized the need for a standardized, uniform, organized response on the part of public safety providers involved in major multi-discipline and multi-jurisdictional incidents. The collaborative efforts of Orange County law enforcement leaders over the past six decades have forged a collective voice in mutual assistance and mutual aid. All major components tasked with public safety (law, fire, health, emergency management) are actively involved in developing emergency plans and insuring emergency preparedness.

### 3.2.5.3 Location/Geographic Extent

#### Groundwater Contamination

Groundwater contamination may occur county-wide by means of intentional or accidental spillage to groundwater.

#### Saltwater Intrusion

Conversely, the coastal area of the Orange County Groundwater Basin is vulnerable to seawater intrusion due to geologic features and increased pumping from inland municipal wells to meet consumer demands. The susceptible locations in the basin are the Talbert, Bolsa, Sunset, and Alamitos Gaps.

### Hazardous Materials

Human-caused hazards may affect a specific location or multiple locations, each of which may be a disaster scene, a hazardous scene, and/or a crime scene simultaneously. Accidental hazardous materials release can occur wherever hazardous materials are manufactured, stored, transported, or used. In Orange County, a hazardous material event is most likely to occur within Orange County's industrial areas.

### Power Outage

A power outage can cause impacts at the local level and potentially the regional level. As seen from previous occurrences, a severe outage can easily impact several counties at a time. All jurisdictions within the planning area have the potential to be impacted should an event occur; either directly or indirectly. Highly developed communities may see more outage occurrences if a heat wave should occur, due to the number of cooling systems running at once. Water and wastewater facilities with backup generators or alternate power sources are less likely to experience severe losses or disruption.

### Terrorism (Cyber Threat)

Since computers are so ubiquitous, a cyber threat could appear in virtually any part of Orange County. In extreme circumstances, a threat could impact the entire county. Cyber threats vary in their length and severity of impact. A minor threat could cause computer systems to slow down for a few minutes and not behave as responsively. On the other hand, a major cyber threat could cause a complete shutdown of critical systems, including those used by banks, healthcare institutions, universities, major businesses, and city governments.

### Terrorism (Mass Casualty Incident)

One of the special considerations in dealing with the terrorist threat is that it is difficult to predict. The Department of Homeland Security's National Planning Scenario identifies the possible terrorist strike locations it views as most plausible. Places at risk include cities that have economic and symbolic value, places with hazardous facilities, and areas where large groups of people congregate, such as an office building, sports arena, or amusement park. As such, Anaheim (Disneyland, Angels Stadium, Honda Center), Buena Park (Knott's Berry Farm), and San Clemente (SONGS) are viewed as potential targets.

# 3.2.5.4 Magnitude/Severity

## Groundwater Contamination

The 1974 Safe Drinking Water Act requires the EPA to set standards for contaminants in drinking water that may pose health risks to humans. The EPA standard for lifetime exposures in drinking water, the maximum contaminant level (MCL), is the highest amount of a contaminant allowed in drinking water supplied by municipal water systems (EPA Drinking Water n.d.). In Orange County more than 700 monitoring wells assess water quality conditions (OCWD 2015). Thus, it is unlikely that human consumption of contaminated groundwater will occur. A large environmental spill could result in contamination of groundwater; however, the extent and the severity cannot be predicted. Based on historical occurrences, a contamination in the groundwater basin could extend several miles and result in water wells being unavailable.

### Saltwater Intrusion

Massive seawater intrusion has been prevented in Orange County by the Orange County Groundwater Basin management programs. However, the threat of saltwater intrusion along the coast is still present. To prevent further intrusion and to provide basin management flexibility, OCWD operates a hydraulic barrier system. A series of 23 multi-point injection wells 4 miles inland delivers fresh water into the underground aquifers to form a water mound, blocking further passage of seawater. Continued injection of recycled water into the aquifer is essential to keep saltwater from intruding into the groundwater table and contaminating a major source of the county's potable water. OCWD maintains the Coastal Aquifer Mergence Zones and Chloride Concentration map, which indicates a 250 mg/L Chloride Concentration Contour. This contour is used to indicate the approximate leading edge of seawater intrusion. OCWD monitors the movement of the chloride contour to provide an indication of whether seawater intrusion is worsening or improving in a given area.

# Hazardous Materials

Human-caused hazards have the potential to directly impact water and wastewater systems. A hazardous material spill could be localized and, depending upon when the spill is identified and addressed, may be contained with limited to no impact on water supplies and systems. However, there is the potential for a hazardous material spill to severely impact water supplies due to groundwater intrusion and direct contamination of a water source. The magnitude and severity of the hazard would be highly dependent upon the type of hazardous material spill, location, and the extent to which the hazardous material extends into the water system. Similarly, an act of terrorism could cause a significant impact to water and wastewater systems depending upon the type of event and whether it occurs at a primary source or is focused to a specific area or system. Human-caused hazards can have a direct impact on water supplies and the ability to provide water services to communities, potentially resulting in significant health and safety issues.

### Power Outage

A power outage has the potential to directly impact water and wastewater systems. Disruption of water utilities and systems often requires notification of the public and businesses to curtail usage, boil available water, use bottled water, etc. Firefighting capabilities may also be impacted if an outage causes disruption to water supplies. In areas where telephone service is provided by above-ground lines that share poles with electrical distribution lines, telecommunications providers may not be able to make repairs to the telephone system until electrical utilities restore power lines to a

safe condition. This could impact response times to a water or wastewater incident. The impacts of electric utility disruptions are felt most significantly by Southern California communities during the summer months due to cooling demands from higher heat. Any extended electric disruption can also lead to local economic losses when computers, lighting, refrigeration, gas pumps, and other equipment are without power during business hours. A severe power outage also can cause cascading impacts such as transportation incidents, civil unrest, and disease. The magnitude/severity of a power outage would be the same for all jurisdictions within the planning area.

## Terrorism (Cyber Threat)

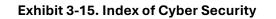
Cyber threats are not measured on any scale, but they can be assessed by determining:

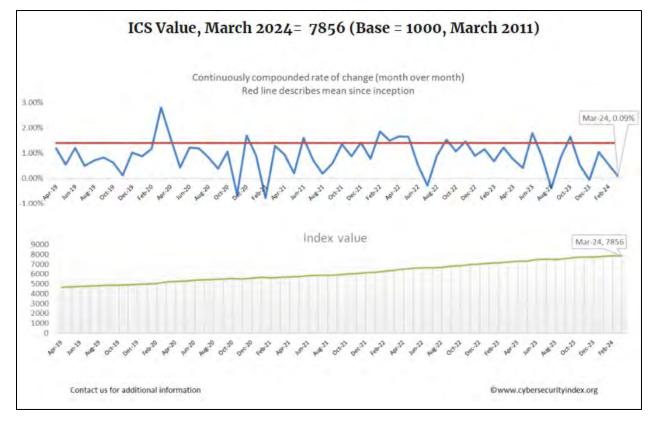
- The type of incident (website defacement, denial of service, unauthorized surveillance)
- The use of malicious software
- The level of security countermeasures that failed to prevent the cyber threat
- The duration of the cyber threat (a few hours, a few days, several weeks, etc.) (Mateski 2012)

Globally, cyber threats are increasing and becoming more sophisticated. The most common types of attacks include:

- Phishing
- Ransomware
- Intellectual Property Theft
- Spyware/Malware
- Unpatched Software

The Index of Cyber Security (NYU 2024) **Exhibit 3-15** can be referenced to understand the status of cyber threats, which identifies the measure of perceived risk. Since 2015, this index has trended upward and appears to have doubled in this timeframe.





### Source: NYU, 2024

# Terrorism (Mass Casualty Incident)

Possible locations that may attract acts of terrorism were discussed in **Section 3.2.5.3**; however, the perpetrators may also choose high-value targets such as electricity-generating facilities, water treatment plants, dams or reservoirs, railroads, highways, and other facilities that could impact governmental operations and services. Mass casualty incidents and acts of terrorism are typically measured by the fatalities, injuries, and destruction they cause, but there is no universally used scale for measuring these events.

### 3.2.5.5 Probability of Future Occurrences

### Groundwater Contamination

Due to the amount and types of urban development that occur within Orange County and the transportation systems that allow for the movement of hazardous materials through the county and greater region, future groundwater contamination is likely. However, as a result of groundwater monitoring and protection systems, human consumption of contaminated groundwater is unlikely.

### Saltwater Intrusion

Due to the successful operation of the Orange County Groundwater Basin management programs, the probability of saltwater intrusion in the future is unlikely.

### Hazardous Materials

According to the Cal OES, hazardous materials have been released approximately 1,517 times (incidents that were reported to Cal OES) into the environment between the years of 2019 and 2024 in Orange County, for an average of approximately 253 times a year during that period. Thus, the probability of future contamination of the environment is likely. However, human consumption of contaminated groundwater is unlikely due to the constant monitoring of more than 700 wells across Orange County (OCWD 2015).

### Power Outage

Power outages are a normal part of life and are unpredictable; they happen for many reasons and can be expected to continue in the future. Water and wastewater systems are most susceptible to failure during extreme weather conditions, fires, and earthquake events. Regional power outages can threaten human life, particularly when outages affect water supply, hospitals, and other healthcare facilities. As both population and climate variability increase across Southern California and puts more pressure on aging distribution systems, it is likely that power outage events will continue to occur. Due to the nature and extent of power outages, the probability for future occurrences would be the same for all jurisdictions in the planning area.

### Terrorism (Cyber Threat)

Due to the integrated nature of technology into the everyday lives of residents, businesses, and government operations, it is possible that a cyber incident could emerge in the future as these threats occur on a daily basis across the planning area.

### Terrorism (Mass Casualty Incident)

Because of the dynamic nature of the terrorist threat and the open nature of California society, all jurisdictions within California are vulnerable to terrorist attack. One must know the minds and capabilities of various terrorists and terrorist groups; these are characteristics terrorist organizations strive to conceal. Because all terrorists are not the same, the calculation is even more difficult. From the perspective of hazard mitigation, the most often used weapon of terrorists is bombs, and the greatest potential for loss is from weapons of mass destruction.

### 3.2.5.6 Climate Change Considerations

### Groundwater Contamination

Climate change can cause more frequent and intense precipitation, which can lead to increased instances of flooding. Flooding can potentially mobilize contaminants in soil, which can then be transported to aquifers. While more intense precipitation events are anticipated, they could be followed by or preceded by droughts, which can potentially cause groundwater levels to decline. As groundwater levels fall, a greater concentration of contaminants occurs, impacting the ability to provide safe potable water to customers. Rising sea levels can lead to an increase in saltwater intrusion, which can contaminate groundwater aquifer/basins in coastal areas. Rising temperatures can increase the temperature of groundwater, which can potentially affect the levels and concentrations of undesirable substances in the water. Increased rainfall (both in intensity and frequency) can lead to more runoff of nutrients into water bodies, which can cause harmful algal blooms. Climate change may also lead to changes in human activities, such as increased pumping, irrigation, or land use, which can also impact groundwater quality and exacerbate other issues associated with groundwater supplies.

### Saltwater Intrusion

Climate change has led to an increase in sea levels. When this is combined with increased groundwater pumping, the potential for saltwater intrusion can increase. Sea level rise may also lead to larger areas of coastal land becoming inundated. With additional areas inundated, the potential for additional seawater displacing fresh water increases. Saltwater intrusion into groundwater aquifers can increase treatment costs for drinking water facilities or render groundwater wells unusable. As sea levels rise, the "salt front" (location of the freshwater-saltwater line) may progress further upstream. This encroachment may be further exacerbated by drought, reduced rainfall, or changes in water use and demand. Saltwater intrusion can result in the need for water utilities to increase treatment, relocate water intakes, or develop alternate sources of fresh water.

### Hazardous Materials

Climate change itself has no direct effect on hazardous material releases. However, climate change may increase the frequency or severity of other hazard types, which may result in a hazardous material release as an indirect effect. For example, climate change is expected to cause a 10% to 20% increase in the average intensity of the strong storms that affect Orange County during the winter. An increase in the intensity of these storms increases the chance that such a storm may damage or destroy a hazardous material storage tank, cause a vehicle crash involving hazardous materials, or lead to an incident that results in the release of hazardous materials.

### Power Outage

As temperatures increase, so will the demand for utility/energy providers to produce larger quantities of reliable energy to power cooling equipment in homes and businesses. This could cause an increased strain on the current infrastructure and production facilities, possibly leading to an increase in power shortages and a decrease in the current energy grid reliability.

# Terrorism (Cyber Threat)

Climate change is not likely to impact cyber threats in the future within Orange County.

### Terrorism (Mass Casualty Incident)

Climate change has no direct impact on terrorism, as acts of terror are not directly caused by climate conditions. However, national security experts have raised concerns as early as 2003, if not before, that climate change indirectly affects terrorism by causing food, water, and resource shortages, potentially triggering migrations and economic upheaval that could cause some individuals to commit acts of terror (Schwartz and Randall 2003). More recently, a report prepared by the U.S. Department of Defense (DoD) repeated and expanded upon the connection between climate change and national security, referring to climate change as a "threat multiplier" that can "enable terrorist activity and other forms of violence" (DoD 2015).

# 3.2.6 Seismic Hazards (Fault Rupture, Seismic Shaking, and Liquefaction)

# 3.2.6.1 Description (Nature) of the Hazard

Earthquakes are considered a major threat to Orange County, especially when focusing on water and wastewater facilities and pipelines that run throughout the county. A significant earthquake along one of the major faults could cause substantial casualties, extensive damage to infrastructure, fires, and other threats to life and property. Significant damage and outages of water and wastewater facilities could also occur. The effects could be aggravated by aftershocks and by secondary effects such as fire, landslides, and dam failure. A major earthquake could be catastrophic in its effects on the population and could exceed the response capability of the local communities and even the State.

Following major earthquakes, extensive search and rescue operations may be required to assist trapped or injured persons. Emergency medical care, food/water, and temporary shelter would be required for injured or displaced persons. In the event of a truly catastrophic earthquake, identification and burial of the dead would pose difficult problems. Mass evacuation may be essential to save lives. Emergency operations could be seriously hampered by the loss of communications, damage to transportation routes within, to, and out of the disaster area, and by the disruption of public utilities and services. With damage to critical water and wastewater infrastructure there will be significant public health concerns, such as dehydration or exposure to contaminated water, and the potential for reduced fire protection due to limited sources of water. Facilities at greatest risk from severe earthquakes are dams and pipelines. Additionally, damage to water and sewer lines that service commercial and industrial areas could have a significant impact on the economy of the region. Extensive mutual aid for an extended period may be required to bring water and wastewater services back online.

Earthquakes strike with little to no warning, and they can have multiple impacts on an area. Aftereffects from an earthquake may include impacted roadways, downed power and communication lines, fires, and damage to structures (especially poorly built structures or those already in disrepair). Should a major event occur, major damages and losses should be expected to pumping systems and wastewater treatment infrastructure. Earthquakes are not a seasonal hazard, and thus can be experienced year-round. This fact presents its own set of planning and preparedness concerns.

Seismic-specific building codes can provide MAs with reasonable guidance for structural mitigation. As maintenance and potentially new building occurs within the planning area, seismic retrofitting is highly recommended to prevent extensive damage to essential infrastructure.

For decades, partnerships have flourished between the USGS, Cal Tech, the California Geological Survey (CGS), and California universities to share research and educational efforts with Californians. Tremendous earthquake mapping and mitigation efforts have been made in California in the past two decades, and public awareness has risen remarkably during this time. Major Federal, State, and local government utilities and private organizations support earthquake risk reduction. These partners have made significant contributions in reducing the adverse impacts of earthquakes.

# Fault Rupture

Fault rupture occurs when the Earth's surface shifts and cracks along a fault line during a seismic event. While this phenomenon is not especially dangerous in natural environments, issues arise when structures are built near or on top of an active fault. Per the CGS, an active fault has experienced surface movement in the past 11,700 years (CGS, n.d.a)

The shifting and movement of the Earth's tectonic plates are responsible for seismic events. These tectonic plates can pull away from, move toward, or pass by each other. As they do, the plates sometimes lock together. This inability to move creates tension, which is eventually released like a

springboard. The tension dissipates into the Earth's crust. The location at which two tectonic plates join is called a fault line. Fault lines are sometimes visible on the Earth's crust as sudden rifts or anomalies in the landscape's continuity. California's major north-south fault line is the San Andreas Fault, where the North American and Pacific Plates meet. However, constant friction between the two plates over the millennia has caused the areas where the two plates intersect to become fragmented, creating new, smaller faults.

The area near a fault line is at risk of damage due to the potential for a fault rupture—the deformation or displacement of land on either side of the fault—and may move a few inches to several feet in opposite directions. Buildings or infrastructure near a fault line could be severely damaged or destroyed. The fault rupture's direction depends on the fault type: dip-slip faults produce vertical shearing, strike-slip faults produce horizontal shearing, and oblique-slip faults produce both vertical and horizontal shearing. A fourth kind of fault, called a "blind" fault, produces virtually no visible land displacement. Some faults have emerged recently in geologic history. Quaternary faults have developed between the Holocene Era and the present (within the last 1.8 million years). These faults are especially concerning since they are the most likely to be active and cause future earthquakes (CGS, n.d.b. "Earthquakes").

# Seismic Shaking

Seismic shaking is the motion felt on the Earth's surface caused by an earthquake. In most cases, earthquakes are not powerful enough to cause the feeling of shaking. However, particularly powerful earthquakes can generate significant shaking, causing widespread destruction resulting in property damage.

### Liquefaction

Liquefaction is the phenomenon that occurs when ground shaking causes groundwater to mix with the soil. The mixture temporarily becomes a fluid and loses its strength. Liquefaction causes two types of ground failure: lateral spread and loss of bearing strength. Lateral spreads develop on gentle slopes and entail the sidelong movement of large masses of soil as an underlying layer liquefies. Loss of bearing strength results when the soil supporting structures liquefies and causes structures to settle and/or collapse from weakened foundations. Liquefaction can also occur independently of an earthquake, if any sudden and significant stress causes the mixing of groundwater and soil. The risk of liquefaction depends on several factors, including the height of the groundwater table and the types of soil in the area (CGS, n.d.c. "Seismic").

# 3.2.6.2 History/Past Occurrences

# Fault Rupture

There have not been any reports of fault rupture within the planning area, despite some large seismic events in the past. However, the presence of active faults underlying the area make it a very real possibility should a major earthquake occur. The seismic shaking section highlights some of the larger earthquakes that have recently occurred within the planning area.

### Seismic Shaking

Southern California and Orange County have experienced several powerful earthquakes. The earliest recorded earthquake in California occurred in Orange County in 1769. To better understand the potential for damaging earthquakes in Southern California, the scientific community has reviewed historical records and conducted extensive research on faults that are

the sources of the earthquakes occurring in Southern California. Historical earthquake records can generally be divided into records of the pre-instrumental period and the instrumental period. In the absence of instrumentation, historic records of past earthquakes are based on observations and the level of information is often dependent upon population density in the area of the earthquake. Since California was sparsely populated in the 1800s, detailed information on pre-instrumental earthquakes is relatively sparse. However, two very large earthquakes, the Fort Tejon in 1857 (magnitude 7.9) and the Owens Valley in 1872 (magnitude 7.6) are evidence of the tremendously damaging potential of earthquakes in Southern California. Other notable earthquakes that have impacted Southern California include the 1910 Glen Ivy Hot Springs Earthquake (Elsinore Fault Zone, magnitude 6.0), the 1933 Long Beach Earthquake (Newport-Inglewood Fault Zone, magnitude 6.4), the 1952 Kern County and Lander earthquakes (magnitude 7.3), the 1971 San Fernando Earthquake (San Fernando Fault Zone, magnitude 6.6), the 1987 Whittier Earthquake (Whittier Fault Zone, magnitude 5.9), and the 1994 Northridge Earthquake (Pico Thrust, magnitude 6.7). The 1987 Whittier Earthquake caused damage to the Puente Hills Reservoir in La Habra and after inspection the reservoir was found to have cracks in the concrete lining.(MWDOC 2019)

Damage from some of these earthquakes was limited because they occurred in areas that were sparsely populated at the time they occurred. However, developed areas were much more severely affected. Damage from the 1933 Long Beach Earthquake was estimated at more than \$40 million (\$970 million in 2024 dollars), and 115 lives were lost. The seismic risk is much more severe today than in the past because the population at risk is in the millions, rather than a few hundred or a few thousand persons. Earthquakes of great magnitudes have caused lasting effects in developed regions.

The most recent significant earthquake event affecting Southern California was the 1994 Northridge Earthquake. At 4:31 a.m. on Monday, January 17, 1994, a moderate, but very damaging earthquake with a magnitude of 6.7 struck the San Fernando Valley. In the following days and weeks, thousands of aftershocks occurred, causing additional damage to affected structures. In this earthquake, 57 people were killed and more than 1,500 people seriously injured. For days afterward, thousands of homes and businesses were without electricity, tens of thousands had no gas, and nearly 50,000 had little or no water. Out of the approximately 66,000 structures inspected, approximately 15,000 structures were moderately to severely damaged, which left thousands of people temporarily homeless. Several collapsed bridges and overpasses created commuter havoc on the freeway system. Extensive damage was caused by ground shaking, but the earthquake triggered liquefaction, and dozens of fires also caused additional severe damage. The extremely strong ground motion felt in sizable portions of Los Angeles County resulted in record economic losses. The fact that the earthquake occurred early in the morning on a holiday considerably reduced the potential effects. Many collapsed buildings were unoccupied, and most businesses were not yet open. The direct and indirect economic losses ran into the tens of billions of dollars. Clearly, no community in Southern California is beyond the reach of a damaging earthquake. The historical earthquake events that have affected Southern California are listed below in Exhibit 3-16.

Date Location (Magnitude)					
1769 Los Angeles Basin (6.0)	1952 Kern County (7.7)				
1800 San Diego Region (6.5)	1954 West of Wheeler Ridge (5.9)				
1812 Wrightwood (7.0)	1971 San Fernando (6.5)				

### Exhibit 3-16. Magnitude 5.0 or Greater Earthquakes in the Southern California Region

**Risk Assessment** 

Date Location (Magnitude)					
1812 Santa Barbara Channel (7.0)	1973 Point Mugu (5.2)				
1827 Los Angeles Region (5.5)	1979 Imperial Valley (6.5)				
1855 Los Angeles Region (6.0)	1986 North Palm Springs (6.0)				
1857 Great Fort Tejon (8.3)	1987 Whittier Narrows (5.8)				
1858 San Bernardino Region (6.0)	1990 Upland (5.7)				
1862 San Diego Region (6.0)	1991 Sierra Madre (5.6)				
1892 San Jacinto or Elsinore Fault (6.5)	1992 Landers (7.3)				
1893 Pico Canyon (5.8)	1992 Big Bear (6.2)				
1894 Lytle Creek Region (6.0)	1994 Northridge (6.7)				
1894 E. of San Diego (5.8)	1999 Hector Mine (7.1)				
1899 Lytle Creek Region (5.8)	2004 San Luis Obispo (magnitude unknown)				
1899 San Jacinto and Hemet (6.4)	2008 Greater Los Angeles Area (5.5)				
1907 San Bernardino Region (5.3)	2008 Borrego Springs (5.4)				
1910 Glen Ivy Hot Springs (5.5)	2009 El Centro/Baja, Ca (5.9)				
1916 Tejon Pass Region (5.3)	2010 El Centro/Baja, Ca (7.2)				
1918 San Jacinto (6.9)	2010 El Centro/Baja, Ca (5.7)				
1923 San Bernardino Region (6.0)	2014 La Habra (5.1)				
1925 Santa Barbara (6.3)	2019 Ridgecrest (6.4)				
1933 Long Beach (6.3)	2019 Ridgecrest (7.1)				
1941 Carpentaria (5.9)					

# Liquefaction

Comprehensive, historic accounts of damage to structures from liquefaction are not readily available. Some damage caused by the Northridge Earthquake of 1994, such as damage to the King Harbor area of Redondo Beach in Los Angeles County, was due to liquefaction, as opposed to ground shaking.

# 3.2.6.3 Location/Geographic Extent

### Fault Rupture

The area at risk of fault rupture is limited to areas in the immediate vicinity of a fault. California began extensive mapping of earthquake faults with the Alquist-Priolo Earthquake Fault Zoning Act of 1972. **Exhibit 3-17** shows both the fault zones in Orange County that have been mapped through the act. The Whittier Fault Zone near the county's northern border passes through part of the YLWD. The Newport-Inglewood Fault Zone parallels the coast in western Orange County.





# There are many additional large faults that could affect Orange County in addition to the Whittier and Newport-Inglewood-Rose Canyon faults. These include the Elsinore Fault, Peralta Fault, Puente Hills Fault, San Andreas Fault, and San Jacinto Fault. Smaller faults include the Norwalk Fault and the El Modena Faults. In addition, newly studied thrust faults, such as the San Joaquin Hills Fault could also have a significant impact on Orange County. Each of the major fault systems

are described briefly below and are presented in alphabetical order. This order does not place more danger on one fault over another; it is simply for organizational purposes.

- Elsinore Fault Zone/Whittier Fault/Chino Fault. Located in the northeast part of the county, the Elsinore Fault Zone follows a general line easterly of the Santa Ana Mountains into Mexico. The main trace of the fault zone is about 112 miles long. The last major earthquake on this fault occurred in 1910 (magnitude 6.0), and the interval between major ruptures is estimated to be about 250 years. Southern California Earthquake Center (SCEC) reports probable earthquake magnitudes for the main trace of the Elsinore Fault to be in the range of 6.5 to 7.5. At the northern end of the Elsinore Fault Zone, the fault splits into two segments: the 25-mile-long Whittier Fault (probable magnitudes between 6.0 and 7.0). The location of the Whittier Fault makes it especially critical to the Diemer Filtration Plant in Yorba Linda and pipelines bringing water into Orange County and/or from the Diemer Plant, which is located very near this fault.
- Newport-Inglewood-Rose Canyon Fault Zone. This fault zone extends from the Santa Monica Mountains in a southeast direction through the western part of Orange County, then continues offshore (not more than 4 miles from the coast) down to San Diego Bay. Originally, this was thought to have been two separate systems; the Newport-Inglewood Fault and the Rose Canyon Fault Line. However, a study prepared in March 2017 found that they are in fact one continuous fault line with three main stepovers. This fault line was the source of the destructive 1933 Long Beach earthquake (magnitude 6.4), which caused 120 deaths and considerable property damage. SCEC reports probable earthquake magnitudes for the Newport-Inglewood Fault to be in the range of 6.0 to 7.4.
- **Peralta Hills Fault.** Limited information is available to paleo seismically characterize the fault and no studies have been undertaken to determine the timing of earthquakes. There is a strong geomorphic expression along Lincoln Boulevard west of Tustin Avenue in the City of Orange. Some believe the fault is not active while others believe it is active. Ongoing research has linked the fault as a back thrust with the Elsinore Fault, with a potential magnitude of 6.8.
- **Puente Hills Thrust Fault.** This is another recently discovered blind thrust fault that runs from northern Orange County to downtown Los Angeles. It is now known to be the source of the 1987 Whittier Narrows Earthquake. Recent studies indicate that this fault has experienced four major earthquakes ranging in magnitude from 7.2 to 7.5 in the past 11,000 years, but that the recurrence interval for these large events is on the order of several thousand years.
- San Andreas Fault Zone. As the dominant active fault in California, it is the main element of the boundary between the Pacific and North American tectonic plates. The longest and most publicized fault in California, it extends approximately 650 miles from Cape Mendocino in Northern California to east of San Bernardino in Southern California and is approximately 35 miles northeast of Orange County. This fault was the source of the 1906 San Francisco earthquake, which resulted in some 700 deaths and millions of dollars in damage. It is the southern section of this fault that is currently of greatest concern to the scientific community. Geologists can demonstrate that at least eight major earthquakes (Richter Magnitude 7.0 and larger) have occurred along the southern San Andreas Fault in the past 1,200 years with an average spacing in time of 140 years, plus or minus 30 years. The last such event occurred in 1857 (Fort Tejon Earthquake). Based on that evidence and other geophysical observations, the Working Group on California Earthquake Probabilities (Field, 2013) has estimated the probability of a similar rupture (magnitude 7.8) in the next 30 years (1994 through 2024) to be

about 50%. The range of probable magnitudes on the San Andreas Fault Zone is reported to be 6.8 to 8.0.

- San Jacinto Fault Zone. The San Jacinto Fault Zone is located approximately 30 miles north and east of the county. The interval between ruptures on this 130-mile-long fault zone has been estimated by SCEC to be between 100 and 300 years, per segment. The most recent event (1968 M6.5) occurred on the southern half of the Coyote Creek segment. SCEC reports probable earthquake magnitudes for the San Jacinto Fault Zone to be in the range of 6.5 to 7.5.
- San Joaquin Hills Fault. This fault is a recently discovered southwest-dipping blind thrust fault originating near the southern end of the Newport-Inglewood Fault close to 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 recurrence interval of about 1,650 and 3,100 years has been estimated for moderate-sized earthquakes on this fault (Bender, 2000).

In addition to the major faults described above, the rupture of several smaller faults could potentially impact Orange County, including the Norwalk Fault (located in the north of the county in the Fullerton area) and the El Modeno Fault (located in the City of Orange area).

In 2005, MWDOC hired Earth Consultants International to prepare specific ground acceleration and shaking maps for five fault earthquake scenarios in Orange County (Earth Consultants 2005). **Exhibit 3-18, Characteristics of Important Geologic Faults in Orange County**, summarizes the characteristics of these five major geologic faults. Earthquake maps for the individual jurisdictions are included in the Jurisdictional Annexes.

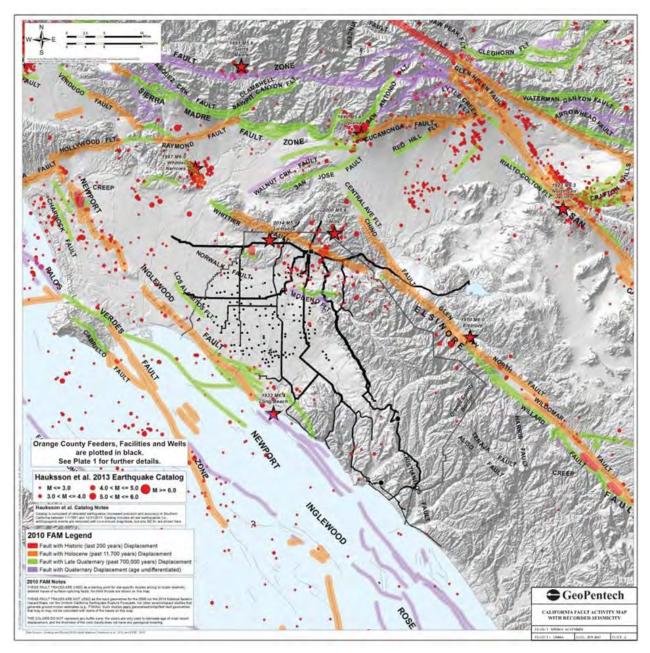
Characteristic	Newport- Inglewood- Rose Canyon (onshore)	Peralta Hills	Puente Hills	San Joaquin Hills	Whittier
Fault Type	Strike-slip	Thrust	Blind thrust	Blind thrust	Strike-slip
Slip Rate (mm/yr)	1 +/-0.5	Unknown, Prob. <1	0.7 +/-0.4	0.5 +/-0.2	2.5 +/-1.0
Magnitude <sup>1</sup>	6.9	6.8	7.5	6.6	6.8
Recurrence Interval (years)	2,200-3,900	Unknown	2,750	1,600-3,100	1,100
Last Activity (years ago)	6.3 in 1933	Unknown	<3,000	200-300	1,600-2,000

Exhibit 3-18. Characteristics of Important Geologic Faults in Orange County

1. The magnitude shown represents the fault's average behavior. (Earth Consultants 2005)

**Exhibit 3-19**, prepared for the California Domestic Water Corp., a private wholesaler, shows the location of earthquake epicenters from 1941 to 2013 in and around Orange County, which is outlined in the center of the map.

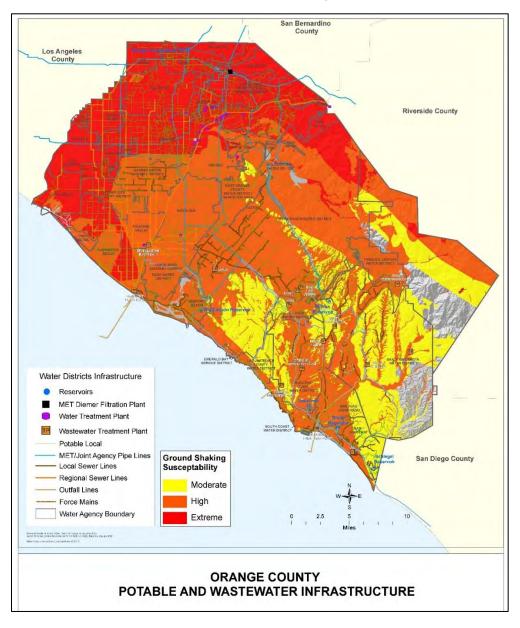




Earthquakes that occur outside of Southern California and Orange County could also have a significant impact on drinking water supplies. Such scenarios include disruptions of the Colorado River Aqueduct, the State Water Project (especially at an area such as the Edmonston Pumping Station and Porter Tunnel bringing water over and through the Tehachapi), and in the Bay-Delta Region, where failure of levees and flooding of islands with saltwater from San Francisco Bay could disrupt water supplies for months or years. Orange County is 50% dependent on supplies from beyond its borders to meet the county's drinking water needs. This leaves it exposed to these occurrences from outside the region.

## Seismic Shaking

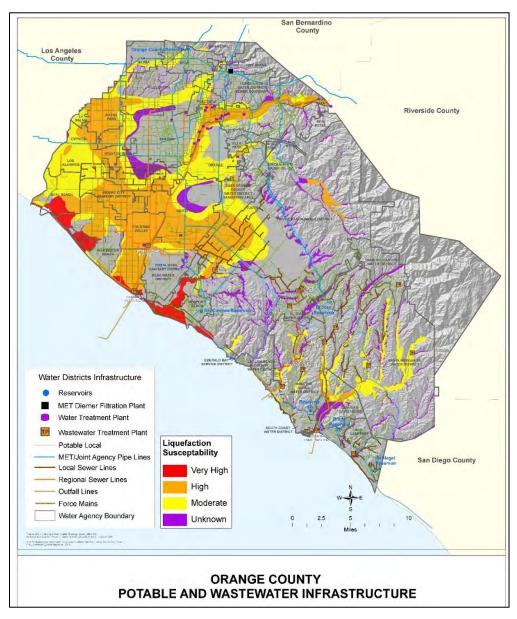
Nearly all of Orange County is at risk of moderate to extreme ground shaking. **Exhibit 3-20** shows ground shaking severity zones for Orange County. The area's most susceptible to damage from earthquakes based on the shaking intensity hazard map include YLWD and the Cities of La Habra and Buena Park. These communities can be severely impacted by landslides, liquefaction, extensive infrastructure damage, fire, dam failure, and other secondary earthquake effects. A major earthquake could be catastrophic in its effect on the population and could exceed the response capability of the local communities and even the State. Although the above-noted water/wastewater utilities are most likely to experience "extreme" shaking, all of Orange County's water/wastewater utilities fall within a moderate to extreme shaking intensity zone and therefore should expect the potential of damage from an earthquake.



### Exhibit 3-20. Ground Shaking Hazard

# 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 much of Orange County. The California Geological Survey's Seismic Hazards Zonation Program identifies and maps areas prone to liquefaction. These zones for Orange County are shown in **Exhibit 3-21**. The most extensive liquefaction zones occur in coastal areas, including parts of Huntington Beach and Newport Beach, and along Upper Newport Bay. In addition, a 2016 Seismic Hazard Assessment conducted by GeoPentech, Inc., found that the highest liquefaction hazard areas are the flat, coastal portions of the planning area, and the risk decreases moving inland. The areas identified as being highly susceptible to liquefaction are the San Juan Creek/San Clemente Beach areas.



### Exhibit 3-21. Liquefaction Susceptibility Zones

## 3.2.6.4 Magnitude/Severity

## Fault Rupture

The planning area has multiple known faults that run through and near the planning area. A significant earthquake along any of these major faults could cause substantial casualties, extensive damage, and other threats to life and property. The shaking of the ground can also damage or destroy underground utilities or pipelines, potentially leading to the release of hazardous materials and flooding if water lines are breached.

The planning area can expect varying degrees of damage depending on the magnitude and duration of an earthquake along one of these faults within the region. The topography in portions of the planning area means there are areas with critical infrastructure and facilities of concern constructed on or adjacent to slopes, which may be subject to earthquake-induced landslides (reference the landslide hazard profile for further discussion).

## Seismic Shaking

Ground shaking is measured using either the moment magnitude scale (MMS, denoted as Mw or simply M) or the Modified Mercalli Intensity Scale. The MMS is a replacement for the Richter scale, which is still often referred to but is no longer actively used, as the Richter scale is not reliable when measuring large earthquakes (USGS 2014). The weakest earthquakes measured by the MMS start at 1.0, with the numbers increasing with the strength of the earthquake. The strongest recorded earthquake, which struck Chile in 1960, measured 9.5 on the MMS (MWDOC 2019). Like the Richter scale, the MMS is a logarithmic scale, meaning the difference in strength between two earthquakes is much larger than the difference in their measurements. For example, a 6.0 Mw earthquake is 1,000 times stronger than a 4.0 Mw earthquake and about 1.4 times as strong as a 5.9 Mw event.

The Modified Mercalli Intensity Scale is based on the damage caused by the earthquake and how it is perceived, rather than an actual measurement. When comparing multiple earthquakes, one event may have a higher Mercalli rating than another even if it released less energy, and thus was measured lower on the MMS. The Mercalli scale ranges from I (instrumental, rarely felt by people) to XII (catastrophic, total damage and lines of sight are distorted). **Exhibit 3-22, Comparison of MMS and Modified Mercalli Intensity Scale,** shows a general comparison between the MMS and the Modified Mercalli Intensity Scale. Note that there is some overlap toward the higher end of the Mercalli ratings, with certain intensities produced by multiple ranges of magnitude measurements.

Magnitude (MMS)	Modified Mercalli Intensity Scale				
magnitude (mms)	Intensity	Description			
1.0 to 3.0	1	Not felt except by very few people under especially favorable conditions.			
	II	<b>Weak:</b> Felt only by a few persons at rest, especially on upper floors of buildings.			
3.0 to 3.9		<b>Weak:</b> Felt quite noticeably by people indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck.			
4.0 to 4.9	IV	<b>Light:</b> 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.			

#### Exhibit 3-22. Comparison of MMS and Modified Mercalli Intensity Scale

Magnitude (MMS)			Modified Mercalli Intensity Scale
Magnitu		Intensity	Description
		V	<b>Moderate:</b> Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
		VI	<b>Strong:</b> Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
5.0 to 5.9		VII	<b>Very Strong:</b> 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.
6.0 to 6.9		VIII	<b>Severe:</b> 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.
7.0 and		IX	<b>Violent:</b> Damage considerable in specially designed structures; well- designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
greater		Х	<b>Extreme:</b> Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.
		XI	<b>Extreme:</b> Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.
		XII	<b>Extreme:</b> Damage total. Lines of sight and level are distorted. Objects thrown into the air.
(USGS 2	017)		

Several faults in Orange County can produce severe to extreme earthquakes. The SCEC and the Working Group on California Earthquake Probabilities have determined the probable magnitude for an earthquake along these major faults:

- Elsinore Fault Zone. SCEC reports probable earthquake magnitudes for the main trace of the Elsinore Fault to be in the range of 6.5 to 7.5. The two northern segments, the Whittier Fault and the Chino Fault, have probable magnitudes of 6.0 to 7.2 and 6.0 to 7.0, respectively. The Whittier Fault location is extremely critical because it crosses the two main sources of untreated water being brought into Orange County (Yorba Linda Feeder and the Lower Feeder) and it passes very close to the Diemer Filtration Plant, which serves as the treatment facility for the bulk of Orange County. Metropolitan does not have a backup system to supply treated water to many parts of central and southern Orange County in the event of an outage of the Diemer Plant.
- **Newport-Inglewood Fault Zone.** SCEC reports probable earthquake magnitudes for the Newport-Inglewood Fault to be in the range of 6.0 to 7.4.
- **Puente Hills Thrust Fault.** Recent studies indicate that this fault has experienced four major earthquakes ranging in magnitude from 7.2 to 7.5 in the past 11,000 years, but that the recurrence interval for these large events is on the order of several thousand years.
- **Peralta Hills Fault.** The Earth Consultants International study for MWDOC indicates that this may be a back thrust fault to the Elsinore Fault and may be capable of a magnitude 6.8 (Earth Consultants 2005).

- San Andreas Fault Zone. Based on that evidence and other geophysical observations, the fault has estimated the probability of a rupture with a magnitude 7.8 in the next 30 years (1994 through 2024) to be about 50% (Field 2013). The range of probable magnitudes on the San Andreas Fault Zone during this period is reported to be 6.8 to 8.0.
- San Joaquin Hills Fault. Recent reports have determined that the blind thrust fault can generate an earthquake as large as 7.3. In addition, a minimum average recurrence interval of 1,650 to 3,100 years has been estimated for moderate-sized earthquakes on this fault.
- San Jacinto Fault Zone. SCEC reports probable earthquake magnitudes for the San Jacinto Fault Zone to be in the range of 6.5 to 7.5.

Although the San Andreas Fault Zone can produce an earthquake with a magnitude greater than 8.0, some of the smaller faults have the potential to inflict greater damage on the urban core of the Los Angeles Basin. Seismologists believe that a 6.0 earthquake on the Newport-Inglewood Fault Zone would result in far more death and destruction than a larger earthquake on the San Andreas Fault Zone, due to the San Andreas' relatively remote location from the urban centers of Southern California.

## 3.2.6.5 Probability of Future Occurrences

## Fault Rupture

Based on the amount of seismic activity that occurs within the region, there is no doubt that communities within the jurisdictional boundaries of MWDOC will continue to experience future earthquake events. It is reasonable to expect that a major event (5.0 magnitude or higher) and possibly even more severe will occur within a 30-year timeframe.

The Third Uniform California Earthquake Rupture Forecast (UCERF3), developed in 2014 by the Working Group on California Earthquake Probabilities and led by the USGS, provides estimates of the magnitude, location, and likelihood of fault rupture for more than 350 fault segments throughout the State. For Southern California, the study estimated the likelihood of a 6.0 magnitude earthquake at 100%, a 7.0 earthquake at 75%, and an 8.0 earthquake at 7% (USGS 2015).

#### Seismic Shaking

Predicted ground shaking patterns throughout Southern California for hypothetical scenario earthquakes are available from the USGS as part of their ongoing "ShakeMap" program. These maps are provided in terms of Instrumental Intensity, which is essentially Modified Mercalli Intensity estimated from instrumental ground motion recordings. ShakeMaps in graphical and GIS formats are available on the USGS website at: https://earthquake.usgs.gov/data/shakemap/.

In 2014, USGS released a simplified Peak Ground Acceleration (PGA) map to demonstrate the 2% probability of exceedance within a 50-year time period; refer to **Exhibit 3-23**. This analysis was done at the nationwide level. California, and many parts of Southern California, have a risk of high PGA at this probability level.

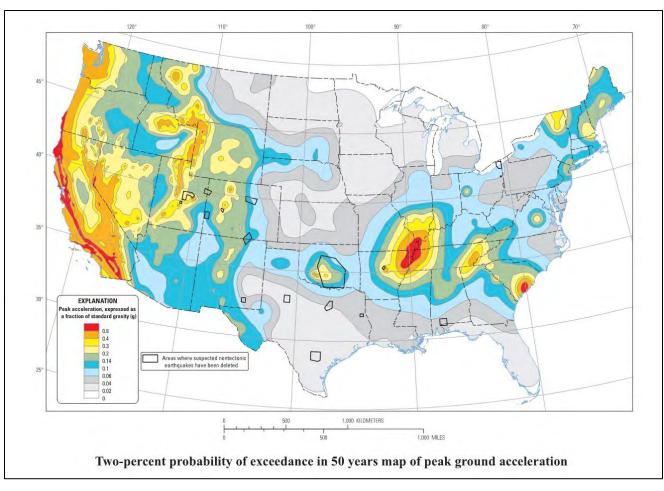


Exhibit 3-23. United States PGA with 2% Probability in 50 Years

(Petersen et al. 2014)

## Liquefaction

Soil liquefaction is a seismically induced form of ground failure, which has been a significant cause of earthquake damage in Southern California. During the 1971 San Fernando and 1994 Northridge earthquakes, significant damage to roads, utility pipelines, buildings, and other structures in the region was caused by liquefaction (a significant amount of this damage type was reported in Los Angeles County). Research and historical data indicate that loose, granular materials situated at depths of less than 50 feet with fine (silt and clay) contents of less than 30%, which are saturated by a relatively shallow groundwater table, are most susceptible to liquefaction. These geological and groundwater conditions exist in parts of Southern California and the planning area, typically in valley regions, stream and river watersheds, and alluvial floodplains.

For liquefaction to occur, three general conditions must be met. The first condition, strong ground shaking for a relatively long duration, can be expected to occur in the planning area because of an earthquake on any of the several active faults in the region. The second condition, loose or unconsolidated, recently deposited sediments consisting primarily of silt and sand, occurs in many valley floors and the larger canyon bottoms prevalent throughout Orange County and the region. The third condition is water-saturated sediments within about 50 feet of the surface. Liquefaction could occur, but defining the precise likelihood is not possible. Refer to the seismic shaking magnitude/severity section for the probability of a major earthquake occurring in faults within the planning area.

#### 3.2.6.6 Climate Change Considerations

#### Fault Rupture

Generally, there is no known direct connection between fault rupturing and climate change. Some evidence suggests that greater oceanic pressure on tectonic plates due to melting land ice could influence seismic events' behavior. Still, little indicates that this would play a major factor in any seismic event, including fault rupture.

## Seismic Shaking

There is no direct link between climate change and seismic activity, so climate change is not expected to cause any changes to the frequency or intensity of seismic shaking. Some research indicates that climate change could result in "isostatic rebounds," or a sudden upward movement of the crust because of reduced downward weight caused by glaciers. As glaciers are known to melt when global temperatures increase, climate change could indirectly lead to increased seismicity in Southern California. (Masih 2018)

## Liquefaction

While climate change may not impact seismic shaking, it can directly impact liquefication. Climate change is anticipated to change the usual precipitation patterns in Southern California. Periods of both rain and drought are expected to become more intense and frequent. This means more precipitation will likely occur during rainy periods, and drought is expected to last even longer. As a result, the water table along the creeks and canyons in Orange County could rise during intense periods of precipitation. Alternatively, a longer-lasting drought may lead to more groundwater withdrawal and could lower the water table. Therefore, climate change could potentially increase during times of intense precipitation or decrease during times of prolonged drought.

