AGENDA
IRVINE RANCH WATER DISTRICT
ENGINEERING AND OPERATIONS COMMITTEE MEETING
WEDNESDAY, APRIL 19, 2023

This meeting will be held in-person at the District's Michelson Water Recycling Plant located at 3512 Michelson Dr., Irvine, California. In the first floor Committee room. The meeting will also be broadcasted via Webex for those wanting to observe the meeting virtually.

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

Via Web: https://irwd.webex.com/irwd/j.php?MTID=m4714fe1556e544b3f84577c881163877
Meeting Number (Access Code): 2498 857 4189
Meeting Password: ziJ8V298ZQM (94588298 from video systems)

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.

CALL TO ORDER 1:30 p.m.

ATTENDANCE
Committee Chair: Doug Reinhart _____
Committee Member: Karen McLaughlin _____

ALSO PRESENT

Paul Cook	_____	Kevin Burton	_____	Wendy Chambers	_____
Jose Zepeda	_____	Paul Weghorst	_____	Cheryl Clary	_____
Steve Choi	_____	Jim Colston	_____	Fiona Sanchez	_____
Rich Mori	_____	Eric Akiyoshi	_____	Joseph McGhee	_____
Jacob Moeder	_____	Malcolm Cortez	_____	Ken Pfister	_____
Harry Cho	_____	Alex Murphy	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

PUBLIC COMMENT NOTICE

If you wish to address the Committee on any item, please submit a request to speak via the "chat" feature available when joining the meeting virtually. Remarks are limited to three minutes per speaker on each subject. Public comments are limited to three minutes per speaker on each subject. You may also submit a public comment in advance of the meeting by emailing comments@irwd.com before 9:00 a.m. on Wednesday, April 19, 2023.

COMMUNICATIONS

1. Notes: Burton
2. Public Comments
3. Determine the need to discuss and/or take action on item(s) introduced that came to the attention of the District subsequent to the agenda being posted, and determine which items may be approved without discussion.

WORKSHOP

4. CAPITAL BUDGET AND LONG-TERM CAPITAL PROGRAM FOR FISCAL YEARS 2023-24 AND 2024-25 – JOHNSON / ROBINSON / JOHNSON / AKIYOSHI / BURTON

   Recommendation: That the Committee provide comments on the Capital Budget for Fiscal Years 2023-24 and 2024-25 prior to Board adoption on April 24, 2023.

INFORMATION

5. RESEARCH BUSINESS PLAN UPDATE – COLTON / BURTON

   Recommendation: Receive and file.

6. MICROPLASTICS OVERVIEW – PREPARING FOR SAMPLING AND MONITORING – HANEY / COLSTON / BURTON

   Recommendation: Receive and file.

ACTION

7. RATTLESNAKE DAM GEOTECHNICAL INVESTIGATION AND STABILITY ANALYSIS CONSULTANT SELECTIONS AND BUDGET ADDITION – CHO / MOEDER / BURTON

   Recommendation: That the Board authorize a budget increase for Project 12101, Rattlesnake Dam Geotechnical Investigation and Stability Analysis, to the FY 2022-23 Capital Budget in the amount of $2,331,000, authorize the General Manager to execute a Professional Services Agreement with AECOM in the amount of $741,115 for geotechnical investigation services, and authorize the General Manager to execute a sole source Professional Services Agreement with HDR Engineering, Inc. in the amount of $624,865 for engineering services.

ACTION, continued

8. REHABILITATION OF WELL OPA-1 BUDGET ADDITION AND CHANGE ORDER – MARCACCI / MCGHEE / MORI / BURTON

   Recommendation: That the Board authorize the addition of Project 12594, Rehabilitation of Well OPA-1, to the FY 2022-23 Capital Budget in the amount of $557,500 and authorize the General Manager to accept OCWD's construction contract change order with Innovative Construction Solutions in the amount of $387,476.40.

TOUR OF WATER QUALITY LABORATORY

9. Staff will provide a tour of its laboratory to the Committee members.

OTHER BUSINESS

10. Directors' Comments

11. Adjournment

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April 19, 2023
Prepared by: D. Johnson / M. Robinson / E. Akiyoshi
Submitted by: K. Burton
Approved by: Paul A. Cook

ENGINEERING AND OPERATIONS COMMITTEE

CAPITAL BUDGET AND LONG-TERM CAPITAL PROGRAM
FOR FISCAL YEARS 2023-24 AND 2024-25

SUMMARY:

Staff will present the IRWD Capital Budget and Long-Term Capital Program for Fiscal Years (FY) 2023-24 and 2024-25. The forecasted capital expenditures for FY 2023-24 and FY 2024-25 are $105.1 and $111.0 million, respectively. The Capital Budget is presented for information and discussion purposes prior to Board adoption on April 24, 2023.