## 3.2.7 Severe Weather (Drought, Extreme Heat, Windstorm [Santa Ana Winds])

## 3.2.7.1 Description (Nature) of the Hazard

## Drought

Many governmental utilities, the NOAA and the California Department of Water Resources, as well as academic institutions, such as the University of Nebraska-Lincoln's National Drought Mitigation Center, generally agree that there is no clear definition of drought. Drought is highly variable depending on one's location.

Drought in its simplest definition is 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.

In effect, there are essentially three forms of drought: meteorological or hydrological drought, agricultural drought, and regulatory drought.

- A meteorological or hydrological drought is typically defined when there is a prolonged period of less than average precipitation resulting in the water level in aquifers, lakes, or above-ground storage reservoirs falling below sustainable levels.
- An agricultural drought occurs when there is insufficient moisture for an average crop yield. Agricultural drought can be caused by the overuse of groundwater, poor management of cultivated fields, as well as lack of precipitation.
- A 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.

An example of regulatory drought occurred between 1999 and 2004. A six-year drought on the Colorado River Basin, a major water supply for Southern California, resulted in a draw-down of Colorado River water storage by more than 50%. More recently, beginning in 2008, regulatory restriction in exporting water via the State Water Project combined with unusually dry weather patterns resulted in two years of water rationing in Southern California. Additionally, a meteorological drought can lead to regulatory restrictions; for example, California experienced prolonged drought from 2013 to 2017, resulting in mandatory water restrictions for residents through November 25, 2017.

Even distant droughts may have consequences for the plan area and participating jurisdictions. The great drought of the 1930s, coined the "Dust Bowl," was geographically centered in the Great Plains yet ultimately affected water shortages in California. The drought conditions in the plains resulted in a large influx of people to the west coast. Approximately 350,000 people from Arkansas and Oklahoma immigrated mainly to the Great Valley of California. As more people moved into California, including Orange County, increases in intensive agriculture led to overuse of the Santa Ana River Watershed and groundwater resulting in regional water shortages.

Droughts cause public health and safety impacts, as well as economic and environmental impacts. Public health and safety impacts 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 water and wastewater infrastructure systems.

In Orange County, drought conditions typically result in implementation of large-scale conservation efforts, reducing water supplies to customers and altering the pricing system by implementing higher rates for water usage that exceeds certain levels (e.g., wasteful). Higher rates that may be imposed during a drought could have disproportionate impacts on lower-income households. Reduction in groundwater supplies during drought conditions can also result in the need for water agencies that have high reliance on local groundwater supplies to purchase larger amounts of imported water. 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, see **Section 3.2.8, Wildland/Urban Fire.** In addition, climate change may lead to more frequent and persistent droughts in the future.

Several bills have been introduced into Congress to mitigate the effects of drought. In 1998, President Clinton signed into law the National Drought Policy Act, which called for the development of a national drought policy or framework that integrates actions and responsibilities among all levels of government. In addition, it established the National Drought Policy Commission to provide advice and recommendations on the creation of an integrated Federal policy. The most recent bill introduced into Congress was the National Drought Preparedness Act of 2003, which established a comprehensive national drought policy and statutorily authorized a lead Federal utility for drought assistance. Currently there exists only an ad-hoc response approach to drought unlike other disasters (e.g., hurricanes, floods, and tornadoes) which are under the purview of FEMA.

## Extreme Heat

Extreme heat is a period when temperatures are abnormally high relative to a designated location's normal temperature range. There are generally three types of extreme heat events:

- Extreme Heat Days: A day during which the maximum temperature surpasses 98% of all historic high temperatures for the area, using the time between April and October from 1961 to 1990 as the baseline.
- Warm Nights: A day between April to October when the minimum temperature exceeds 98% of all historic minimum daytime temperatures observed between 1961 to 1990.
- Extreme Heat Waves: A successive series of extreme heat days and warm nights where extreme temperatures do not abate. Although no universally accepted minimum length of time for a heatwave event exists, Cal-Adapt considers four successive extreme heat days and warm nights to be the minimum threshold for an extreme heatwave.

Extreme heat events will have unique metrics from region to region since different areas have different historic high temperatures. For example, an extreme heat day on the coast will have lower temperatures than an extreme heat day in the High Desert.

Humidity plays a factor in people's perception of heat, as humid conditions will make a day feel hotter than a non-humid day even though the temperature may be the same on both days. The difference between the perceived and actual temperatures is known as the "heat index." To illustrate the effect of the heat index, a 90°F day with 50% humidity feels like 95°F, whereas a 90°F with 90% humidity feels like 122°F. **Exhibit 3-24** shows NOAA's National Weather Service Heat Index.

Extreme heat poses several dangers to public health. The human body is vulnerable to long periods of high temperatures and will eventually enter a state of heat exhaustion and dehydration if exposure to heat is extended. If exposure to high temperatures is particularly prolonged to the point that internal body temperature surpasses 105°F, heatstroke may occur, and organ failure and death may soon follow without intervention.

12	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	130
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	138					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								_
90	86	91	98	105	113	122	131								R	IRR
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										and a

Exhibit 3-24. NOAA's National Weather Service Heat Index

## Windstorm

High winds are defined as those that last longer than 1 hour at greater than 39 miles per hour (mph) or for any length of time at greater than 57 mph. High winds that affect Orange County, notably Santa Ana winds, are generally defined as warm, dry winds that blow from the east or northeast (offshore). Santa Ana winds often blow with exceptional speed in the Santa Ana Canyon and forecasters at the National Weather Service in Oxnard and San Diego usually place speed minimums on these winds and reserve the use of "Santa Ana" for winds greater than 25 knots. The complex topography of Southern California combined with various atmospheric conditions creates numerous scenarios that may cause widespread or isolated Santa Ana events. Commonly, Santa Ana winds develop when a region of high pressure builds over the Great Basin (the high plateau east of the Sierra Mountains and west of the Rocky Mountains including most of Nevada and Utah). Clockwise circulation around the center of this high-pressure area forces air down slope from the high plateau. The air warms as it descends toward the California coast at the rate of 5°F per 1,000 feet due to compression of the air mass. The air is dry since it originated in the desert, and it dries out even more as it is compressed.

## 3.2.7.2 History/Past Occurrences

## Drought

Based on years of recorded water trends in Southern California, it is quite apparent that droughts and water shortages can occur. Paleo records indicate that much more extreme events can occur than those since historical record-keeping began. A significant drought, reported by many of the ranchers in Southern California, occurred in 1860.

The National Drought Mitigation Center maintains a Drought Risk Atlas with historic data on drought classifications throughout the United States. Based on the Palmer Drought Severity Index

(PDSI), there have been eight occasions since records began in 1920 when the monitoring station in the City of Santa Ana recorded "severe" or "extreme" drought conditions for a period of at least 12 months. These periods, based on a "self-calibrating" PDSI, which uses data adjusted to be more sensitive to the local climate, are listed in **Exhibit 3-25**, Severe and Extreme SC-PDSI Drought Periods 1920-2023 Lasting 12 Months or Longer (Santa Ana, California) (NDMC 2024).

Drought Start	Drought End	Duration (Months)
February 1961	September 1963	31
March 1971	January 1978	82
May 1984	December 1992	103
January 1994	January 1995	12
December 1999	October 2004	58
January 2006	October 2010	57
December 2011	March 2017	64
January 2020	December 2022	36

## Exhibit 3-25. Severe and Extreme SC-PDSI Drought Periods 1920-2023 Lasting 12 Months or Longer (Santa Ana, California)

Governor Jerry Brown proclaimed a State of Emergency in January 2014; the declaration was not lifted until April 2017. In Orange County, precipitation totals were well below average for five 12month periods in a row. From July 2013 to June 2014, the weather station in Santa Ana recorded just 4.4 inches or rain, about one-third of the normal annual amount (OC Public Works n.d.). Governor Gavin Newsom issued a series of emergency proclamations beginning in April 2021, initially in only parts of California, but by October of 2021 the drought state of emergency proclamation was extended statewide. Newsom also issued Executive Order N-10-21 in July of 2021, which called for Californians to voluntarily reduce their water use by 15% from their 2020 levels, which was followed by additional water restrictions and regulations. The California Department of Water Resources stated that the State Water Project would not provide water to California farmers unless drought conditions improved in 2022, while many of California's water suppliers were forced to implement water shortage contingency plans to combat low water supplies (Romey et al. 2021).

## Extreme Heat

According to NASA's Global Climate Change website, the mean global temperature has increased 1.8°F since 1880, and 17 of the 18 warmest years on record have occurred since 2001 (NASA 2024). The scientific consensus is that these changes are the result of human activity increasing the levels of carbon dioxide and other greenhouse gases in the atmosphere, and that they will intensify. The Intergovernmental Panel on Climate Change forecasts temperatures to rise an additional 2.5 to 10 degrees over the next century. Such drastic changes to the Earth's climate will have significant consequences around the globe. Long-term effects include rising sea levels due to melting ice, changes in precipitation patterns, heat waves, and more frequent and intense storms.

Based on local data from NOAA, Orange County can expect to see its daily maximum temperature increase from a current annual average of 73°F to 78°F by 2100 under a low-emission scenario and 82°F under a high-emission scenario (MWDOC 2019). The county currently experiences an average of 4.5 days a year where temperatures reach 95°F; that is projected to increase to as many as 31 days a year by the end of the century.

## Windstorm

Most high wind incidents in the planning area are the result of Santa Ana wind conditions. While high impact wind incidents are not frequent in the area, significant Santa Ana wind events have impacted Orange County. The NOAA Storm Events Database identified 250 events reported within Orange County between January 1, 1950, and June 30, 2024. **Exhibit 3-26**, Major High Wind Events, identifies and describes some of the major events occurring within Orange County.

Date	Location	Magnitude (kts)	Property Damage (dollars)	Description
12/9/1998	Northeast Orange County	81	50,000	Severely disrupted transportation, power, and daily activities. Broken trees and power poles were common throughout the area and power was knocked out to 180,000 customers. Downed power lines also started several wild fires, damaging one house.
12/3/1999	Santa Ana Mountains and Foothills	104	20,000	Most of the major highways in the Inland Empire and through the Santa Ana Mountains were closed, partially due to two semi-tractor trailers that overturned, partially from blowing dust reducing visibility, and partially from road signs and other debris being blown onto the roads.
3/20 – 3/21/2000	Santa Ana Mountains and Foothills	51	25,000	Damage ranged from downed power poles, trees falling on cars and houses, fruit being knocked off of trees, and blowing sand and dust lowering visibility to zero.
1/5 <i>–</i> 1/7/2003	Santa Ana Mountains and Foothills			Numerous trees and power poles were blown down. At least 60 communities were affected. A commuter train was delayed for several hours in Orange County when power poles were blown down onto the track. A brush fire whipped by the winds, damaged 5 houses and burned 150 acres. Sparks from downed power lines started numerous small brush fires, but these were quickly contained. Many houses and at least 300 parked automobiles were damaged by falling trees.
11/23/03	Santa Ana Mountains and Foothills	50	50,000	Trees, power lines, and signs were knocked down.
12/16/04	Northeast Orange	68	20,000	
2/3/05	Santa Ana Mountains and Foothills	53	5,000	
3/31/05	Northeast Orange	54	5,000	Strong Santa Ana winds caused power outages, blew over big rigs, and knocked down trees.
1/22/06	Santa Ana Mountains and Foothills	62	15,000	Surface high pressure over the Great Basin resulted in gusty Santa Ana winds from the San Bernardino mountains, through the Inland

#### Exhibit 3-26. Major High Wind Events

# Orange County Water & Wastewater Multi-Jurisdictional Hazard Mitigation Plan 2024

Date	Location	Magnitude (kts)	Property Damage (dollars)	Description
				Empire, and into Orange County. Wind gusts over 60 mph toppled trees and power poles. Downed power lines caused sporadic power outages. Most of the property damage that occurred came as a direct result of falling trees.
10/21- 22/2007	Santa Ana Mountains and Foothills/Orange County Coastal Areas	74	100,000	Santa Ana winds toppled trees, brought down power lines, and knocked out power to thousands in many parts of Orange County. The strongest winds were felt along the foothills of the Santa Ana Mountains and near the Chino Hills area.
12/16/11	Santa Ana Mountains and Foothills	56	15,000	This system set off intense showers and isolated thunderstorms with pea-sized hail (accumulations in Rancho Cucamonga and Mission Viejo), as well as several funnel clouds spotted east of John Wayne Airport. Most of the rain with this system was confined to Orange County, the Inland Empire, and the northern mountains. Heavy rain was observed in Orange County and the Inland Empire on December 15 and 16, with locations there recording between one-quarter and one-half inch. Strong winds were also observed with this storm, especially on December 16, which was a more widespread wind event than early December, impacting all counties, including San Diego County, with warning-level winds. Several wind gusts of 45-65 mph were reported in the Santa Ana Mountains, the Inland Empire and San Diego County Mountains. Several trees and power poles were downed, leaving many without power. Power poles were reported down in Yorba Linda and around 240 customers were reported without power in Tustin.
1/14/14	Santa Ana Mountains and Foothills	67	2,000	The highest wind gusts occurred in the San Diego County foothills and inland Orange County, including the Santa Ana Mountains. Winds downed fiber optic lines near Santiago Canyon in Orange County.
2/12/16	Orange County Inland	52	20,000	Strong northeasterly winds downed numerous trees near Irvine, Santa Ana, and Orange. Approximately 85 customers lost power in the City of Santa Ana.
2/17/17	Orange County Coastal	52	75,000	A strong trough and associated Pacific cold front swept into Southern California from the west, bringing strong winds, heavy snow, and rain. The storm was noteworthy for the strong prefrontal southerly winds that produced significant tree damage over the coast and valleys. In the

# Orange County Water & Wastewater Multi-Jurisdictional Hazard Mitigation Plan 2024

Date	Location	Magnitude (kts)	Property Damage (dollars)	Description
				mountains the ski resorts received 1-2 feet of snow, while elevations as low as 5,000 feet saw a few inches of accumulation. Rainfall ranged from 2-6 inches along the coastal slopes to 1-2 inches at the coast. At the beaches surf heights reached 8 to 12 feet. An isolated peak gust of 60 mph occurred at San Clemente Pier. Numerous trees were downed over the coastal areas.
12/4/17	Orange County Inland	52	15,000	Report of a large tree downed by strong winds in Orange. Tree damage, minor roof damage, and an exploding transformer were also reported in Santa Ana.
10/15/18	Orange County Inland	71	Unknown	A deep low pressure axis extending across Southern California produced strong region-wide Santa Ana winds. The strongest gust reached 82 mph in Fremont Canyon, with widespread gusts above 40-50 mph reported in valley locations. In Orange County, more than 200 trees were downed, and one person was killed when a tree fell onto their vehicle.
10/26/20	Santa Ana Mountains and Foothills	61	Unknown	A strong offshore wind, a "cool" Santa Ana, produced many gusts exceeding 70 mph and a top gust of 88 mph at Fremont Canyon. The winds toppled big-rig trucks and downed mature trees in the northern Inland Empire. The dry winds also contributed to spreading two fires, the Blue Ridge and Silverado fires in eastern Orange County.

Notes: kts = knots. One knot is equal to 1.151 mph. (NOAA 2024a)

## 3.2.7.3 Location/Geographic Extent

#### Drought

Droughts occur over large regions and thus can affect the entire planning area.

#### Extreme Heat

Extreme heat can occur anywhere in the planning area; however, areas farther from the coast are expected to experience hotter temperatures than coastal communities. For many coastal communities, warmer temperatures are expected to have greater impacts on residents living in homes without air conditioning. Extreme heat events occurring throughout the planning area could also impact utilities and infrastructure if power loss occurs either due to grid reliability or the use of a public safety power shutoff.

#### Windstorm

Santa Ana winds blow westward through the canyons toward the coastal areas of Southern California. Orange County commonly experiences Santa Ana winds between October and March.

The winds are not location specific, but rather impact the entire planning area in different ways based on location, topography, and the nature of the wind event itself.

#### 3.2.7.4 Magnitude/Severity

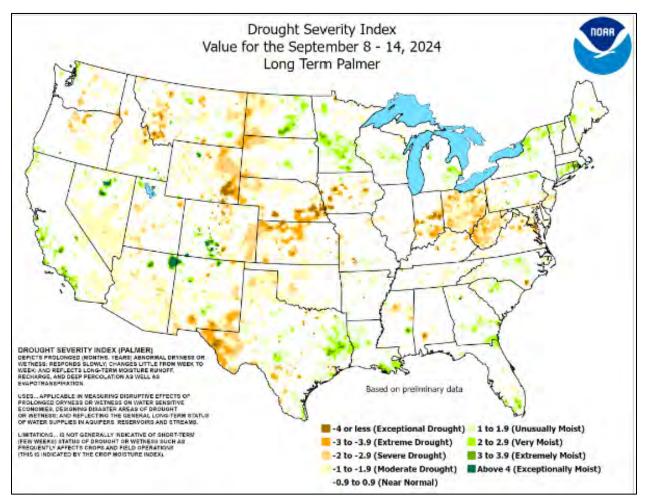
#### Drought

Of the many varied indexes used to measure drought, the PDSI is the most commonly used in the United States. Developed by meteorologist Wayne Palmer, the PDSI is used to measure dryness based on recent temperature compared to the amount of precipitation. It utilizes a number range, where 0 indicates normal conditions, negative numbers indicate drought, and positive numbers indicate wet spells; refer to **Exhibits 3-27 and 3-28**.

#### Exhibit 3-27. Palmer Drought Severity Index

Drought	Wet Spells
-4.0 or less (Extreme Drought)	+2.0 or +2.9 (Unusual Moist Spell)
-3.0 or -3.9 (Severe Drought)	+3.0 or +3.9 (Very Moist Spell)
-2.0 or -2.9 (Moderate Drought)	+4.0 or above (Extremely Moist)
-1.9 to +1.9 (Near Normal)	

Exhibit 3-28. September 8, 2024, PDSI



## Extreme Heat

The minimum threshold for an extreme heat day in the planning area is 93.4°F. The minimum threshold for a warm night in the planning area is 65.1°F. These values are displayed below in **Exhibit 3-29** and **Exhibit 3-30**.

Scenario	Historic (1961-1990)	Projected (2020-2050)	Projected (2050-2070)	Projected (2070-2099)
RCP 4.5	3	8	11	16
RCP 8.5	3	9	18	31

#### Exhibit 3-29. Average Number of Extreme Heat Days

		-	-	
Scenario	Historic (1961-1990)	Projected (2020-2050)	Projected (2050-2070)	Projected (2070-2099)
RCP 4.5	5	22	32	42
RCP 8.5	5	25	54	88

Exhibit 3-30. Average Number of Warm Nights

Cal-Adapt uses an emissions scenario when determining the data in its projections. An emissions scenario is a representation of future greenhouse gas emissions and resulting atmospheric concentrations through time. An emissions scenario illustrates a plausible future so that climate projections for that emissions scenario can be generated, used to inform analysis and decision-making, and compared to other scenarios. The data for these scenarios uses what are called representative concentration pathways (RCPs), which are different scenarios for the future severity of climate change, and comes from California's Fourth Climate Change Assessment, which uses two RCPs from the Fifth Intergovernmental Panel on Climate Change (IPCC) Assessment Report on Climate Change (Cal-Adapt 2024).

- **RCP 4.5 (medium emissions scenario):** A mitigation scenario where greenhouse gas (GHG) emissions peak by 2040 and decline. In California, annual average temperatures under this scenario are projected to increase 2°C to 4°C (35.6°F to 39.2°F) by the end of this century, depending on the location.
- RCP 8.5 (high emissions scenario): A no-mitigation scenario where global GHG emissions continue to rise throughout the 21st century. In California, annual average temperatures under this scenario are projected to increase 4°C to 7°C (39.2°F to 44.6°F) by the end of this century.

Based on these scenarios, extreme heat days throughout the planning area could increase from three days to 31 days by the end of the century. In addition, the average number of warm nights could increase from five nights to 88 nights during that same period.

## Windstorm

Wind speeds are typically 35 knots through and below passes and canyons with gusts 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 Orange County Groundwater 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 backup generation is unavailable. The magnitude and severity of Santa Ana winds are similar throughout the planning area.

## 3.2.7.5 Probability of Future Occurrences

#### Drought

The University of Nebraska-Lincoln has published PDSI maps analyzing trends over the past 100 years (NDMC 2024). In coastal Southern California, from 1895 to 1995, severe droughts occurred 10% to 15% of the time. From 1990 to 1995, severe droughts occurred 10% to 20% of the time.

Based on the droughts listed in **Exhibit 3-25**, Orange County has been in severe or extreme drought for a total of 443 months, or approximately 35.5% of the time since 1920 and approximately 57.7% of the time since 1960.

#### Extreme Heat

Given past occurrences of extreme heat events in the planning area, it is expected that these types of events will occur in the future. What is expected in the future is that extreme heat events will increase in both frequency and duration. With the projected increases in extreme heat days and warm nights, the probability of future occurrence is highly likely.

#### Windstorm

High winds, including Santa Ana winds, will continue to occur annually in Orange County. The probability of future occurrence throughout the planning area is high.

## 3.2.7.6 Climate Change Considerations

## Drought

Climate change is anticipated to abate drought in certain situations; however, projections suggest that future drought events could become more frequent and intense. In some cases, climate change-intensified weather patterns, like El Niño Southern Oscillation (ENSO), may bring more rain to California and the planning area, reducing drought conditions. In other years, climate change may also prolong the La Niña phase of ENSO, which could lead to longer periods with no precipitation in California.

Climate change is also expected to increase the average temperature and cause more frequent and prolonged heatwaves in the region. During these events, water supplies may be affected within the planning area. Hotter temperatures may also lead to increased surface water evaporation, which could lead to greater water consumption. If a drought occurs coupled with heatwave events, additional strain could be placed on water and wastewater infrastructure.

From a regional perspective, warmer overall temperatures in California are anticipated to reduce statewide water supplies. Much of California's water comes from melted snow in the High Sierra. As the average temperature grows warmer with climate change, the precipitation that falls as snow is expected to shift towards rain. As less snow falls, the amount of melted water from the snowpack in the Sierra Nevada will decrease, reducing the water that will flow into the reservoirs and aqueducts that supply Southern California. Reductions in water availability could strain supplies, impacting the quality and availability of water within the Orange County Groundwater Basin.

## Extreme Heat

The primary effect of climate change is warmer average temperatures. The warmest decade on record is 2011-2020, and the warmest three years on record occurred in 2023, 2016, and 2020. As climate change accelerates in the 21st century, it is anticipated that extreme heat events will become more frequent and intense in California. In the planning area specifically, the projected average number of extreme heat days per year could increase from three to 16 (in 2100), assuming global greenhouse gas emissions peak around 2040, then decline. If global greenhouse gas emissions continue to rise until 2100, the number of extreme heat days could increase to as many as 31 days per year. The number of warm nights could increase from five to 42 (in 2100), assuming an emissions peak and decline in 2040 but could increase to as many as 88 if emissions continue to rise until 2100.

#### Windstorm

It is anticipated that the atmospheric rivers that deliver storms to Southern California may intensify because of climate change. While the average number of storms in Southern California will remain the same, storms are expected to increase in intensity between 10% and 20% (Oskin 2014). This increase in storm intensity may also bring more intense winds to the Southern California region, including the planning area.

Studies indicate that Santa Ana wind events may be affected in varying ways by climate change, but it is unknown whether this will affect the frequency and intensity of these events. According to one study that examined two global climate models, there is a projected increase in future Santa Ana events. However, other studies have found that the number of Santa Ana events may decrease by about 20% in the future (Hall et al. 2018). Given the anticipated increases in temperatures throughout the region, future events are anticipated to become more severe in some cases, even if the number of events decreases.

## 3.2.8 Wildland/Urban Fire

## 3.2.8.1 Description (Nature) of the Hazard

#### Wildland Fire

A variety of fire protection challenges exist within Orange County, including structure fires, urban fires, wildland fires, and fires at the wildland/urban interface. This hazard analysis focuses on wildland fires, but also addresses issues specifically related to the wildland/urban interface. There are three categories of interface fires:

- The classic wildland/urban interface exists where well-defined urban and suburban development presses up against open expanses of wildland areas;
- The mixed wildland/urban interface is characterized by isolated homes, subdivisions and small communities situated predominantly in wildland settings; and
- The occluded wildland/urban interface existing where islands of wildland vegetation occur inside a largely urbanized area.

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 severe wildfires in Orange County are drought, insect infestation causing tree decimation (bark beetles), and wildfire suppression. Once a fire has started, several conditions influence its behavior, including fuel topography, weather, drought, and development.

A key challenge Orange County faces regarding the wildfire hazard is the increasing number of houses being built in the wildland/urban interface. Every year the growing population has expanded further and further into the hills and mountains, including forest lands. The increased "interface" between urban/suburban areas and open space areas has produced a significant increase in threats to life and property from fires and has pushed existing fire protection systems beyond original or current design and capability.

#### Urban Fire

An urban fire is a fire that causes damage to buildings or infrastructure in an urban area. In some minor situations, the fire prompts the evacuation of the building's occupants, and the fire is contained within a short amount of time by firefighting teams or the building's fire suppression systems. In severe cases, the fire leads to the complete destruction of the building and can spread to other surrounding properties. Common causes of urban fires include stoves that are accidentally left on, short-circuited electrical equipment, or mishandling of household tools. Larger urban fires may be caused by breaches in gas pipelines, large transportation accidents, or downed electrical transmission wires. Fires may also be intentionally started by arsonists.

## 3.2.8.2 History/Past Occurrences

## Wildland Fire

Although no federally declared wildfire disasters have occurred in Orange County, significant wildfires have impacted Orange County and surrounding areas. Since 1950, the NOAA reports 28 wildfire events occurring in Orange County. **Exhibit 3-31**, Major Wildfires, identifies significant fires that have occurred since 1950.

Date	Location	Description
8/22/2000	San Clemente	Hot temperatures and dry conditions allowed a brush fire to quickly race uphill and ignite the underside of two roofs. Fifteen families were evacuated as more than 40 firefighters worked for several hours to control the blaze.
9/11/2000	San Clemente	A wild fire was fanned by east winds and burned 500 acres before being contained.
8/7/2001	Laguna Beach	A wild fire in a steep canyon near the main toll plaza on the San Joaquin Hills Toll Road (Highway 73).
9/9/2001	El Toro	A brush fire burned 30 acres before it was brought under control.
1/23/2002	Trabuco	Santa Ana winds gusted between 60 to 70 mph for several days across Southwest California.
5/13/2002	Mission Viejo	Extremely dry conditions, above normal temperatures, and gusty winds helped a brush fire, started by an arsonist, to quickly consume 1,100 acres before being controlled. Two trucks and one structure were destroyed. Many residential homes suffered smoke damage and residents were evacuated. Traffic was halted on Highway 241. No injuries occurred.
2/6- 12/2006		Santa Ana winds and Red Flag conditions resulted in the rapid spread of a wildfire in the Santa Ana Mountains. Named the Sierra Fire, this fire burned

#### Exhibit 3-31. Major Wildfires

# Orange County Water & Wastewater Multi-Jurisdictional Hazard Mitigation Plan 2024

Date	Location	Description
		10,854 acres from Sierra Peak to the 241 Toll Road. While evacuations were
		ordered, no structures were burned. Eight minor injuries were reported.
3/11- 14/2007	Santa Ana Mountains and Foothills	The Windy Ridge Fire was intentionally set during the early stages of a Red Flag event at the mouth of Fremont Canyon. Humidity values less than 10% and wind gusts in excess of 40 mph caused the fire to spread quite rapidly across the rain starved hillsides. At the time of the fire, the Santa Ana Fire Station had only measured 1.81 inches of rain on the season, nearly 9 inches below the average rainfall for that date. Mandatory evacuations were posted for 1,200 homes in Anaheim Hills and Orange as the wind-driven fire spread westward. The fire burned 2,036 acres, damaged one home, and destroyed two out-structures before it was extinguished.
10/21/2007	Santa Ana Mountains and Foothills	The Santiago Fire was intentionally set and burned 28,400 acres in Modjeska and Santiago Canyons. The fire destroyed 15 homes and nine outbuildings. An additional 20 structures were damaged. Sixteen firefighters were injured during the blaze.
9/23/2010	Santa Ana Mountains and Foothills	The Long Canyon Fire started in the Cleveland National Forest in eastern Orange County, west of the Ortega Highway near the Riverside County line. Some structures were threatened, but the fire generally burned away from the populated areas, 40 acres total. Three firefighters and one police officer suffered non-life-threatening heat-related and smoke inhalation injuries. One of the Cleveland National Forest's fire engines was destroyed by fire, cause unknown, no injuries.
8/5/2013	Santa Ana Mountains and Foothills	The Falls Fire started off Ortega Highway near Decker Canyon, in Riverside. Due to the fire burning on the Trabuco Ranger District, the San Mateo Wilderness, El Cariso Campground, Blue Jay Campground, the Firefighter Memorial Picnic Area and Wildomar Off-Highway Vehicle area were closed. Road closures included Ortega Hwy 74 from Lake Elsinore west to San Antonio Parkway. Evacuations were ordered for Lakeland Village, Rancho Capistrano and Decker Canyon residents. Evacuation perimeter was between Grand/Ortega and Grand/Corydon. No structures were threatened and no injuries. Minor guardrail damage occurred because of a rock fall along Ortega Highway. The fire burned 1,416 acres before being fully contained.
9/12- 13/2014	Santa Ana Mountains and Foothills	The Silverado Fire began along Silverado Canyon Road in the Cleveland National Forest of the Santa Ana Mountains. The fire burned at a critical rate of spread, threatening power lines and forcing evacuations and road closures. Mandatory Evacuations were ordered from 30331 Silverado Canyon east to the end of the road (fire gate) and included 50 residences affecting approximately 220 people. The American Red Cross opened an evacuation center at 3:30 p.m. at El Modena High School at 3920 East Spring Street. The 12kV line servicing Silverado residents was down. One pole and the downed lines required replacement. There were 71 customers without power in Silverado Canyon. After burning a total of 1,600 acres, the Silverado Fire was completely contained.
9/25/2017	Santa Ana Mountains and Foothills	The Canyon Fire began near Highway 91 in Orange County. The fire spread rapidly due to dry fuel conditions and very low humidity, and firefighting efforts were hindered by a transition from light Santa Ana winds to onshore flow. This initially pushed the fire into the foothills before sending it back eastward toward Corona. The fire was estimated at 1,700+ acres and was threatening residences. Winds calmed over the ensuing days and the fire

Date	Location	Description
		was quickly contained at 2,662 acres. The cause of the wildfire was determined to be a roadside flare.
10/9/2017	Orange County Inland	The Canyon Fire began near the 91 Freeway and Gypsum Canyon Road in Anaheim Hills. The fire spread rapidly, threatening numerous structures. In the first 24 hours the fire consumed more than 7,000 acres. In total, 25 structures were destroyed, 55 were damaged, and 9,217 acres burned. Four injuries were also reported. The cause of the fire was reported to be embers from the Canyon Fire which began September 25 and was contained October 4, 2017.
08/06/2018	Cleveland National Forest	The Holy Fire was a wildfire that burned in the Cleveland National Forest in Orange and Riverside Counties, California. The wildfire started on August 6, 2018, at around 1:15 p.m. Pacific Daylight Time (PDT), in the vicinity of Trabuco Canyon. It burned approximately 23,136 acres, destroyed 18 structures, and caused more than \$25 million in damages. Three firefighters were injured battling the fire, no fatalities were reported.
10/26/2020	Santa Ana Mountains and Foothills	The Silverado Fire started near Orange County Route S-18 (Santiago Canyon Road) and Silverado Canyon Road, fueled by strong Santa Ana winds gusting up to 80 mph (130 km/h) and low humidity. The fire burned in a path similar to that taken by the 2007 Santiago Fire, mostly through terrain that had not seen significant burning in the 13 years since that fire. The fire consumed over 13,390 acres, destroyed one structure, two minor structures and damaged five others. Two firefighters were seriously burned battling this fire, both men survived. Over 90,000 people were forced to be evacuated as a result.
10/26/2020	Orange County Inland	A second brush fire ignited in Southern California amid dangerous high winds, which prompted evacuation orders for Yorba Linda. The blaze was initially dubbed the Green Fire but was later renamed the Blue Ridge Fire. This brush fire started in the Chino Hills area of Corona, west of the Santa Ana River. Spreading west toward Brea. The fire burned some 13,694 acres destroying one structure and damaging 10 others, as a result over 30,000 people were evacuated.
12/2/2020	Santiago Canyon	The Bond Fire was a wildfire that burned 6,686 acres in the Santiago Canyon area of Orange County, California in December 2020. The fire caused evacuations of 25,000 residents and injured two firefighters. The fire was very close to the burn scar of the Silverado Fire, which took place in October 2020. The fire destroyed 31 structures.
05/11/2022	Laguna Niguel	The Coastal Fire was a brushfire which started in the wilderness area near a Laguna Niguel neighborhood, burned approximately 200 acres and destroyed 20 homes in the neighborhood. One injury to a fire fighter was reported.
09/09/2024 (NOAA 2024a)	Santa Ana Mountains, Trabuco Canyon	The Airport Fire was unintentionally ignited by an Orange County public works crew using heavy equipment in Trabuco Canyon. The fire burned over 23,000 acres in the Cleveland National Forest, destroying 160 structures and damaging another 34. Although this incident started in Orange County a majority of the affected areas are located in Riverside County on the eastern slopes of the Santa Ana Mountains.

#### (NOAA 2024a)

At 9:01 a.m. on November 15, 2008, the Corona Fire Department responded to calls reporting a brush fire in Riverside County. Upon arrival it became apparent to first responders the fire would be significant and of a highly destructive nature. At the time of the alarm a Red Flag Warning had been

in effect due to low humidity levels, high temperatures, and strong Santa Ana winds. These conditions along with the terrain of the areas burned facilitated the rapid growth and spread of the fire and significantly affected first responder's efforts of containment and in the protection of property and lives. Initial calls reported the fire's location as west of the Green River Exit off the 91 Freeway in Riverside County. From there the fire quickly advanced in a Northwesterly direction towards Orange County where the fire split into two separate branches shortly after crossing over the county line; the first branch of the fire followed the Santa Ana River Basin southwest into Anaheim hills, and the second continued northwest into Yorba Linda. Both branches of the fire became of concern to the water utilities of Orange County as the fire threatened infrastructure or moved into the service areas of Anaheim, Brea, the YLWD, and Metropolitan's Diemer Filtration Plant facility. Eventually, the fire burned through approximately 30,305 acres and damaged or destroyed over 300 structures in Riverside, San Bernardino, Los Angeles, and Orange counties.

A brush fire erupted along State Route 241 near Santiago Canyon Road in Irvine on the morning of July 13, 2015. Campgrounds near Irvine Lake were evacuated, and three abandoned structures caught fire. The blaze encompassed a total of approximately 214 acres. Around one year later, a fire occurred in the Laguna Coast Wilderness Park near Bommer Ridge Trail on June 26, 2017. The fire burned approximately 47 acres and was reported as contained on June 27, 2017. On August 31, 2016, the Holy Fire started in the early morning just east of Trabuco Canyon in the Cleveland National Forest. The blaze did not threaten any homes; however, it was in an area around Holy Jim Canyon that was difficult for firefighters to reach. The fire burned through approximately 150 acres.

Most recently on September 9, 2024, the Airport Fire erupted in the Cleveland National Forest (in the vicinity of Trabuco and Rose Canyons) burning over 23,000 acres in both Orange and Riverside Counties. Impacts associated with the fire included nearly 200 damaged and destroyed structures and 22 injuries. No loss of life was reported as a result of this incident.

## Urban Fire

A majority of the water/wastewater infrastructure locations throughout the planning area are located in developed areas. Many of these sites are surrounded by existing developments and run a low risk of ignition due to the use of non-combustible materials, and limited vegetation. Even with these typical site conditions on most utility locations, there is still the potential for fires to occur. To date, no significant fire events within the more developed portions of the planning area have occurred affecting water/wastewater infrastructure.

The Coastal Fire (05/11/2022) took place in a wildland/urban interface area within Aliso and Wood Canyons causing damage to the SOCWA Coastal Treatment Plant and affecting wastewater treatment plant operations.

## 3.2.8.3 Location/Geographic Extent

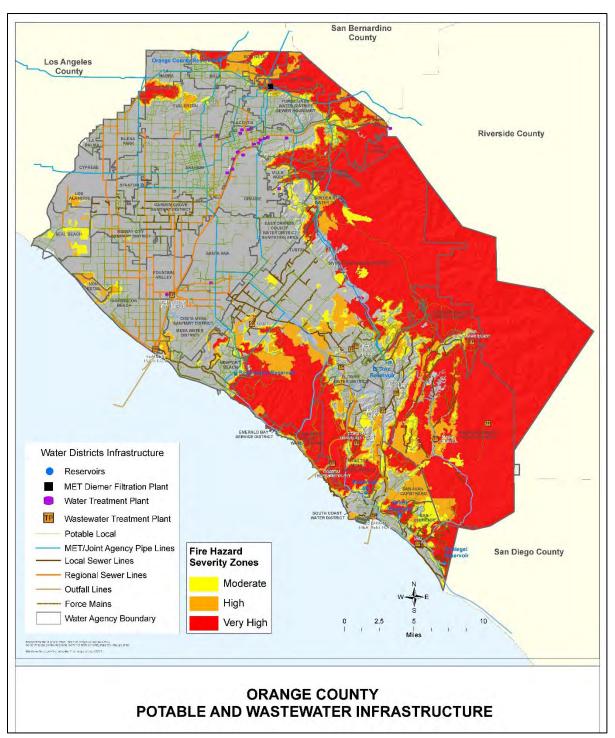
## Wildland Fire

California Department of Forestry and Fire Protection (Cal Fire) prepares fire 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. According to **Exhibit 3-32**, the southern and eastern portions of Orange County are located within High and Very High Fire Severity Zones.

## Urban Fire

Most buildings in the planning area consist of wooden-frame construction, which is vulnerable to catching fire. Structures that do not have wooden frames, such as large wastewater and processing facilities, pumping stations, and other infrastructure are also potentially at risk of urban fires. These locations contain furniture, paper, chemicals, plant material, textiles, and other objects that can be ignited. Given that a very large portion of the planned area is developed, urban fires can occur at any location.

Fires are also likely to occur where there are other types of major infrastructure, such as gas pipelines, power lines, or highways. For example, SCE owns and operates above-ground, highvoltage transmission lines strung from towers on rights-of-way throughout the planning area. The planning area is also crisscrossed by multiple freeways (State routes) and interstates. These freeways/interstates facilitate the transportation of people and goods, which leads to an immense amount of traffic every day. If a major transportation accident were to occur on any of these freeways or roads, it could potentially cause a fire and spread to nearby facilities, buildings, and infrastructure within the planning area.





## 3.2.8.4 Magnitude/Severity

#### Wildland Fire

California experiences large, destructive wildland fires almost every year, and Orange County is no exception. Wildland fires have occurred within Orange County, particularly in the fall, ranging from small, localized fires to disastrous fires covering thousands of acres. The most severe fire protection problem is wildland fire during Santa Ana wind conditions. These conditions have been further exacerbated by more recent drought conditions. Drought causes fuels (both live and dead vegetation) to dry out and become more flammable, increasing the probability of ignition along with the rate of fire spread. If drought continues for an extended period, the number of days with elevated probability of ignition and fire spread increases, raising the risk of widespread burning. The combination of drought conditions, need to maintain water fire flow and the potential for power failure due to Santa Ana wind conditions can impact the magnitude and severity of fires within the planning area.

The magnitude/severity of a wildfire would be dependent upon the location and conditions (e.g., Santa Ana winds) in place at the time. The Fire Hazard Severity Zone maps prepared by Cal Fire (refer to **Exhibit 3-32**) identify the extent and severity of the fire hazard zones within Orange County. Although a fire could start and/or extend beyond these areas, they identify the areas of severity so that measures can be identified to mitigate the rate of spread and reduce the potential intensity of uncontrolled fires that threaten to destroy resources, life, or property.

#### Urban Fire

A fire can only ignite if three elements are present: heat, fuel, and oxygen. If any one of these elements is removed, the fire will extinguish itself. Throughout the planning area, hundreds of thousands of structures have the ability to provide fuel to an urban fire. The National Institute of Standards and Technology, Fire Research Division has developed a scale that measures the increase in temperature and the kind of fire response that develops. **Exhibit 3-33** shows the progression of temperature relative to fire response.

Temperature (°F)	Response
98.6 °F	Average normal human oral/body temperature.
101 °F	Typical body core temperature for a working firefighter.
109 °F	Human body core temperature that may cause death.
111 °F	Human skin temperature when pain is felt.
118 °F	Human skin temperature causing a first-degree burn injury.
130 °F	Hot water causes a scald burn injury with 30 seconds of exposure.
131 °F	Human skin temperature with blistering and second degree burn injury.
140 °F	Temperature when burned human tissue becomes numb.
162 °F	Human skin temperature at which tissue is instantly destroyed.
212 °F	Temperature when water boils and produces steam.
482 °F	Temperature when charring of natural cotton begins.
>572 °F	Modern synthetic protective clothing fabrics begin to char.
≥752 °F	Temperature of gases at the beginning of room flashover.
≈1832 °F	Temperature inside a room undergoing flashover.

#### Exhibit 3-33. Fire Susceptibility Based On Temperature Increase

Once a fire has been ignited, it could conceivably grow to an indefinite size if abundant fuel and oxygen are available. For example, a fire that ignites in one structure could hypothetically continue to expand and even spread to other adjacent structures if there was enough fuel to link the structures together. Fires in confined spaces may occasionally burn so intensely that they consume all the oxygen available and burn out before they can expand. The magnitude and severity of urban fires would be dependent upon the location and the conditions in place at the time. A fire in or near a small structure in an isolated area would not be as severe as a fire in or near a large facility or piece of infrastructure when considering the monetary cost or replacement. However, that same small structure could be a key piece of infrastructure required to maintain the function of services in the planning area and could be considered a greater concern for the people who rely on it for their daily needs.

## 3.2.8.5 Probability of Future Occurrences

## Wildland Fire

Wildfires are a regular feature of many of California's ecosystems and will continue to be in the future. Since the northern, eastern, and southern portions of Orange County are considered wildland/urban interface areas, the county has a higher probability of wildfire risks in those communities and surrounding areas. The specific chance of wildfire in Orange County's wildland/urban interface is not known, but the general vulnerability of the area to fires means that there is a reasonable possibility such an event will occur. According to the Planning Team and based on conditions experienced within the last several years, the probability of Orange County experiencing wildfires is highly likely—near 100% probability in the next year or happens every year.

## Urban Fire

If the conditions for an urban fire exist in the planning area, the planning area will forever be at risk of experiencing an urban fire event. It is impossible to predict the precise likelihood and location of an urban fire emerging in the planning area, given how each fire event has unique origins. However, some areas are at an increased risk, including facilities, buildings, and infrastructure located along or adjacent to natural gas transmission pipelines, powerlines, and the many freeways and roads that run through the planning area. Given the vast amount of activity and fuel and chemicals that pass through the region, the likelihood of an urban fire outbreak in the planning area is probable.

## 3.2.8.6 Climate Change Considerations

#### Wildland Fire

Climate change is expected to cause an increase in temperatures and more frequent and intense drought conditions. This increase will likely increase the amount of dry plant matter available for fuel, increasing wildfire risk statewide. Climate change is expected to increase the number of acres burned annually in the foothills and mountainous areas of Orange County, which are already highly prone to wildfires. However, increases in fuel supplies could cause wildfires to move faster or spread into more developed areas, increasing the future threat for the planning area.

#### Urban Fire

While climate change has been linked to a potential increase in wildfire events, it is not clear exactly how climate change could influence the ignition or behavior of urban fires in the planning area.

# 3.3 Vulnerability Assessment

Vulnerability describes how exposed or susceptible to damage an asset is, and depends on an asset's construction, condition, contents, and the economic value of its functions. A vulnerability analysis predicts the extent of injury and damage on the existing and future built environment that may result from a hazard event of a given intensity in a given area. Due to the interrelatedness of water and wastewater infrastructure and the role each has in public health and safety, vulnerabilities in one community are often related to vulnerabilities in another. Indirect effects can be much more widespread and damaging than direct effects. For example, damage to a major water utility line could result in significant inconveniences and business disruption that would far exceed the cost of repairing the utility line.

The vulnerability assessment quantifies, to the extent feasible using best available data, assets at risk to hazards and estimates potential losses. This section focuses on the risks to the planning area; data for each of the MAs was also evaluated and is included here and in the Jurisdictional Annexes.

## 3.3.1 Asset Inventory

Hazards that occur in Orange County can impact critical facilities located throughout the county. For this 2024 MJHMP, a critical facility is defined as public infrastructure used to provide potable water to the public and maintain wastewater services, necessary to maintain public health and safety. Critical facilities associated with potable water services located within the planning area include wells, water storage tanks, reservoirs with dams, water treatment plants, pump stations, pressure reducing stations, emergency interties, service connections, pipelines, and administrative buildings and utility yards; refer to **Exhibit 3-35, Summary Assets**, at the end of this section. Critical facilities associated with wastewater services located within the planning area include wastewater treatment plants, lift stations, pipelines, and administrative buildings and utility yards (**Exhibit 3-36**).

## 3.3.2 Estimating Potential Exposure and Losses

Orange County covers 948 square miles with several different climate patterns and types of terrain, from the coast to the mountains, which allows for several hazards to affect various parts of Orange County, as described above. Due to the vast area, a hazard event could impact a single jurisdiction or multiple jurisdictions.

To assess the changing conditions within the planning area, an updated analysis of new water and wastewater infrastructure constructed since the last update was developed to inform the 2024 MJHMP update. As part of this update, the infrastructure mapping for new assets was overlaid with hazards having a physical geographic location to estimate exposure to water and wastewater infrastructure. Hazard areas and infrastructure overlays were conducted for wildfires, flooding, fault rupture, earthquakes, liquefaction, landslides, and tsunamis; refer also to the Jurisdictional Annexes. Hazards and infrastructure overlays were not conducted for the remaining hazards because data for these hazards was either not available or is not geographically distinct. Many of these hazards, such as drought, power outage, and high winds/Santa Ana winds affect the entire planning area; therefore, all water and wastewater infrastructure could be potentially susceptible to damage from them. For these hazards are based on historic incidents and the knowledge

that water and wastewater experts have of their critical facilities and the susceptibility of those facilities to these hazards.

For water and wastewater infrastructure pipelines, the length of exposure/impact is given in miles. Other critical facilities are identified by facility/structure type. Exposure characterizes the value of facilities/structures within the hazard zone and is shown as estimated exposure based on the overlay of the hazard on the critical facilities which are assigned a cost of replacement for each type of facility/structure exposed. These replacement costs for the critical facilities were identified by each MA. The loss or exposure value is then determined with the assumption that the given facility/structure is destroyed (worst-case scenario), which is not always the case in hazard events. This assumption was valuable in the planning process, so that the total potential damage value was identified when determining capabilities and mitigation measures for each MA.

**Exhibit 3-34, Unit Replacement Costs of Facilities,** provides average replacement costs used for critical facilities and infrastructure listed in all subsequent exposure/loss tables.

Abbreviation	Name	Replacement Cost
WST	Water Storage Tank	\$20,000,000
RES	Reservoir (with a dam)	\$50,000,000
WTP	Water Treatment Plant (Diemer Filtration Plant)	\$350,000,000
WTP	Water Treatment Plant by retail agency	\$10,000,000
PS	Pump Station (South County Pump Station)	\$35,000,000
PS	Retail Water Agency Pump Station	\$8,000,000
PRS	Pressure Reducing Station (Metropolitan facility)	\$52,000,000
PRS	Pressure Reducing Station for retail agency	\$2,000,000
EIT	Emergency Interties	\$2,000,000
SC	Service Connector	\$3,000,000
ADM	Administration (large administration building)	\$8,000,000
LS	Wastewater Pump Station/Lift Station by OC San/SOCWA	\$4,000,000
LS	Wastewater Pump Station/Lift Station by retail agency	\$5,000,000
WWTP	Wastewater Water Treatment Plant	\$30,000,000
WELL	Well	\$5,000,000
PP	Power Plant (Metropolitan Yorba Linda Power Plant)	\$12,000,000

#### Exhibit 3-34. Unit Replacement Costs of Facilities

(1) Based on the highest cost for typical facility from among the MAs' facility values submitted. These results are conservatively high replacement costs for some retail agencies.

**Exhibit 3-35** provides the total inventory for the critical facilities and infrastructure by jurisdiction. Estimated exposure for critical infrastructure by MA is provided in the Jurisdiction Annexes. **Exhibit 3-36, Planning Area Critical Facilities and Infrastructure Exposure Costs by Hazard,** provides a summary of exposure for the planning area by hazard. The costs identified reflect cost of replacement in a worst-case scenario (defined as the highest cost submitted from among all the MAs in the study process, excluding the regional facilities, as this would overstate the local costs). For example, Garden Grove may have identified a cost of \$3 million to replace a well and Buena Park may identify a cost of \$3.5 million to replace a well; however, \$3.5 million would be used as the replacement cost for all wells within the planning area. This methodology was used for consistency across the planning area and selection of the highest cost helps ensure that appropriate costs are considered when requesting grants. For any detailed proposals submitted to FEMA, actual costs for mitigation and detailed estimates of the benefits of the mitigation measure will be prepared and submitted. The costs included herein provide a relative measure of the impacts of the various hazards.

For additional detail on the exposure of facilities by MA, refer to the Jurisdictional Annexes. The Jurisdiction Annexes include a discussion of hazards and vulnerabilities specific to each MA, a discussion of their capabilities to address these losses, and identifies the actions to help mitigate damage to their infrastructure against hazards identified in the risk assessment.

## 3.3.3 Land Use and Development Trends/Changes in Development

The MAs provide water and wastewater services to majority of Orange County, which has a population of almost 3.2 million people. Depending upon the hazard and its magnitude and duration, a considerable number of people and businesses could be impacted. Of primary concern would be a hazard that results in the loss of water supply and wastewater services to the planning area. As discussed previously, a hazard could result in direct physical damage to water/wastewater infrastructure, as well as indirect damage resulting from business disruption.

Although Orange County is urbanized and predominately built out, the Southern California Association of Governments (SCAG) projects continued population, employment, and housing growth into 2040. The County of Orange and its incorporated cities maintain General Plans, which identify the planned growth and development for their respective jurisdictions. The planning area includes a wide variety of residential and non-residential land uses. Water and wastewater service providers will continue to work with the communities they serve to identify service needs, including the construction, expansion, or modification of water and wastewater infrastructure. The construction of new facilities or infrastructure will be completed in coordination with these communities to ensure compliance with appropriate codes and regulations, including consideration of potential hazards.

Population growth and development in Orange County has increased since 2012. According to the Department of Finance, the population for the county is expected to rise by approximately 0.31% in 2024 from the previous year. For a total population of approximately 3,150.835 people living within Orange County. Along with population growth has come an increase in development, increasing demands on water and wastewater infrastructure. Many Orange County cities have seen shifts in development toward higher-density residential and mixed-use development projects in response to the demand for housing.

Due to the highly developed nature of Orange County along with the presence of natural hazards throughout the area such as earthquakes, liquefaction, flood risk, and wildfires, development and population growth has continued to occur within areas of risk. Recent drought conditions have placed greater emphasis on the ability for new development to be served by water supplies and planning for prolonged drought conditions. Water and wastewater agencies continue to coordinate with Orange County, cities, and each other to meet the demands of the respective communities they serve while also strengthening regional and local infrastructure and overall reliability in the event of a hazard. MWDOC and many of the MAs have modified their infrastructure to include EOCs and water infrastructure, to mitigate potential threats.

#### 3.3.4 Vulnerable Populations

Water supplies for safe drinking, sanitation, and hygiene are relied upon by the entire population. However, there are populations within the MA service areas that would be considered more vulnerable in the event of a hazard that affects water and wastewater infrastructure. These 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. Vulnerable populations are more significantly impacted in the event of a hazard.

## 3.4 Summary of Vulnerability

Due to the nature of water and wastewater infrastructure and its location throughout Orange County, there is some form of infrastructure that intersects with a hazard area. **Exhibit 3-35** identifies the infrastructure that intersects with hazards that have a specific geographic area (e.g., fire hazard, liquefaction); however, the entire MA service area also intersects with hazards that are not geographically specific (e.g., drought, power outage). The variety of hazards and the varying magnitude and probability of occurrence make it challenging to assess the hazards that pose the greatest risk to the MAs. The potential losses vary greatly depending upon the hazard and resulting impact to infrastructure. The challenge is further magnified by the potential health and economic impacts that could occur in the event water supplies are disrupted.

## 3.4.1 Impact Vulnerability Discussions

The following discussions identify key vulnerabilities and impacts to population throughout the planning area. For most of the MAs their customers will experience these impacts, however each Annex includes specific discussions for key impacts and vulnerabilities that are different from the overall planning area. Based on the FEMA National Risk Index (NRI), Orange County received a score of 99.78, indicating very high risk. This rating was determined based on very high expected annual losses, relatively moderate social vulnerability, and very low community resilience.

In addition to the NRI, MWDOC and the MAs reviewed the 2022 Center for Disease Control – Agency for Toxic Substances and Disease Registry Social Vulnerability Index (SVI) for Orange County. The SVI refers to a community's capacity to prepare for and respond to the stress of hazardous events like those profiled in this plan. Using 16 census derived factors, the CDC organized them into four categories (socioeconomic status, household characteristics, racial and ethnic minority status, and housing type/ transportation), which when combined indicate the social vulnerability of census tracts within the planning area. **Exhibit 3-37** illustrates the social vulnerability determined for each census tract within the planning area using the CDC's methodology.

## 3.4.1.1 Human-Caused Hazards: Power Outage

Power outages within the planning area typically are associated with Public Safety Power Shutoff (PSPS) events. While many PSPS circuits are located throughout Orange County, those that are most prone to shutoff are typically located within the hillsides and mountainous areas of the planning area. These same areas are also fire prone areas as identified in **Exhibit 3-32**. Populations located within these areas of the planning area typically have lower social vulnerability. In addition to these areas, other parts of the planning area contain populations that may be impacted by power outages. These populations may include individuals that rely on electricity to run medical equipment, elderly residents that require heating and cooling to stay comfortable/safe. While most of these populations are located in the north/central portion of the planning area, many of these customers are supported by cities that are not participants in this plan. In addition, the MAs participating in this plan, coordinate closely with their local jurisdictions to better understand the needs of residents and businesses that could be affected by power outage.

## 3.4.1.2 Wildfire (NRI – Relatively High)

Wildfires within the planning area are located within the elevated portions of the County. The majority of these areas are in the northern, eastern, and southern portions with a few areas in the northern typically are associated with Public Safety Power Shutoff (PSPS) events. While many PSPS circuits are located throughout Orange County, those that are most prone to shutoff are typically located within the hillsides and mountainous areas of the planning area. These same areas are also fire prone areas as identified in **Exhibit 3-32**. Populations located within these areas of the planning area typically have lower social vulnerability.

## 3.4.1.3 Human-Caused Hazards: Terrorism (Cyber Threat)

All residents, businesses, and public agencies are vulnerable to cyber threats. While many populations in the planning area can be victimized by these types of incidents, MWDOC and the MAs are considered significant targets for this type of activity due to the critical significance of the infrastructure they own and functions they support. Various populations can be vulnerable to cyber threats based on their technological acumen, understanding of computer systems, and/or new or emerging threats that little knowledge is known about. Populations without financial resources that rely on technology may be most vulnerable to this threat.

## 3.4.1.4 Seismic Hazards: Seismic Shaking (NRI – Very High)

Seismic shaking events (earthquakes) have the potential to occur throughout the planning area. **Exhibit 3-20** identifies seismically prone areas, which can impact populations with high social vulnerability. Populations experiencing greater impacts from an earthquake include seniors, immunocompromised, the unhoused, residents with low annual household incomes, renters, and those on fixed incomes. Many of these populations may not have the disposable income necessary to rebuild after an earthquake or if renting may not have control over when repairs occur.

## 3.4.1.5 Seismic Hazards: Liquefaction

Liquefaction susceptibility within the planning area is predominantly located in the coastal areas and Santa Ana River floodplain (refer to **Exhibit 3-21**). Other portions of the planning area containing streams and other waterways are also susceptible to liquefaction. While it has not occurred frequently in the past, the potential for this type of an event is closely linked to an earthquake (see above). For many of the areas in the northern portion of the planning area, liquefaction impacts may be especially difficult for communities experiencing high social vulnerability. These communities may include residents with low annual household incomes, renters, and those on fixed incomes. For these populations, impacts from a strong earthquake that causes liquefaction will magnify effects on these populations.

## 3.4.1.6 Severe Weather: Windstorm (NRI – Relatively Low)

Windstorms like the Santa Ana Winds can occur at various times throughout the year. These events are most common in the fall and typically result in loss of tree limbs, downed trees, and can even cause structural damage to buildings and infrastructure. During these events, utilities may conduct Public Safety Power Shutoff (PSPS) events to reduce the potential for wildfire ignition. The effects of windstorms can vary across the planning area based on location and windspeed. Most residents may experience minor inconveniences (lost or misplaced property, additional cleanup of properties, etc.), while some may experience property damage or loss (fallen trees, damage to buildings/vehicles). Populations that experience greater impacts during these events include those with higher social vulnerability (seniors, immunocompromised, the unhoused) that may have

limited incomes and are unable to afford repairs or unable to make repairs. In addition, renters may have little control over the resilience of their properties to these events nor the ability to make repairs, if damage occurs.

#### 3.4.1.7 Severe Weather: Extreme Heat (NRI – Relatively Moderate)

Extreme Heat within the planning area can occur in a variety of locations. For many of the coastal communities that enjoy mild temperatures year round, extreme heat conditions may offer challenges since most of the residences within these communities have little or no air conditioning. While the more inland parts of the planning area experience larger temperature shifts, which can see temperatures surpassing 100° F. While most of the coastal portions of the planning area do not experience extreme heat conditions often, when these conditions occur, those with higher social vulnerability (seniors, immunocompromised, the unhoused) may be impacted to a greater degree from these types of incidents. In comparison the inland portions of the planning area experience lower social vulnerability, however populations living in substandard structures (poorly insulated, structural deficiencies), as well as the unhoused would experience greater impacts to extreme heat conditions.

## 3.4.1.8 Severe Weather: Drought (NRI – Relatively Low)

Drought incidents within the planning area are typically cyclical. During these events, MWDOC and the MAs determine the severity of the incident and monitor its effects on water supplies and availability. Most of the water providers that rely on groundwater are located in the northern portion of the County, which is relatively resilient to the effects of drought. Several MAs in the southern portion of the County rely on Metropolitan for their water supplies, which may be impacted by drought easier. Customers located in these portions of the planning area have a lower social vulnerability and are able to accommodate fluctuations in water availability and cost. Key populations that may be impacted during these events are those on fixed incomes, individuals with medical conditions that require water, and businesses that use large quantities of water that would have to curtail or reduce operations if restrictions are put in place.

## 3.4.1.9 Dam/Reservoir Failure

Dam/Reservoirs Failure within the planning area typically occurs downstream from dam facilities constructed within the County or in close proximity. The primary facility with the greatest potential impacts associated with dam failure is the Prado Dam located along the Santa Ana River in San Bernardino and Riverside Counties. In addition numerous other dam facilities within the planning area increase the risk associated with dam failure. Populations at greatest risk for this type of hazard event are residents and property owners immediately downstream of these facilities. In addition, any unhoused individuals living within the stream course below the dam may be susceptible as they may not have adequate warning of a failure or the means to evacuate quickly.

#### 3.4.1.10 Flood (NRI – Relatively High)

Flooding within the planning area typically occurs along drainages, stream courses, and low lying or relatively flat areas. Much of the development in the planning area has increased impervious surfaces, which have increased both the quantity and velocity of storm flows exacerbating flooding. Populations most affected by flood include unhoused residents living within drainages, property owners within or in close proximity to areas identified in FEMA flood zones, and residents in close proximity to storm drain infrastructure that is undersized or poorly maintained. For many

communities where a lack of investment in upgraded storm drains or very flat topography may experience flooding in areas not easily identifiable on maps.

## 3.4.1.11 Coastal Hazards: Coastal Storm

Coastal storms occur throughout the planning area. Due to the flat topography in the northern portion of the County, coastal storms tend to impact much of the area with flooding, high winds, and intense rainfall. Populations typically affected during these events include lower income residents, residents living in substandard structures or structures with deferred maintenance issues. Many of the impacts associated with coastal storms are similar to those described under the flood and severe weather hazards identified above.

## 3.4.1.12 Coastal Hazards: Coastal Erosion

Coastal erosion is isolated to the coastal portions of the planning area. Impacts to these areas predominantly affects residential developments and open space areas along the coastline. The populations inhabiting these areas generally have a higher household income and some of the lowest social vulnerability in the region. Key populations that may be affected by coastal erosion include property owners along the shoreline and visitors to the open space areas (beaches, wetlands, etc...). Vulnerable populations affected by this hazard may include renters, lower income residents, and residents unable to adequately protect/repair their properties if damaged by erosion.

## 3.4.1.13 Seismic Hazards: Earthquake Fault Rupture

Areas prone to earthquake fault rupture within the planning area are primarily located along the active splays of the Newport-Inglewood and Whittier-Elsinore Fault Zones. Properties located along and in close proximity to these faults as well as any other active faults in the planning area are the most susceptible to the effects of fault rupture. While these areas are located in some of the more expensive communities within Orange County, populations most vulnerable to the effects of this type of incident would include renters, lower income residents, and seniors that are unable to make the necessary repairs if impacted.

#### 3.4.1.14 Geological Hazards: Landslide and Mudflow (NRI – Relatively Moderate)

Landslides and mudflow hazards within the planning area are typically located in areas of higher elevation along hillsides and the foothills of the Santa Ana Mountains. These locations typically accommodate lower density residential developments housing residents with higher median incomes and lower social vulnerability. Populations within these areas that could be affected by these incidents are the unhoused living within open space and wildland areas, lower income residents that have found more affordable housing in lower density development within the hillsides/mountains and property owners that are underinsured, and renters.

#### 3.4.1.15 Coastal Hazards: Sea Level Rise

Sea level rise is a hazard that is isolated to the coastal portions of the planning area. Inundation associated with rising sea levels would predominantly affect residential developments and open space areas within low lying coastal areas. In addition, harbors, man-made islands, and water oriented uses would be impacted by increases in mean sea level. The populations inhabiting these areas generally have a higher household income and some of the lowest social vulnerability in the region. Key populations that may be affected by sea level rise may include seniors, residents with

mobility issues, and visitors and commuters unfamiliar to the area experiencing flooding in locations that previously did not flood.

#### 3.4.1.16 Human-Caused Hazards: Contamination/Saltwater Intrusion

Contamination and Saltwater Intrusion impacts within the planning area would primarily we isolated to water agencies/providers. Individuals impacted by this hazard would typically be customers connected to a water system that becomes contaminated. While the likelihood of this is remote, if this type of event were to occur, customers connected to water infrastructure facilities that do not have the latest protective measures may be more susceptible to these effects.

#### 3.4.1.17 Human-Caused Hazards: Terrorism (MCI)

Terrorism and Mass Casualty Incidents within the planning area can occur almost anywhere. While many of the facilities identified in this plan could be sensitive targets, most events of this type could occur anywhere, where large populations may congregate. Impacts to populations from these types of events can vary from physical harm to emotional and psychological stress. While it is difficult to determine specific populations that would be most vulnerable to these types of events, it is reasonable to assume that lower income residents and the elderly would experience greater impacts and have fewer resources to support their recovery after an event.

#### 3.4.1.18 Human-Caused Hazards: Hazardous Materials

Hazardous material releases within the planning area can occur at individual sites containing these substances, along roadways where materials are transported, or in the vicinity of an existing location if a release occurs and materials migrate away from the point of origin. Populations at risk of this type of hazard event include residents and employees of properties located close to sites containing these materials as well as occupants of properties along major roadways that accommodate hazardous materials movement.

#### 3.4.1.19 Urban Fire

Urban fires can occur anywhere development is located within the planning area. Populations located in the wildland urban interface may be at a higher risk to fire impacts given their proximity to fire prone areas. In addition, populations living in substandard conditions or in structures that do not meet current code requirements are especially vulnerable to urban fire impacts.

#### 3.4.1.20 Geological Hazards: Land Subsidence

Land subsidence within the planning area generally occurs in the relatively flat portions of the County along the Santa Ana River and floodplain. The subsidence experienced in the planning area has historically occurred as a result of groundwater extraction. For the past 20 years, OCWD and other MAs have been actively managing groundwater elevations and aquifer recharge, which has reduced the risk associated with land subsidence. Localized subsidence may still occur throughout the planning area due to weak soils or substandard soil engineering. For most populations within the planning area, the effects of land subsidence are slow and typically consist of damage to buildings and infrastructure. Populations that experience greater impacts from this hazard include renters and owners that do not have the resources necessary to repair facilities adequately.

## 3.4.1.21 Geological Hazards: Expansive Soils

Expansive soils within the planning area are predominantly located in low lying areas where peat and other fine sediments have been deposited in the recent past. While most of the impacts associated with this condition can be mitigated through adherence to the building code, existing structures and development are at the greatest risk, depending on the type of development/ construction and the nature of the underlying soils. For most populations within the planning area, the effects of expansive soils are slow and typically consist of structural damage to buildings and infrastructure. Populations that experience greater impacts from this hazard include renters and owners that do not have the resources necessary to repair facilities adequately.

## 3.4.1.22 Coastal Hazards: Tsunami (NRI – Relatively Low)

Tsunami hazards are isolated to the coastal portions of the planning area. Inundation of these areas predominantly affects residential developments and open space areas along the coastline. The populations inhabiting these areas generally have a higher household income and some of the lowest social vulnerability in the region. Key populations that may be affected by tsunami are visitors to these areas from other parts of the City, southern California, or tourists from other states/nations. In addition, for visitors exposed to tsunami impacts may experience greater impacts if they have limited motion, experience disabilities, and/or do not speak the language used during tsunami event notifications. Visitors to these areas, especially those unfamiliar with the risks associated with tsunami hazards may experience greater susceptibility to impacts of this type.

#### **Risk Assessment**

## Exhibit 3-35. Summary Assets

												F	Facility/In	frastructu	re													
									E	xisting			Future															
Member Agency	Wells	Dams/Reservoirs	Water Treatment Plant	Potable Water System Pipeline (mile)	Water Storage Tank	Pump Stations	Pressure Reducing Station	Imported Water Connections	Emergency Intertie	Hydrants	Potable Service Connections	Administrative/ Office/Lab/ Maintenance Facilities	Wastewater System Pipeline (mile)	Wastewater/Water Reclamation Plant	WW Service Connections	Sewer Lift Stations	Heli Pad/Heli Hydrant	Wells	Dams/Reservoirs	Potable Water System Pipeline (mile)	Water Treatment Plant	Administrative/Office/ Maintenance Facilities	Water Storage Tank	Pump Stations	Pressure Reducing Station	Wastewater System Pipeline (mile)	Lab	Sewar Lift Station
Metropolitan Water District of Orange County	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orange County Water District	901	27	0	15	5	9	0	2	0	0	4	12	40	2	0	0	0	6	0	0	0	0	0	0	1	0	0	0
Orange County Sanitation District	0	0	0	0	0	0	0	0	0	0	0	1	380	2	0	16	0	0	0	0	0	0	0	0	0	0	1	0
South Orange County Wastewater Authority	0	0	0	0	0	0	0	0	0	0	0	6	25	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0
El Toro Water District	0	2	0	168	5	9	19	4	12	1,964	9,871	2	114	1	8,950	11	0	0	0	0	0	0	0	0	0	0	0	0
Laguna Beach County Water District	0	0	3	135	21*	14	19	3	14	952	8,800	2	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
Mesa Water District	9	0	1	317	3	2	0	3	15	3,404	25,300	1	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0
Moulton Niguel Water District	0	0	0	655	28	25	16	12	19	7,168	53,620	2	501	2	50,682	17	0	0	0	2	0	1	0	0	1	10	1	0
Santa Margarita Water District	0	3	0	626	34	21	25	22	4	4,250	54,254	1	630	3	57,537	19	0	0	2	3	0	0	22	21	25	20	0	0
Serrano Water District	2	1	1	43	2	5	0	1	0	370	2,385	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
South Coast Water District	1	0	2	169	14	9	25	4	18	1,694	17,240	9	140	1	14,764	13	0	1	0	0	0	0	1	0	0	0	0	1
Trabuco Canyon Water District	2	2	2*	65	9	12	11	2	6	600	4,150	2	47	1	3,670	8	0	1	0	2	0	0	2	2	5	2	0	0
Yorba Linda Water District	10	0	1	354	14	12	45	4	9	4,045	25,471	2	269	0	24,291	1	4	1	0	4	0	0	0	0	2	1	0	0
Irvine Ranch Water District	30	5	4	2,034	49	58	363	21	36	18,929	125,404	8	1,496	3	113,945	11	0	2	0	0	0	0	1	2	1	0	0	0
Costa Mesa Sanitary District	0	0	0	0	0	0	0	0	0	0	0	2	224	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0

(1) Regional water systems identified here are co-owned and managed by multiple utilities.

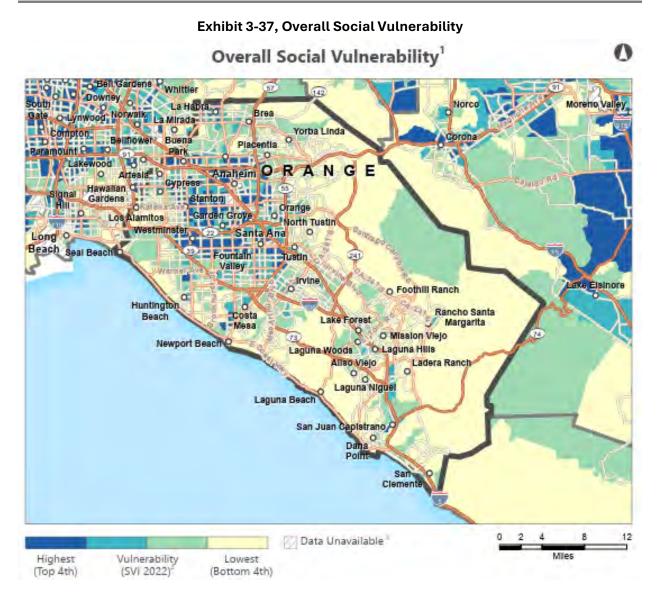
## Orange County Water & Wastewater Multi-Jurisdictional Hazard Mitigation Plan 2024

		Infrastructure Type															
Hazard		Administration Buildings	Interties (#)	Pump Stations (#)	Treatment Plants (#)	Lift Stations (#)	Pressure Control Stations (#)	Reservoirs (#)	Water Storage Tanks (#)	Wells (#)	Effluent Pipeline (miles)	Potable Pipeline (miles)	Wastewater Pipeline (miles)	Manholes	Heli Pad/ Heli Hydrant	Replacement Costs	
Fire Hazard	Moderate	0	14	13	0	7	0	13	0	0	0.5	45.02	37.78	0	0	\$148,340,000	
Zone	High	igh 0 5 6 1 0		0	0	13	0	1	1.0	59.03	66.8	0	0	\$172,964,000			
	Very High	0	24	48	2	10	1	72	1	5	1.6	151.14	101.75	0	0	\$609,812,000	
FEMA Flood	100-Year	0	4	2	2	7	0	15	0	9	0.5	38.73	137.84	70	0	\$183,256,000	
Zone	500-Year	0	18	7	2	11	4	8	0	38	2.1	106.05	308.36	535	0	\$297,288,000	
Alquist-Priolo	Fault Zone	0	0	0	0	0	2	0	0	0	0	4.29	1.81	0	0	\$440,000	
Ground	Moderate	0	22	40	0	2	1	50	1	0	0	86.18	53.59	0	0	\$391,736,000	
Shaking	High			11	67	5.2	370.53	727.72	5,708	1	\$1,387,396,357						
	Extreme	1	24	25	1	10	1	43	0	26	0	169.53	391.85	48	2	\$561,504,000	
Liquefaction	Moderate	0	13	13	3	3	1	14	8	41	0	85.53	484.64	76	0	\$321,936,000	
	High	3	25	16	6	2	20	17	1	42	0	91.48	198.47	1,075	0	\$553,840,000	
	Very High	0	0	0	1	0	2	0	0	0	0	10.39	16.74	0	0	\$23,104,000	
	Unknown	0	13	7	1	1	0	1	0	7	0	54.45	100.4	0	0	\$142,080,000	
Landslide Zone		0	5	24	0	7	8	28	7	0	2.8	40.83	46.64	17	0	\$227,676,000	
Tsunami Zone	;	3	0	58	4	9	77	1	11	10	0.6	6.75	7.42	5,653	4	\$299,752,357	

## Exhibit 3-36. Planning Area Critical Facilities and Infrastructure Exposure Costs by Hazard

(1) Based on the highest cost for typical facility from among the MAs' facility values submitted. These results are conservatively high replacement costs for some retail agencies.

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### **SECTION 4: MITIGATION STRATEGY**

Planning is the cornerstone to successful hazard mitigation efforts. Citizens, local government, and private interests with proactive policies can reduce damages and impacts associated with natural and human-caused hazards. Benefits realized by implementing hazard mitigation measures include:

- Saving lives by removing people from hazard-prone situations.
- Limiting property damage by regulating development in hazard areas.
- Reducing economic impacts by minimizing outages of essential services during and after these events.
- Saving money for taxpayers by reducing the need for services during a disaster.
- Speeding disaster recovery and post-disaster relief funds.
- Demonstrating a strong commitment to the health and safety of the community.

Relocating people, institutions, and businesses from hazard-prone areas saves property and lives. Removal or protection of the structures within hazard-prone areas means that there is less to pay for disaster recovery or for service outages during an event. Having alternative service plans for essential services, such as water and sewer operations, protects structures from fire and allows residents and businesses to continue functioning or to restore normal functions quicker following a disaster. Post-event, recovery crews will have less to do because there will be less damage. Implementation of these measures speeds the overall recovery process.

### 4.1 Hazard Mitigation Overview

The mitigation strategy and actions were developed by the Planning Team based on an in-depth review of the vulnerabilities and capabilities described in the plan. The mitigation actions described in the Jurisdictional Annexes represent each MA's risk-based approach for reducing and/or eliminating the potential losses as identified in **Section 3, Risk Assessment**.

As part of the update process, the hazard mitigation goals were reviewed and refined. It was determined that the overarching mitigation goals were the same for all MAs. Therefore, one set of goals were identified for the MJHMP, as discussed below. If additional, jurisdiction-specific goals were identified by an MA, they are included in the Jurisdictional Annex.

MAs provided a comprehensive review of their mitigation actions to assess their ability to reduce risk and vulnerability to the jurisdiction from identified hazards. Upon review of each mitigation action, an assessment was made as to whether the mitigation action should be carried forward into the 2024 MJHMP and/or be revised/modified or removed to reflect changing conditions or priorities. Mitigation actions that were deemed complete during the current plan period were identified and removed (refer to the Jurisdictional Annexes). New mitigation measures were also identified.

### 4.1.1 FEMA's National Flood Insurance Program

In 1968, the U.S. Congress created the National Flood Insurance Program (NFIP) to provide affordable insurance to property owners while also encouraging communities to adopt and enforce floodplain management regulations. Community participation is voluntary; however, it is required to receive certain grants and funding from FEMA. The Orange County Flood Division (OC Flood) is a participant in the program and administers the floodplains within the unincorporated areas of Orange County. Within the incorporated areas, Orange County cities administer their floodplains.

Since the creation of NFIP, OC Flood has worked cooperatively with cities in Orange County to reduce the floodplain area by constructing flood control facilities that provide 100-year flood protection. Such facilities typically traverse through the cities and ultimately outlet into the Pacific Ocean. All cities within Orange County are participants in the program. As participants in this HMP update, both water and wastewater districts do not participate in the NFIP nor do they monitor properties within their jurisdictional boundaries as this responsibility falls on the county or cities they support.

#### Repetitive Loss Properties

According to the NFIP, a repetitive loss structure is an insured building that has had two or more losses of at least \$1,000 each being paid under the NFIP within any 10-year period since 1978. MWDOC and MAs are not participants in the NFIP. Based on this status they do not regulate flood management for other property owners and solely focus on flood management of their owner properties/facilities.

### 4.2 Hazard Mitigation Goals

Mitigation goals are defined as general guidelines explaining what each jurisdiction wants to achieve in terms of hazard risk reduction and loss prevention. Goal statements are typically long-range, policy-oriented statements representing jurisdiction-wide visions. The goals identified in the previous plan were reviewed by the Planning Team. Through the update process, it was determined that these previous goals were adequate and relevant to MWDOC and the MAs. Based on discussions with the Planning Team only minor revisions to two goals were recommended to better align with current priorities. The following hazard mitigation goals have been identified for this 2024 MJHMP:

- **Goal 1:** Minimize vulnerabilities of critical facilities and infrastructure to minimize damages, loss of life, and injury to human life caused by 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 in order to increase the community resilience.
- **Goal 5:** Eliminate or minimize wastewater/recycled water spills and overflows (wastewater agencies).
- **Goal 6:** Protect water quality and supply, critical aquatic resources, and habitat to ensure a safe water supply.
- **Goal 7:** Strengthen emergency response services, workforce training, and education enhancement to ensure preparedness, response, and recovery during any major or multi-hazard event.

The MJHMP goals guide the direction of future activities aimed at reducing risk and preventing loss from natural and human-caused hazards. The goals also serve as checkpoints as the MAs begin implementing mitigation action items. Mitigation goals do not account for implementation cost, schedule, funding sources, etc. Goals represent what each MA wants to achieve, whereas the mitigation actions provide the actions needed to achieve the goals.

### 4.3 Identify and Prioritize Mitigation Actions

Mitigation actions were identified, evaluated, and prioritized by the MAs. They provide a list of activities that the MAs will use to reduce their risk of potential hazards. Some of these actions may be eligible for funding through Federal and State grant programs and other funding sources as made available by the MAs or other agencies/organizations. The mitigation actions are intended to address the comprehensive range of identified hazards for each MA, while some actions may address risk reduction from multiple hazards.

A detailed list of mitigation actions for each MA is provided in their respective Jurisdictional Annexes. The process used by the Planning Team to identify hazard mitigation actions for this MJHMP included the following:

- Review of the risk assessment presented in Section 3;
- Review of the capabilities assessment presented for each MA in the Jurisdictional Annexes; and
- Team discussion of new concerns/issues that need to be addressed to reduce hazards to critical water/wastewater infrastructure.

The mitigation actions identify the hazard, proposed mitigation action, location/facility, local planning mechanism, risk, cost, timeframe, possible funding sources, status, and status rationale, as applicable.

MAs conducted a capabilities assessment (provided in the Jurisdictional Annexes), to identify existing local agencies, personnel, planning tools, public policy and programs, technology, and funds that have the capability to support hazard mitigation activities and strategies outlined in this MJHMP. To identify the capabilities, the Planning Team collaborated to identify current local capabilities and mechanisms available for reducing damage from future hazard events. The capabilities and resources were reviewed while developing the 2024 MJHMP, and opportunities to enhance mitigation were identified where applicable. After completion of the capabilities and strategies and actions.

FEMA's Social, Technical, Administrative, Political, Legal, Economic, and Environmental (STAPLEE) criteria was used to identify, evaluate, and prioritize mitigation actions based on existing local conditions. Using this method each MA considered the STAPLEE criteria regarding the feasibility and implementation of a mitigation action; refer to **Exhibit 4-1, STAPLEE Review and Selection Criteria.** This process was used to help ensure that the most equitable and feasible actions would be undertaken based on each MA's unique capabilities.

STAPLEE Review	Selection Criteria	
Social	Is the proposed action socially acceptable to the jurisdiction and surrounding community? Any 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?	

### Exhibit 4-1. STAPLEE Review and Selection Criteria

STAPLEE Review	Selection Criteria
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?
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, non-profit, 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?

In some instances, MAs revised the priorities of mitigation actions or removed mitigation actions all together. If the mitigation action was completed and no further action would be needed, the action was removed. However, in some instances it was determined that a mitigation action was no longer relevant due to technical changes or advances, a change in service conditions, or the cost associated with a mitigation that would not result in the benefits needed. To document these instances an additional table was included in the Jurisdictional Annex that highlights actions removed due to completion or if it was deemed unnecessary or infeasible. Some actions that may have been considered lower in priority during the last plan update were elevated due to conditions that either allowed for the action to be prioritized, such as the potential for funding or completion of other mitigation actions that preceded them. Mitigation actions were also prioritized based on more recent experiences associated with drought conditions and wildfires. These hazards and the impact they have had throughout Orange County and the State have resulted in new requirements in how these hazards are addressed in water supply and water and wastewater infrastructure systems.

### 4.3.1 Hazard Mitigation Benefit-Cost Review

FEMA requires local governments/agencies 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 to avoid disaster-related damages later. The analysis is based on calculating the frequency and severity of a hazard, avoided future damages, and risk.

An HMP must demonstrate that a process was employed that 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 people will benefit from the action?
- How large of an area is impacted?
- How critical are the facilities that benefit from the action (e.g., which is more beneficial to protect, the fire station or the administrative building)?
- Environmentally, does it make sense to do this project for the overall community?

These questions were used to help determine the appropriateness of mitigation actions. Benefits and costs are a primary motivation for implementing mitigation projects at water and wastewater utilities. Past disasters have shown the benefit-cost of mitigating water utilities against identifiable hazards. For example, a cold weather system that impacted most of the United States resulted in pipeline breaks across the State of California. Those ruptures primarily occurred on a specific type of pipeline that has been gradually phased out of use in California. The replacement of this type of pipeline prior to the cold front could have not only prevented the cost of pipeline breaks, but also costs related to flooding, landslides, loss of water supply, other secondary effects of the broken pipelines.

The final prioritization completed by each MA depended on the direct loss estimations for water/wastewater critical infrastructure along with the secondary costs associated with business loss and recovery. Much of this effort was completed with informal cost-benefit analysis based on the knowledge and expertise of the participants (many of them certified operators, water quality experts, or engineers), previous planning documents, and the concepts identified above. Those actions that did not have adequate benefits were excluded from the list of mitigation actions.

### 4.4 Regional Considerations

It is envisioned that the mitigation actions for the most part will be implemented on a district-bydistrict basis. MWDOC will provide facilitation, as appropriate, of this process to help reduce duplication of efforts between jurisdictions and to spearhead coordination of initiatives and action items that could be accomplished more efficiently on a regional level. In its role as a regional planning agency, MWDOC will act as lead on water-related hazard mitigation projects that are regional in nature, such as projects that cross several jurisdictional boundaries and work planned on behalf of Metropolitan. OC San, CMSD, and SOCWA will take the lead on wastewater related hazard mitigation projects that are regional in nature and within their individual service areas.

**Section 3: Risk Assessment** and Jurisdictional Annexes indicate that each MA is susceptible to a variety of potentially serious hazards in the region. The approach to emergency planning in California has been comprehensive in its planning for and preparedness to respond to all hazards utilizing the SEMS and a coordinated Incident Command System. A program managed by MWDOC, the WEROC, acts as a coordination point (Area Command) to support an effective emergency response to major disasters by the Orange County water and wastewater utilities. WEROC provides services that promote planning and preparedness activities for both the utilities, as well as its own EOC staff. WEROC also helps maintain a turn-key EOC as well as other preparedness and response resources throughout Orange County. WEROC receives guidance from a steering committee, which includes representatives from Orange County water utilities, Metropolitan, the

County of Orange and the California Department of Health Service's Office of Drinking Water. WEROC and its steering committee help ensure water and wastewater utilities remain current with Federal and State emergency response procedures and plans for potential disasters.

The Disaster Mitigation Act of 2000 requires that in addition to having emergency response and emergency preparedness documents, regions should develop and maintain a document outlining measures that can be implemented before a hazard event occurs that would help minimize the damage to life and property. MWDOC has accepted the role of coordinating the development the HMP as a multi-jurisdictional plan. All-hazard mitigation planning efforts within the region are the responsibility of the jurisdictions. As noted, the capabilities of the jurisdictions to perform hazard mitigation planning are detailed in the Jurisdictional Annexes.

#### 4.4.1 Regional Fiscal Resources

One of MWDOC's primary roles in coordinating the development of the MJHMP is to identify and obtain grant funding for preparing and implementing certain aspects of the plan. This is consistent with WEROC's role, as a program managed by MWDOC, for hazard mitigation and preparedness. WEROC has received grants to improve the EOCs and to secure water trailers for distribution of drinking water during disasters and will continue to provide guidance to the MAs with hazard mitigation project grant applications and their implementation. Additional fiscal capabilities of the jurisdictions when implementing a hazard mitigation project are detailed in their individual capabilities assessments.

#### **District Related Sources**

- **Annual Operating Budget:** Each water district maintains an annual operating budget that is the primary source of funding for district operations and expenditures. This budget source would typically fund many of the mitigation strategies identified in this plan.
- **Capital Improvement Plan Budget:** In addition to the annual operating budget, many districts will rely on the budget established by their capital improvements plan which may be a separate funding source for many district's expenditures. Typically these funds are established based on a Capital Improvements Program that identifies and prioritizes key assets that will be upgraded by the district within a certain timeframe.

#### Potential Funding Sources

The following are potential funding sources that may be used to implement mitigation strategies. These funding sources include the following Federal and State sources:

- **Building Resilient Infrastructure and Communities (BRIC):** A competitive FEMA grant program to support States, local communities, tribes, and territories.
- Hazard Mitigation Grant Program (HMGP): Provides funding to local, State, tribal, and territorial governments to rebuild in a way that reduces or mitigates future disaster losses in their communities. This grant funding is available after a presidentially declared disaster.
- Emergency Management Performance Grant (EMPG) Program: The Federal Government, through the EMPG Program, provides necessary direction, coordination, and guidance and provides necessary assistance, as authorized in this title, to support a comprehensive all hazards emergency preparedness system.

- **Other Grants:** Other grants may include State of California grants associated with climate change, water infrastructure, homeland security, transportation, or other funding sources that periodically become available. The list below provides some common sources:
  - 1. Climate Adaptation Planning Sustainable Transportation Planning Grant Program Department of Transportation
  - 2. Sustainable Communities Competitive Department of Transportation
  - 3. CAL FIRE Wildfire Prevention Grants Program Department of Forestry and Fire Protection
  - 4. Integrated Climate Adaptation and Resiliency Program's Climate Adaptation Planning Grant Office of Planning and Research
  - 5. Small Community Drought Relief Program Department of Water Resources
  - 6. Addressing Climate Impacts Department of Fish and Wildlife
  - 7. Cleanup Loans and Environmental Assistance to Neighborhoods (CLEAN) Program Department of Toxic Substances Control
  - 8. Clean Water State Revolving Fund (CWSRF) Program Construction State Water Resources Control Board
  - 9. Drinking Water State Revolving Fund (DWSRF) Construction State Water Resources Control Board
  - 10. Water Recycling Funding Program (WRFP) Construction Grant State Water Resources Control Board
  - 11. Equitable Community Revitalization Grants (ECRGs) Department of Toxic Substances Control
  - 12. Water Recycling Funding Program (WRFP) Planning Grant State Water Resources Control Board
  - 13. Infrastructure State Revolving Fund (ISRF) Program Infrastructure and Economic Development Bank

### 4.4.2 Implementation Timeframes

For the mitigation strategies identifies, MWDOC and the MAs developed timeframes for implementation with the understanding that water and wastewater districts typically require longer timeframes for completion of some of their projects due to complexity and the level of planning, design, and engineering necessary to construct these facilities. The following are the timeframe categories used for the mitigations strategies identified in each MAs HMP Annex:

- Immediate (1-2 years)
- Short Term (3-5 years)
- Long Term (>5 years)

### **SECTION 5: PLAN MAINTENANCE**

This section of the MJHMP describes the formal process that will ensure this plan remains an active and relevant document. The maintenance process includes a schedule for monitoring and evaluating the MJHMP annually and producing a plan revision every five years. This section describes how the MAs will integrate public participation throughout the plan maintenance process. It also describes how the MAs intend to implement the MJHMP and incorporate its mitigation actions into existing planning mechanisms and programs. The MJHMP format, organized with Jurisdictional Annexes, allows the MAs to readily update sections when new data becomes available, ensuring the plan remains current and relevant.

### 5.1 Monitoring, Evaluating, and Updating the Plan

### 5.1.1 Plan Maintenance

MWDOC will be responsible for initiating plan reviews and coordinating with the MAs. The internal planning teams for each jurisdiction will meet bi-annually to review progress on plan implementation. MWDOC and the MAs will meet annually, or following a hazard event as described below, to monitor the plan's progress and implementation. This will also allow the opportunity for updates to hazards, jurisdictional goals, and mitigation action items, as necessary. If needed, the MAs will coordinate with MWDOC to integrate updates into the plan.

### 5.1.2 Plan Evaluation

The plan will be evaluated by the MAs at least annually to determine the effectiveness of the plan, and to reflect changes in land development or programs that may affect mitigation priorities. MWDOC and the Planning Team leads (or their jurisdictional representative) will also review the goals and action items to determine their relevance to changing situations in Orange County, as well as changes in State or Federal regulations and policy. MWDOC and MA representatives will also review the risk assessment portion of the plan to determine if this information should be updated or modified, given any new available data or incidents. The MAs will report on the status of their projects, the success of various implementation processes, difficulties encountered, success of coordination efforts, and which strategies should be revised. Any updates or changes necessary will be forwarded to MWDOC for inclusion in further updates to the plan.

MWDOC, with input from the Planning Team, will use the progress report template provided in **Appendix C** to report on annual progress. This will help to ensure consistent and accurate tracking of the plan implementation by each of the MAs. Each MA will coordinate with their responsible departments/agencies identified for each mitigation action. These responsible departments/agencies will help to monitor and evaluate the progress made on the implementation of mitigation actions and report to the MA's Planning Team representative on a semi-annual basis. These responsible departments/agencies will be asked to assess the effectiveness of the mitigation actions and modify the mitigations actions as appropriate. The MJHMP Mitigation Action Progress Report worksheet will assist Planning Team representatives in reporting the status and assessing the effectiveness of the mitigation actions.

The following questions will be considered in evaluating the plan's effectiveness:

- Has the nature or magnitude of hazards affecting the planning area/jurisdiction changed?
- Are there new hazards that have the potential to impact the planning area/jurisdiction?
- 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 HMP?
- Should additional local resources be committed to address identified hazards?

Future updates to the MJHMP will account for any new hazard vulnerabilities, unusual circumstances, or additional information that becomes available. Issues that arise during monitoring and evaluating the MJHMP, which require changes to the risk assessment, mitigation strategy, and other components of the plan, will be incorporated into the next update of the MJHMP, described below.

#### 5.1.3 Plan Updates

Title 44 CFR § 201.6(d)(3) requires that local hazard mitigation plans be reviewed, revised if appropriate, and resubmitted for approval in order to remain eligible for mitigation project grant funding. Monitoring the progress of the mitigation actions, as described above, will be ongoing throughout the five-year period between the adoption of the HMP and the next update effort. The five-year cycle may be accelerated to less than five years based on the following triggers:

- A Presidential Disaster Declaration that impacts one or more of the MAs.
- A hazard event that causes loss of life.

Should a significant hazard occur within the planning area, the MJHMP Planning Team will reconvene within 60 days of the disaster to review and update the HMP, as required.

MWDOC, working in conjunction with the MAs, will serve as the primary responsible agency for updates to the plan. All MAs will be responsible to provide MWDOC with jurisdictional-level updates to the plan when/if necessary, as described above. Every five years the updated plan will be submitted to Cal OES and FEMA for review.

The intent of the update process will be to add new planning process methods, MA profile data, hazard data and events, vulnerability analyses, mitigation actions, and goals to the adopted plan so that the MJHMP 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:

- The update process will be convened by MWDOC and a Planning Team comprised of at least one representative from each MA.
- The hazard risk assessment will be reviewed and updated using best available information and technologies on an annual basis.
- The evaluation of critical infrastructure and mapping will be updated and improved as funding becomes available.
- 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 policies identified under other planning mechanisms, as appropriate.
- The draft update will be made available to appropriate agencies for comment.
- The public will be given an opportunity to comment prior to adoption.
- The governing bodies for each MA will adopt the updated MJHMP.

### 5.1.4 Adoption

Each jurisdiction is responsible for adopting the MJHMP. This formal adoption should take place every five years. Once the plan has been adopted, MWDOC will be responsible for final submission to Cal OES. Cal OES will then submit the plan to FEMA for final review and approval.

#### 5.1.5 Implementation Through Existing Programs

The effectiveness of the nonregulatory MJHMP depends on the implementation of the plan and incorporation of the outlined mitigation action items into existing plans, policies, and programs. The plan includes a range of action items that, if implemented, would reduce loss from hazard events in the planning area. Together, the mitigation action items in the MJHMP provide the framework for activities that the MAs may choose to implement over the next five years. The MAs have identified the plan's goals and prioritized jurisdiction-specific actions that will be implemented (resources permitting) through existing plans, policies, and programs.

Implementation of the plan will be the responsibility of each MA. Successful implementation is more likely if the plan recommendations are integrated into other plans and mechanisms, such as water and wastewater master plans, urban water management plans, administrative codes, strategic plans, CIPs, and budgets for each of the participating jurisdictions. Upon adoption of the 2024 MJHMP, the MAs can use the MJHMP as a baseline of information on the hazards that impact their jurisdictions. The MJHMP can also build on related planning/design efforts and mitigation programs that are already occurring within the planning area. This will also facilitate applying for funding opportunities as they become available. Progress on implementing mitigation actions through other planning programs and mechanisms should be monitored and integrated into future updates.

By adopting a resolution approving this MJHMP, each MA agrees to reference and incorporate the document into their future local planning documents, codes, decisions, processes, and regulations. The MJHMP will be reviewed and considered by each MA, as applicable plans are created or updated in the future. Upon creating or updating new plans or policies, each MA will review this MJHMP 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 or policy that can be integrated into the next MJHMP update?