BACKGROUND:

Since 2019, IRWD has reviewed and approved the Capital Budget on a biennial cycle. The draft presentation, provided as Exhibit "A", includes a review of the FY 2021-22 and FY 2022-23 earned value, a preview of the forecasted FY 2023-24 and FY 2024-25 capital expenditures, and an update on the Long-Term Capital Program.

For the past two fiscal years (FY 2021-22 and FY 2022-23), forecasted expenditures were originally estimated at $181.2 million. Actual expenditures are on target for $145.6 million, approximately 80% of forecasted expenditures. The estimated capital expenditures for FY 2023-24 and FY 2024-25 are $105.1 and $111.0 million, respectively.

FISCAL IMPACTS:

The following table shows the major expenditure groups for FY 2023-24 and FY 2024-25:

Expenditure Group Description	**FY 2023-24 ($ Million)**	**FY 2024-25 ($ Million)**
Operational Improvements	34.4	13.9
Replacement – Facilities	33.3	50.2
OC San – CORF	11.9	12.2
Development	6.8	12.4
Water Banking	5.0	5.9
Non-potable Storage	4.3	7.2
General Plant	3.1	2.4
Sewage Treatment	2.7	2.8
Planning	1.9	2.2
Water Resources	1.1	1.1
OCWD Annexation	0.6	0.7
Total:	*105.1*	*111.0*

The Capital Budget for FY 2023-24 and 2024-25, provided as Exhibit "B", provides details on all capital projects with anticipated expenditures in FY 2023-24 and FY 2024-25 and Exhibit "C" provides a resolution approving the Capital Budgets.

ENVIRONMENTAL COMPLIANCE:

Not applicable.

RECOMMENDATION:

That the Committee provide comments on the Capital Budget for Fiscal Years 2023-24 and 2024-25 prior to Board adoption on April 24, 2023.

LIST OF EXHIBITS:

Exhibit "A" – Capital Budget Draft Presentation
Exhibit "B" – Capital Budget for FY 2023-24 and 2024-25
Exhibit "C" – Resolution approving the Capital Budgets

Exhibit "A"

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PRESENTATION OUTLINE

- Two-Year Capital Budget
  - Review FY 2021-22 & 2022-23 Capital Budget
  - Development Update
  - Proposed FY 2023-24 & 2024-25 Capital Budget
- Long-Term Capital Program

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TWO-YEAR CAPITAL BUDGET

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TWO-YEAR CAPITAL BUDGET

Accomplishes the following objectives:

- Forecasts work effort and two-year capital expenditures
- Identifies all capital projects for next two years
- Reflects Board approval for the capital budgets
- Identifies “Flagged” projects for further Board discussion
- Aligns with the two-year Operating Budget cycle, and includes General Plant projects

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PREVIOUS FORECAST VS. ACTUAL EARNED VALUE

- *Earned Value* includes actual expenditures and work completed but not yet invoiced
- FY 2021-22 & 2022-23 Capital Expenditures
  - Forecast for past two-year expenditures is $181.2 M
  - Actual Earned Value is $145.6 M (≈80%)

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COMPARE PREVIOUS FORECAST TO ACTUAL EARNED VALUE

No.	Description	Forecast ($ Millions)	Earned Value ($ Millions)	Delta ($ Millions)
1	Water Banking	35.5	8.9	(26.6)
2	Sewage Treatment	7.3	0.1	(7.2)
3	Planning	4.0	1.8	(2.2)
4	Water Resources	2.6	0.9	(1.7)
5	Nonpotable Storage	13.3	11.7	(1.6)
6	Replacement - Facilities	74.6	73.1	(1.5)
7	General Plant	3.7	2.6	(1.1)
8	Replacement-Business Software	2.1	1.8	(0.3)
9	OCWD Annexation	1.2	1.1	(0.1)
10	Baker WTP	0.3	0.2	(0.1)
12	Operational Improvements	24.9	25.8	0.9
13	Property Management	4.5	6.0	1.5
14	Development	7.3	11.6	4.3
	Subtotal	**181.2**	**145.6**	**(35.6)**