Further, the WEROC program manager will establish as an annual agenda item to review and discuss incorporation of the MJHMP into local planning efforts and processes.

Some of the ways each MA will integrate information from this MJHMP into their planning mechanisms are described below.

The timing of updates to plans, programs, and regulatory documents vary depending upon the document and statutory requirements. The information provided in the hazards profiles, vulnerability assessment, and the mitigation actions will be integrated directly or incorporated by reference to support and enhance goals/policies and specific actions for each MA. This will be done as the documents are updated by each MA.

For water and wastewater service providers the most common plans, programs, and regulatory documents expected to integrate information from the MJHMP include water and wastewater master plans, urban water management plans, risk and resilience assessments, and capital improvement programs.

Water and Wastewater Plans will integrate more current hazard and vulnerability information and establish or update their framework for implementing actions identified in the MJHMP. Upon creating or updating any plans, water and wastewater agencies will review this MJHMP to consider the various hazards of concern as part of system design and programming and ensure integration of the mitigation actions into the respective plans. As staff assesses the information and analysis in the current plan it is anticipated that updated hazard information and mitigation actions would allow the MA to modify assumptions on their proposed systems that could increase resilience from potential hazard events.

The Urban Water Management and Planning Act was passed in 2010 and requires water suppliers to estimate water demands and available water supplies. Each water district has an Urban Water Management Plan (UWMP). UWMPs are required to evaluate the adequacy of water supplies including projections of 5, 10, and 20 years. These plans are also required to include water shortage contingency planning for dealing with water shortages, including a catastrophic supply interruption.

UWMPs are intended to be integrated with other urban planning requirements and management plans. Some of these plans include city and county General Plans, Water Master Plans, Recycled Water Master Plans, Integrated Resource Plans, Integrated Regional Water Management Plans, Groundwater Management Plans, ERP, and others. Each water district will review the MJHMP in coordination with preparation of UWMP updates to ensure the most current hazard information is provided and that the appropriate mitigation actions are incorporated.

Additionally, all water utilities are required to conduct RRAs and corresponding ERPs every five years in accordance with the AWIA. The RRAs include a risk assessment process that focuses on potential physical and cyber components of operations and business continuity. AWIA requires water utilities to assess their facilities for all-hazard risks, but specifically calls attention to malevolent acts, physical security, natural hazard risks, cyber security, and fiscal processes security. The corresponding ERP typically addresses protocols for potential emergency events. Both the RRA and the ERP are documents that are considered Protected Critical Infrastructure Information (PCII) due to information within the documents related to the water infrastructure. However, MAs will integrate pertinent information from this mitigation plan into their updated RRAs and ERPs, as well as utilize those documents to continue to update and enhance the MJHMP.

Wastewater agencies are also required to maintain current Sewer Master Plans; Sanitary Overflow Response Plans; and Fats, Oils, and Grease Ordinances. These plans can help to support hazard mitigation efforts, as well as shape future policy to reduce the impacts of sewer system failures.

Each MA has its own budget process, including CIPs that identify capital projects and equipment purchases. These systems provide a link between an MAs general and/or strategic plan and annual budget. As part of the annual review and update of the CIP, the mitigation actions identified in this HMP will be reviewed to determine which actions should be included within the CIP.

This HMP will be added or incorporated by reference into each MA's emergency plans (e.g., Emergency Operations Plans, ERPs, and Emergency Evacuation 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 HMP will be identified for consideration as part of the MJHMP update.

Other opportunities for integration of this MJHMP include education programs and continued coordination between MWDOC, the MAs, and other agencies. Each MA maintains a website and utilizes social media to provide updated information to its community and service area. Hazard information and opportunities for the community to reduce individual exposure to hazards will be provided. Some MAs will also provide in-person educational events and activities to further inform the community.

### 5.1.6 Continued Public Involvement

MWDOC is dedicated to involving the public directly in review and updates of the plan. MWDOC and a representative from each participating jurisdiction will be responsible for monitoring, evaluating, and updating the plan as described above. During all phases of plan maintenance, the public will have the opportunity to provide feedback.

The most current copy of the plan will be publicized and permanently available for review on MWDOC's website at https://www.mwdoc.com/your-water/emergency-management/emergency-management-resources/. The site will contain contact information to which people can direct their comments and concerns. All public feedback will be forwarded to the appropriate jurisdiction for review and consideration for incorporation (if deemed appropriate) into the next plan update. This information will also be forwarded to MWDOC, responsible for keeping track of public comments on the plan. In addition, copies of the plan will be catalogued and kept at all the appropriate agencies in the county. The existence and location of these copies will also be posted on the MWDOC website. This will provide the public an outlet for which they can express their concerns, opinions, or ideas about any updates/changes that are proposed to the plan.

### Point of Contact

The primary point of contact for the HMP is MWDOC Emergency Manager Vicki Osborn. Ms. Osborn (or their designee) provides oversight and support for maintenance and implementation efforts as well as future updates. To contact Ms. Osborn and other MWDOC staff, please use weroc@mwdoc.com or 714.963.3058.

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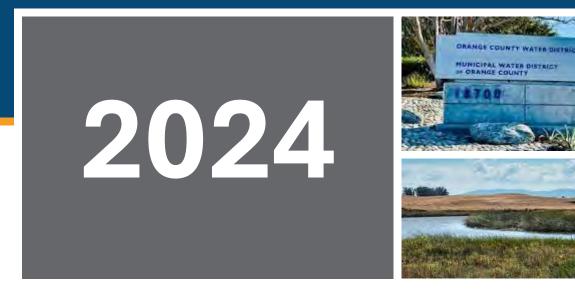
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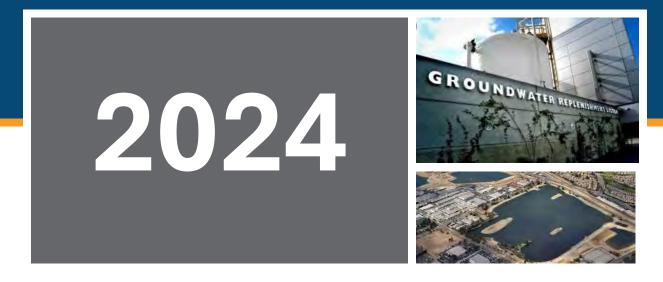
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## Annex A: Municipal Water District of Orange County





**Annex B: Orange County Water District** 





**Annex C: Orange County Sanitation District** 





## Annex D: South Orange County Water Authority

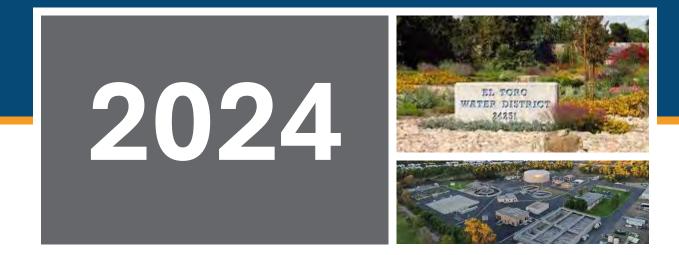






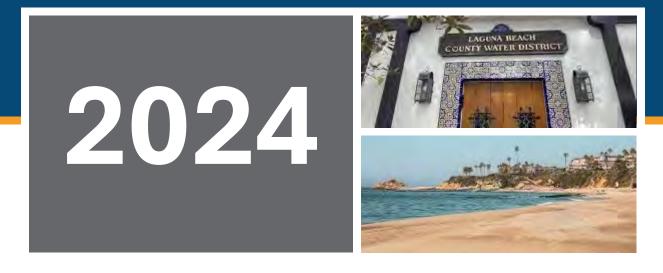
## **Annex E: Costa Mesa Sanitary District**





**Annex F: El Toro Water District** 





**Annex G:** Laguna Beach County Water District





## **Annex H: Moulton Niguel Water District**

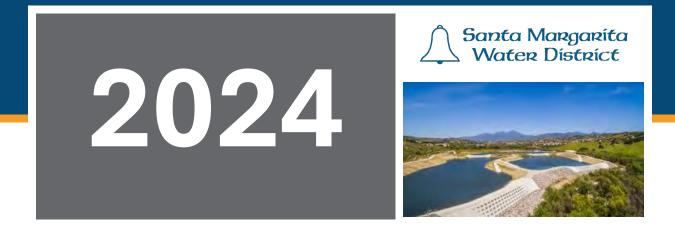






**Annex I:** Mesa Water District





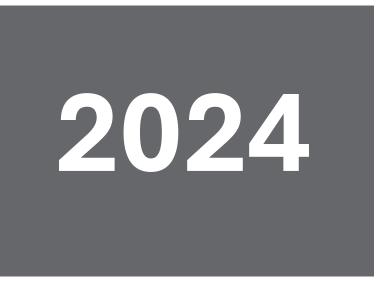
## **Annex J: Santa Margarita Water District**





**Annex K: Serrano Water District** 

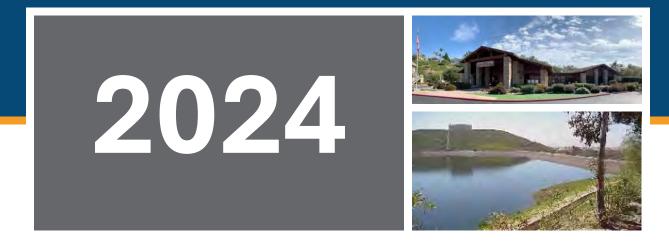






## **Annex L: South Coast Water District**





## **Annex M: Trabuco Canyon Water District**





## **Annex N: Yorba Linda Water District**





## **Annex O: Irvine Ranch Water District**



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### **IRVINE RANCH WATER DISTRICT ANNEX**

Irvine Ranch Water District (IRWD) is a participant (Member Agency [MA]) in the Orange County Water and Wastewater Multi-Jurisdictional Hazard Mitigation Plan (MJHMP). As a participant MA, IRWD representatives were part of the MJHMP planning process and served on the planning team responsible for the plan update; refer to **Section 2** of the MJHMP. The base plan, including the Hazard Mitigation Plan (HMP) procedural requirements and planning process apply to IRWD.

To comply with DMA 2000 requirements IRWD recently completed a single-jurisdiction Local Hazard Mitigation Plan (LHMP) that was adopted in 2021 (included as Appenix O-1). Instead of updating this plan, IRWD opted to join the MJHMP update process established by MWDOC.

This annex supersedes the 2021 IRWD LHMP and details the hazard mitigation planning elements specific to IRWD. The annex also describes how IRWD's risks vary from the planning area. This annex is not intended to be a standalone document but supplements the information contained in the base plan. All sections of the MJHMP, including the planning process and other procedural requirements, apply to and were met by IRWD. The base plan treats the entire county as the planning area and identifies which MAs are subject to a profiled hazard. The purpose of this annex is to provide additional information specific to IRWD with a focus on the risk assessment and mitigation strategies.

# 0.1 HAZARD MITIGATION PLAN POINT OF CONTACT AND DEVELOPMENT TEAM

The representative listed in **Exhibit O-1** lead the IRWD Planning Team, attended meetings, and coordinated the hazard mitigation planning efforts with IRWD staff.

Primary Point of Contact		
Steve Choi		
Director of Safety and Security		
Telephone: (949) 453-5712		
Email: choi@irwd.com		

#### Exhibit O-1. Planning Team Attendance

IRWD followed the planning process detailed in **Section 2** and formed an internal team to support and provide information for the plan update. The following staff served as IRWD's internal hazard mitigation planning development team.

### Exhibit O-2. Internal Hazard Mitigation Planning Development Team

Name	Title
Eric AKiyoshi	Engineering Manager
Bryan Clinton	Operations Manager
Robert Meripol	Safety & Security Supervisor
Mitch Robinson	Senior Engineer

### O.2 OUTREACH

Outreach to the public within IRWD's service area was performed to ensure residents could access information on this planning effort. To reach the largest number of people possible, IRWD published a webpage/ blogpost with information on the MJHMP process. Posts to social media

platforms Facebook, X (formerly known as Twitter), LinkedIn, and Nextdoor were made on August 21, 2024, regarding the MJHMP to increase exposure.

IRWD has been diligent in continuing to distribute information using their in-person board meetings, social media and web-based platforms to ensure their customers are aware of the project and have an opportunity to share their feedback.

## 0.3 JURISDICTION PROFILE

### Service Population: 425,208

IRWD is an independent special district serving multiple jurisdictions in central Orange County, California. The jurisdictions covered by IRWD include Unincorporated Orange County and portions of the Cities of Orange, Tustin, Santa Ana, Costa Mesa, Newport Beach, Laguna Woods, Lake Forest, and Irvine. 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. 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 provided below:

- Groundwater 27,382 acre-feet per year
- Recycled Water 24,913 acre-feet per year
- Treated Groundwater 19,523 acre-feet per year
- Imported Water 17,398 acre-feet per year
- Local Surface Water 5,165 acre-feet per year

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.

## O.4 HAZARDS

This section is intended to profile the hazards and assess the vulnerabilities that IRWD faces, distinct from that of the county-wide planning area. The hazard profiles in the MJHMP discuss overall impacts to the planning area and describe the hazard problem description, hazard extent, magnitude/severity, previous occurrences of hazard events and the likelihood of future occurrences. For more information on risk assessment methodologies, see **Section 3**.

IRWD's service area is subject to most of the other hazards identified for the planning area. Many of these hazards are dispersed and may affect the entire region, including power outages, drought, seismic shaking, and windstorms. Based on the risk assessment, the IRWD development team discussed which hazards should or should not be profiled in the base plan. This discussion resulted in the identification of the following hazards that affect IRWD and summarized their probability of future occurrence, level of impact and significance as outlined in **Exhibit O-3**. Detailed hazard profiles for the planning area are provided in **Section 3** of the base plan.

Impact **IRWD Hazard** Countywide Total **Hazard Type** Probability Planning Hazard Affected **Primarv** Secondarv Score Consideration Consideration Area Impact Impact Human-Caused Hazards: Terrorism (Cyber High High 4 3 3 2 44.0Threat) 4 3 2 2 Medium High Wildfire 38.4 2 2 3 Medium High 4 36.0 Seismic Hazards: Seismic Shaking Medium Medium 3 3 3 3 36.0 Severe Weather: Extreme Heat Medium Medium Seismic Hazards: Earthquake Fault Rupture 4 2 2 3 36.0 Medium Medium Severe Weather: Windstorm 4 4 1 1 35.2 Medium Medium Severe Weather: Drought 4 4 1 1 35.2 3 2 3 3 31.2 Medium Medium Geological Hazards: Landslide and Mudflow 2 2 Medium High Human-Caused Hazards: Power Outage 4 1 26.4 2 Medium Medium 3 2 2 24.0 Coastal Hazards: Coastal Storm 2 3 4 Medium Medium Flood 1 19.6 Human-Caused Hazards: Hazardous Medium Low 2 2 2 3 18.0 Materials 3 3 3 Low\* Low 1 12.0 Human-Caused Hazards: Terrorism (MCI) Human-Caused Hazards: Low\* Low 2 3 1 4 11.4 Contamination/Saltwater Intrusion 1 2 3 3 10.4 Low\* High Seismic Hazards: Liquefaction 1 4 7.0 Low\* Medium Dam/Reservoir Failure 1 1 Low\* Low Urban Fire 1 1 2 1 5.4 1 2 5.0 Low\* Medium Coastal Hazards: Coastal Erosion 1 1 Low\* Low Geological Hazards: Land Subsidence 1 1 1 2 5.0 Low\* 2 Low Geological Hazards: Expansive Soils 1 1 1 5.0 4.0 Low\* Medium Coastal Hazards: Sea Level Rise 1 1 1 1 Coastal Hazards: Tsunami 1 1 1 1 4.0 Low\* Low

**Exhibit O-3. IRWD Hazard Identification** 

Orange highlights indicate differences between hazard planning consideration levels for IRWD and the overall planning area.

\*Any hazards identified as a low priority for IRWD have not been analyzed nor have mitigation strategies been developed.

Geographic Affected Area	Primary Impacts
<ul> <li>1 = Isolated, less than 10% of planning area</li> <li>2 = Small, 10-30% of planning area</li> <li>3 = Medium, 30-60% of planning area</li> <li>4 = Large, 60-100% of planning area</li> </ul>	<ul> <li>1 = Negligible, little to no damage</li> <li>2 = Limited, some damage, loss of service for days</li> <li>3 = Critical, devastating damage, loss of service for months</li> <li>4 = Catastrophic, catastrophic damage, uninhabitable conditions</li> </ul>
<ul> <li>Probability of Future Occurrences</li> <li>1 = Unlikely, less than 1% chance of occurrence in next 100 years or has a recurrence interval of greater than every 100 years.</li> <li>2 = Occasional, between 1 and 10% chance of occurrence in the next year or has a recurrence interval of 11 to 100 years.</li> <li>3 = Likely, between 10 and 100% chance of occurrence in next year or has a recurrence interval of 10 years or less.</li> <li>4 = Highly Likely, near 100% chance of occurrence in next year or happens every year.</li> </ul>	<ul> <li>Secondary Impacts</li> <li>1 = Negligible, no loss of function, downtime, and/or evacuations</li> <li>2 = Limited, minimal loss of function, downtime, and/or evacuations</li> <li>3 = Moderate, some loss of functions, downtime, and/or evacuations</li> <li>4 = High, major loss of function, downtime, and/or evacuation</li> </ul>

#### Exhibit O-3. IRWD Hazard Identification (cont.)

The Federal Emergency Management Agency (FEMA) Local Mitigation Planning Handbook requires each agency to identify the magnitude/severity of each hazard to their infrastructure. The identification of hazards provided in **Exhibit O-3** is highly dependent on the location of facilities within each agency's jurisdiction and takes into consideration the history of the hazard and associated damage (if any), information provided by agencies specializing in a specific hazard (e.g., FEMA, California Geological Survey), and relies upon each agency's expertise and knowledge. The table was created with input from the Water Emergency Response Organization of Orange County (WEROC), consultant staff, and IRWD.

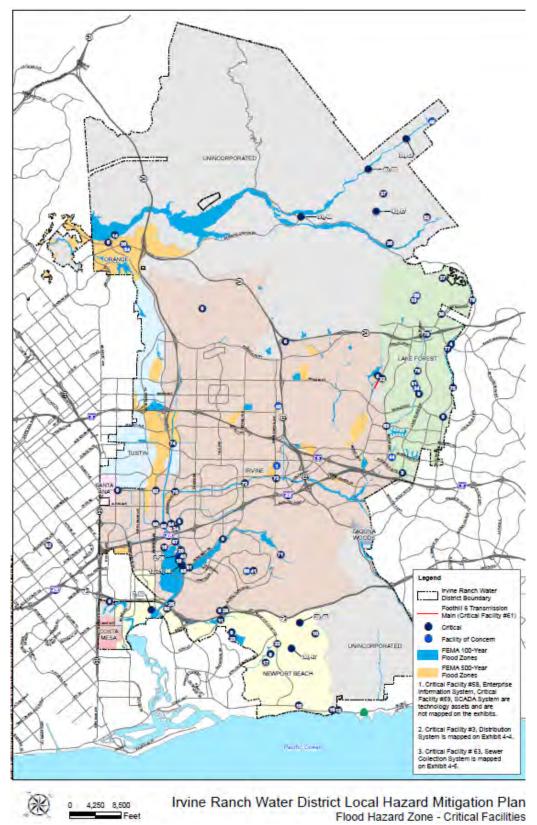
#### Changes to Risk/Vulnerability between IRWD and the Planning Area

Hazard	Justification for Concern Adjustment
Wildfire	The majority of IRWDs service areas is located outside of high fire hazard areas mapped within the planning area. Given the lack of resources in these fire prone areas, IRWD felt that the risk associated with wildfires was not as significant for their service area and impacts associated with these types of incidents would not impact them as greatly as other MAs and the planning area as a whole.
Seismic Hazards: Seismic Shaking	While IRWDs service area is located within areas prone to significant seismic shaking many of their assets are located on earth materials that are considered more stable than in other parts of the planning area. In addition, IRWD has invested in retrofitting many of their assets to meet higher seismic standards reducing the vulnerability to this hazard.
Human-Caused Hazards: Power Outage	While power outages are a significant concern for the planning area, IRWD has invested in backup generation that has reduced their concern regarding this type of incident. In addition, past power outage incidents have not impacted IRWD in the same way as other MAs have been impacted.

Hazard	Justification for Concern Adjustment			
Human-Caused Hazards: Hazardous Materials	Given the design and location of their assets, IRWD increased this hazard type to a medium consideration. Based on historical incidents and concerns regarding current and future operations IRWD staff felt hazard materials release is a greater concern for their system than what was identified for the planning area.			
Low Priority Hazards	Due to the number of hazards identified in the Planning Area, these low priority hazards have not been analyzed further by IRWD to allow greater focus on the other hazards of concern.			

# **O.5 HAZARD MAPS**

The following maps show the location of hazard zones within the jurisdiction relative to potable water systems, as applicable.



**Exhibit O-4. IRWD Flood Hazard Zones** 

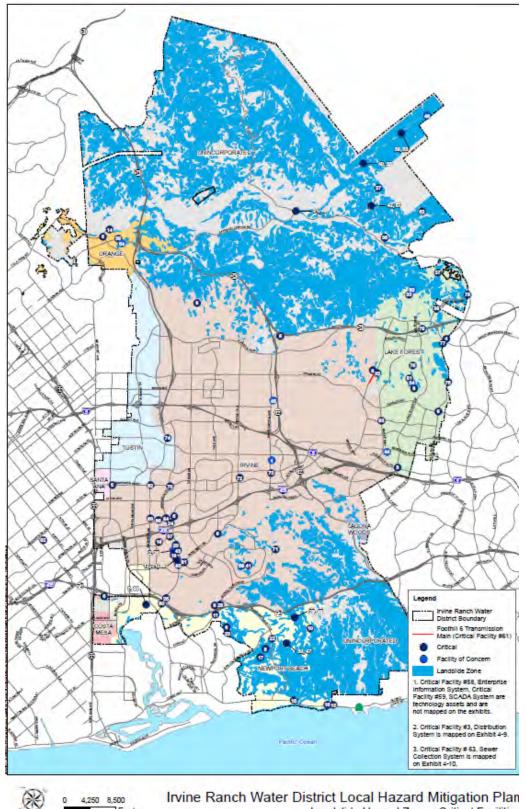


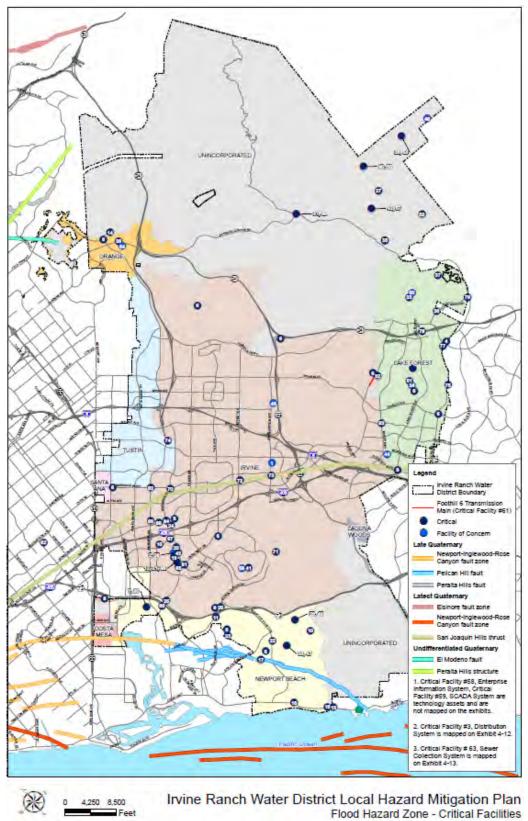
Exhibit O-5. IRWD Landslide Hazard Zones



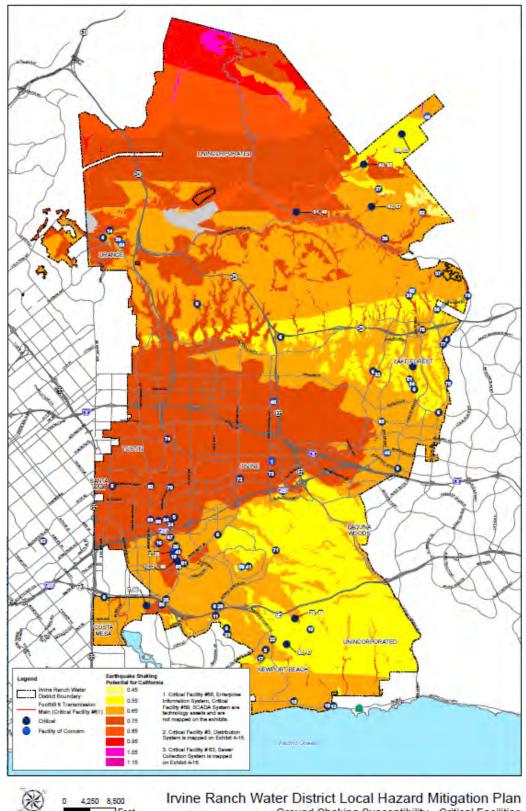
4,250 8,500

Feet

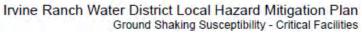
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**Exhibit O-6. IRWD Fault Hazard Zones** 



**Exhibit O-7. IRWD Seismic Hazard Zones** 



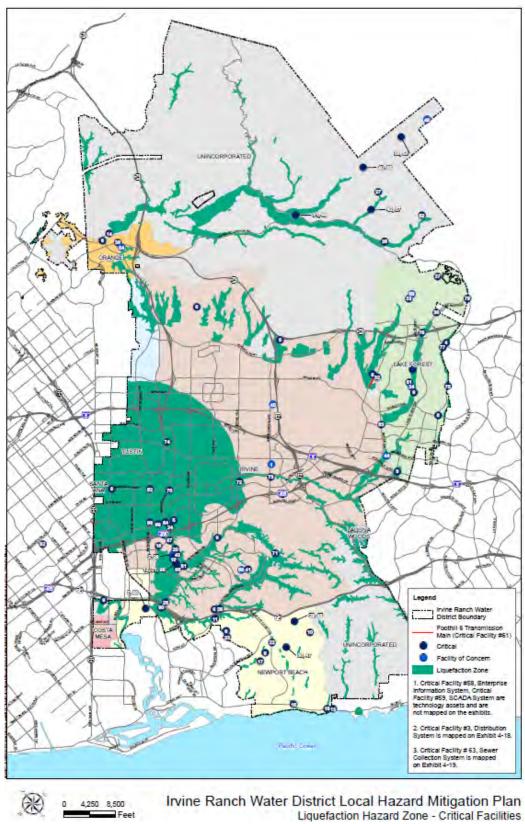


Exhibit O-8. IRWD Liquefaction Hazard Zones

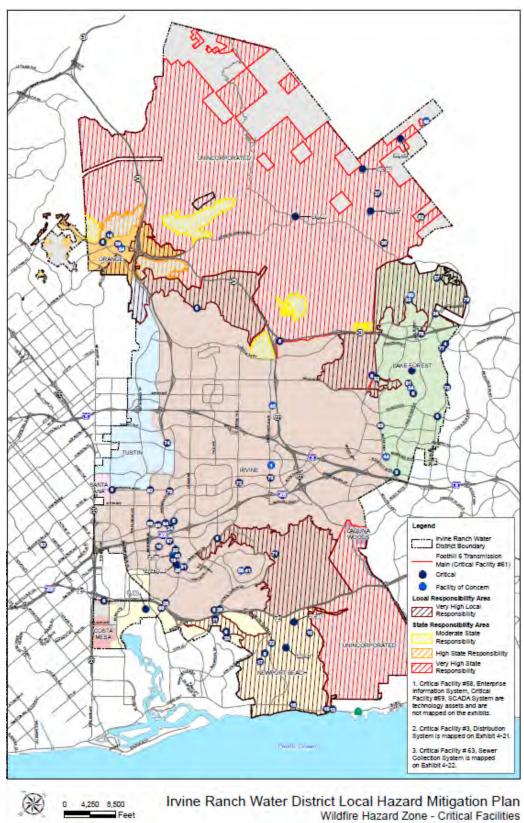


Exhibit O-9. IRWD Wildfire Hazard Zones

# 0.6 VULNERABILITY AND RISK ASSESSMENT

Assessing vulnerabilities shows the unique characteristics of individual hazards and begins the process of narrowing down locations within IRWD's service area that are vulnerable to specific hazard events. The existing vulnerability assessment in the 2021 LHMP considered unique local knowledge of hazards and impacts and a Geographic Information Systems (GIS) overlaying method for examining such vulnerabilities more in depth. Using these methods, vulnerable populations, infrastructure, and potential losses from hazards were estimated. This coupled with the analysis conducted in this MJHMP update ensures the IRWD Annex meets the latest requirements adopted by FEMA. **Exhibit O-10** identifies the risks assessment conducted on IRWD critical facilities from the previous LHMP, which was determined to be relevant for this update. No new assets have been constructed since that analysis. To supplement this, the updated hazard profiles and vulnerability discussions in **Section 3** address the latest FEMA requirements since IRWD's last update.

Exhibit O-10	Risk Assessment	Summary
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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	Ν	Y	Ν	Y	Y	N	Ν	Y	Ν	Y	Ν
2	Michelson Biosolids	Y	Y	Ν	Y	Y	Ν	Y	Y	Ν	Y	N
3	Distribution System	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4	El Toro Diversion Structure	Ν	Y	Ν	Y	Y	N	Y	Y	Ν	Y	Ν
5	San Mateo Diversion	N	Y	Ν	Y	Y	N	Y	Y	Ν	Y	N
6	Met Source Water	Y	Y	Y	Y	Y	N	Y	Y	Ν	Y	Y
7	Bayview	N	Y	Ν	Y	Y	N	Ν	Y	Ν	Y	N
8	Buck Gully	N	Y	Ν	Y	Y	Y	N	Y	Ν	Y	Y
9	Canada	N	Y	N	Y	Y	N	Y	Y	Ν	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	Ν	Y	N	Y	Y
12	Duck Club	N	Y	Y	Y	Y	N	Y	Y	Ν	Y	N
13	El Morro School	N	Y	N	Y	<u>Y</u>	N	N	Ŷ	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 Y	N N	Y Y	Y	N	Y Y	Y	N	Ý	Y
19 20	MWRP MPS-3 MWRP Auto Shop		Y Y	N	Y Y	Y Y	N N	Y N	Y Y	N N	Y Y	N N
20	MWRP Auto Shop MWRP Caretaker Housing	N N	Y Y	N Y	Y Y	Y Y	N	N Y	Y Y	N	Ý	N N
21	Newport Coast	N	Y Y	N	T Y	T Y	N	T V	T Y	N	I V	Y
22	San Joaquin Housing	N	T V	N	Y		N	N	I V	N	I V	
23	HATS Lift Station	N	I V	N	Y	Y	N		Ŷ	N	I V	N
24	University	Y	Y	N	Y	Y	Y	N	Y	N	I V	N
26	Michelson Operations Center	Y	Y	N	Y	Y	N	V N	Y	N	I V	N
27	Benner Reservoir	N	Ý	N	Y	Ý	Y	N	Ý	N	Y	Y
28	Coastal OC 63-Zn.4 Pump											
20	Station	N	Y	N	Y	Y	N	Y	Y	Ν	Y	N
29	Coastal Zn 6-7 Pump Station	Ν	Y	Ν	Y	Y	Ν	Ν	Y	Ν	Y	Y
30	Coastal Zn. 4-6 Pump Station	Ν	Y	Ν	Y	Y	N	Ν	Y	Ν	Y	Y
31	Fleming Pump Station	Ν	Y	Ν	Y	Y	Ν	Ν	Y	Ν	Y	Y
32	Foothill Zn 4-6 Pump Station	Ν	Y	Ν	Y	Y	Ν	Ν	Y	Ν	Y	Y
33	Foothill Zn 6-6A Pump Station	Ν	Y	Ν	Y	Y	Ν	Ν	Y	Ν	Y	Y
34	Lake Forest 4 - 5 West	Ν	Y	Ν	Y	Y	N	Ν	Y	Ν	Y	Ν
35	Manning Pump Station	Ν	Y	Ν	Y	Y	N	Ν	Y	Ν	Y	Y
36	Portola Hills Zn 6-8	Ν	Y	Ν	Y	Y	N	Ν	Y	Ν	Y	Y
37	Portola Hills Zn 8-9 Pump Station	Ν	Y	Ν	Y	Y	Ν	Ν	Y	Ν	Y	Y
38	Read Pump Station	N	Y	N	Y	Y	N	N	Y	N	Y	Y
39	Santiago Hills Zn 5-6	Ν	Y	Ν	Y	Y	N	Ν	Y	Ν	Y	N
40	Shaw Pump Station	N	Y	Y	Y	Y	N	Ν	Y	Ν	Y	Y
41	Turtle Rock Zn 3-4 Pump Station	Ν	Y	Ν	Y	Y	Ν	Ν	Y	Ν	Y	N
42	Williams Canyon Pump Station (Benner)	N	Y	Ν	Y	Y	N	Y	Y	Ν	Y	Y
43	Michelson MWRP	Y	Y	Ν	Y	Y	N	Y	Y	Ν	Y	N

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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	Ν	Y	Y	Ν	Y	Ν
45	Central Irvine Zn 1 Reservoir	N	Y	N	Y	Y	N	N	Y	N	Y	N
46	Chapman Reservoir	Ν	Y	N	Y	Y	Y	N	Y	Ν	Y	Y
47	Coastal Zn 4 Reservoir	Ν	Y	N	Y	Y	N	Ν	Y	Ν	Y	Y
48	Coastal Zn 6 Reservoir	Ν	Y	Ν	Y	Y	Ν	Ν	Y	Ν	Y	Y
49	Fleming Reservoir	Ν	Y	Ν	Y	Y	N	Ν	Y	Ν	Y	Y
50	Foothill Zn 6 Reservoir	N	Y	N	Y	Y	N	Ν	Y	Ν	Y	Y
51	Lake Forest Zn 4 Tank 1 & Tank 2	N	Y	N	Y	Y	N	N	Y	Ν	Y	Ν
52	Modjeska Reservoir	Ν	Y	Ν	Y	Y	Y	Ν	Y	Ν	Y	Ν
53	Read Reservoir	Ν	Y	Y	Y	Y	Y	Ν	Y	Ν	Y	Y
54	Santiago Canyon Zn 5	Ν	Y	Ν	Y	Y	N	Ν	Y	Ν	Y	N
55	Shaw Reservoir	Ν	Y	N	Y	Y	N	Ν	Y	Ν	Y	Y
56	Turtle Rock Zn 3	Ν	Y	Ν	Y	Y	N	Ν	Y	Ν	Y	Ν
57	Williams Canyon Reservoir	Ν	Y	Ν	Y	Y	Y	Ν	Y	Ν	Y	Y
58	Enterprise Information System	Ν	Y	Ν	Y	Y	N	Ν	Y	Ν	Y	N
59	SCADA System	Ν	Y	Ν	Y	Y	Ν	Ν	Y	Ν	Y	N
60	Bayview Telemetry	N	Y	N	Y	Y	N	N	Y	Ν	Y	N
61	Foothill 6 Transmission Line	N	Y	Ν	Y	Y	N	Y	Y	Ν	Y	Y
62	Deep Aquifer Treatment System (DATS)	Y	Y	Ν	Y	Y	Ν	N	Y	Ν	Y	Ν
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	Ν	Y	Y	Ν	Y	N
65	S1	Y	Y	Y	Y	Y	Ν	Y	Y	Ν	Y	N
66	S2	Y	Y	Y	Y	Y	Ν	Y	Y	Ν	Y	Ν
67	S3	Y	Y	Y	Y	Y	N	Y	Y	Ν	Y	Ν
68	S4	Y	Ý	Ý	Ý	Y	N	Ý	Y	Ν	Ý	N
69	S5	Y	Y	Y	Ý	Y	N	Ý	Y	N	Y	N
70	S6	Y	Y	Y	Ŷ	Y	N	Y	Y	Ν	Y	N
71	S7	N	Y	N	Y	Y	N	Y	Y	N	Y	Y
72	S8	N	Y	Y	Y	<u> </u>	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 78	S13 S14	N N	Y	Y	Y	Y	N	Y	Y	N	Y	N
78 79	S14 S15	N	Y Y	Y N	Y Y	Y Y	N N	N N	Y Y	N N	Y Y	Y Y
79 80	S15 S16	N Y	Y Y	N	Y Y	Y Y	N	N Y	Y Y	N	Y Y	Y N
81	S18	Y Y	Y	N Y	r Y	Y	N	V	Y Y	N	Y	N
82	S19	Y	Y	N	Y	Y	N	Y	Y	N	Y	N
83	S17	N	Y	Y	Y	Ý	N	N	Y	N	Y	N
00	517	IN					IN IN	IN		IN		14

Exhibit O-10	. Risk Assessment Su	ummary (cont'd)
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## Vulnerabilities/Impacts to Hazard Events

The IRWD service area is approximately 181 square miles (approximately 20% of the planning area) of developed and undeveloped land. Over 425,000 residents live within the IRWD service area and due to the amount of employment within their service area, the daytime population increases to over 600,000 people.

Hazard	Impact on IRWD Vulnerable Populations
Human-Caused Hazards: Terrorism (Cyber Threat)	All populations within IRWD's service area that use the internet are equally vulnerable to this threat. Some populations that are unfamiliar with cyber security threats or the latest types of intrusion techniques may become victims of this activity.
Wildfire	Wildfire threats along the eastern portion of the service area (foothills of the Santa Ana Mountains) and western areas within the Peralta Hills are considered fire prone. While some of these areas are undeveloped or sparsely developed the proximity of these areas to developed areas (wildland urban interface areas) increase the vulnerability to wildfire incidents. While all populations located in fire prone areas are vulnerable, key populations like senior citizens and those living in substandard structures (not meeting current fire codes) may experience greater impacts during a wildfire incident.
Seismic Hazards: Seismic Shaking	All populations within IRWD's service area are vulnerable to seismic shaking. The highest vulnerabilities exist for populations with older housing that doesn't meet current seismic standards and/or renters that do not have control over repairs and mitigation projects to reduce seismically vulnerability.
Severe Weather: Extreme Heat	All populations within IRWD's service area are vulnerable to extreme heat, especially those with no access to air conditioning such as populations living within older homes, manufactured/mobile homes, or the unhoused population.
Seismic Hazards: Earthquake Fault Rupture	Populations in IRWD's service area living in close proximity to active faults have a higher degree of vulnerability to these hazards. While IRWD has not analyzed the demographics of property owners living in these areas, it is safe to assume those living on fixed incomes, renters, and residents without disposable income will be impacted more severely by a fault rupture incident that damages their home or place of work.
Severe Weather: Windstorm	All populations in IRWD's service area can be subjected to major windstorm events. For many of these residents and property owners' impact may not be significant. However some populations may be impacted greatly if significant structural damage occurs that they cannot repair or the building becomes unsafe/uninhabitable.
Severe Weather: Drought	Drought does not directly impact populations within IRWD's service area beyond potential restrictions in water usage and water rate increases.
Geological Hazards: Landslide and Mudflow	Residents within IRWD's service area that are located on or at the base of hillsides have an increased vulnerability to landslides and mudflows. Structures housing vulnerable populations in these areas may experience moderate to severe damage, if landslides occur. Many of the properties located in landslide prone areas of the service area are higher value properties, suggesting that the property owners have financial resources available to make repairs if impacts occur. However, some residents in these areas are senior citizens that may not have the financial means to make

#### Exhibit O-11. IRWD Vulnerable Population Impacts

	repairs to these structures or may be renting and have little control of the recovery process if impacts occur.
Human-Caused Hazards: Power Outage	The entire population within the IRWD service area is susceptible to potential outages, however increased vulnerabilities exist for residents and facilities reliant on electricity-dependent medical equipment such as ventilators and monitoring equipment.
Coastal Hazards: Coastal Storm	The majority of the IRWD service area experiences coastal storms that have the potential to cause flooding and wind damage. Vulnerable populations associated with these events are similar to those experienced under those types of incidents.
Flood	Residents and property owners located adjacent or in close proximity to streams and drainages have a higher vulnerability to flooding. Populations living in these drainages (unhoused), those without access to transportation or limited options, individuals with limited mobility, and populations with language limitations may experience greater impacts.
Human-Caused Hazards: Hazardous Materials	Populations located in close proximity to properties storing, manufacturing, or disposing of hazardous materials are vulnerable to potential exposure if a release were to occur. In addition, properties along roadways used to transport these materials are also potentially vulnerable. Populations in these locations that experience mobility challenges (unable to evacuate/relocate) are especially vulnerable to these types of incidents.

#### **Changes in Land Use and Development**

According to the 6<sup>th</sup> cycle Housing Elements for the respective cities and county located within the IRWD service area anticipate a significant amount of new development and growth over the next 8 years. A majority of this development is anticipated to occur in the City of Irvine withing the Great Park development. This development is occurring on land formerly used as a military installation and it is anticipated that the new buildings and infrastructure constructed will be more resilient and meet the latest standards and federal, state, and local requirements.

With new developments adhering to the latest standards and requirements, the vulnerability to any hazard has not changed for IRWD assets and populations. For the portions of the service areas previously developed, reinvestment and retrofitting is occurring in some areas which can reduce future vulnerability, however many areas still require mitigation activities, which may provide future opportunities for residents and businesses.

Hazard	Climate Change Vulnerabilities					
Hazards of High Concern						
Human-Caused Hazards: Terrorism (Cyber Threat)	Connections between climate change and cyber based terrorism have not been identified.					
Hazards of Medium Concern						
Wildfire	Climate change is expected to cause an increase in both wildfire severity and intensity. It is anticipated that the fire prone areas in both the eastern and western portions of the service area will experience more frequent and intense wildfires as a result of climate change.					
Seismic Hazards: Seismic Shaking	Climate change is not expected to cause any changes to the frequency or intensity of seismic shaking occurring within IRWD's service area.					

#### Vulnerabilities Associated with Climate Change

Hazard	Climate Change Vulnerabilities
Severe Weather: Extreme Heat	Temperatures are expected to increase due to climate change and IRWD anticipates more frequent and intense extreme heat days and heat waves in the future.
Seismic Hazards: Earthquake Fault Rupture	Climate change is not expected to cause any changes to the potential for earthquake fault rupture occurring within IRWD's service area.
Severe Weather: Windstorm	While there is no definitive analysis identifying how wind patterns will change as a result of climate change, it is expected that damage associated with windstorms may be greater due to climate change effects on plants, animals, and infrastructure.
Severe Weather: Drought	Droughts are expected to increase in length and frequency due to climate change and impact IRWD as described in the base plan.
Geological Hazards: Landslide and Mudflow	Climate change could indirectly affect the conditions for landslides within IRWD's service area as increased precipitation and storm intensities may cause more moisture-induced landslides. In addition as droughts become more frequent and intense, vegetation along hillsides may be impacted affecting slope stability.
Human-Caused Hazards: Power Outage	Climate change will likely increase IRWD's vulnerability to power outages as local electric companies implement protocols such as Public Safety Power Shutoff events or as electric demand increases due to increased energy needs.
Coastal Hazards: Coastal Storm	Greater precipitation fluctuations resulting from climate change are anticipated to increase the frequency and intensity of coastal storms and could cause storms occurring in parts of the year when no storm activity usually occurs. These events could impact IRWD as described in the base plan.
Flood	Climate change is expected to increase the potential for flooding either due to more intense precipitation events or flooding in areas that haven't historically been affected by these events.
Human-Caused Hazards: Hazardous Materials	While there is no direct link to hazardous materials release and climate change, it is possible that increased temperatures and changes in precipitation intensity could cause releases. Hotter temperatures could affect the integrity of containers used to store and transport materials and more intense precipitation coupled with leakage from containers could increase the migration of materials impacting IRWD's service area.

# 0.7 CAPABILITIES ASSESSMENT

IRWD's existing capabilities assessment identifies the various plans, programs, staffing, and resources necessary to conduct mitigation activities within the District. To better comply with the latest requirements the following updates to their capabilities assessment have been provided as part of the plan update process (**Exhibit O-12**).

	Planning and Regulatory				
Resource	Description and Ability to Support Mitigation				
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.				
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	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.				

#### Exhibit O-12. IRWD Capabilities Assessment

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	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.
<b>Emergency Operations</b> <b>Plan</b> Responsible Department: IRWD Safety & Security, Automation, and Information Technology Departments	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 and then again in 2023 to clarify activation levels and other concept of operations. 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 references to a Disaster Recovery Plan and Cyber Incident Response Plan maintained by Automation and Information Technology Departments. Together, the EOP and LHMP provide a mitigation and response strategy to hazard events.
Capital Improvement Plan Responsible Department: IRWD Engineering Department	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.
<b>Urban Water</b> <b>Management Plan</b> Responsible Department: IRWD Water Resources Department and Environmental Compliance Department	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. The latest UWMP was adopted in June 2021, along with the IRWD Water Shortage Contingency Plan. 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). IRWD will update the UWMP in 2025 to be adopted in 2026.

<b>Groundwater</b> <b>Management Plan</b> Responsible Department: Engineering (Infrastructure Planning), Orange County Water District (external)	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 overlie 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.
Overflow Emergency Response Plan (Sewer System Management Plan) Responsible Department: IRWD Collections and Regulatory Compliance Departments	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.
Dam Emergency Action Plan and Inundation Maps Responsible Department: IRWD Engineering and Safety & Security Departments.	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.
Baker Water Treatment Plant Emergency Action Plan Responsible Department: IRWD Safety & Security Department	The Baker Water Treatment Plant (BWTP) Emergency Action Plan (EAP) provides guidance for IRWD employees in the case of emergencies as outlined by California Code of Regulations (CCR) Title 8. The BWTP EAP identifies potential hazards 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.
Michelson Operations Center Emergency Action Plan Responsible Department: IRWD Safety & Security Department	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.

Water System Risk and Resilience Assessment Responsible Department: IRWD Safety & Security, Engineering, and Operations Departments	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 2020 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.
<b>Dam Safety Program</b> Responsible Department: Engineering Department	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 has implemented 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.
Water Supply Reliability Evaluation Responsible Department: Water Resources & Environmental Compliance, IRWD	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.
<b>Cybersecurity</b> <b>Assessment</b> Responsible Department: Information Technology, Network and Cyber Security	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.
Sewage Treatment Master Plan & Potable Reuse Program Responsible Department: Water Resources, Capital Projects	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.
Hazardous Materials Program Responsible Department: IRWD Safety & Security, Regulatory Compliance, and Operations.	The IRWD Hazardous Materials Emergency Response Plan (HMERP) includes a Hazardous Materials Emergency Response Plan, training for responders responsible for the facility. During a hazardous materials emergency, IRWD would reference industry resources (Department of Transportation's Emergency Response Guide [ERG]. The IRWD HMERP can be utilized in coordination with the LHMP to manage and mitigate risks related to hazardous materials use.

Administrative and Technical					
Resource	Description and Ability to Support Mitigation				
Engineers or professionals trained in construction practices related to buildings and/or infrastructure	Four Engineering groups are staffed within the Engineering Department: Treatment & Conveyance, Dams & Storage, Operations Support & Pipelines, and Infrastructure Planning. Each group 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 groups are staffed within the Engineering Department: Treatment & Conveyance, Dams & Storage, Operations Support & Pipelines, and Infrastructure Planning. Each group employs engineers trained in construction practices related to buildings and infrastructure, and staff has the capability to implement mitigation actions.				
Safety & Security Department	The Safety & Security Department writes and implements related plans, provides training, manages exercise projects, and/or develops and facilitates safety exercises. The Director of Safety & Security and Safety & Security Specialists support the LHMP and has the capability to implement mitigation actions. As part of the previous LHMP implementation, this Department has added monitoring and tracking regulatory requirements and updates related to hazardous materials storage and response actions to their annual budgeting and workplan.				
Emergency Operations Team	The IRWD Emergency Operations Team (EOT) is comprised of managers and supervisors across various departments.				
Personnel skilled in Geographic Information Systems	The Infrastructure Planning Group within Engineering 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 (WEROC) membership	WEROC is administered by the Municipal Water District of Orange County (MWDOC), supports and manage countywide emergency preparedness, planning, response, and recovery efforts among Orange County water and wastewater utilizes. IRWD participates in trainings and exercises and utilizes resources from WEROC for emergency preparedness purposes.				

	Financial
Resource	Description and Ability to Support Mitigation
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.
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 Connection Fees	IRWD collects developer connection fees during the plan check and permitting process to fund existing infrastructure and to offset future 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
Resource	Description and Ability to Support Mitigation
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.
IRWD Alert	IRWD Alert is IRWD's mass notification system used to communicate with employees and the public within IRWD's service area. Coordination with WEROC would occur before sending any broad messages so as to not overlap or conflict with County or City messaging.
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 Communications Department maintains the IRWD website, writes the monthly e- newsletter, and posts regularly though 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.

# Multiple mitigation actions are priority projects to expand IRWD capabilities. Examples of opportunities to expand capabilities include the following mitigation actions:

**Planning/Regulatory:** Technical Communications Plan (Mitigation Action #2), Specific Hazard Response Plans (Mitigation Action #5), Energy and Greenhouse Gas Master Plan (Mitigation Action #7), Inflow and Infiltration Study (Mitigation Action #13), Cybersecurity Plan (Mitigation Action #20).

Admin/Technical: Technical communications system (Mitigation Action #2), WEROC membership (Mitigation Action #6).

**Financial:** Seek funding opportunities for potable reuse program (Mitigation Action #9), funding for seismic vulnerability evaluation (Mitigation Action #32).

**Education/Outreach:** Specific Hazard Response Plans regular training and exercise programs (Mitigation Action #5), WEROC membership for communication and collaboration (Mitigation Action #6), coordination with police for IRWD-preferred response in localized flooding incidents (Mitigation Action #15), support customer cities in community outreach regarding hazardous materials (Mitigation Action #18), coordination with public safety agencies after wildfires (Mitigation Action #22), and explore opportunities for additional outreach programs (Mitigation Action #37).

# **O.8 MITIGATION STRATEGY**

# 0.8.1 Mitigation Goals

IRWD adopts the hazard mitigation goals developed by the planning team; refer to Section 4.

# **O.8.2** Mitigation Actions

The internal development team reviewed the mitigation actions identified in the 2021 plan and the updated risk assessment to determine if the mitigation actions were completed, required modification, should be removed because they are no longer relevant, and/or should remain in the MJHMP update. Since many of the actions were relatively recent, IRWD identified the actions that were completed and removed those from the mitigation actions table. The remaining actions were kept in the plan, which are illustrated in **Exhibit O-13**, IRWD Mitigation Actions. This exhibit identifies the mitigation actions, including the priority, hazard addressed, cost, timeframe, and potential funding sources. Additional details regarding this information can be found in **Section 4**.

Cost estimates rely on a three tiered system, which include the following categories and corresponding dollar amounts:

Low - <\$500,000 | Medium - \$500,001 - \$2,000,000 | High - > \$2,000,001

High

#	Action/Task/Project Description	Hazard	Responsible	Cost	Possible Funding Sources*	Timeframe
HIGH	I PRIORITY					
1	Build redundancy into the wastewater collection, treatment, disposal, and non-potable distribution system to mitigate major structural defects.	All Hazards	Recycling Operations, Engineering	High	Annual Operating Budget	Immediate (1-2 years)
2	Develop a technical communications plan to build redundancy and evaluate the cost/benefit and feasibility of different communications systems.	All Hazards	Safety, Information Technology Services, Facilities/Fleet	Low	Annual Operating Budget	Immediate (1-2 years)
3	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 Technology Services	Low	Annual Operating Budget	Immediate (1-2 years)
4	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	Low	Annual Operating Budget	Immediate (1-2 years)
5	Evaluate dam improvements to increase resiliency in coordination with the Dam Safety Program and Implementation Plan.	Seismic Shaking	Engineering	Medium	Annual Operating Budget	Immediate (1-2 years)
6	Continue to conduct geotechnical studies for geologic hazards on new construction projects when appropriate, to evaluate vulnerabilities for geologic hazards	Seismic Shaking, Earthquake Fault Rupture, Landslide and Mudflow	Engineering	Low	Annual Operating Budget	Immediate (1-2 years)
7	Develop a Cybersecurity Plan in coordination with a consultant to include a disaster recovery (DR) plan.	Terrorism (MCI), Terrorism (Cyber Threat)	Information Technology Services	Low	Annual Operating Budget	Immediate (1-2 years)
8	Continue to conduct geotechnical studies to determine the potential for onsite landslides in any new construction project.	Landslide/Mudflow	Engineering	Medium	Annual Operating Budget	Immediate (1-2 years)
9	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.	All Hazards	Engineering Department; Serrano Water District, Department of Safety of Dams (external partners)	High	Annual Operating Budget	Short Term (3-5 years)
10	Continue to locate electrical generators at Water Treatment Plants for short-term power solutions.	Wildfire, Seismic Shaking, Extreme Heat, Windstorm, Power Outage	Electrical and Mechanical	Medium	Annual Operating Budget	Immediate (1-2 years)

**O-13. IRWD Mitigation Actions** 

11	Coordinate with SCE prior to any planned power outage to ensure generator capacity and time to pre-position supplies as needed. Maintain communications with SCE for duration of power outage.	Wildfire, Extreme Heat, Windstorm, Power Outage	Electrical, Safety, in coordination with WEROC (external partner)	Low	Annual Operating Budget	Immediate (1-2 years)
12	Utilize data from ongoing generator replacement projects to develop further wildfire and power outage mitigation projects, once above study results become available.	Wildfire, Seismic Shaking, Extreme Heat, Windstorm, Power Outage	Engineering, Water Operations, Collection Systems, Maintenance	Low	Annual Operating Budget	Short Term (3-5 years)
13	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 Shaking, Earthquake Fault Rupture, Landslide and Mudflow	Engineering	Low	Annual Operating Budget	Immediate (1-2 years)
14	If any IRWD-owned critical facility is determined to be seismically vulnerable, identify a plan to conduct structural retrofitting, including funding sources.	Seismic Shaking, Earthquake Fault Rupture, Landslide and Mudflow	Engineering	Low	Annual Operating Budget	Long Term (>5 years)
15	As repair and rehabilitation needs are identified in vertical structural facilities, consider options that increase stability and resiliency as needed. Make improvements in accordance with current codes.	All Hazards	Engineering	Medium	Annual Operating Budget	Immediate (1-2 years)
16	Include assessment and mitigation of potential liquefaction conditions in the scope of any new building or infrastructure project.	Seismic Shaking	Engineering	Low	Annual Operating Budget	Immediate (1-2 years)
Medi	um Priority	·				
17	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	Low	Annual Operating Budget	Immediate (1-2 years)
18	Conduct an update of the IRWD Climate Adaptation and Energy Management Plan, formerly known as the Energy & Greenhouse Gas Master Plan.	All Hazards	Water Resources	Low	Annual Operating Budget	Long Term (>5 years)
19	Seek funding opportunities to further study, plan and implement the IRWD potable reuse program.	Drought	Water Resources	High	Annual Operating Budget	Immediate (1-2 years)
20	Continue to proactively monitor drought conditions or water conservation warnings issued by state agencies or regional water authorities.	Drought	Water Resources	Low	Annual Operating Budget	Immediate (1-2 years)
21	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	High	Annual Operating Budget	Long Term (>5 years)

22	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	High	Annual Operating Budget	Short Term (3-5 years)
23	Continue to coordinate with customer cities and the County to ensure proper storm drain maintenance, to prevent localized flooding due to sediment or debris in the drainage system.	Flood, Coastal Storm, Landslide and Mudflow	Safety, Collection Systems, in coordination with WEROC (external partner)	Low	Annual Operating Budget	Immediate (1-2 years)
24	Continue to support customer cities and the County in community outreach actions regarding the proper handling, storage, and disposal of hazardous materials including runoff contaminants.	Hazardous Materials	Safety, Public Affairs Communications	Low	Annual Operating Budget	Immediate (1-2 years)
25	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 and Mudflow, Flood, Coastal Storms, Windstorm	Engineering, Safety, in coordination with WEROC (external partner)	Low	Annual Operating Budget	Immediate (1-2 years)
26	Establish procedures for staging District vehicles, materials, and equipment at alternative work locations prior to significant storm events.	Landslide and Mudflow, Flood, Coastal Storms, Windstorm	Safety, Fleet, all relevant departments	Low	Annual Operating Budget	Immediate (1-2 years)
27	Consider developing and seeking funding for an evaluation program to determine the seismic vulnerability of critical assets.	Seismic Shaking	Engineering	Medium	Annual Operating Budget	Short Term (3-5 years)
28	Annually review defensible space, brush clearing and weed abatement needs for all canyon water facilities.	Wildfire	Facilities	Low	Annual Operating Budget	Immediate (1-2 years)
29	Evaluate opportunities to enhance infrastructure building hardscape (including protective walls) and undergrounding power lines as appropriate.	Wildfire	Engineering	Medium	Annual Operating Budget	Short Term (3-5 years)
30	Conduct a study to assess canyon facilities: •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	Annual Operating Budget	Short Term (3-5 years)
31	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	All Hazards	All Departments	Medium	Annual Operating Budget	Immediate (1-2 years)

	hazard mitigation. By collaborating with other agencies,					
	outreach will engage larger audiences across a variety of					
	platforms.					
Low F	Priority					
32	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	Annual Operating Budget	Short Term (3-5 years)
33	Conduct an inflow & infiltration study to determine where 50 year and 100 year flood waters would collect. Study outcomes should include the following: •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	Medium	Annual Operating Budget	Long Term (>5 years)
34	Designate alternative locations for residual dirt and fill storage, away from the Michelson Yard.	Flood	Construction, Facilities	Low	Annual Operating Budget	Immediate (1-2 years)
35	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	Annual Operating Budget	Short Term (3-5 years)
36	Evaluate and study critical facilities and facilities of concern that could benefit from protective retaining wall installation.	Landslide/Mudflow	Engineering	Low	Annual Operating Budget	Long Term (>5 years)

\* All potential grant funding sources are outlined within the Base Plan section 4.4.1 such as FEMA BRIC, HMPG, EMPG, and other California state specific grants

# 0.8.3 Completed or Removed Mitigation Initiatives

The following mitigation actions from the 2021 plan have been completed or are in progress and therefore are removed from this plan update.

**Mitigation:** Coordinate with the County of Orange for opportunities to allow shared communication space on cell towers for IRWD. Shared space would allow for IRWD Supervisory Control and Data Acquisition (SCADA) radio communication only.

– **Status:** Completed.

**Mitigation:** 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.

– **Status:** Completed.

**Mitigation:** 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.

– **Status:** Completed.

**Mitigation:** Enhance phone system to support phone connectivity when people are working offsite through Voice over Internet Protocol (VoIP).

- Status: Completed.

Mitigation: Prepare a Recycled Water Shortage Contingency Plan

- Status: Completed.

**Mitigation:** Assess permanently elevating water-sensitive equipment and anchoring fuel tanks in flood-prone locations.

- Status: Completed.

Mitigation: Regularly check and maintain radar flood level gauges located in San Diego Creek.

 Status: Remove. This is part of preventative maintenance and does not need to be included here.

**Mitigation:** Designate alternative locations for residual dirt and fill storage, away from the Michelson Yard

 Status: Complete in 2024. Expected to be completed in 2024 with alternative road access being developed into and out of Michelson Water Recycling Plant for use in the event of major flooding. Flood gates have also been implemented. This allows IRWD vehicles and equipment to continue to be staged at its normal location without having to be re-staged.

**Mitigation:** Continue to monitor and track regulatory requirements and updates as they relate to hazardous materials storage and response actions.

Status: Completed. Regulatory compliance team and legislative team that tracks all regulatory requirement.

**Mitigation:** 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.

- Status: Remove.

**Mitigation:** 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.

– **Status:** Completed.

**Mitigation:** Perform monthly maintenance checks on permanent and portable back-up generators, and check fuel supply

 Status: Remove. This is part of preventative maintenance and does not need to be included here.

**Mitigation:** Seek funding opportunities to rehabilitate or replace aging generators in order to maintain critical water and wastewater operations during power outages.

 Status: Complete. No funding found. Construction is underway for increasing fuel storage to 72 hours and replacing several generators.

**Mitigation:** 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.

- Status: Completed.

**Mitigation:** 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.

Status: Complete. All fuel tanks in the canyons are in construction to support 72 hours of operation.

**Mitigation:** Extend battery life for the 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.

 Status: Complete. A new UPS was installed at Modjeska Reservoir to allow longer runtime during power outages. Manning, Williams, Fleming, Shaw, and Read pump stations all have generators. Shaw Reservoir is getting a new PLC panel & UPS as part of the current projects so that will help that site.

**Mitigation:** 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.

- Status: Complete. Now part of the annual maintenance program.

**Mitigation:** 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.

- Status: Complete. Now part of a standard operating procedure

**Mitigation:** Continue existing community and customer outreach programs/modules, including landscaping, irrigation, water quality, water efficiency, leak detection, and other relevant topics as needed.

- Status: Complete.

# 0.9 PLAN INTEGRATION

IRWD's capital budget, Capital Improvements Program, Infrastructure Master Planning, and other planning and response documentation are all used to implement mitigation initiatives identified in this annex. IRWD will update its Emergency Response Plan (aka EOP) that will establish protocol and incorporate applicable areas of the MJHMP. After adoption of the MJHMP, the District will continue to integrate mitigation priorities into these documents.

Since the pervious plan update, IRWD incorporated information from the HMP in its Capital Investment Plan (CIP), updated various plans, and procedures and conducted the following activities to support plan integration:

The risk assessment and mitigation actions were used to inform IRWD's updates to the Master Plan and UWMP.

The Capital Budget was used to implement mitigation initiatives identified in the previous plan.

The risk assessment informed the need for additional studies focused on risk reduction and mitigation implementation.



# IRVINE RANCH WATER DISTRICT DRAFT LOCAL HAZARD MITIGATION PLAN

AUGUST 2021

Michael Baker

# IRVINE RANCH WATER DISTRICT LOCAL HAZARD MITIGATION PLAN



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#### **IRVINE RANCH WATER DISTRICT**

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# IRVINE RANCH WATER DISTRICT LOCAL HAZARD MITIGATION PLAN



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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

<u>Response Cycle</u>. 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







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 <u>Appendix A</u>.



### 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 fourstep planning process for the development and approval of hazard mitigation plans. <u>Table 2-1</u>, <u>DMA 2000 CFR Crosswalk</u>, lists the specific CFR excerpts that contain the requirements for approval, and identifies the applicable section of this LHMP.

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	

Table 2-1 DMA 2000 CFR Crosswalk

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.

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

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	
LHMP Planning T	eam



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

Name	Title/Role	Organization	LHMP Planning Team Role
	Public Affairs Specialist, Public	Irvine Ranch	Hazard Identification and Plan Review.
Deniene Rivenburg	Affairs	Water District	
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.
lan 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
Namo			Capabilities Assessment, Mitigation Actions
Marina Lindsay	Water Resources Planner,	Irvine Ranch	and Prioritization, Focus Group Discussion
	Planning	Water District	and Plan Review.
		Orange City	Mitigation Actions and Plan Review.
Matthew Barba	Firefighter Paramedic, Station 6	Firefighters	
Natalie Palacio	Water Resources Specialist	Irvine Ranch	Mitigation Actions, Focus Group Discussion,
Natalie Palacio	water Resources Specialist	Water District	and Plan Review.
		State Water	Hazard Identification, Capabilities
Oliver Pacifico	Water – South Coast Section	Resources Control	Assessment, Mitigation Actions and
		Board	Prioritization, and Plan Review.
	Electrical & Instrumentation		Hazard Identification, Capabilities
Owen O'Neill	Manager, Electrical Services –	Irvine Ranch	Assessment, Mitigation Actions and
	Maintenance Operations	Water District	Prioritization, Focus Group Discussion, and
		la da a Davia h	Plan Review.
Randy Williams	Network and Cybersecurity	Irvine Ranch	Hazard Identification, Mitigation Actions,
,	Manager, Information Systems	Water District	Focus Group Discussion, and Plan Review. Hazard Identification, Capabilities
Richard (Rick) Mykitta	Director of Maintonance	Irvine Ranch	Assessment, Mitigation Actions, Focus Group
RICHAIU (RICK) MYKIIIA	Director of Maintenance	Water District	Discussion and Plan Review.
		Office of	Hazard Identification and Plan Review.
	Emergency Management	Emergency	Hazaru luentincation and Plair Review.
Robert (Bobby) Simmons	Administrator	Management, City	
	Administrator	of Irvine	
о I Б II II		Tustin Police	Capabilities Assessment and Plan Review.
Sarah Fetterling	Sergeant	Department	•
Scott Toland	Soniar Engineer	Irvine Ranch	Mitigation Actions and Prioritization, Focus
	Senior Engineer	Water District	Group Discussion, and Plan Review.
Sharlyn de la Paz	Senior Management Analyst	City of Lake	Hazard Identification and Plan Review.
Shahyin ue la Faz	• •	Forest	
Stephen Foster	Emergency Management	City of Tustin	Mitigation Actions and Prioritization, and Plan
Stephen i Oster	Coordinator	3	Review.
	Emergency Operations	Emergency	Hazard Identification and Plan Review.
Steve Rhyner	Coordinator	Management, City	
		of Santa Ana	
Todd Colvin	Water Maintenance Supervisor,	Irvine Ranch	Mitigation Actions, Focus Group Discussion,
	Field Services	Water District	and Plan Review.
Thomas Malon-	Director for Information Con 1	Irvine Ranch	Hazard Identification, Capabilities
Thomas Malone	Director for Information Services	Water District	Assessment, Mitigation Actions and Prioritization, and Plan Review.
		Metropolitan	Hazard Identification, Capabilities
Vicki Osborn	Director of Emergency	Water District of	Assessment, and Plan Review.
	Management	Orange County	ASSESSITIETII, ATIU FIATI REVIEW.
	Executive Director of	Irvine Ranch	Capabilities Assessment, Mitigation Actions
Wendy Chambers			and Prioritization, and Plan Review.
5	Operations	Water District	and Prioritization, and Plan Review.

The LHMP Planning Team held four meetings, as summarized in <u>Table 2-3</u>, <u>LHMP Planning</u> <u>Team Meeting Summary</u>. 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 <u>Appendix B</u>, <u>LHMP Planning Team Meetings</u>.



Table 2-3			
LHMP Planning Team Meeting Summary			

Date	Meeting	Discussion Items
January 27, 2021	Planning Committee Meeting #1	<ul> <li>Project goals, objectives, and expectations</li> <li>Purpose and requirements of the LHMP</li> <li>Hazard identification and prioritization</li> <li>Critical facilities introduction</li> </ul>
February 24, 2021	Planning Committee Meeting #2	<ul> <li>Summary of hazards/hazard profiles</li> <li>Risk assessment methodology</li> <li>Critical facilities discussion</li> <li>Capabilities assessment and identification</li> <li>Public involvement update</li> </ul>
March 31, 2021	Planning Committee Meeting #3	<ul> <li>Risk assessment and vulnerability overview</li> <li>Critical facilities discussion and update</li> <li>Mitigation strategy discussion</li> <li>Public involvement update</li> </ul>
May 5, 2021	Planning Committee Meeting #4	<ul> <li>Hazard mitigation goals</li> <li>Risk assessment and vulnerability overview/updates</li> <li>Public involvement, survey summary</li> <li>Mitigation strategy discussion</li> </ul>

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 <u>Appendix B</u>.

### 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 <u>Appendix B</u>.

### **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 <u>Table 2-4</u>, <u>Primary Plan</u> <u>Resources</u>. A complete list of resources is included in <u>Section 7.0</u>, <u>References</u>.

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	Hazard Profiles, Vulnerability Assessment, Mitigation Strategy	
Canyon, Santiago Creek, Syphon) and Approved Inundation Maps	(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 2-4Primary Plan Resources



### 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 <u>Section</u> <u>5.0</u>, <u>Mitigation Strategy</u>.

### 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 <u>Section 4.0</u>, <u>Hazards Assessment</u>.

### 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 <u>Section 4.0</u>.

### 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 <u>Section 1.0</u>, *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 <u>Section 5.0</u>.

### 2.3.3 IDENTIFY MITIGATON 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 <u>Section 5.0</u>.

### 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 <u>Appendix A</u>, <u>IRWD Adoption Resolution</u>.

### 2.3.5 PLAN MAINTENANCE

Plan maintenance procedures, found in <u>Section 6.0</u>, 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 <u>Exhibit 3-1</u>, <u>Regional Location</u>. 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.<sup>1</sup>

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 <u>Table 3-1</u>, <u>IRWD Water Portfolio</u>.

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, Irvine Ranch Water District: An Overview, https://www.irwd.com/images/pdf/about-us/factsheet.pdf, published February 2020, accessed May 1, 2021.		

Table 3-1 IRWD Water Portfolio

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.

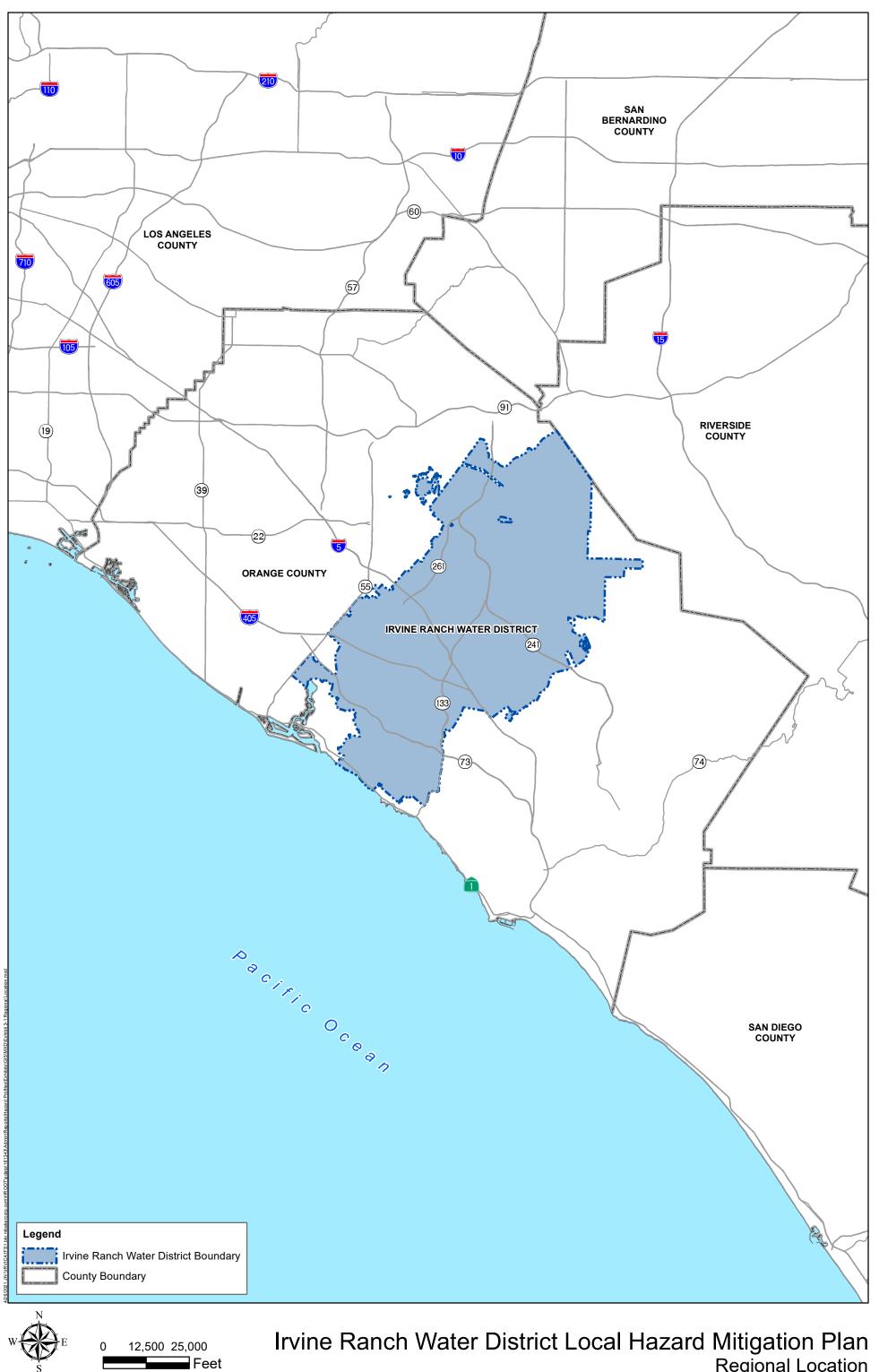
### 3.1 PHYSICAL SETTING

IRWD provides both water and wastewater services in six cities and several unincorporated communities within central Orange County, California; refer to <u>Exhibit 3-2</u>, <u>Irvine Ranch Water</u> <u>District Service Area</u>. 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.

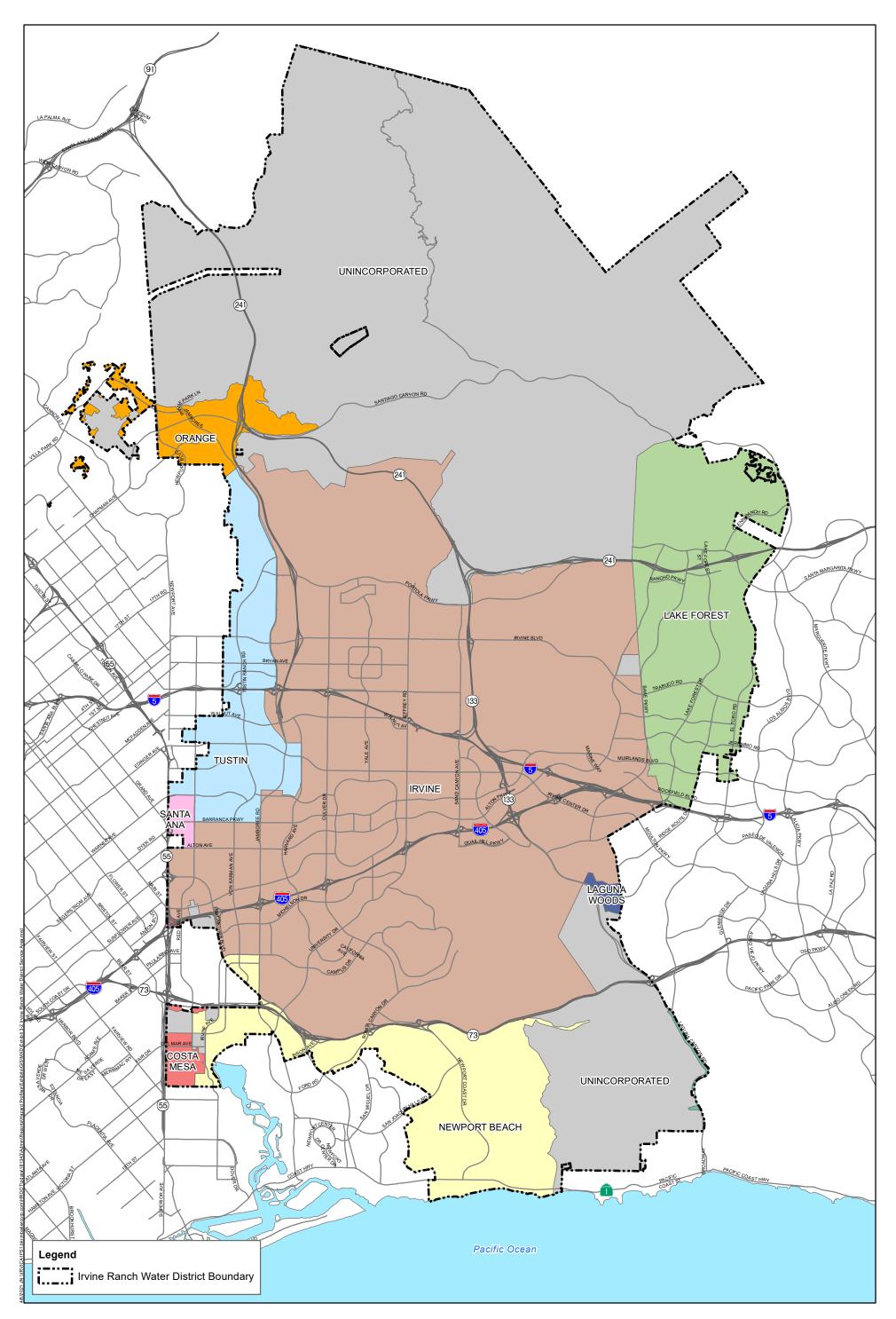
<sup>&</sup>lt;sup>1</sup> Irvine Ranch Water District. *About Us.* https://www.irwd.com/about-us. Accessed March 11, 2020.



# Regional Location

Exhibit 3-1

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





### Irvine Ranch Water District Local Hazard Mitigation Plan Irvine Ranch Water District Service Area

Data Source: IRWD, 2021

Exhibit 3-2



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.<sup>2</sup>

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.<sup>3</sup>

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. <u>Table 3-2</u>, <u>Consolidated Districts in IRWD History</u>, shows each water district or company that IRWD has consolidated with, as well as the cities/communities to which each district previously provided services.

Consolidated Districts in IRWD History		
Serviced Cities/Communities	Consolidation Date	
East of the City of Orange	June 1, 2008	
East of the City of Orange and the City of Tustin	July 6, 2006	
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	
N/A	December 31, 1998	
N/A	1997	
	Serviced Cities/Communities East of the City of Orange East of the City of Orange and the City of Tustin The City of Laguna Hills, Laguna Woods, the City of Lake Forest, west of the City of Mission Viejo, north of the Aliso Viejo N/A	

Table 3-2 Consolidated Districts in IRWD History

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 <u>Table 3-3</u>, <u>Irvine Ranch Water Districts Critical Facilities and Facilities of Concern</u>. 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

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

<sup>&</sup>lt;sup>3</sup> 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 Mary 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.

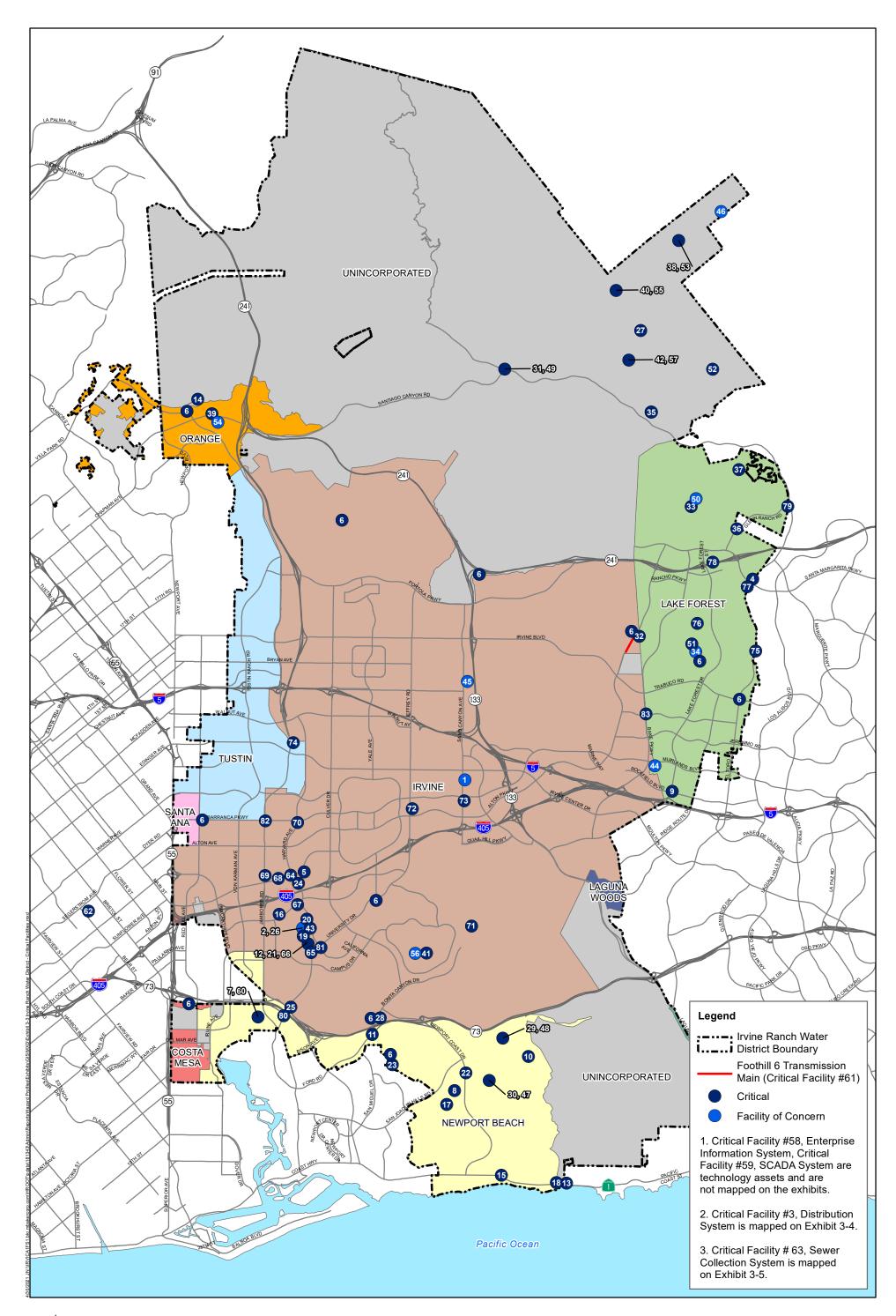
ID	Name	Facility Type	Critical Facility	Facility of Concern
1	Headquarters Building	Administrative Offices		Х
2	Michelson Biosolids	Biosolids Treatment		Х
3	Distribution System	Distribution System	Х	
4	El Toro Diversion Structure	Diversion Structure	Х	
5	San Mateo Diversion	Diversion Structure	Х	
6	Met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

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



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

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

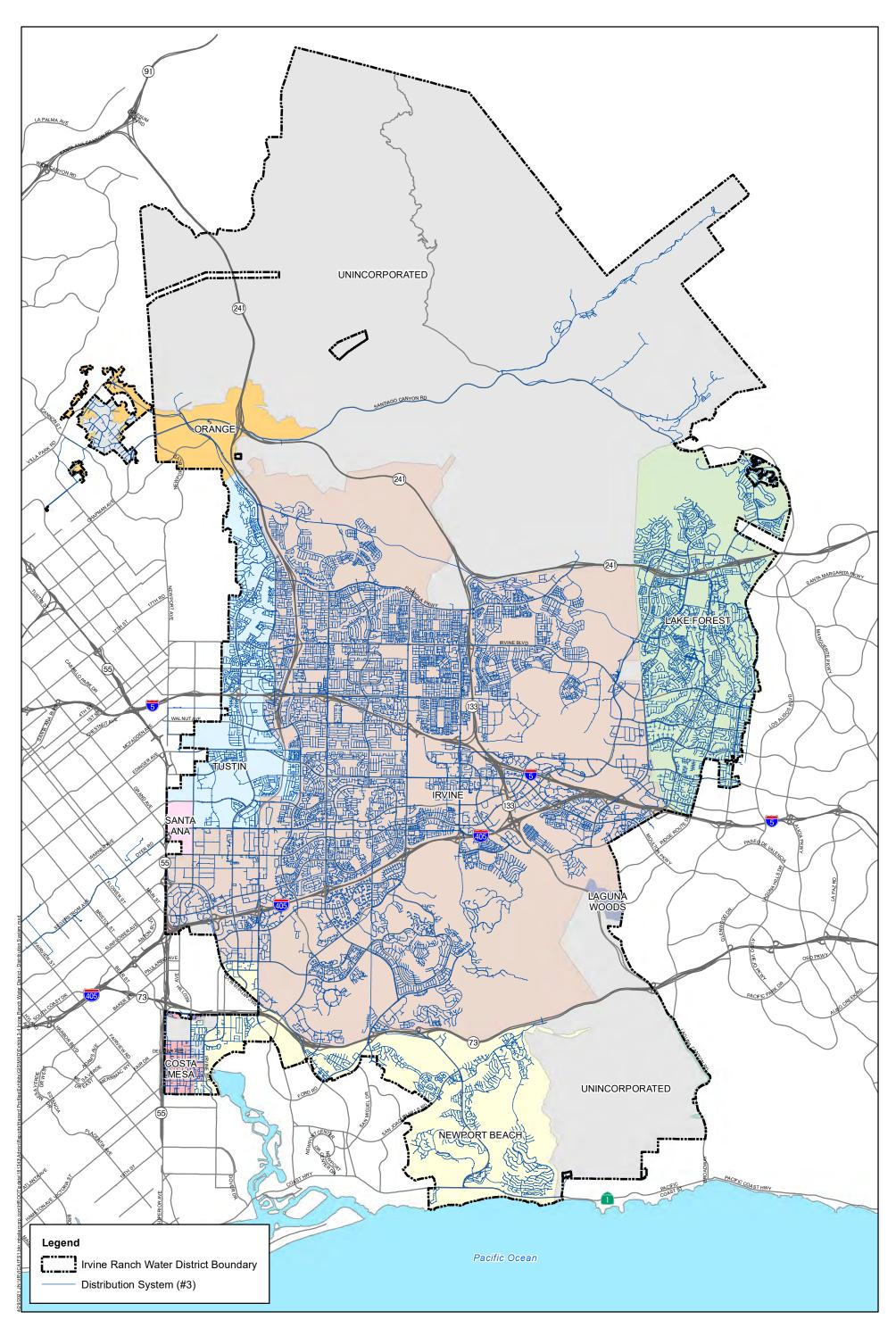




### Irvine Ranch Water District Local Hazard Mitigation Plan Irvine Ranch Water District - Critical Facilities

Data Source: IRWD, 2021

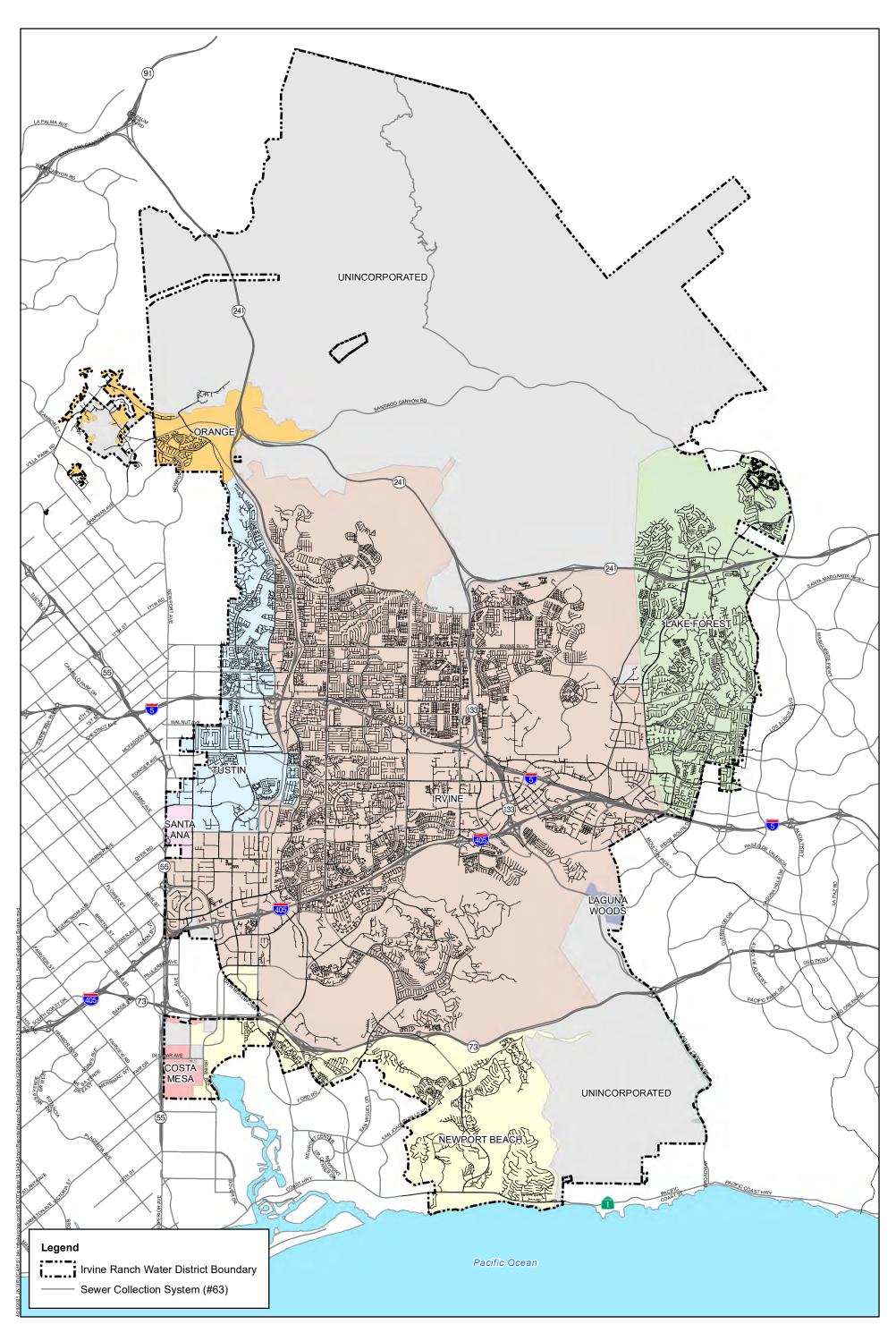
Exhibit 3-3





### Irvine Ranch Water District Local Hazard Mitigation Plan Irvine Ranch Water District - Distribution System

Source: IRWD, 2021





### Irvine Ranch Water District Local Hazard Mitigation Plan Irvine Ranch Water District - Sewer Collection System

Source: IRWD, 2021

Exhibit 3-5



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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. <u>Table 4-1</u>, *IRWD Hazard Identification*, summarizes the Planning Team's discussion and determination of hazards for inclusion in the LHMP.

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, clima 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 tsunami. 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 IRWD Hazard Identification



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

Hazards	Include in LHMP?	Zard Identification 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 tsunami. 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 <u>Table 4-2</u>, <u>Hazard Ranking Methodology</u>. 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.

<u>Table 4-3</u>, <u>Hazard Rankings</u>, 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 4-2Hazard 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			
Somewhat Likely – between 1% and 10% probability in next year or has a recurrence interval of 11 to 100 years			
Likely – between 10% and 100% probability in next year or has a recurrence interval of 10 years or less			
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 histo	orical 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) <sup>1</sup>
Climate Change <sup>2</sup>	N/A	N/A	N/A	N/A	N/A	N/A
Coastal Erosion <sup>3</sup>	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 <sup>3</sup>	1	1	1	1	4.00	Low
Tsunami <sup>3</sup>	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 <sup>4</sup>	4	2	1	2	26.40	Medium
1. Refer to <u>Table 4-2</u> 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 <u>Section 4.2</u>, below.

3. As outlined in <u>Table 4-1</u>, 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 <u>Section 4.2</u>. 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:<sup>1</sup>

- 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 postflood 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:<sup>2</sup>

- 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.

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

<sup>&</sup>lt;sup>2</sup> 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.

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.		
LOW	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		
Significant	damage, impacts to critical facilities, or other significant impacts.		
High Expected to cause loss of at least one human life.			
Extromoly High	Expected to cause considerable loss of human life or would result in an inundation		
Extremely High	area with a population of 1,000 or more.		
Source: California Department of Water Resources, Division of Safety of Dams, Definitions of Downstream Hazard and Condition			
Assessment, 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.			

### Table 4-4 DEOD Downstroom Hazard Potential Classification Lovala

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.

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

Table 4-5



# 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	None.					
NUL Kaleu	inspected but, for whatever reason, has not been rated.	None.					
Source: Californ	Source: California Department of Water Resources, Division of Safety of Dams, Definitions of Downstream Hazard and Condition						
Assessment, htt	Assessment, https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/All-Programs/Division-of-Safety-of-						
Dams/Files/Pub	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 <u>Table 4-6</u>, <u>IRWD Dams</u>, and reservoirs are listed in <u>Table 4-7</u>, <u>IRWD Reservoirs</u>.

### Table 4-6 IRWD Dams

Dam Name	Dam Name Hazard Type Size DSOD Rating					
Dani Name	Classification	Type	3120	DOOD Ruting		
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, DSOD Safety Rating for IRWD Dams,						
https://www.irwd.com/images/	/pdf/construction/DSC	D_safety_rating_for_dams_chart_03172	1_temp.pdf, accessed	d 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 –	8631 Portola Parkway, Irvine	Zone 6
Rattle Snake Canyon Dam Reservoir		
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, Water System Risk and Resilience Assessment: A Comprehensive Analysis Consistent with		
America's Water Infrastructure Act of 2018, 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 <u>Appendix C</u>, <u>Dam/Reservoir Failure Vulnerability Assessment</u>. 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.<sup>3</sup> 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 Feburary 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.<sup>4</sup> 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.<sup>5</sup> Refer to <u>Section 4.2.3</u> 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.

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

<sup>&</sup>lt;sup>4</sup> 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.

<sup>&</sup>lt;sup>5</sup> 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.<sup>6</sup>

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.<sup>7</sup>

### 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

<sup>&</sup>lt;sup>6</sup> Irvine Ranch Water District, *Emergency Action Plan for San Canyon Dam*, https://www.irwd.com/images/pdf/construction/damemergency-action-plans/eap\_sand\_canyon\_2019-10-25\_post.pdf, accessed July 15, 2021.

<sup>&</sup>lt;sup>7</sup> 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.<sup>8</sup>

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 <u>Section 4.2.9</u>, <u>Wildfire</u>.

#### 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.

<sup>&</sup>lt;sup>8</sup> 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 <u>Table 4-8</u>, <u>Drought Severity Classification</u>.