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UPDATE ON DEVELOPMENT

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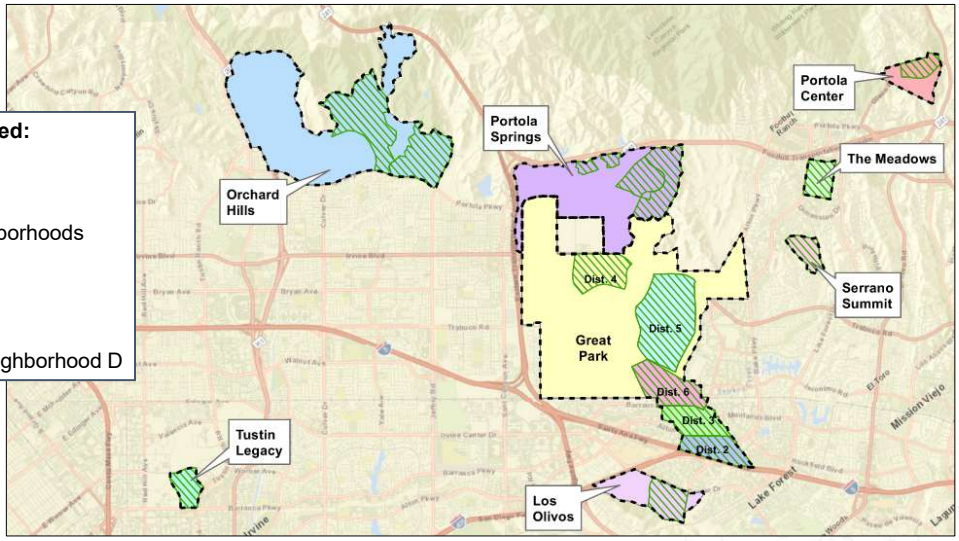
REVIEW DEVELOPMENT FY 2021-22 AND FY 2022-23

Active Areas Included:
- Portola Center
- Orchard Hills
- Portola Springs
- Great Park Neighborhoods (2,3,4,5, and 6)
- Los Olivos
- Serrano Summit
- The Meadows
- Tustin Legacy Neighborhood D



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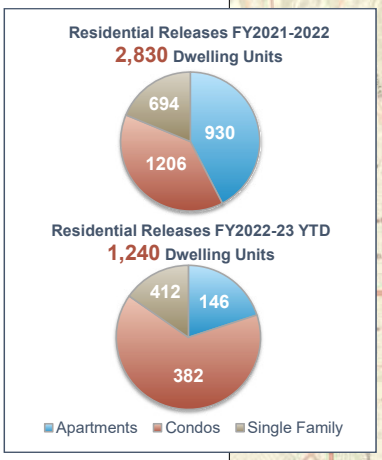
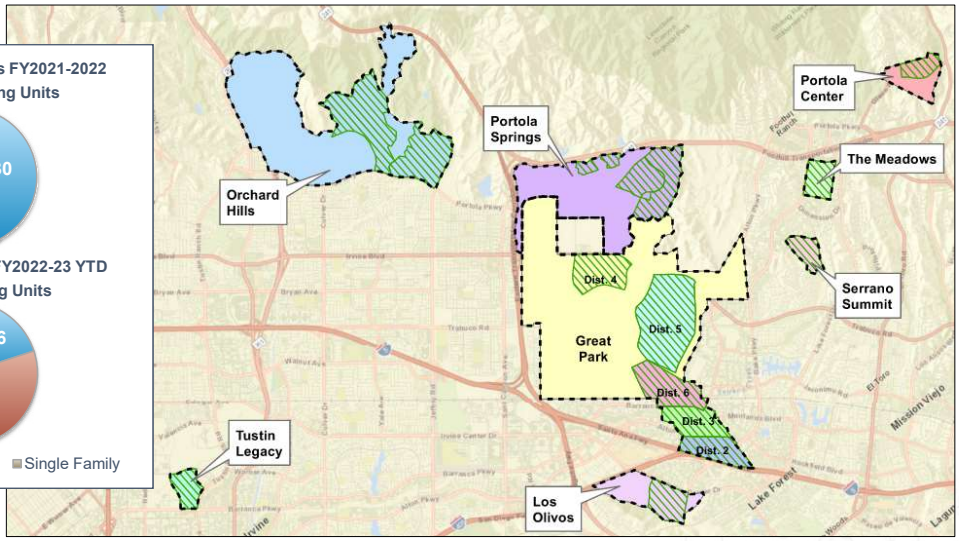
REVIEW DEVELOPMENT FY 2021-22 AND FY 2022-23