Category Description Possible Impacts				
<b>3</b>				
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	Some damage to crops, pastures; streams, reservoirs, or wells low, some water shortages developing		
	Drought	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	Exceptional and widespread crop/pasture losses; shortages of water in reservoirs, streams, and wells		
	Drought	ght creating water emergencies.		
Source: U.S. Drought Monitor, Drought Classification, https://droughtmonitor.unl.edu/About/AbouttheData/DroughtClassification.aspx,				
accessed February 8, 2021.				

Table 4-8	
Drought Severity Classificatio	r

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.

<u>Exhibit 4-1</u>, <u>Drought Monitor Map</u>, depicts the drought monitor map, which identifies areas of drought and labels them by intensity as shown in <u>Table 4-8</u>. 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.<sup>9</sup>

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.<sup>10</sup> On April 7, 2017, the

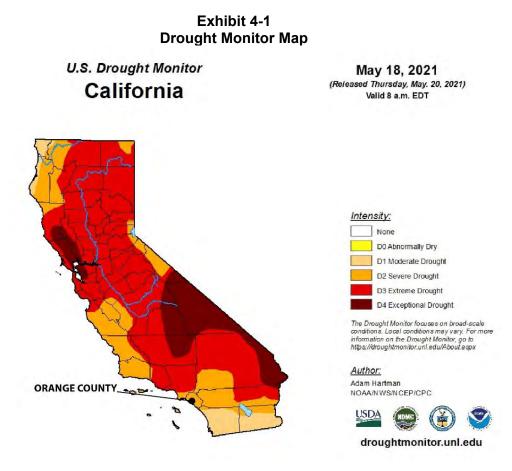
<sup>&</sup>lt;sup>9</sup> California Governor's Office of Emergency Services, 2018 California State Hazard Mitigation Plan,

https://www.caloes.ca.gov/HazardMitigationSite/Documents/003-2018%20SHMP\_FINAL\_ACK-TOC.pdf, published September 2018, accessed February 8, 2021.

<sup>&</sup>lt;sup>10</sup> 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.



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.<sup>11</sup> 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.<sup>12</sup> Thus far, no emergency declarations have included Orange County and IRWD has not experienced any immediate drought impacts.

<sup>&</sup>lt;sup>11</sup> The Washington Post, *California facing drought crisis as water shortages mount and fire danger escalates,* dated May 21, 2021, accessed May 24, 2021.

<sup>&</sup>lt;sup>12</sup> 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. <u>Table 4-9</u>, <u>*Historical Droughts*</u>, shows the historical droughts that have occurred in California from 1827 through the present.

Area Affected Statewide atewide except central Sierra Nevada and north coast atewide except central Sierra	Notes           Multiyear: 1827–29, 1843–44, 1856–57, 1863–64 (particularly extreme), 1887–88, 1897–1900, 1912–13.           Simultaneous in affected areas, 1919–20. Most extreme in north.		
atewide except central Sierra Nevada and north coast	1887–88, 1897–1900, 1912–13.		
Nevada and north coast	Simultaneous in affected areas, 1919–20. Most extreme in north.		
atewide except central Sierra			
Nevada	Simultaneous in effect for entire State only during 1924, which was particularly severe.		
Statewide	Simultaneously in effect for entire State, 1929–34. Longest in State's history.		
Statewide	Simultaneously in effect for entire State, 1947–49. Most extreme in south.		
Statewide	Most extreme in Sierra Nevada and central coast.		
Statewide, except for southwestern deserts	Two significantly dry years in State's history. Most severe in northern two- thirds of State.		
Statewide	Moderate, continuing through 1989. Most extreme in northern Sierra Nevada.		
Statewide	Most severe in southern California.		
Statewide	Twelfth driest 3-year period on record at the time. Most severe in western San Joaquin Valley.		
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.			
Ì.	Chase, R. S. Roberts, and D. Geological Survey Water-Sup		

Table 4-9		
Historical Droughts		

## Probability of Future Occurrences

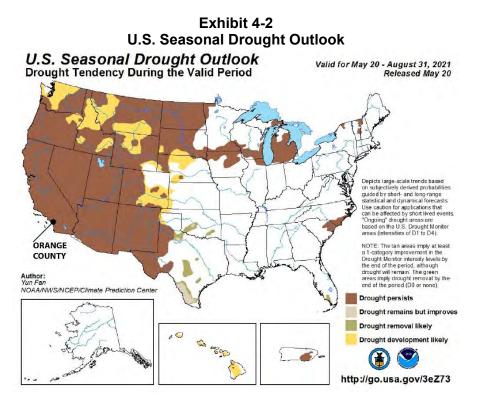
Based on previous occurrences and trends in California, the likelihood that the IRWD service area will experience drought conditions in the future is considered high. The U.S. Seasonal Drought Outlook depicts large-scale trends based on U.S. Drought Monitor areas (intensities of D1 to D4), as shown in <u>Exhibit 4-2</u>, <u>U.S. Seasonal Drought Outlook</u>. 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.<sup>13</sup> 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).

<sup>&</sup>lt;sup>13</sup> 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 Nino and La Nina are complex weather patterns resulting from variations in ocean temperatures in the equatorial Pacific. Warner or colder than average ocean temperatures in one part of the world can influence weather around the globe. El Nino and La Nina episodes typically last 9 to 12 months, but some prolonged events may last for years.<sup>14</sup>
  - 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.<sup>15</sup>

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.

<sup>&</sup>lt;sup>14</sup> National Oceanic and Atmospheric Administration, *What are El Nino and La Nina*?

https://oceanservice.noaa.gov/facts/ninonina.html, February 15, 2021.

<sup>&</sup>lt;sup>15</sup> 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.<sup>16</sup> 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.

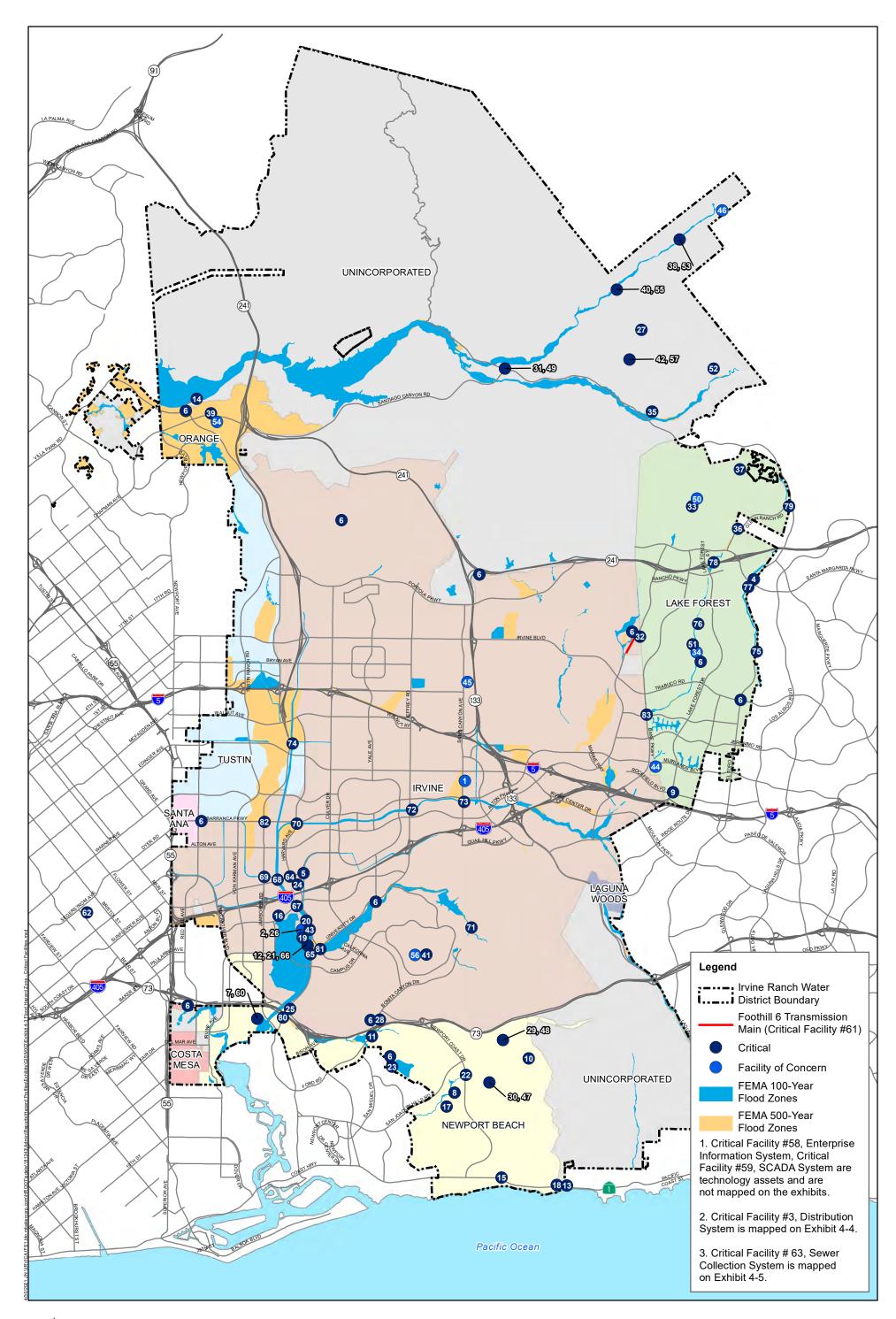
Exhibit 4-3, *Flood Hazard Zone – Critical Facilities*, Exhibit 4-4, *Flood Hazard Zone – Distribution System*, and Exhibit 4-5, *Flood Hazard Zone – Sewer Collection System*, show the locations of flood zones in the IRWD service area. Significant 100-year flood zones are located within the City of Irvine 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 <u>Table 4-10</u>, *Acreage by Flood Zones*, for the amount of IRWD's service area located within 100-year or 500-year flood zone.

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.				

Table 4-10		
Acreage by Flood Zones		

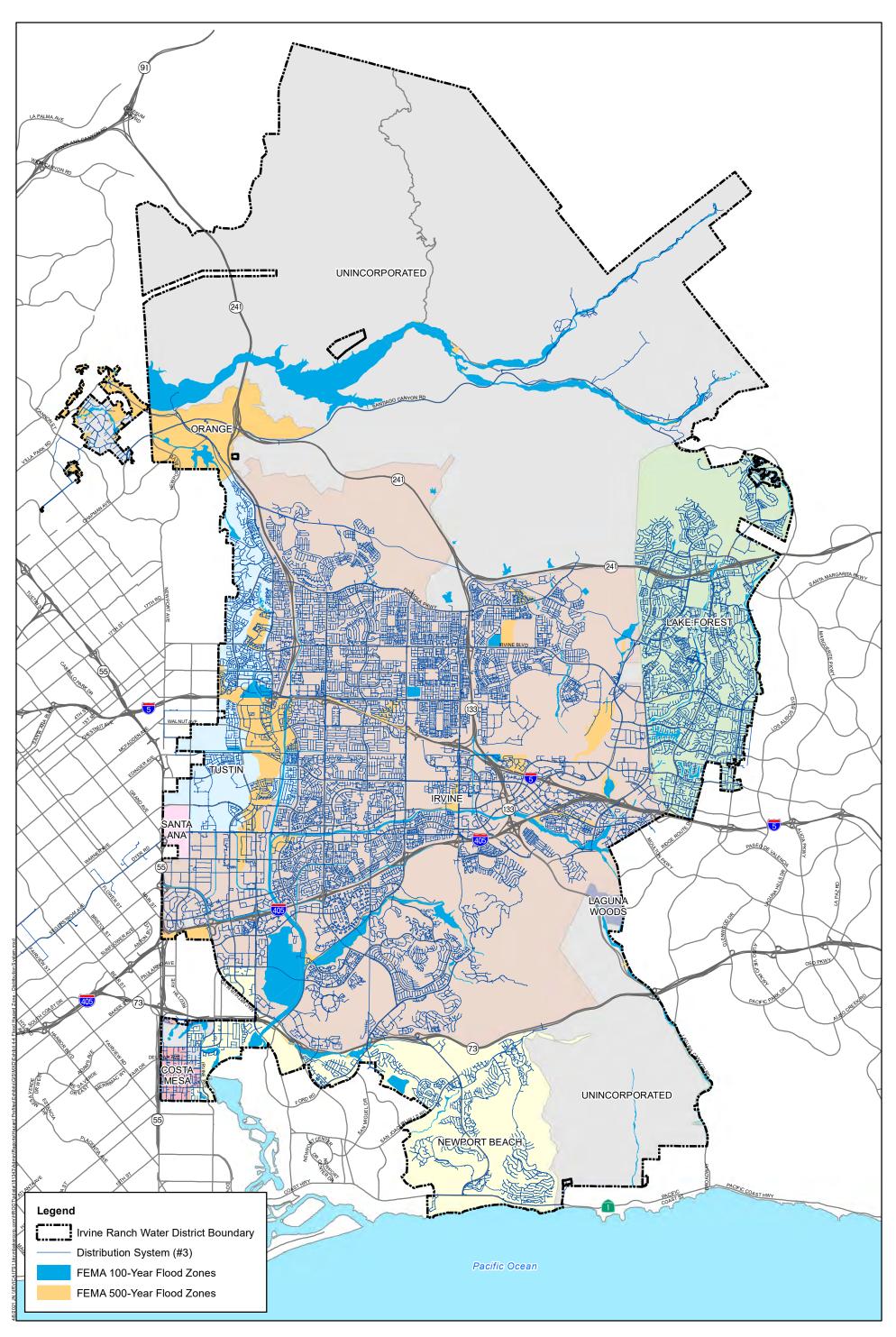
<sup>&</sup>lt;sup>16</sup> Orange County Open Data ARCGIS, *Orange County – Our Watersheds*, https://data-ocpw.opendata.arcgis.com/datasets/orange-county-our-watersheds?geometry=-118.009%2C33.555%2C-117.142%2C33.755, accessed February 15, 2021.





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

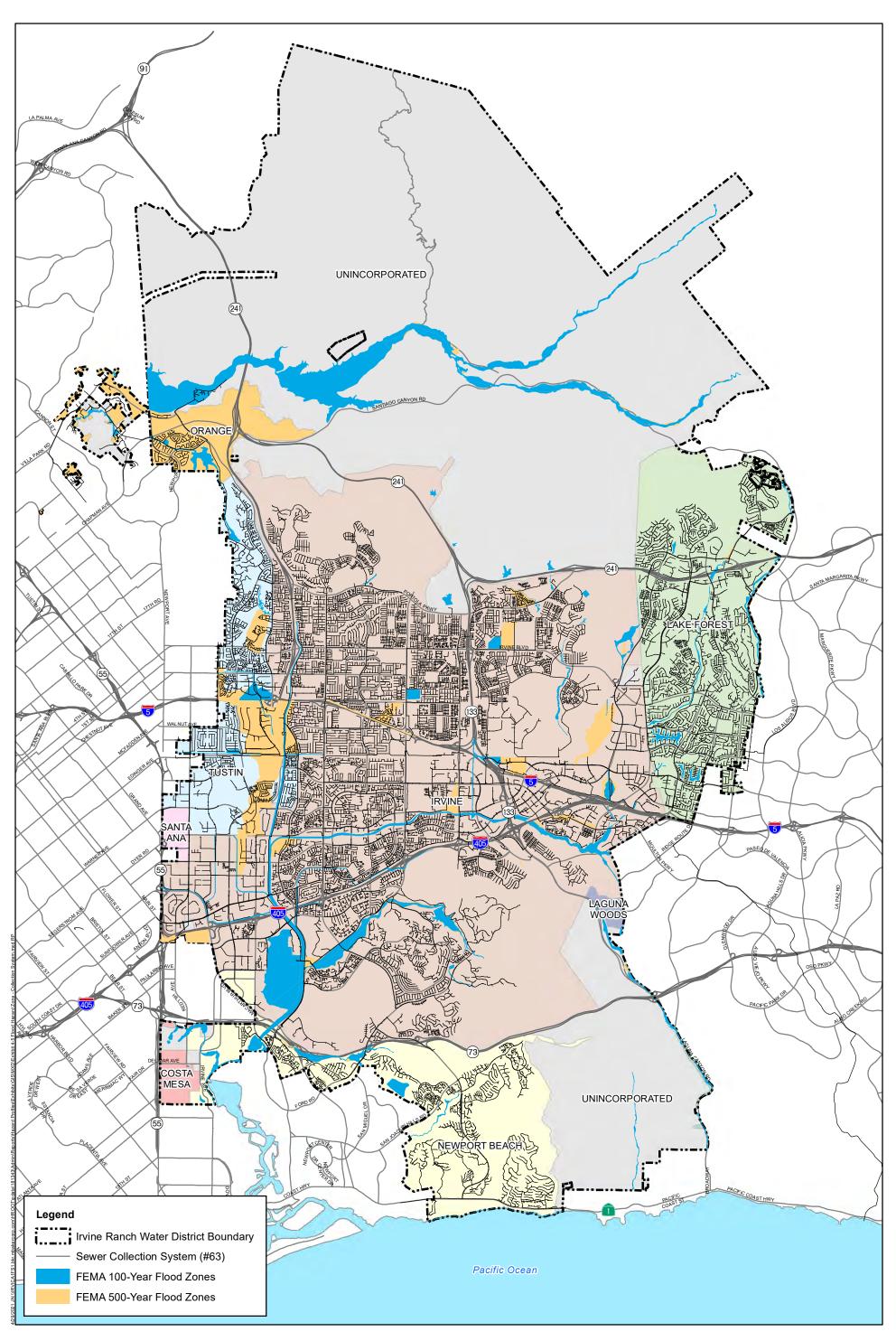
Data Source: IRWD, 2021, FEMA, 2009





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

Source: IRWD, 2021, FEMA, 2009





## Irvine Ranch Water District Local Hazard Mitigation Plan Flood Hazard Zone - Sewer Collection System

Source: IRWD, 2021, FEMA, 2009



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.<sup>17</sup>

In January and February 1969, two major storms caused mass flooding across Orange County. On Feburary 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.<sup>18</sup>

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:<sup>19</sup>

 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.

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

<sup>&</sup>lt;sup>18</sup> City of Irvine, Local Hazard Mitigation Plan Public Review Draft, prepared June 2020.

<sup>&</sup>lt;sup>19</sup> 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&begin Date\_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."<sup>20</sup> 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.<sup>21</sup> 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

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

<sup>&</sup>lt;sup>21</sup> 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 <u>Section 4.2.6</u>, <u>Landslide and Mudflow</u>, 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.<sup>22</sup> 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

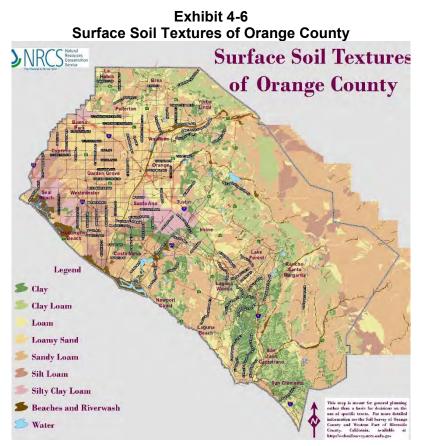
Based on Natural Resources Conservation Service (NRCS) mapping, soils that could be defined as expansive underly significant portions of Orange County, including part of the IRWD jurisdiction. Consensus among experts suggests that due to the diversity of soil conditions throughout the County, no structures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

<u>Exhibit 4-6</u>, <u>Surface Soil Textures of Orange County</u>, depicts the NRCS mapped soil surface textures prepared for the Metropolitan Water Department of Orange County (MWDOC), showing clay, clay loam, and silty clay loam occurring through much of the IRWD service area. IRWD facilities within areas of underlaying 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.

<sup>&</sup>lt;sup>22</sup> 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.

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





Source: Municipal Water District of Orange County, Orange County Surface Soils Textures Map, https://www.mwdoc.com/savewater/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 <u>Section 4.2.1</u>, <u>Dam/Reservoir Failure</u> 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.<sup>24</sup> 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

<sup>&</sup>lt;sup>24</sup> 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.

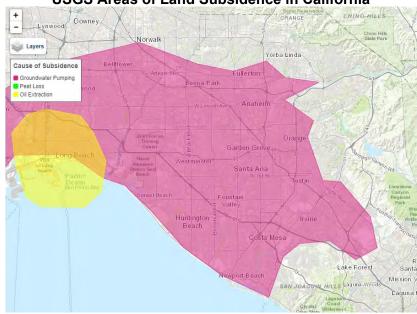


Exhibit 4-7 USGS Areas of Land Subsidence in California

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 20<sup>th</sup> 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.<sup>25</sup> 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

Source: U. S. Geologic Survey, Areas of Land Subsidence in California, https://ca.water.usgs.gov/land\_subsidence/californiasubsidence-areas.html accessed February 9, 2021

<sup>25</sup> 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.<sup>26</sup> 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.<sup>27</sup> 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.<sup>28</sup> 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.<sup>29</sup> 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

https://www.cpc.ncep.noaa.gov/products/expert\_assessment/sdo\_summary.php, accessed February 8, 2021.

<sup>&</sup>lt;sup>26</sup> National Weather Service - Climate Prediction Center, U.S. Seasonal Drought Outlook,

<sup>&</sup>lt;sup>27</sup> 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.

<sup>&</sup>lt;sup>28</sup> 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.

<sup>&</sup>lt;sup>29</sup> Mitchel, 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.<sup>30</sup> 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.<sup>31</sup>

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.<sup>32</sup>

#### Terrorism/Sabotage

Domestic terrorism is defined by the Federal Bureau of Investigation (FBI) as perpetuated 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 perpetuated by individuals and/or groups inspired by or associated with designated foreign terrorist organizations or nations (i.e., State sponsored).<sup>33</sup> 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.<sup>34</sup> 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.

<sup>&</sup>lt;sup>30</sup> Health and Safety Code Division 20, Chapter 6.95, *Hazardous Materials Release Response Plans and Inventory*, Article 1.
<sup>31</sup> Department of Homeland Security, *Hazardous Materials Incidents*, https://www.ready.gov/hazardous-materials-incidents, accessed February 16, 2021.

<sup>&</sup>lt;sup>32</sup> 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. <sup>33</sup> Federal Bureau of Investigation, *Terrorism*, https://www.fbi.gov/investigate/terrorism, accessed February 16, 2021.

<sup>&</sup>lt;sup>34</sup> 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 <u>Section 4.2.1</u> 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).<sup>35</sup> 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 polices 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

<sup>&</sup>lt;sup>35</sup> 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.<sup>36</sup>

## 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 infrastructureinduced 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.

<sup>&</sup>lt;sup>36</sup> Climate Diplomacy Organization, *Insurgency, Terrorism and Organized Crime in a Warming Climate*, https://www.climatediplomacy.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.

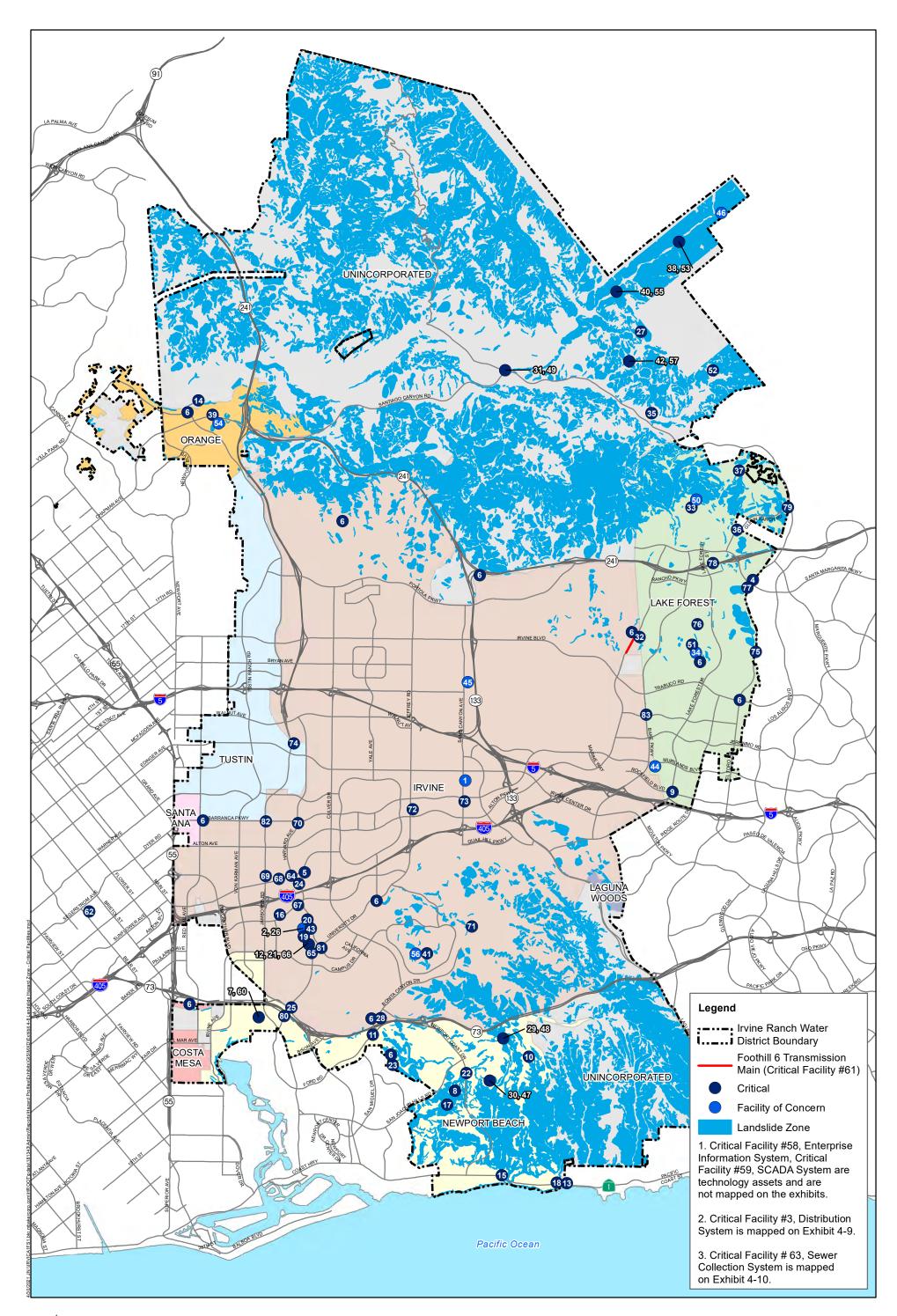
#### Location/Extent

<u>Exhibit 4-8, Landslide Hazard Zone – Critical Facilities, Exhibit 4-9, Landslide Hazard Zone –</u> <u>Distribution System</u>, and <u>Exhibit 4-10</u>, <u>Landslide Hazard Zone – Sewer Collection System</u>, 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: <sup>37</sup>

- 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 <u>Section 4.2.9</u> regarding wildfire hazard zones.

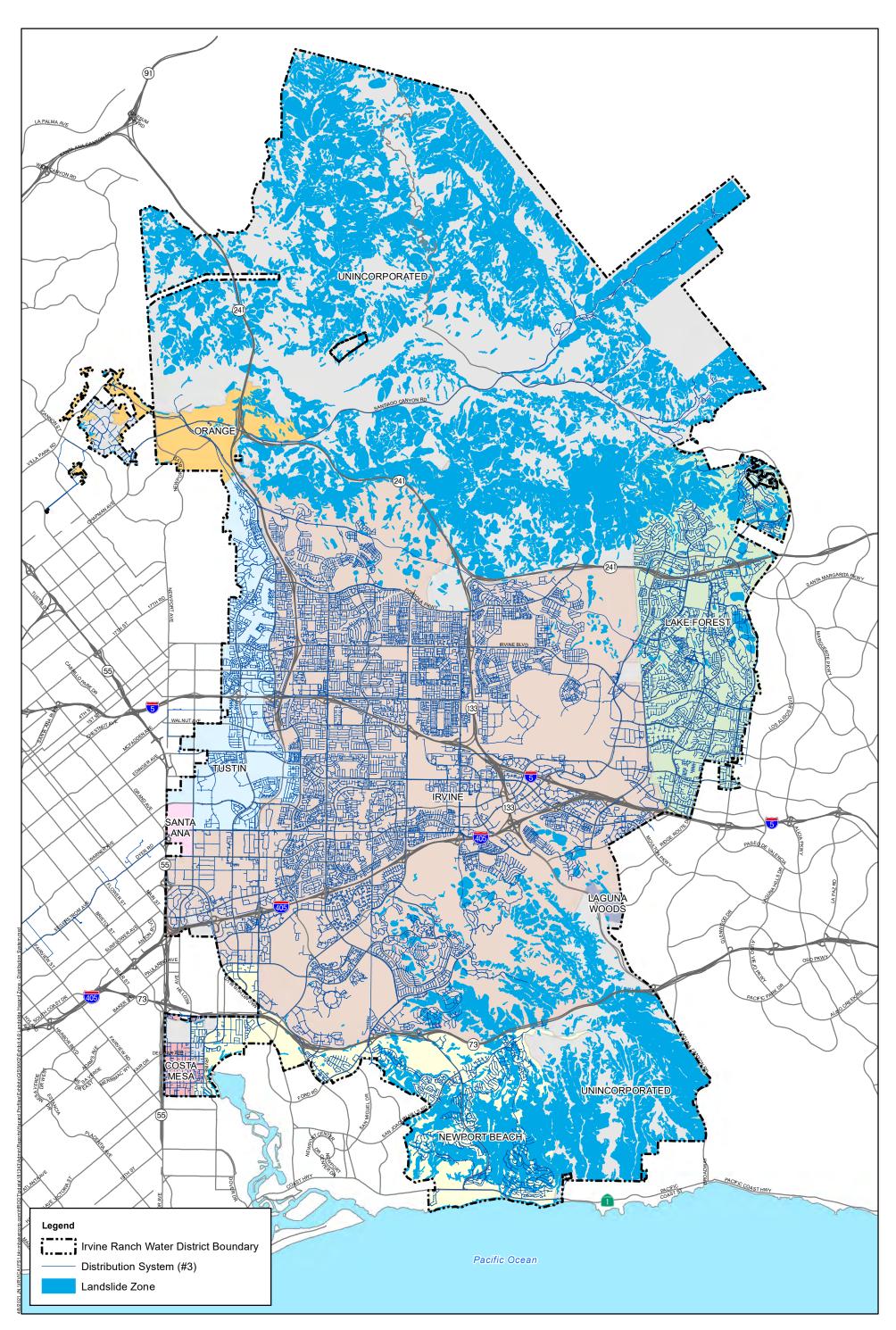
<sup>&</sup>lt;sup>37</sup> County of Orange and Orange County Fire Authority, *Local Hazard Mitigation Plan*, adopted November 2015.





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

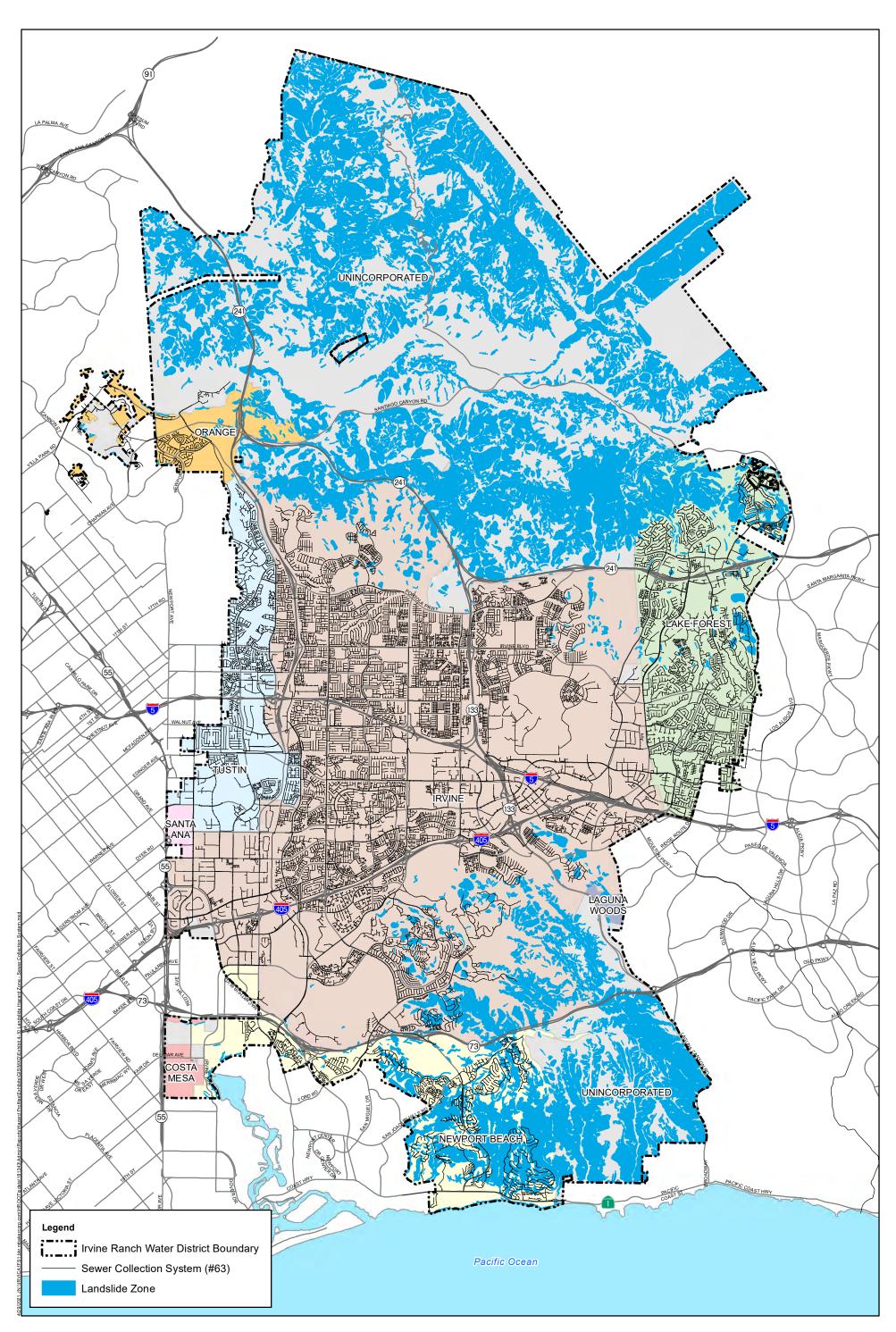
Data Source: IRWD, 2021, CGS, 2016





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

Source: IRWD, 2021, CGS, 2016





## Irvine Ranch Water District Local Hazard Mitigation Plan Landslide Hazard Zone - Sewer Collection System

Source: IRWD, 2021, CGS, 2016



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.<sup>38</sup> 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).<sup>39</sup>

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.<sup>40</sup>

#### **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

<sup>&</sup>lt;sup>38</sup> 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.

<sup>&</sup>lt;sup>39</sup> Municipal Water District of Orange County, Orange County Regional Water and Wastewater Hazard Mitigation Plan, adopted August 2019.

<sup>&</sup>lt;sup>40</sup> The San Luis Obispo Tribune, A year ago, debris flows brought unfathomable destruction to Montecito,

https://www.sanluisobispo.com/news/local/article224213780.html, accessed Feburary 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).<sup>41</sup> 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.<sup>42</sup> Seismic ground shaking can be strong enough to result in widespread devastation or be virtually

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

<sup>&</sup>lt;sup>42</sup> 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 loser sediment with a higher water table. According to FEMA, liquefaction causes three types of ground failure, as described below:<sup>43</sup>

- 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:

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

<sup>&</sup>lt;sup>43</sup> 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.<sup>44</sup>

 <u>Pelican Hill fault</u>: 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.<sup>45</sup>

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.<sup>46</sup>
- 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.<sup>47</sup>
- <u>San Andreas Fault Zone</u>: 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

<sup>&</sup>lt;sup>44</sup> Municipal Water District of Orange County, Orange County Regional Water and Wastewater Hazard Mitigation Plan, adopted August 2019.

<sup>&</sup>lt;sup>45</sup> Čity of Newport Beach, *Local Hazard Mitigation Plan*, updated 2016.

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

<sup>&</sup>lt;sup>47</sup> 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.<sup>48</sup>

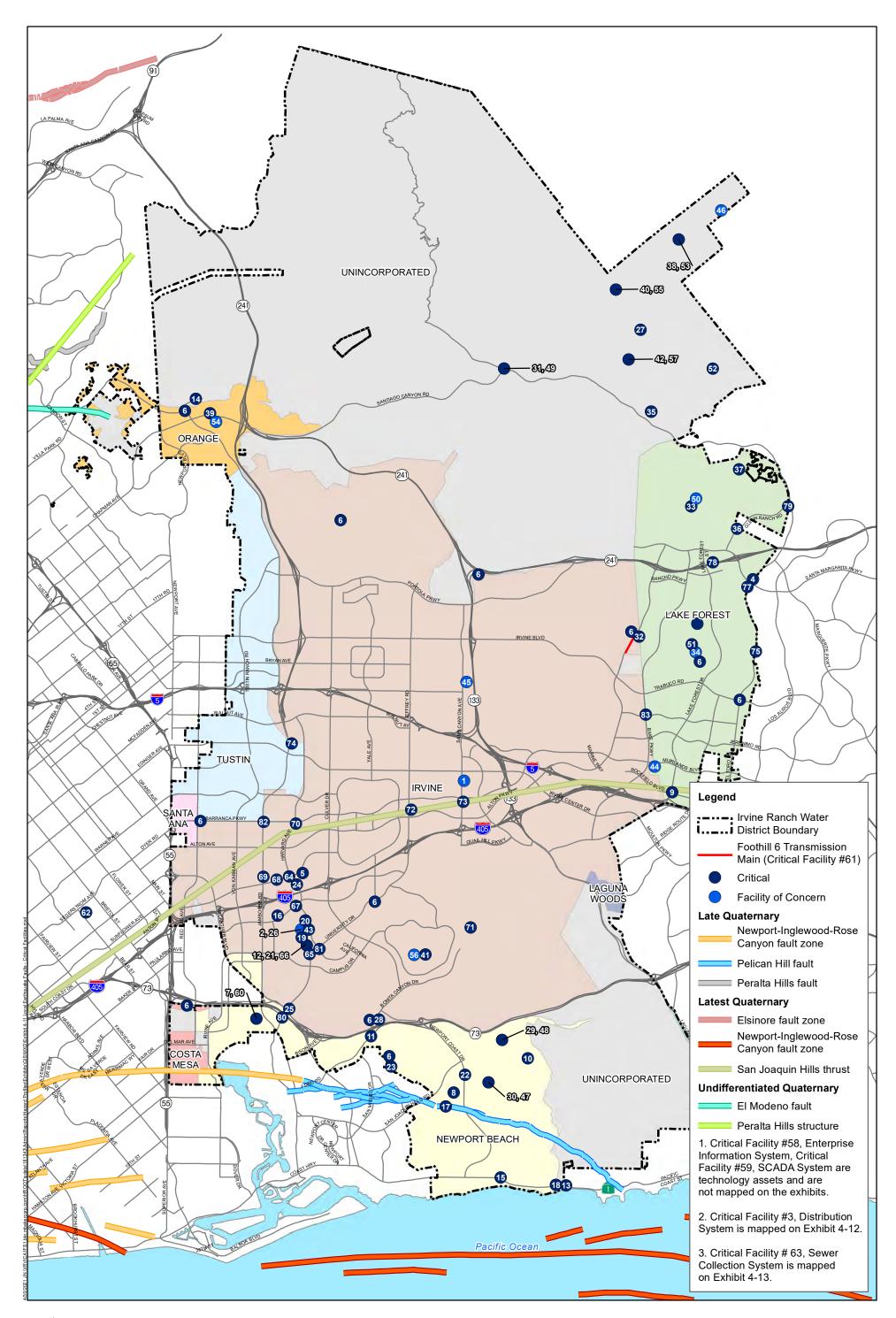
San Jacinto Fault Zone: The San Jacinto Fault Zone is a right-lateral strike-slip fault, located approximately 30 miles northeast of Orange County (passing through the Cities of Hemet and San Bernardino). This fault is 210 kilometers in length, including the Coyote Creek fault line as part of the San 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.<sup>49</sup>

<u>Exhibit 4-11, Fault Zones – Critical Facilities, Exhibit 4-12, Fault Zones – Distribution System</u>, and <u>Exhibit 4-13</u>, <u>Fault Zones – Sewer Collection System</u>, 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.

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

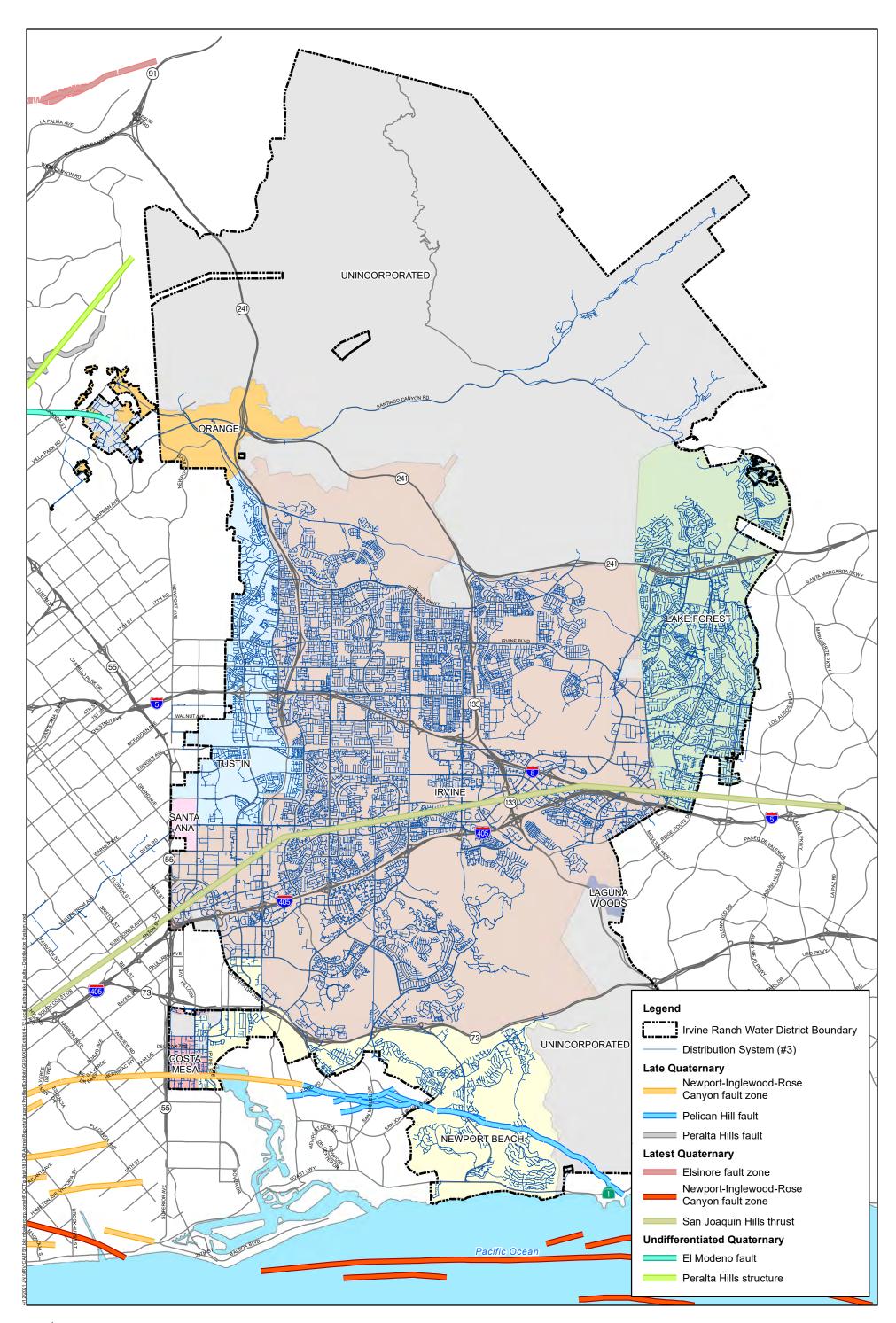
<sup>&</sup>lt;sup>49</sup> Southern California Earthquake Data Center, *San Jacinto Fault Zone, https://scedc.caltech.edu/earthquake/sanjacinto.html,* accessed February 15, 2021.





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

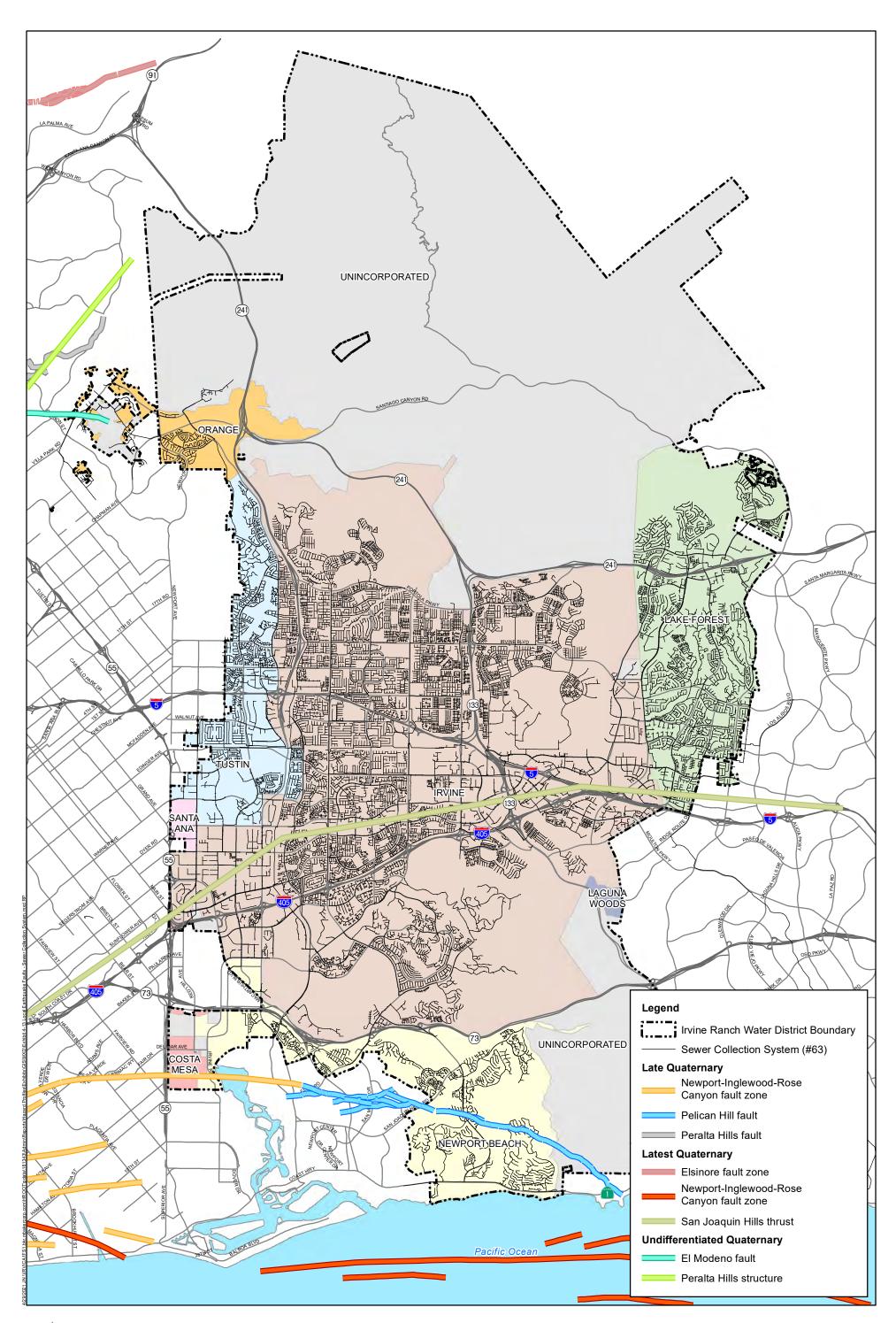
Data Source: IRWD, 2021, USGS, 2018

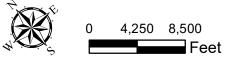




## Irvine Ranch Water District Local Hazard Mitigation Plan Local Earthquake Faults - Distribution System

Source: IRWD, 2021, USGS, 2018





## Irvine Ranch Water District Local Hazard Mitigation Plan Local Earthquake Faults - Sewer Collection System

Source: IRWD, 2021, USGS, 2018



## 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 <u>Table 4-11</u>, *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.<sup>50</sup>

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 wakening 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 <u>Table 4-12</u>, <u>The Modified Mercalli Intensity Scale</u> <u>Summary</u>, for further information.

The Modified Mercalli Intensity Scale Summary			
Intensity	Shaking	Description/Damage	
1	Non felt	Not felt except by a very few under especially favorable conditions.	
	Weak	Felt only be few persons at rest, especially on upper floors of buildings.	
111	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.	

Table 4-12The Modified Mercalli Intensity Scale Summary

<sup>&</sup>lt;sup>50</sup> 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 structur	
		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		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-
		alli-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.

Moment Magnitude and Modified Mercalli Intensity Scale Comparison			
Moment Magnitude	Typical Maximum Modified Mercalli Intensity		
1.0 – 3.0			
3.0 – 3.9	–		
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.			

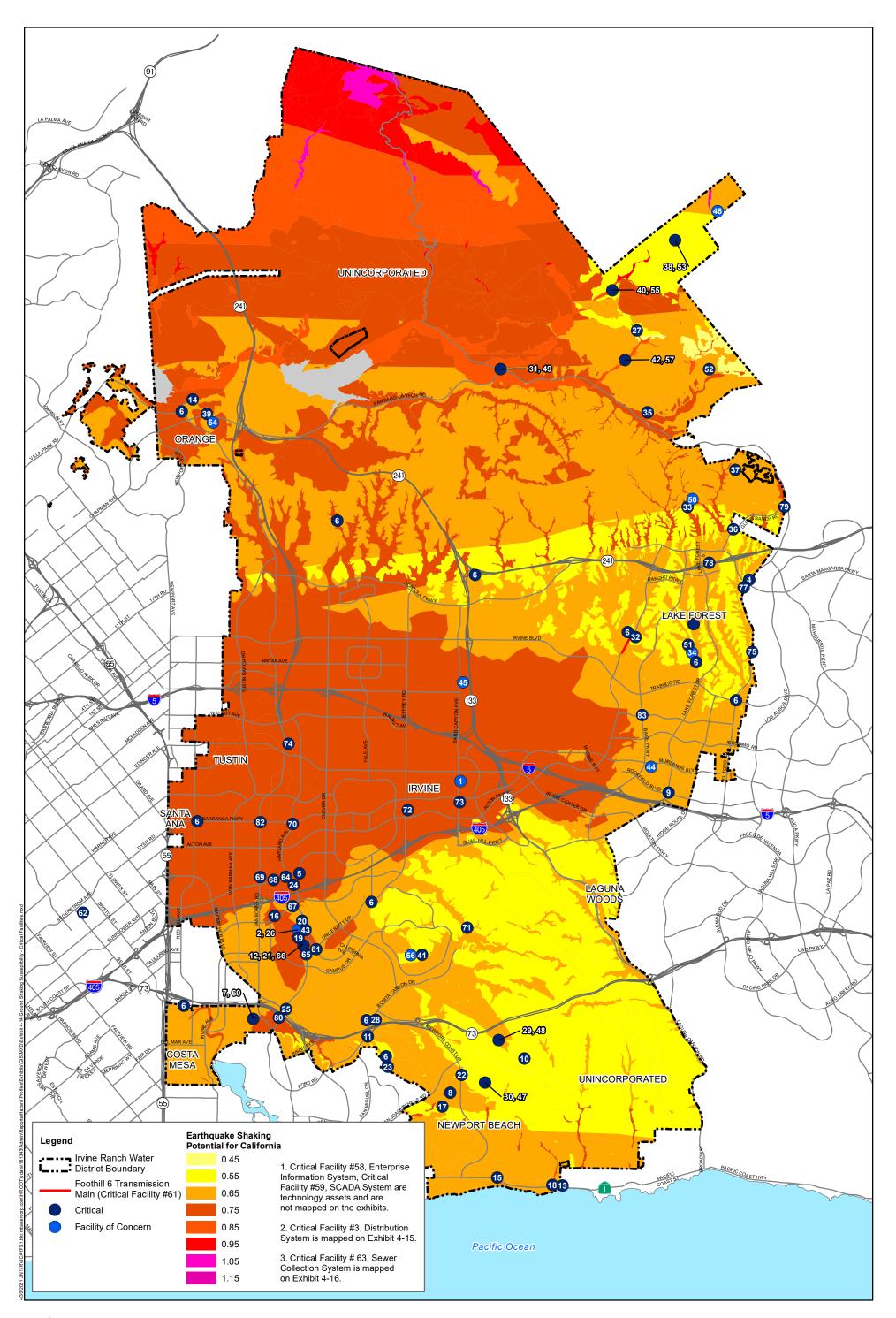
Table 4-13

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

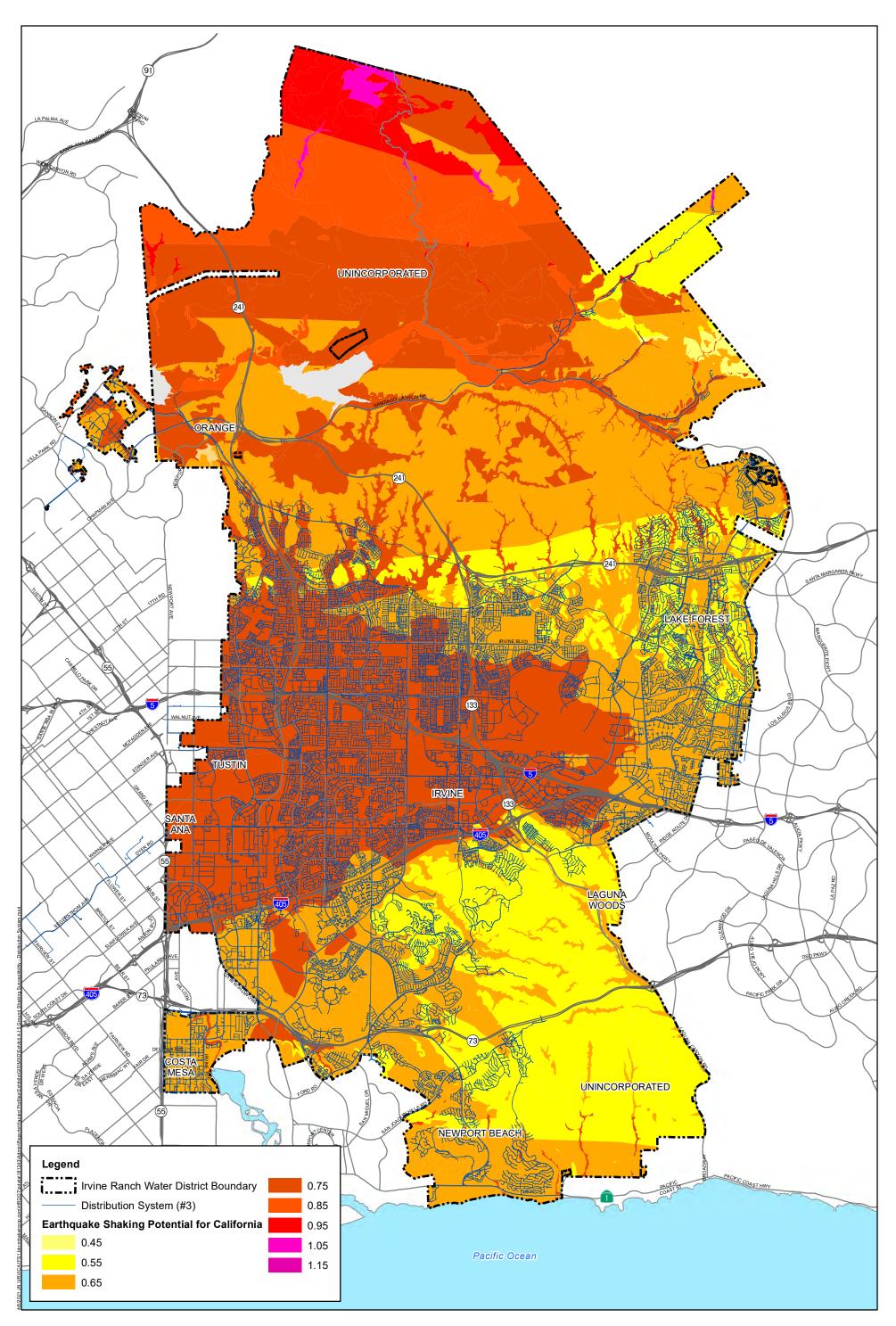
The potential for liquefaction exists in areas susceptible to ground shaking with loose soils and/or shallow groundwater. Given the active faults in the region and the presence of geologically young, unconsolidated sediments and hydraulic fills, liquefaction is possible throughout significant portions 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.





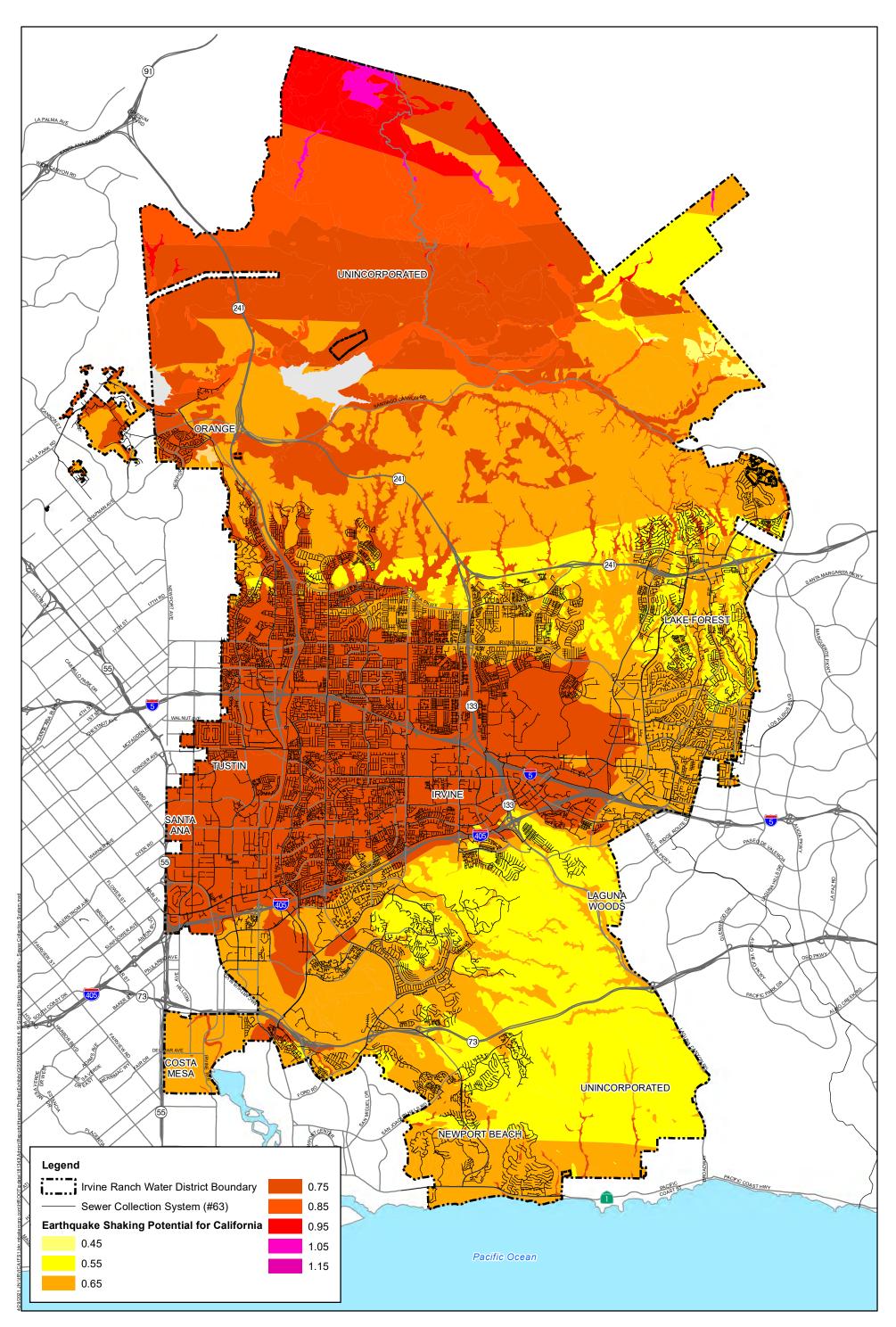
## Irvine Ranch Water District Local Hazard Mitigation Plan Ground Shaking Susceptibility - Critical Facilities

Data Source: IRWD, 2021, CGS, 2016





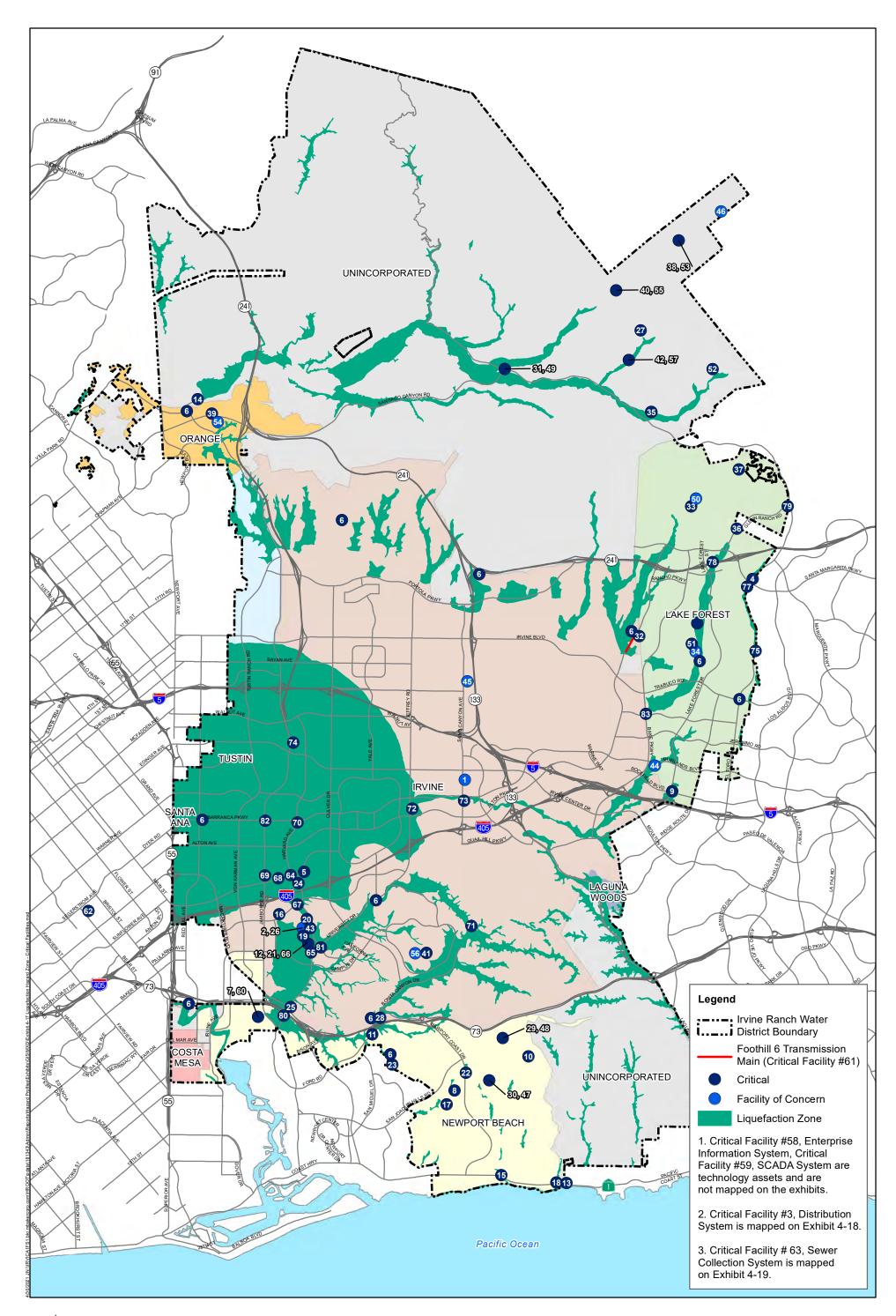
# Irvine Ranch Water District Local Hazard Mitigation Plan Ground Shaking Susceptibility - Distribution System





### Irvine Ranch Water District Local Hazard Mitigation Plan Ground Shaking Susceptibility - Sewer Collection System Exhibit 4-16

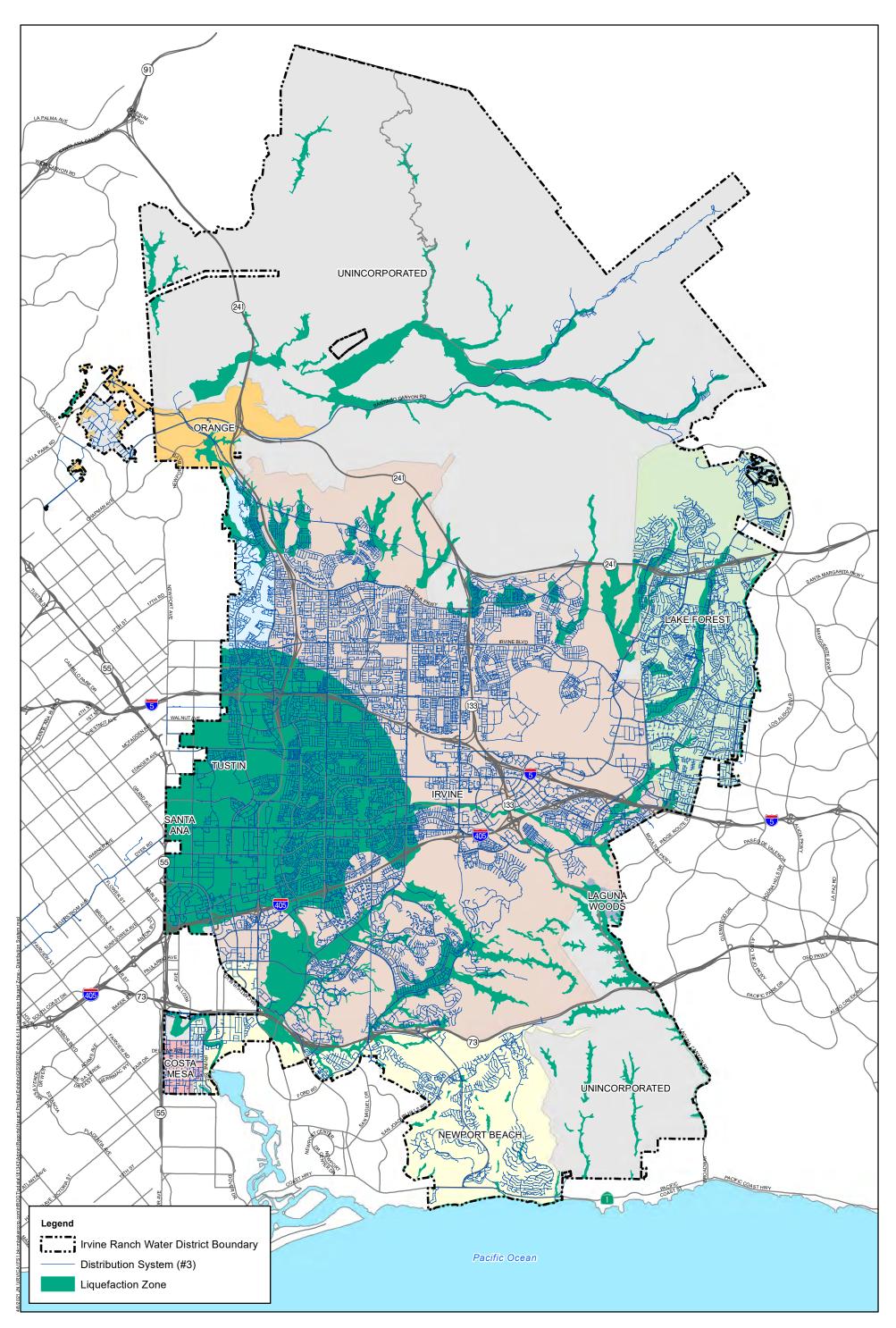
Source: IRWD, 2021, CGS, 2016





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

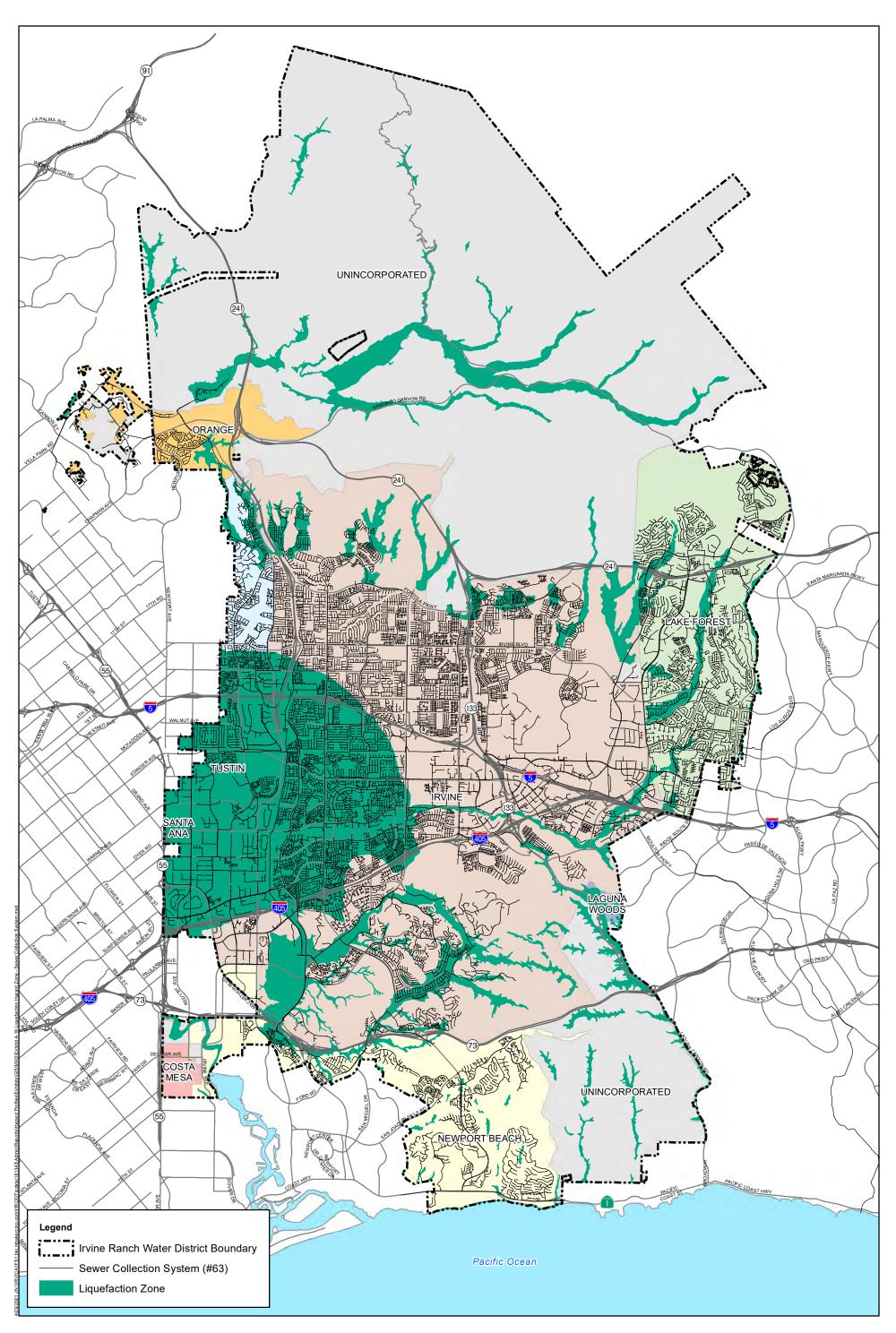
Data Source: IRWD, 2021, CGS, 1998, 2001, 2002





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

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





## Irvine Ranch Water District Local Hazard Mitigation Plan Liquefaction Hazard Zone - Sewer Collection System

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



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.

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	Blind thrust	Unknown; potentially 1855	0.42 to 0.79 mm/year	Unknown	>7.0

Table 4-14			
Major Earthquake	Faults of Particular Conce	ern	

Grant, Lisa B. et al, Coastal Uplift of the San Joaquin Hills, Southern Los Angeles Basin, California, by a Large Earthquake since A.D. 1635,

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.<sup>51</sup> 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.

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			

Table 1 15

<sup>&</sup>lt;sup>51</sup> 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 https://scedc.caltech.edu/earthquake/chronol		

#### 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.<sup>52</sup> Regionally, some damage in Los Angeles County during the Northridge earthquake of 1994 was due to liquefaction as opposed to ground shaking.<sup>53</sup>

#### **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 <u>Table 4-16</u>, <u>Likelihood of One or More Earthquakes Occurring in the Next 30 Years in Orange County Region by Fault</u>.

		Table	e 4-16		
Likelihood of C	One or More Ea	rthquakes Occ	urring in the Nex	ແ 30 Years in Orange Coເ	unty
Region by Fault					
		Newport	Southorn San		

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 fau	It sections closest to IR\	ND 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.

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

<sup>53</sup> 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.<sup>54</sup> 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.<sup>55</sup>

<sup>&</sup>lt;sup>54</sup> National Weather Service, *What Constitutes a Severe Thunderstorm*, https://www.weather.gov/bmx/outreach\_svr, accessed Feb 8, 2021

<sup>&</sup>lt;sup>55</sup> 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.<sup>56</sup>

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

<sup>&</sup>lt;sup>56</sup> 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.<sup>57</sup>

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*.

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.			

Table 4-17 Monthly Average Precipitation in IRWD Service Area

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 <u>Section 4.2.3</u>). Severe storms could also cause overtopping of dams or reservoirs (refer to <u>Section 4.2.1</u>) or threaten slope stability (refer to <u>Section 4.2.4</u> and <u>Section 4.2.6</u>).

#### 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 <u>Section 4.2.9</u>). 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 <u>Table 4-18</u>, <u>Saffir-Simpson Hurricane Wind Scale</u>.

<sup>&</sup>lt;sup>57</sup> 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	<b>Extremely dangerous winds will cause extensive damage</b> : 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	<b>Devastating damage:</b> 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	<b>Catastrophic damage</b> : 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	<b>Catastrophic damage:</b> 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: Nation February 2021.		fir-Simpson Hurricane Wind Scale, https://www.nhc.noaa.gov/aboutsshws.php, accessed

#### 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.<sup>58</sup>

#### 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.

<sup>&</sup>lt;sup>58</sup> 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 humancaused 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; multistory 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.

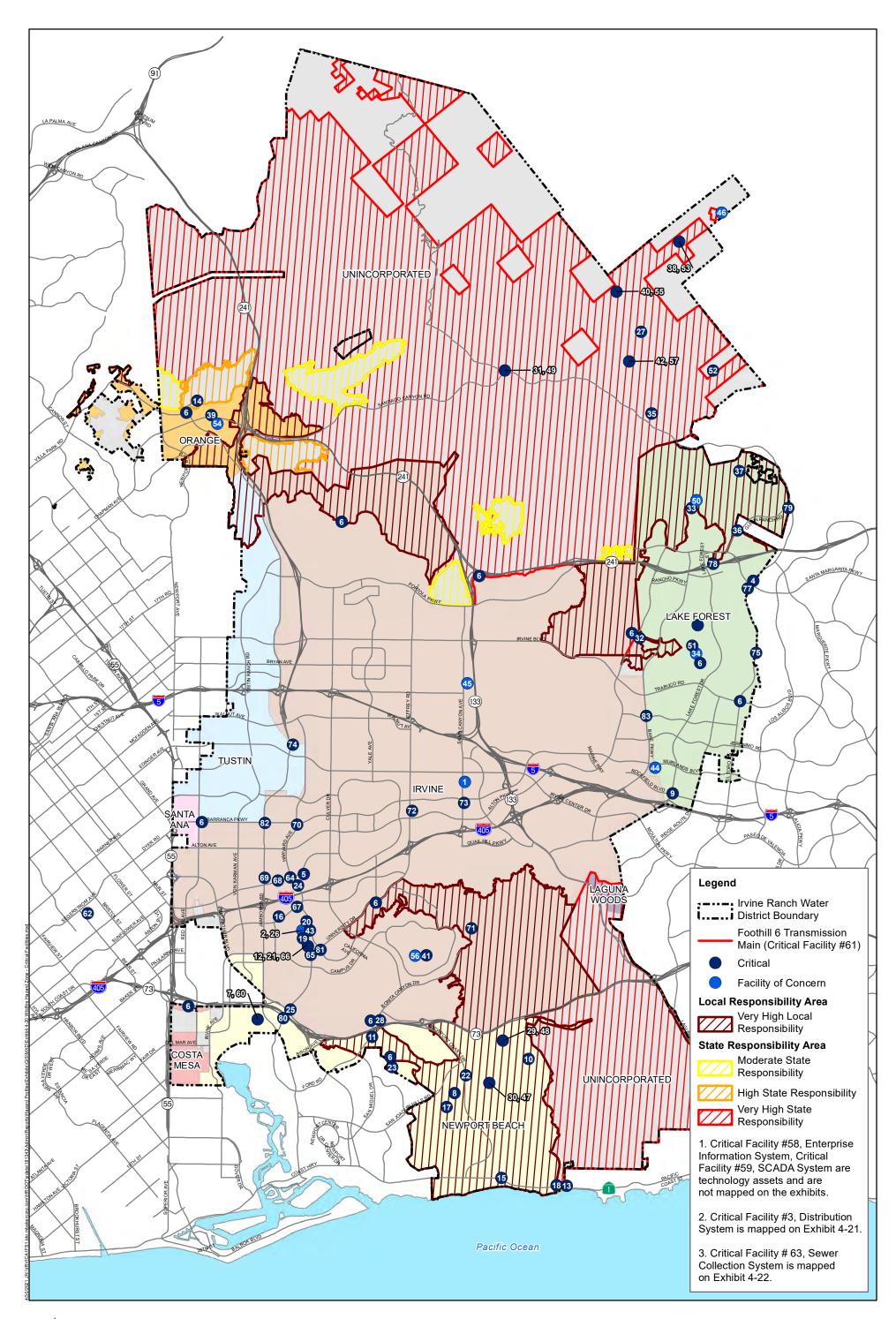
Fire protection challenges occur where development is located within and directly adjacent to wildland urban interface areas. As the number of structural features increases, so does the risk of incidence of fire. Wildfires are not measured on a specific scale and are usually classified by size or impact. 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.

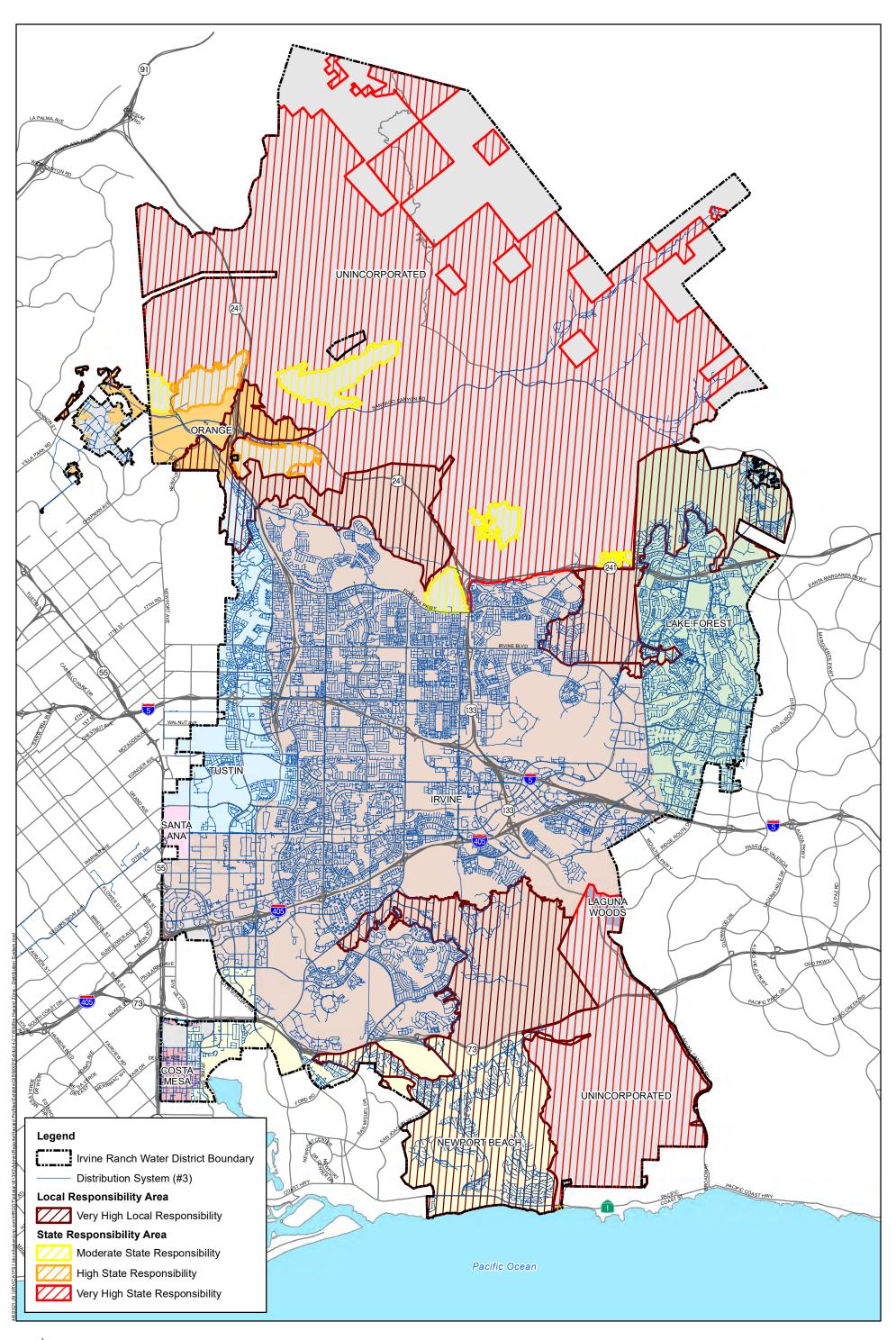
<u>Table 4-19</u>, <u>Recent Fires in Orange County</u>, summarizes wildfire activity in Orange County dating back to 1996. These fires have resulted in varying impacts with the amount of acreage ranging from three acres to over 23,000 acres. These fires have occurred both within and outside of what has been referred to as the traditional wildfire season. In comparison to <u>Table 4-20</u>, <u>Major</u> <u>Wildfires in Orange County History</u>, identifies the most significant historical fires in Orange County dating back to 1948 in terms of the amount of acreage claimed.





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

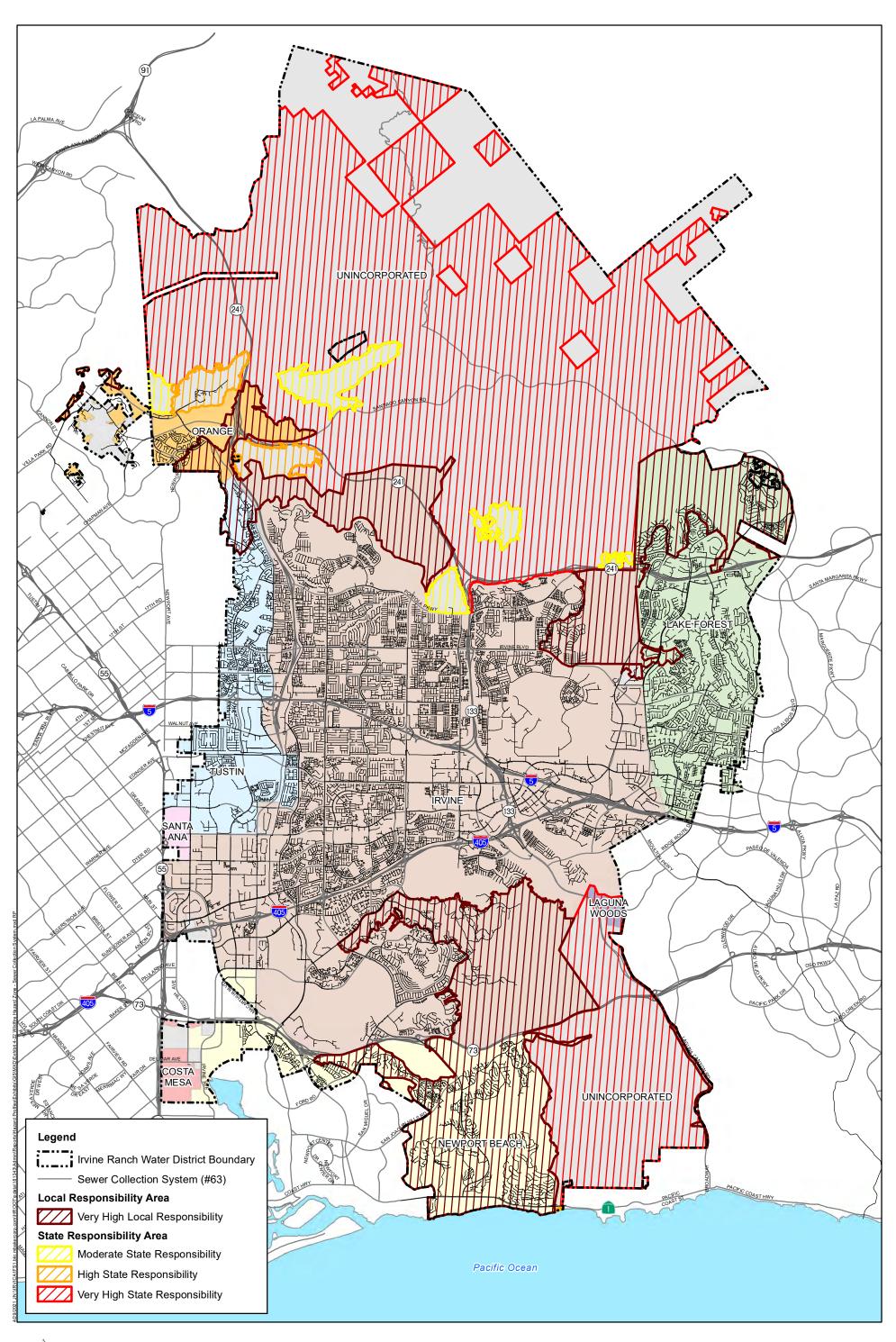
Data Source: IRWD, 2021, CALFIRE, 2018

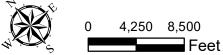




## Irvine Ranch Water District Local Hazard Mitigation Plan Wildfire Hazard Zone - Distribution System

Source: IRWD, 2021, CALFIRE, 2018





### Irvine Ranch Water District Local Hazard Mitigation Plan Wildfire Hazard Zone - Sewer Collection System

Source: IRWD, 2021, CALFIRE, 2018



## Table 4-19Recent Fires in Orange County

Location	Name	Begin Date	Acres Claimed
Lemon Heights	N/A	10/21/1996	Unknown
EI 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
EI 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
Vission 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
https://www.ncdc.noaa.gov/st	nd Atmospheric Information - Nati tormevents/, accessed February 1 nts/2020/, accessed February 16	16, 2021; CALFIRE, 2020 CalFIRI	nformation, Storm Events Database, E Incidents,

#### 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			
CalFIRE Incidents, https://www.fire.ca.gov/incidents/2020/, accessed February 16, 2021.			
NOTE: Major fires in Orange County are defin	ed 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.<sup>59</sup> 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.<sup>60</sup> 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.<sup>61</sup>

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.<sup>62</sup> IRWD facilities relied on emergency generators to maintain water service for customers and firefighting services. No facilities were damaged by the wildfire.

<sup>&</sup>lt;sup>59</sup> 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.

<sup>&</sup>lt;sup>60</sup> 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.

<sup>&</sup>lt;sup>61</sup> CalFIRE, 2020 Incidents Mapper – Blue Ridge and Silverado Fires, https://www.fire.ca.gov/incidents/2020/, accessed February 16, 2021.

<sup>&</sup>lt;sup>62</sup> 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.<sup>63</sup>

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.<sup>64</sup>

#### **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

 <sup>&</sup>lt;sup>63</sup> Irvine Ranch Water District, Santiago Fire – 2007, https://www.irwd.com/services/santiago-fire-2007, accessed March 15, 2021.
 <sup>64</sup> 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 <u>Section 4.2</u>, <u>Hazard Identification and Prioritization</u>, 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 <u>Section 5.0</u>, <u>Mitigation Strategy</u>. 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 <u>Section 3.0</u>, <u>Jurisdictional Profile</u>, 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 <u>Appendix C, Dam/Reservoir Failure Vulnerability Assessment</u> maintained separately by IRWD.

Overlays were not prepared for the following hazards: drought, geologic hazards (land subsidence expansive human-caused (hazardous and soils). hazards 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 <u>Appendix C</u>.

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. <u>Table 4-21</u>, *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.

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 <sup>1</sup>		
3	Distribution System – 55.06 miles	Distribution System	FEMA 500 YR	\$790,000,000.00 <sup>1</sup>		
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 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 <sup>2</sup>			
63	Sewer Collection System – 37.94 miles	Wastewater Collection System	FEMA 500 YR	\$781,131,700.00 <sup>2</sup>			
65	S1	Siphon	FEMA 100 YR	\$585,00.00			
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.							

#### Table 4-21 (continued) Facilities in a Flood Hazard Zone

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 <u>Table 4-21</u>, 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. <u>Table 4-22</u>, <u>Facilities in a Landslide Hazard Zone</u>, identifies critical facilities and one facility of concern located within zones with mapped potential for landslides.

Map ID	Name	Asset Type	Total Loss Potential
Critical F	acilities		
3	Distribution System – 40.65 miles	Distribution System	\$790,000,000.00 <sup>1</sup>
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 <sup>2</sup>
Facilities	s of Concern		
46	Chapman Reservoir	Reservoir	\$1,510,400.00
system.	cement cost for Critical Facility #3, Distribu cement cost for Critical Facility #63, Sewer m		<b>-</b> .

			Table 4-22		
Fa	acilities	in a	Landslide	Hazard	Zone

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 <u>Table 4-23</u>, <u>Facilities in a Fault Rupture Zone</u>. Fault ruptures could physically impact the outlined critical facilities by displacing foundations or underground infrastructure, potentially disrupting IRWD service.

Map ID	Name	Asset Type	Total Loss Potential						
Critical Facilities									
3	Distribution System	Distribution System	\$790,000,000.00 <sup>1</sup>						
17	Montecito	Lift Station	\$1,935,024.00						
63	Collection System	Wastewater Collection System	\$781,131,700.00 <sup>2</sup>						
system.	1.Replacement cost for Critical Facility #3, Distribution System, is labeled as replacement for a "significant portion" of the								
2. Replacement cost for Critical Facility #63, Sewer Collection System, is labeled as replacement for a "significant portion" of									
the syster	the system.								

## Table 4-23Facilities in a Fault Rupture Zone

The IRWD jurisdiction is also susceptible to seismic-induced liquefaction, and mapped liquefaction zones are known throughout the service area. <u>Table 4-24</u>, *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.