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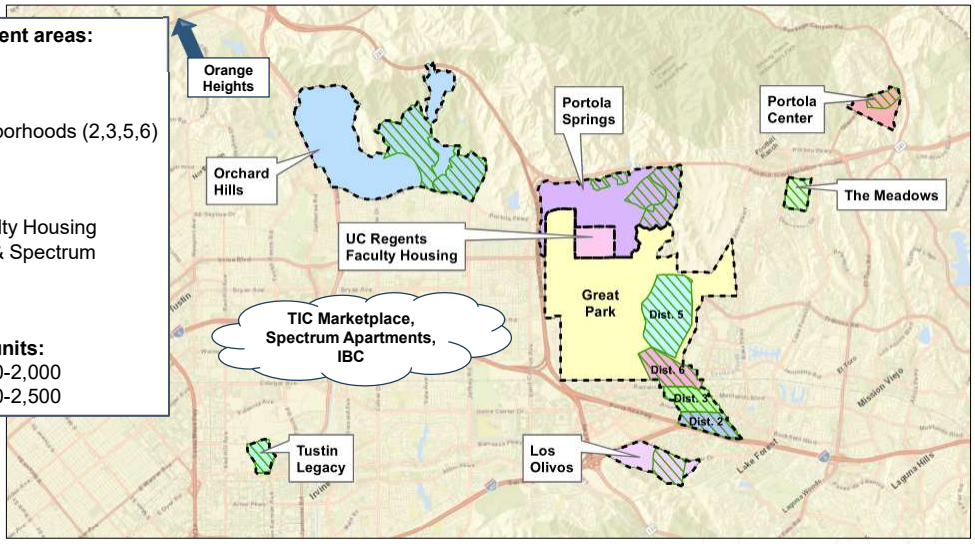
PROJECTED DEVELOPMENT THROUGH FY 2024-25

Projected development areas:
- Portola Center
- Orchard Hills
- Portola Springs
- Great Park Neighborhoods (2,3,5,6)
- Los Olivos
- The Meadows
- Tustin Legacy
- UC Regents Faculty Housing
- TIC Marketplace & Spectrum Apartments
- Orange Heights

Projected dwelling units:
- FY 2023-24: 1,500-2,000
- FY 2024-25: 2,000-2,500

Green hatch fill denotes active development projected through FY 2024-25



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PROPOSED CAPITAL BUDGET FISCAL YEARS 2023-24 AND 2024-25

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FY 2023-24 AND 2024-25 FORECAST EXPENDITURES BY CATEGORY

Description	FY 2023-24 Forecast Expenditures ($ Millions)	FY 2024-25 Forecast Expenditures ($ Millions)
Operational Improvements	34.4	13.9
Replacement - Facilities	33.3	50.2
OC San - CORF	11.9	12.2
Development	6.8	12.4
Water Banking	5.0	5.9
Non-potable Storage	4.3	7.2
General Plant	3.1	2.4
Sewage Treatment	2.7	2.8
Planning	1.9	2.2
Water Resources	1.1	1.1
OCWD Annexation	0.6	0.7
Total	**105.1**	**111.0**

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TOP EXPENDITURE PROJECTS

Fiscal Year	Description	Expenditure Category	Forecasted Expenditures ($ Millions)
Fiscal Year 2023-24	SAN JOAQUIN RESERVOIR FILTRATION FACILITY	Operational Improvements	14.2
	GENERAL SYSTEM REPLACEMENTS AND MODIFICATIONS DW/SS/RW 23/24	Replacement - Facilities	10.2
	OC SAN CORF	OC San CORF	7.8
	KERN FAN GROUNDWATER STORAGE	Water Banking	4.7
	SYPHON RESERVOIR IMPROVEMENTS	Non-potable Storage	4.3
	FLEMING DW RESERVOIR AND PUMP STATION IMPROVEMENTS	Operational Improvements	4.2
Fiscal Year 2024-25	GENERAL SYSTEM REPLACEMENTS AND MODIFICATIONS DW/SS/RW 24/25	Replacement - Facilities	10.2
	SANTIAGO DAM OUTLET AND SPILLWAY	Replacement - Facilities	8.7
	SYPHON RESERVOIR IMPROVEMENTS	Nonpotable Storage	7.2
	OC SAN CORF	OC San CORF	7.0
	KERN FAN GROUNDWATER STORAGE	Water Banking	5.6
	SAN JOAQUIN RESERVOIR FILTRATION FACILITY	Operational Improvements	5.2