Facilities in a Liquefaction Hazard Zone								
Map ID	Name	Asset Type	Total Loss Potential					
Critical I								
3	Distribution System – 475.14 miles	Distribution System	\$790,000,000.00 <sup>1</sup>					
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 Facilities in a Liquefaction Hazard Zone



28         Coar           42         Willi           43         Mich           61         Foot           63         Colle           64         Harv           (HA)         65           65         S1           66         S2           67         S3           68         S4           69         S5           70         S6           71         S7           72         S8           73         S9           74         S10           75         S11	S Lift Station stal OC 63-Zn.4 Pump Station ams Canyon Pump Station (Benner) nelson MWRP thill 6 Transmission Line ection System – 387.35 vard Area Trunk Diversion Structure TS)	Lift Station Pump Station Pump Station Recycled Water Transmission Main Wastewater Collection System Diversion Structure Siphon Siphon Siphon Siphon Siphon Siphon Siphon Siphon Siphon	\$5,115,644.00 \$3,076,700.00 \$1,649,200.00 \$500,000,000.00 \$504,104.32 \$781,131,700.00 <sup>2</sup> \$5,115,644.00 \$1,266,000.00 \$1,302,000.00 \$1,365,000.00 \$222,000.00 \$444,000.00 \$1,056,000.00
42         Willi           43         Mich           61         Foot           63         Colle           64         Harv           (HA)         65           65         S1           66         S2           67         S3           68         S4           69         S5           70         S6           71         S7           72         S8           73         S9           74         S10	ams Canyon Pump Station (Benner) nelson MWRP thill 6 Transmission Line ection System – 387.35 vard Area Trunk Diversion Structure	Pump Station Recycled Water Transmission Main Wastewater Collection System Diversion Structure Siphon Siphon Siphon Siphon Siphon Siphon	\$1,649,200.00 \$500,000,000.00 \$504,104.32 \$781,131,700.00 <sup>2</sup> \$5,115,644.00 \$1,266,000.00 \$1,302,000.00 \$1,365,000.00 \$222,000.00 \$444,000.00
43         Mich           61         Foot           63         Colle           64         Harv           65         S1           66         S2           67         S3           68         S4           69         S5           70         S6           71         S7           72         S8           73         S9           74         S10	helson MWRP thill 6 Transmission Line ection System – 387.35 vard Area Trunk Diversion Structure	Recycled Water Transmission Main Wastewater Collection System Diversion Structure Siphon Siphon Siphon Siphon Siphon Siphon	\$500,000,000.00 \$504,104.32 \$781,131,700.00 <sup>2</sup> \$5,115,644.00 \$1,266,000.00 \$1,365,000.00 \$1,365,000.00 \$222,000.00 \$444,000.00
61         Foot           63         Colle           64         Harv           (HA)         (HA)           65         S1           66         S2           67         S3           68         S4           69         S5           70         S6           71         S7           72         S8           73         S9           74         S10	thill 6 Transmission Line ection System – 387.35 vard Area Trunk Diversion Structure	Transmission Main Wastewater Collection System Diversion Structure Siphon Siphon Siphon Siphon Siphon Siphon	\$504,104.32 \$781,131,700.00 <sup>2</sup> \$5,115,644.00 \$585,000.00 \$1,266,000.00 \$1,302,000.00 \$1,365,000.00 \$222,000.00 \$444,000.00
63         Colle           64         Harv. (HA)           65         S1           66         S2           67         S3           68         S4           69         S5           70         S6           71         S7           72         S8           73         S9           74         S10	ection System – 387.35 vard Area Trunk Diversion Structure	Wastewater Collection System Diversion Structure Siphon Siphon Siphon Siphon Siphon Siphon	\$781,131,700.00 <sup>2</sup> \$5,115,644.00 \$585,000.00 \$1,266,000.00 \$1,302,000.00 \$1,365,000.00 \$222,000.00 \$444,000.00
64         Harv (HA           65         S1           66         S2           67         S3           68         S4           69         S5           70         S6           71         S7           72         S8           73         S9           74         S10	vard Area Trunk Diversion Structure	Diversion Structure Siphon Siphon Siphon Siphon Siphon Siphon	\$5,115,644.00 \$585,000.00 \$1,266,000.00 \$1,302,000.00 \$1,365,000.00 \$222,000.00 \$444,000.00
(HA)           65         S1           66         S2           67         S3           68         S4           69         S5           70         S6           71         S7           72         S8           73         S9           74         S10		Siphon Siphon Siphon Siphon Siphon Siphon	\$585,000.00 \$1,266,000.00 \$1,302,000.00 \$1,365,000.00 \$222,000.00 \$444,000.00
66         S2           67         S3           68         S4           69         S5           70         S6           71         S7           72         S8           73         S9           74         S10           75         S11		Siphon Siphon Siphon Siphon Siphon	\$1,266,000.00 \$1,302,000.00 \$1,365,000.00 \$222,000.00 \$444,000.00
67         S3           68         S4           69         S5           70         S6           71         S7           72         S8           73         S9           74         S10           75         S11		Siphon Siphon Siphon Siphon	\$1,302,000.00 \$1,365,000.00 \$222,000.00 \$444,000.00
68         S4           69         S5           70         S6           71         S7           72         S8           73         S9           74         S10           75         S11		Siphon Siphon Siphon	\$1,365,000.00 \$222,000.00 \$444,000.00
69         S5           70         S6           71         S7           72         S8           73         S9           74         S10           75         S11		Siphon Siphon	\$222,000.00 \$444,000.00
70         \$6           71         \$7           72         \$8           73         \$9           74         \$10           75         \$11		Siphon	\$444,000.00
71         S7           72         S8           73         S9           74         S10           75         S11			
72         S8           73         S9           74         S10           75         S11		Siphon	¢1 056 000 00
73S974S1075S11			\$1,000,000.00
74 S10 75 S11		Siphon	\$807,000.00
75 S11		Siphon	\$870,000.00
		Siphon	\$549,000.00
		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 Co			
	nelson Biosolids	Biosolids Treatment	\$250,000,000.00
	nelson Operations Center	Operations Staff Offices	\$20,900,000.00
	Alisos Water Recycling Plant NRP)	Recycling Plant	\$10,185,000.00

#### Table 4-24 (continued) Facilities in a Liquefaction Hazard Zone

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). <u>Table 4-25</u>, *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.

Map ID		Asset Type	Wildfire Hazard Zone	Total Loss Poten
Critical	Facilities			
3	Distribution System – 184.77 miles	Distribution System	Very High Local Responsibility	\$790,000,000.00 <sup>1</sup>
3	Distribution System – 36.81 miles	Distribution System	Very High, High and Moderate	\$790,000,000.00 <sup>1</sup>
			State Responsibility	
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 <sup>2</sup>
63	Collection System – 2.68	Wastewater Collection System	Very High, High and Moderate State Responsibility	\$781,131,700.00 <sup>2</sup>
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
Facilitie	es 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

# Table 4-25Facilities in a Wildfire Hazard Zone

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 6<sup>th</sup> 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, <u>RHNA Allocation for IRWD Customer Cities</u>. 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.

			RHNA Allocation	n by Income Level				
Jurisdiction	Total RHNA Allocation	Very-Low Income	Low Income	Moderate Income	Above Moderate Income			
City of Costa Mesa <sup>1</sup>	11,760	2,919	1,794	2,088	4,959			
City of Irvine <sup>2</sup>	23,610	6,396	4,235	4,308	8,671			
City of Lake Forest <sup>1</sup>	3,236	956	543	559	1,178			
City of Newport Beach <sup>1</sup>	4,845	1,456	930	1,050	1,409			
City of Orange <sup>1</sup>	3,936	1,067	604	677	1,588			
City of Tustin <sup>1</sup>	6,782	1,724	1,046	1,132	2,880			
Unincorporated Orange County <sup>1</sup>	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								

#### Table 4-26 RHNA Allocation for IRWD Customer Cities

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 6<sup>th</sup> 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

<u>Table 4-27</u>, <u>*Risk Assessment Summary*</u>, 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 4-27Risk 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	Ν	Y	Ν	Y	Y	Ν	Ν	Y	Ν	Y	Ν
2	Michelson Biosolids	Y	Y	N	Y	Y	N	Y	Y	Ν	Y	N
3	Distribution System	Ý	Ý	Y	Y	Ý	Y	Ý	Ŷ	Y	Ŷ	Y
4	El Toro Diversion Structure	N	Ý	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	Υ	N	Y	Y	N	N	Ý	N	Y	N
8	Buck Gully	N	T Y	N	T Y	T Y	Y	N	Y Y	N	T Y	Y
9	Canada	N	Ϋ́	N	r Y	Υ Υ	r N	Y	Y Y	N	Y Y	N
10		N	Υ Υ	N	r Y	r Y	N	N	Y Y	N	r Y	Y
	Coastal Ridge							N				
11	Coyote Canyon	Y	Y	N	Y	Y	N	N Y	Y	N N	Y	Y
12	Duck Club	N	Y	Y	Y	Y	N		Y		Y	N
13	El Morro School	N	Y	N	Y Y	Y	N	N	Y	N	Y	N
14	Irvine Park	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	Ν	Y	N
20	MWRP Auto Shop	N	Y	N	Y	Y	N	N	Y	Ν	Y	N
21	MWRP Caretaker Housing	Ν	Y	Y	Y	Y	N	Y	Y	Ν	Y	N
22	Newport Coast	Ν	Y	N	Y	Y	Ν	Y	Y	Ν	Y	Y
23	San Joaquin Housing	Ν	Y	Ν	Y	Y	Ν	Ν	Y	Ν	Y	Y
24	HATS Lift Station	N	Y	Ν	Y	Y	Ν	Y	Y	Ν	Y	N
25	University	Y	Y	Ν	Y	Y	Y	N	Y	Ν	Y	N
26	Michelson Operations Center	Y	Y	Ν	Y	Y	N	Y	Y	Ν	Y	N
27	Benner Reservoir	Ν	Y	Ν	Y	Y	Y	N	Y	Ν	Y	Y
28	Coastal OC 63-Zn.4 Pump Station	N	Y	Ν	Y	Y	N	Y	Y	Ν	Y	N
29	Coastal Zn 6-7 Pump Station	Ν	Y	Ν	Y	Y	Ν	Ν	Y	Ν	Y	Y
30	Coastal Zn. 4-6 Pump Station	Ν	Y	Ν	Y	Y	Ν	Ν	Y	Ν	Y	Y
31	Fleming Pump Station	Ν	Y	Ν	Y	Y	Ν	Ν	Y	Ν	Y	Y
32	Foothill Zn 4-6 Pump Station	Ν	Y	Ν	Y	Y	Ν	Ν	Y	Ν	Y	Y
33	Foothill Zn 6-6A Pump Station	N	Y	N	Y	Y	N	N	Y	Ν	Y	Y
34	Lake Forest 4 - 5 West	N	Y	N	Y	Y	N	N	Y	Ν	Y	N
35	Manning Pump Station	N	Y	N	Y	Y	N	N	Y	Ν	Y	Y
36	Portola Hills Zn 6-8	N	Ý	N	Ý	Ý	N	N	Ý	N	Ŷ	Ý
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	Ý	N	Y	Y	N	N	Ý	N	Ŷ	N
40	Shaw Pump Station	N	Υ	Y	Y	Y	N	N	Υ	N	Y	Y
40	Turtle Rock Zn 3-4 Pump Station	N	Y	N	Y	Y	N	N	Y	N	Ŷ	N
42	Williams Canyon Pump Station (Benner)	N	Y	N	Y	Y	N	Y	Ŷ	N	Y	Y
43	Michelson MWRP	Y	Υ	N	Ϋ́	Υ	N	Υ	Υ	N	Ŷ	N
чJ				IN			IN			IN I		IN



#### Table 4-27 (continued) Risk Assessment Summary

		1	KISK A	33533		Summ	iai y					
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)	Ν	Y	Ν	Y	Y	N	Y	Y	Ν	Y	Ν
45	Central Irvine Zn 1 Reservoir	Ν	Y	Ν	Y	Y	Ν	Ν	Y	Ν	Y	Ν
46	Chapman Reservoir	Ν	Y	Ν	Y	Y	Y	Ν	Y	Ν	Y	Y
47	Coastal Zn 4 Reservoir	Ν	Y	Ν	Y	Y	N	Ν	Y	Ν	Y	Y
48	Coastal Zn 6 Reservoir	N	Y	N	Y	Y	N	N	Y	Ν	Y	Y
49	Fleming Reservoir	N	Y	N	Y	Y	N	Ν	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	Ν	Y	Ν	Y	Y	Ν	Ν	Y	Ν	Y	Ν
52	Modjeska Reservoir	N	Y	N	Y	Y	Y	N	Y	Ν	Y	N
53	Read Reservoir	Ν	Y	Y	Y	Y	Y	Ν	Y	Ν	Y	Y
54	Santiago Canyon Zn 5	Ν	Y	Ν	Y	Y	Ν	N	Y	N	Y	Ν
55	Shaw Reservoir	N	Y	N	Y	Y	Ν	Ν	Y	Ν	Y	Y
56	Turtle Rock Zn 3	Ν	Y	N	Y	Y	N	N	Y	N	Y	Ν
57	Williams Canyon Reservoir	Ν	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 N	Y Y	N	Y Y	Y Y	N	N	Y Y	N	Y Y	N Y
61 62	Foothill 6 Transmission Line Deep Aquifer Treatment	N Y	Y Y	N N	Y Y	Y Y	N N	Y N	Y Y	N N	Y Y	Y N
(0)	System (DATS)				N						X	
63 64	Collection System Harvard Area Trunk Diversion Structure (HATS)	Y N	Y Y	Y N	Y Y	Y Y	Y N	Y Y	Y Y	Y N	Y Y	Y N
65	S1	Y	Y	Y	Y	Y	Ν	Y	Y	Ν	Y	Ν
66	S2	Y	Y	Y	Y	Y	Ν	Y	Y	Ν	Y	Ν
67	S3	Y	Y	Y	Y	Y	Ν	Y	Y	Ν	Y	Ν
68	S4	Y	Y	Y	Y	Y	Ν	Y	Y	Ν	Y	Ν
69	S5	Y	Y	Y	Y	Y	Ν	Y	Y	Ν	Y	N
70	S6	Y	Y	Y	Y	Y	N	Y	Y	Ν	Y	Ν
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 N	Y Y	Y Y	Y Y	Y	N	Y	Y	N	Y Y	N Y
78 79	S14 S15	N N	Y Y		Y Y	Y Y	N N	N N	Y Y	N N	Y Y	Y Y
79 80	S15 S16	N Y	Y Y	N N	Y Y	Y Y	N N	N Y	Y Y	N	Y Y	Y N
80	S18	Y Y	Y Y	Y	Y Y	Y Y	N	Y Y	Y Y	N	Y Y	N
82	S10	т Y	Y Y	N	Υ Υ	r Y	N	Υ Υ	Υ Υ	N	r Y	N
83	S17	N	Y	Y	Y	Y	N	N	Y	N	Y	N
00	517	I V					IN	14		IN		14



#### 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 NFIP<sup>1</sup>, 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 <u>Section 1.0</u>, <u>Introduction and Purpose</u>) 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).

<sup>&</sup>lt;sup>1</sup> 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:

- <u>High Priority</u>: 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.
- <u>Medium Priority</u>: A good idea that needs more information or is an action that addresses a moderate hazard.
- <u>Low Priority</u>: 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 <u>Table 5-1</u>, <u>STAPLE/E Review and</u> <u>Selection Criteria</u>, 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> <li>Is the proposed action socially acceptable to the jurisdiction and surrounding community?</li> <li>Are there equity issues involved that would mean that one segment of the jurisdiction and/or community is treated unfairly?</li> <li>Will the action cause social disruption?</li> </ul>
Technical	<ul> <li>Will the proposed action work?</li> <li>Will it create more problems than it solves?</li> <li>Does it solve a problem or only a symptom?</li> <li>Is it the most useful action in light of other jurisdiction goals?</li> </ul>
Administrative	<ul> <li>Can the jurisdiction implement the action?</li> <li>Is there someone to coordinate and lead the effort?</li> <li>Is there sufficient funding, staff, and technical support available?</li> <li>Are there ongoing administrative requirements that need to be met?</li> </ul>
Political	<ul><li> Is the action politically acceptable?</li><li> Is there public support both to implement and to maintain the project?</li></ul>
Legal	<ul> <li>Is the jurisdiction authorized to implement the proposed action?</li> <li>Are there legal side effects? Could the activity be construed as a taking?</li> <li>Will the jurisdiction be liable for action or lack of action?</li> <li>Will the activity be challenged?</li> </ul>
Economic	<ul> <li>What are the costs and benefits of this action?</li> <li>Do the benefits exceed the costs?</li> <li>Are initial, maintenance, and administrative costs considered?</li> <li>Has funding been secured for the proposed action? If not, what are the potential funding sources (public, nonprofit, and private)?</li> <li>How will this action affect the fiscal capability of the jurisdiction?</li> <li>What burden will this action place on the tax base or local economy?</li> <li>What are the budget and revenue effects of this activity?</li> <li>Does the action contribute to other jurisdiction goals?</li> <li>What benefits will the action provide?</li> </ul>
Environmental	<ul> <li>How will the action affect the environment?</li> <li>Will the action need environmental regulatory approvals?</li> <li>Will it meet local and State regulatory requirements?</li> <li>Are endangered or threatened species likely to be affected?</li> </ul>

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 <u>Section 4.0;</u>
- 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.

<u>Table 5-2</u>, <u>Hazard Mitigation Actions</u>, 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



#	Mitigation Action	Azard 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	<ul> <li>Conduct an inflow &amp; infiltration study to determine where 50 year and 100 year flood waters would collect. Study outcomes should include the following:</li> <li>What assets, including the collections conveyance system, would be affected?</li> <li>What facilities or equipment would need rehabilitation or replacement after a 50 year or 100 year flood? How should that work be prioritized?</li> <li>What would be the cost of the necessary temporary equipment to get the service area up and running, during the replacement/rehabilitation project?</li> <li>How would these impacts on the wastewater system affect potable water operations? Will they contaminate storage wells?</li> <li>How would this affect IRWD's recycled water business?</li> <li>What measures could IRWD take to prevent or mitigate any of the identified damage?</li> </ul>	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



#	Mitigation Action	Hazard Mitigation Actions 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



	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	



#				Driority	Timolino
-#	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	<ul> <li>Conduct a study to assess canyon facilities:</li> <li>Which facilities are in the historic fire field? With increased fire activity, is that area growing/changing?</li> <li>Which facilities could be further fire hardened or have protective retaining walls added?</li> <li>How should IRWD prioritize any mitigation measures planned?</li> </ul>	Wildfire	Engineering, Water Operations, Collection Systems, Maintenance	Medium	Medium Term



#	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.

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



Table 5-3	
Capabilities Assessment (continued)	

Decourse	Capabilities Assessment (continued)		
Resource	Description and Ability to Support Mitigation		
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	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.		
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	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.		
Emergency Operations Plan Responsible Department: IRWD Safety Department	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.		
Capital Improvement Plan Responsible Department: IRWD Engineering Department, Capital Projects Department	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.		
Urban Water Management Plan Responsible Department: IRWD Water Resources Department and Environmental Compliance Department	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).		
Groundwater Management Plan Responsible Department: IRWD Water Resources Department and Environmental Compliance Department, Orange County Water District (external)	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 overlie 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.		
Overflow Emergency Response Plan (Sewer System Management Plan) Responsible Department: IRWD Recycling Operations Department	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.		



# Table 5-3Capabilities Assessment (continued)

	Capabilities Assessment (continued)
Resource	Description and Ability to Support Mitigation
Dam Emergency Action Plan and Inundation Maps Responsible Department: IRWD Engineering Department, Operations Department	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.
Baker Water Treatment Plant Emergency Action Plan Responsible Department: IRWD Safety Department	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.
Michelson Operations Center Emergency Action Plan Responsible Department: IRWD Safety Department	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.
Water System Risk and Resilience Assessment Responsible Department: IRWD Risk Department	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.
Dam Safety Program Responsible Department: Engineering Operations Support, IRWD	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 works with the LHMP to provide a foundation for infrastructure and safety protocols at IRWD's five "extremely high" hazard dams.
Water Supply Reliability Evaluation Responsible Department: Water Resources & Environmental Compliance, IRWD	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.
Cybersecurity Assessment Responsible Department: Network and Cyber Security, IRWD	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.
Sewage Treatment Master Plan & Potable Reuse Program Responsible Department: Water Resources, Capital Projects	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.



# Table 5-3Capabilities Assessment (continued)

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 (WEROC) membership	WEROC is administered by the Municipal Water District of Orange County (MWDOC), supports and manage countywide emergency preparedness, planning, response, and recovery efforts among Orange County water and wastewater utilizes. IRWD participates in trainings and exercises and utilizes resources from WEROC 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 5-3Capabilities Assessment (continued)

	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 and 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 though 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.	
How can these capabilities be expanded upon and improved to reduce risk?		
Multiple mitigation measures are priority projects to expand on IRWD capabilities. Examples of opportunities to expand capabilities include the following mitigation actions:		
Planning/Regulatory: 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).		
<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).		
<u>Financial</u> : Seek funding opportunities for potable reuse program (Mitigation Action #14), funding for seismic vulnerability evaluation (Mitigation Action #47).		
#5), Specific Hazard Response Plans re communication and collaboration (Mitig (Mitigation Action #23), support custom with public safety agencies after wildfire	ation system training (Mitigation Action #3), annual alert/warning system training (Mitigation Action egular training and exercise programs (Mitigation Action #8), WEROC membership for ation Action #9), coordination with police for IRWD-preferred response in localized flooding incidents er cities in community outreach regarding hazardous materials (Mitigation Action #26), coordination es (Mitigation Action #30), collaboration with CDFW & CAL FIRE regarding defensible space strategy g outreach programs (Mitigation Action #54), and explore opportunities for additional outreach	



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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 <u>Section 2.0</u>, <u>Planning Process</u>) 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 choses 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 <u>Section 4.2.1</u> and <u>Appendix C</u> 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

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## Michael Baker INTERNATIONAL

5 Hutton Centre Drive, Suite 500 Santa Ana, CA 92707 (949) 472-3505

MBAKERINTL.COM

Exhibit "C"

U.S. Department of Homeland Security FEMA Region 9 1111 Broadway, Suite 1200 Oakland, CA 94607-4052



April 14, 2025

Vicki Osborn Director of Emergency Management Municipal Water District of Orange County 18700 Ward Street Fountain Valley, CA 92708

Dear Vicki Osborn:

The Federal Emergency Management Agency (FEMA) has completed its review of the 2025 Municipal Water & Wastewater District of Orange County Hazard Mitigation Plan and has determined that this plan is eligible for final approval, pending its formal adoption by the Municipal Water & Wastewater District of Orange County and all participating jurisdictions. Please refer to the enclosed list of jurisdictions currently considered Approvable Pending Adoption (APA).

Formal adoption documentation must be submitted to FEMA Region 9 by at least one participating jurisdiction within one calendar year from the date of this letter. If no adoption is received within that timeframe, the plan must be updated and resubmitted for review.

FEMA will issue formal approval of the plan upon receipt of the adoption documentation. Once approved, all other participating jurisdictions must adopt the plan within five calendar years of the approval date. Adoption of the plan is required to maintain eligibility for funding under FEMA's Hazard Mitigation Assistance (HMA) programs. All funding requests will be evaluated individually based on the specific eligibility criteria and requirements of the applicable HMA program.

Please note that while mitigation plans may include additional content to meet Element H: Additional State Requirements or other local objectives, FEMA's APA status does not constitute review or approval of any content exceeding FEMA's standard mitigation planning requirements.

www.fema.gov

Municipal Water & Wastewater District of Orange County Hazard Mitigation Plan Approvable Pending Adoption Notice April 14, 2025 Page 2 of 3

If you have any questions regarding the planning or review processes, please contact the FEMA Region 9 Hazard Mitigation Planning Team at <u>fema-r9-mitigation-planning@fema.dhs.gov</u>.

Sincerely,

ifeano

Alison Kearns Planning and Implementation Branch Chief Mitigation Division FEMA Region 9

Enclosures (2)

Municipal Water & Wastewater District of Orange County Plan Review Tool, dated April 14, 2025 Status of Participating Jurisdictions, dated April 14, 2025

 cc: Robyn Fennig, State Hazard Mitigation Officer, California Governor's Office of Emergency Services
 Victoria LaMar-Haas, Hazard Mitigation Planning Chief, California Governor's Office of Emergency Services Municipal Water & Wastewater District of Orange County Hazard Mitigation Plan Approvable Pending Adoption Notice April 14, 2025 Page 3 of 3

### Status of Participating Jurisdictions as of April 14, 2025

#### Jurisdictions - Adopted and Approved

#	Jurisdiction	Adoption Receipt Date	

#### Jurisdictions – Approvable Pending Adoption

#	Jurisdiction
1	Municipal Water & Wastewater District of Orange County
2	Costa Mesa Sanitary District
3	El Toro Water District
4	Irvine Ranch Water District
5	Laguna Beach County Water District
6	Mesa Water District
7	Moulton Niguel Water District
8	Orange County Sanitation District
9	Orange County Water District
10	Santa Margarita Water District
11	Serrano Water District
12	South Coast Water District
13	South Orange County Wastewater Authority
14	Trabuco Canyon Water District
15	Yorba Linda Water District

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April 28, 2025 Prepared by: A. Murphy / M. Cortez Submitted by: K. Burton Approved by: Paul A. Cook

#### ACTION CALENDAR

#### LAKE FOREST WOODS SEWER IMPROVEMENTS BUDGET INCREASE, CONSULTANT SELECTION AND CONSTRUCTION AWARD

#### SUMMARY:

The Lake Forest Woods Sewer Improvements project will replace and relocate sewer pipeline segments located within the upper reach of the San Diego Creek in the Lake Forest Woods community that are at risk of damage from rainstorm events and further erosion of the creek bottom and banks. Staff recommends the Board:

- Authorize the General Manager to execute a construction contract with GCI Construction, Inc. in the amount of \$4,643,784 for the Lake Forest Woods Sewer Improvements project;
- Authorize the General Manager to execute a Professional Services Agreement with Woodard & Curran in the amount of \$248,903 for construction phase engineering services; and
- Authorize a budget increase in the amount of \$1,707,000, from \$5,313,000 to \$7,020,000 for Project 11123.

#### BACKGROUND:

This project is located within the Lake Forest neighborhood known as "The Woods," which is bounded by Lake Forest Drive, Toledo Way, Ridge Route, and Jeronimo Road as shown in Exhibit "A". The existing sewer system in the Lake Forest Woods neighborhood was constructed in 1971 by the Los Alisos Water District when it was common practice to construct gravity sewers adjacent to or within creeks. Since 1971, significant erosion has occurred in the creek, reducing the amount of cover over the existing sewer pipes in the creek to less than one foot in some locations. This project will replace and relocate portions of the Lake Forest Woods sewer system located within the San Diego and Glenwood Creeks to reduce the risk of pipe failure due to soil erosion.

In 2022, IRWD retained Woodard & Curran to develop the engineering design. The design was completed in September 2023 and included replacing the existing sewer segments and manholes with a high risk of failure and the segments with the least remaining cover with new sewer segments that will be located outside of the scour envelope of the creek. The design eliminated creek crossings and will also install check dams along the San Diego and Glenwood Creek channels to slow runoff flow velocities and thus reduce erosion to protect both existing and new sewer facilities and access roads upstream of the check dams.

In 2023, IRWD obtained a temporary construction easement from the Lake Forest Woods homeowners association, an agreement for new pipeline easements for the relocated sewer segments, and a permanent blanket easement for sewer access purposes. In October of 2023, the

Action Calendar: Lake Forest Woods Sewer Improvements Budget Increase, Consultant Selection and Construction Award April 28; 2025 Page 2

District's environmental consultant, LSA Associates completed the California Environmental Quality Act (CEQA) documents and applied for environmental permits including the Santa Ana Regional Water Quality Control Board Clean Water Act Section 401 Water Quality Certification, the Army Corps of Engineers Letter of Permission for the Clean Water Act Section 404 permit, and the California Department of Fish and Wildlife Lake and Streambed Alteration agreement. The final permits were received in March 2025.

#### Construction Bid Process:

The project was advertised to a select bidders list of 19 pipeline contractors on March 3, 2025. The bids were opened on April 8, 2025, and the results, provided in Exhibit "C", are summarized as follows:

Bidder	Bid Amount
GCI Construction, Inc.	\$4,643,784.00
KEC Engineering	\$5,387,477.00
Mladen Buntich Construction Co.	\$5,671,000.00
Paulus Engineering, Inc.	\$5,996,777.09
T.E. Roberts, Inc.	\$6,420,603.00
Engineer's Estimate	\$4,761,000.00

GCI Construction was the apparent low bidder with a bid of \$4,643,784. GCI is well qualified to construct the project and has completed many projects for IRWD. Most recently, GCI completed the Serrano Creek Raw Waterline Replacement and is currently working on the Domestic Water Vault Replacement on East Peltason Drive at UCI. Staff recommends that the Board authorize the General Manager to award a construction contract to GCI in the amount of \$4,643,784.

#### Construction Phase Engineering Services:

For project continuity, staff requested a proposal for construction phase engineering services from Woodard & Curran. The scope of work included providing responses to requests for information, performing submittal reviews, attending construction meetings, preparing record drawings, and modifying the final design over the past year while awaiting permits. Staff reviewed Woodard & Curran's proposal in the amount of \$248,903 and found it reasonable and appropriate. Staff recommends executing a Professional Services Agreement with Woodard & Curran for construction phase engineering services; the proposal is provided as Exhibit "B".

#### FISCAL IMPACTS:

Project 11123 is included in the FY 2025-27 Capital Budget. A budget increase is required to fund the construction phase of the project as shown in the following table:

Project	Current	Addition	Total
No.	Budget	<reduction></reduction>	Budget
11123	\$5,313,000	\$1,707,000	\$7,020,000

Action Calendar: Lake Forest Woods Sewer Improvements Budget Increase, Consultant Selection and Construction Award April 28; 2025 Page 3

#### ENVIRONMENTAL COMPLIANCE:

This project is subject to CEQA and in conformance with California Code of Regulations Title 14, Chapter 3, Article 6. The Board of Directors adopted the Final Initial Study-Mitigated Negative Declaration (IS-MND) for the project on April 22, 2024, and the Notice of Determination was filed with the Orange County Clerk on April 23, 2024.

The District received the Clean Water Act Section 401 Water Quality Certification for the project from the Santa Ana Regional Water Quality Control Board in February 2025 (amended in April 2025) and the Clean Water Act Section 404 Final Letter of Permission from the U.S. Army Corps of Engineers in March 2025. The Lake and Streambed Alteration notification submitted to the California Department of Fish and Wildlife for the project was approved by Operation of Law in November 2024.

#### COMMITTEE STATUS:

The consultant selection for construction phase engineering services was reviewed by the Engineering and Operations Committee on February 18, 2025. Construction awards are not routinely taken to the Committee prior to submittal to the Board.

#### **RECOMMENDATION:**

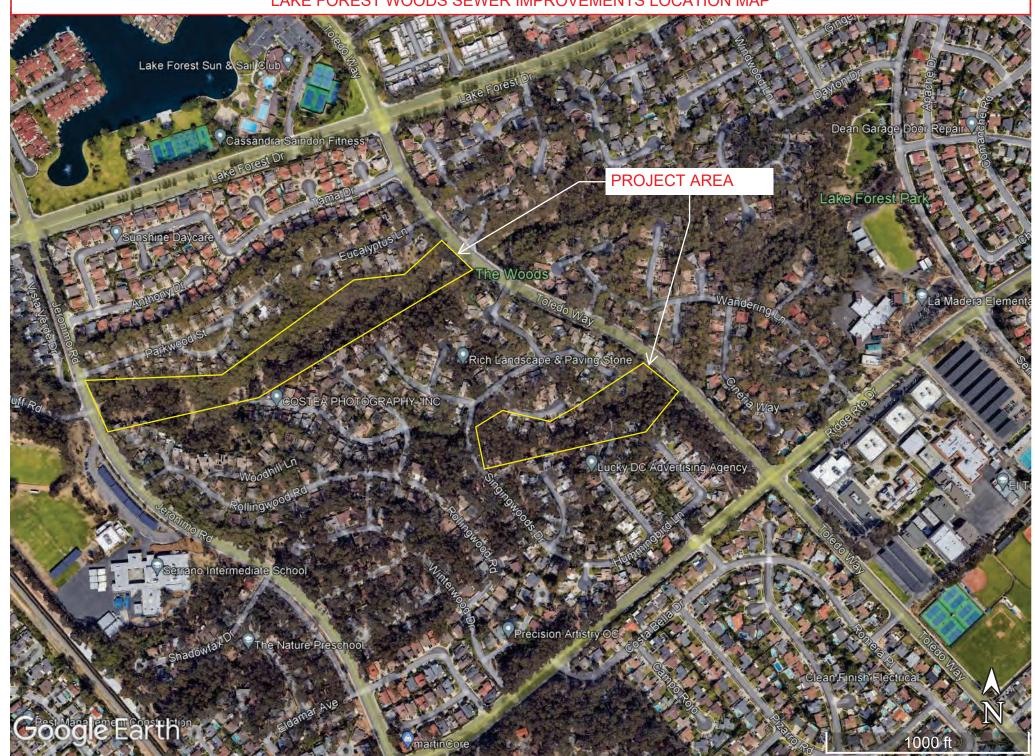
THAT THE BOARD AUTHORIZE A BUDGET INCREASE IN THE AMOUNT OF \$1,707,000, FROM \$5,313,000 TO \$7,020,000 FOR PROJECT 11123; AUTHORIZE THE GENERAL MANAGER TO EXECUTE A PROFESSIONAL SERVICES AGREEMENT WITH WOODARD & CURRAN IN THE AMOUNT OF \$248,903 FOR CONSTRUCTION PHASE ENGINEERING SERVICES; AND AUTHORIZE THE GENERAL MANAGER TO EXECUTE A CONSTRUCTION CONTRACT WITH GCI CONSTRUCTION, INC. IN THE AMOUNT OF \$4,643,784 FOR THE LAKE FOREST WOODS SEWER IMPROVEMENTS, PROJECT 11123.

#### LIST OF EXHIBITS:

- Exhibit "A" Project Location Map
- Exhibit "B" Woodard & Curran Fee Proposal
- Exhibit "C" Bid Results GCI Construction, Inc.

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#### Exhibit "A" LAKE FOREST WOODS SEWER IMPROVEMENTS LOCATION MAP



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#### Exhibit "B"

COMMITMENT & INTEGRITY DRIVE RESULTS 530 Technology Drive | Suite 100 Irvine, California 92618 www.woodardcurran.com

T 800.426.4262 T 949.420.5300



November 22, 2024

Irvine Ranch Water District Attn: Alex Murphy Senior Engineer 2512 Michelson Drive Irvine, CA 92619

#### Re: Proposal for Engineering Services Lake Forest Woods Sewer Improvements

Dear Mr. Murphy:

Attached is Woodard & Curran's proposal to support additional activities associated with the ongoing Lake Forest Woods Sewer Improvements project . The scope of work in this proposal includes engineering services during construction, bid phase support and design services after 1-year of inactivity.

We greatly appreciate this opportunity to offer our engineering services, and as always, we are open to discussing our scope and fee in order to meet Irvine Ranch Water District's needs. Please feel free to call the undersigned at (949) 420-5313 if you have any questions regarding this proposal or require any further information.

Sincerely,

K-/E-5

Kraig Erickson, P.E. Project Manager

Jul Mello

Inken Mello Client Service Manager



#### SCOPE OF SERVICES FOR VARIANCE

The additional scope of work in this variance request is to complete the following items.

#### TASK 1 – DESIGN PHASE EXTENSION

A schedule extension of an additional 12-months from October 2023 through October 2024 to complete the final bid documents while permitting was ongoing. Work included miscellaneous correspondence, client communications, permitting support and final updates to bid documents.

#### **TASK 2 – ENGINEERING SERVICES DURING CONSTRUCTION**

#### **Bid Phase Support**

Woodard & Curran shall attend prebid meeting with contractors and support bid phase with addenda.

#### Pre-Construction Meeting

Woodard & Curran's Project Manager and Project Engineer will coordinate, prepare for, and attend one (1) pre-construction meeting (assumed to be 2 hours long) at IRWD's offices with the contractor and District staff. Assumes IRWD will conduct the meeting and prepare the meeting agenda and minutes that will be prepared and distributed to all attendees. Assumes Woodard & Curran will review the minutes.

#### Construction Meetings / Site Visits

Woodard & Curran will attend construction meetings and/or site visits as requested. Assumes a total of fifteen (15) to be attended by either the Project Manager or Project Engineer. Assume each meeting requires 4-hours of staff time on average for preparation, travel, attendance, and/or follow-up action items. Scope allows for a 15month construction period.

#### **Requests for Information**

Woodard & Curran will review and respond to requests for information (RFIs) from the contractor to clarify the contract documents and the design intent. Assumes 10 RFIs with an average of 4 hours each.

#### Submittals and Resubmittals

Woodard & Curran will review and prepare written engineer's review comments for construction submittals and resubmittals. Assumes 50 submittals with an average of 4 hours each and 25 resubmittals with an average of 2 hours each.

2



#### Plan Revisions

Woodard & Curran will prepare contract document modifications based on change orders reviewed and approved by IRWD. Assumes a total of two (2) contract document modifications with an average of 16 hours each.

#### Record Drawings and Consolidated Construction Files

Woodard & Curran will prepare and issue record drawings electronically only based on one set of legible markups provided by the Contractor, and incorporating the changes to the construction drawings issued via addendum during the bid phase. Together with the record drawings, we will submit a consolidated electronic record of the construction documentation (consisting of RFIs and responses, submittals, contract document clarifications, and any field orders).

#### Permitting Support

Woodard & Curran has allocated a total of 36-hours to support District and Contractor with securing permits with the City of Lake Forest, Orange County Public Works and SWPPP.

#### Project Management

Woodard & Curran shall provide monthly client reports for the project duration of 15 months.

#### Team Coordination

Woodard & Curran shall provide weekly team coordination meetings on construction activities for the project duration of 15 months.

#### **Assumptions and Exclusions**

- Construction management is excluded from our scope. It is assumed that the District and/or a third-party construction manager will provide contractor oversight, field supervision and direction, review of contractor pay applications and baseline schedule updates, and final punch list preparation and closeout.
- Specialty inspections are excluded from our scope. It is assumed that the District and/or contractor will provide third-party inspection services as required.
- Attendance at shop visits is excluded from our scope. It is assumed that District staff will attend any shop visits as appropriate.

3

COMMITMENT & INTEGRITY DRIVE RESULTS 530 Technology Drive | Suite 100 Irvine, California 92618 www.woodardcurran.com



- Hydraulic model updates are excluded from our scope. It is assumed that the District will update its hydraulic model with the project improvements as appropriate.
- Contractor change order request review is excluded from our scope. It is assumed that the District will review change order requests as required.
- Preparation of conformed documents is excluded from our scope. Any changes to the contract documents during the bid phase will be issued via addendum, and those affecting the construction plans will subsequently be incorporated into the record drawing set.

#### SCHEDULE

The anticipated construction schedule is attached, which shows an overall duration of approximately 15 months. Note that this is contingent on the schedule to be submitted by IRWD's selected Contractor. We are prepared to start work upon receipt of Notice to Proceed (NTP).

4

#### FEE

A fully itemized level of estimated effort and budget for each task is attached.

## $\begin{array}{c} \text{COMMITMENT} \& \text{ INTEGRITY} \\ \text{DRIVE RESULTS} \end{array}$

530 Technology Drive | Suite 100 Irvine, California 92618 www.woodardcurran.com T 800.426.4262 T 949.420.5300

				Wooda	rd & Curra	an									
Tasks		Labor								ODCs		Total			
			Kraig Erickson	Mirko Maher	Justin Kraetsch	CADD	Kevin Kopp	Shawn Kenney	Engineer	Project Assistant	Total	Total Labor	ODCs	Total	Total
			Project Manager	Technical Lead	Project Engineer	Des-2	Access Roads	Stormwater Support	PE-1	Admin	Hours	Costs (1)	0200	ODCs	Fee
			\$350	\$350	\$315	\$180	\$315	\$315	\$280	\$113					
Varian	ce Request	Description		1						1					
1	Design Phase Exten	•			40	0.4	40	10	0.4			<b>000 110</b>		<u> </u>	
1.1	Design/PM	updates after 1-year inactivity	4	4	16	24	16	16	24	4	108	\$29,412		\$0	\$29,412
2		d During Construction													
2.1	Bid Phase Support		2	4	8	12	4	4	12	2	48	\$12,886		\$0	\$12,886
2.2	Preconstruction Meetin	ng	4	4	4						12	\$4,060	\$150	\$165	\$4,225
2.3	Construction Meetings	assumes 15 mtgs	15	10	30		8	8			71	\$23,240	\$1,200	\$1,320	\$24,560
2.4	RFls	Respond to Requests for Information (10)	4	4	20		6	6			40	\$12,880		\$0	\$12,880
2.5	Submittals	Review Submittals (50) and Resubmittals (25)	25	25	80		20	20	80		250	\$77,700		\$0	\$77,700
2.6	Plan Revisions	2 total revisions			8	16	4	4			32	\$7,920		\$0	\$7,920
2.7	Record Drawings	Prepare Record Drawings & Consolidated Construction Files	2	4	24	48	6	6			90	\$22,080		\$0	\$22,080
2.8	Permitting Support	support City, OC, SWPPP	4		8			8	16		36	\$10,920		\$0	\$10,920
2.9	Project Management	monthly client reporting	15		15					15	45	\$11,670		\$0	\$11,670
2.10	Team Coordination	weekly check-ins	30	15	30		15	15			105	\$34,650		\$0	\$34,650
Subtota	al:	Subtotal:	105	70	243	100	79	87	132	21	837	\$247,418	\$1,350	\$1,485	\$248,903
		TOTAL	105	70	243	100	79	87	132	21	837	\$247,418	\$1,350	\$1,485	\$248,903

1. The individual hourly rates include salary, overhead and profit.

Note: This page is intentionally left blank.

## **Bid Results**

#### **Bidder Details**

Vendor Name	GCI Construction, Inc.
Address	1031 Calle Recodo Suite D
	San Clemente, California 92673
	United States
Respondee	Alan Aristondo
Respondee Title	CEO
Phone	714-949-4345
Email	alan@gciconstruction.com
Vendor Type	CADIR
License #	755356
CADIR	1000001150

#### **Bid Detail**

Bid Format	Electronic
Submitted	04/08/2025 1:59 PM (PDT)
<b>Delivery</b> Method	
<b>Bid Responsive</b>	
<b>Bid Status</b>	Submitted
Confirmation #	422957

### **Respondee Comment**

#### **Buyer Comment**

### Attachments

File Title Bid Form\_LF Woods Sewer.pdf File Name Bid Form\_LF Woods Sewer.pdf

C-1

File Type Bid Form

## Subcontractors

Showing 9 Subcontractors

Name & Address	Desc	License Num	CADIR	Amount	Туре
Alcorn Fence Company 9901 Glenoaks Blvd. Sun Valley, California 92519	Fence	122954	1000001986	\$47,275.00	CADIR
<b>B &amp; J Tree Service</b> 17602 17 th Street Suite 102 #157 Tustin, California 92780	Tree Removal	540001	10000628	\$102,180.00	
<b>CMB Structures Inc.</b> 7211 Haven Aveue, E-287 Alta Loma, California 91701	Concrete	613977	1000001531	\$253,023.34	CADIR
GUIDA 220 Commerce Suite 150 Irvine, California 92602	Settlement Monitoring	PLS 7542	10000006862	\$174,000.00	CADIR
<b>Geo Cell Solutions</b> 2668 N Fordham Avenue Fresno, California 93727	Pipe Abandonment	938053	1000001454	\$12,900.00	
Hardy & Harper, Inc. 1312 E. Warner Ave Santa Ana, California 92705	AC	215952	100000076	\$45,832.00	
<b>Manhole Builders, Inc.</b> 11762 De Palma Rd STE 1-C Corona, California 92883	Manhole	831892	1000012259	\$8,660.00	
Pipe Jacking Trenchless 26000 Commercentre Drive Lake Forest, California 92630	pipe jacking	1018405	1000042926	\$769,068.00	
<b>Sancon Technologies Inc.</b> 5841 Engineer Dr. Huntington Beach, California 92649	Coating	774055	1000008879	\$36,890.00	CADIR

## Line Items

#### Discount Terms No Discount

Item # Item Code Type BASE BID ITEMS	Item Description	UOM	QTY	Unit Price	Line Total \$4,643,784.00	Response	comme
1	Mobilization, Demobilization, Temporary Traffic Controls, Potholing, Project Closeout, and Cleanup	ى	1	\$160,000.00	\$160,000.00	Yes	
2	Furnishing Contract Bonds, Insurance, and Project Permits	LS	1	\$6,000.00	\$6,000.00	Yes	
3	Demolition Site Work	LS	1	\$40,000.00	\$40,000.00	Yes	
4	Sheeting, Shoring, and Bracing	LS	1	\$335,000.00	\$335,000.00	Yes	
5	Storm Water Pollution Prevention Plan (SWPPP) and Implementation	LS	1	\$22,000.00	\$22,000.00	Yes	
6	Dewatering	LS	1	\$145,000.00	\$145,000.00	Yes	
7	Abandon Existing Sewer Pipelines and Manholes	LS	1	\$55,000.00	\$55,000.00	Yes	
	Remove and Dispose of Existing Sewer Manhole and Base	EA	1	\$8,000.00	\$8,000.00	Yes	
9	Construct 48-Inch Sewer Manhole	EA	4	\$26,000.00	\$104,000.00	Yes	
		EA	5	\$30,000.00	\$150,000.00	Yes	
10	Construct 60-inch Sewer Maahole			\$6,500.00	\$6,500.00	Yes	
11	Connect New Sewer to Existing Manhole No. 131	23	1				
12	Open Cut Installation of 10-inch PVC Sewer with Concrete Encasement	LF	68	\$520.00	\$35,360.00	Yes Yes	
3	Open Cut Installation of & Inch PVC Sewer with Bedding per IRWD Std. Dwg. S-6	ĿF	300	\$255.00	\$76,500.00		
14	Open Cut Installation of 8-inch PVC Sewer with Concrete Encasement	ĿF	281	\$343.00	\$96,383.00	Yes	
5	Pilot-Tube Guided Auger Boring Jacking and Receiving Shafts	15	1	\$1,300,000.00	\$1,300,000.00	Yes	
6	Trenchless Construction of 24-inch Steel Casing using Pilot-Tube Guided Auger Boring	LF	658	\$965.00	\$634,970.00	Yes	
7	Installation of 10-inch PVC Sewer through 24-inch Steel Casing	ĿF	371	\$115.00	\$42,665.00	Yes	
8	Installation of 8-inch PVC Sewer through 24- inch Steel Casing	LF	287	\$105.00	\$30,135.00	Yes	
9	Rescue Shaft for Pilot-Tube Guided Auger Boring Installation	EA	1	\$25,000.00	\$25,000.00	Yes	
0	Concrete Encasement of Existing Sewer Mains	ĿF	103	\$145.00	\$14,935.00	Yes	
1	Construct 4-inch PVC Sewer Lateral with Concrete Encasement	LF	206	\$60.00	\$12,360.00	Yes	
2	Sanitary Sewer Bypassing – Upper San Diego Creek Area	ى	1	\$30,000.00	\$30,000.00	Yes	
3	Sanitary Sewer Bypassing ~ Glenwood Tributary Area	LS	1	\$30,000.00	\$30,000.00	Yes	
24	Access Road Excavation and Grading	ى	1	\$195,000.00	\$195,000.00	Yes	
5	Access Road Aggregate Base	LS	1	\$100,000.00	\$100,000.00	Yes	
6	Hot-Mix Asphalt	ى	1	\$62,000.00	\$62,000.00	Yes	
.7	1-1/2" Asphait Concrete Pavement Cold Milling	LS	1	\$12,000.00	\$12,000.00	Yes	
8	Concrete Pavement Access Road	CY	73	\$1,300.00	\$94,900.00	Yes	
9	CMU Block Retaining Wall	LF	229	\$450.00	\$103,050.00	Yes	
0	Tree Removal	EA	131	\$944.00	\$123,664.00	Yes	
1	4-foot Wide Concrete Valley Gutter	LF	382	\$221.00	\$84,422.00	Yes	
2	8-foot Wide Concrete Valley Gutter	LF	74	\$515.00	\$38,110.00	Yes	
3	3-foot Wide Concrete V-Ditch	LF	59	\$380.00	\$22,420.00	Yes	
4	Construct Rip-Rap	LS	1	\$390,000.00	\$390,000.00	Yes	
5	Wood Post Fence Replacement	ĿF	245	\$218.00	\$53,410.00	Yes	
6	Maintain Redline Markup Set of Drawings and Submit Final Redline Markup Set	– کا	1	\$5,000.00	\$5,000.00	Yes	
		_	, i		\$0.00		
DDITIVE OR DEDUCTIVE	ADDITION (+) OR DEDUCTION (-)	LS	1	\$0.00	\$0.00	Yes	

### Line Item Subtotals

#### BASE BID ITEMS

ADDITIVE OR DEDUCTIVE BID ITEMS

#### Section Title

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\$4,643,784.00 \$0.00 \$4,643,784.00

Line Total

#### Grand Total

C-3

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