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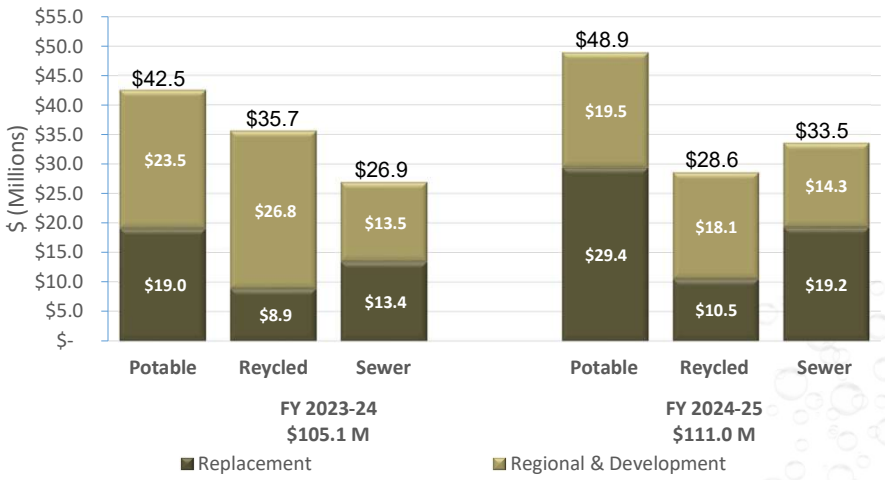
EXPENDITURES BY SYSTEM



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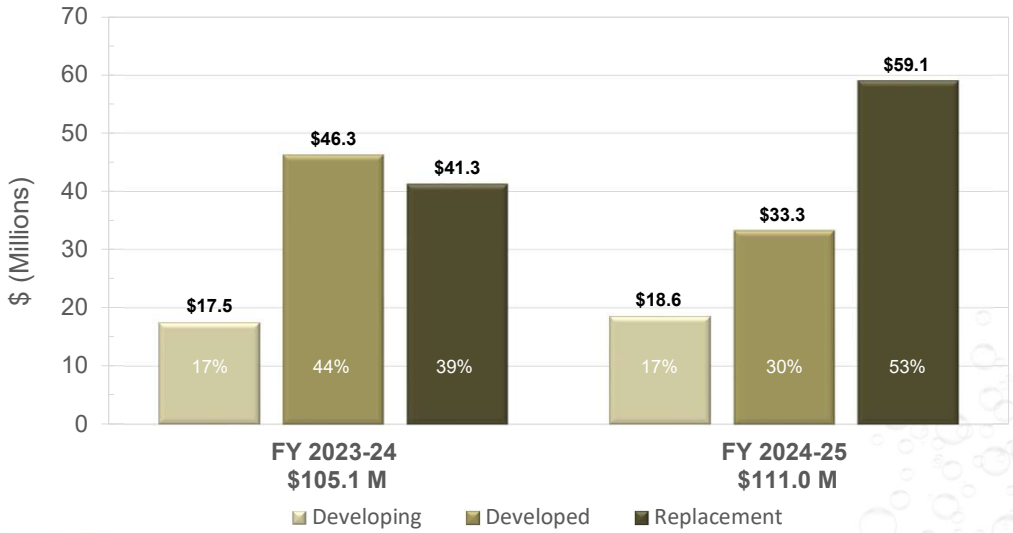
FUNDING SOURCES



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LONG-TERM CAPITAL PROGRAM

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DEFINITIONS

- Replacement Planning Model (RPM)
  - Estimates 50-year timing and replacement costs for all vertical and linear facilities
  - Provides input to Financial Replacement Model (FRPM) for developing replacement funding policies
- Long-Term Capital Program (LTCP)
  - Identifies all planned replacement, regional, and development projects
  - Includes actual projects from the Two-Year Capital Budget
  - Includes **all** replacement costs in the RPM
- Financial Replacement Planning Model (FRPM)
  - Combines output from RPM and revenue streams to develop funding strategies

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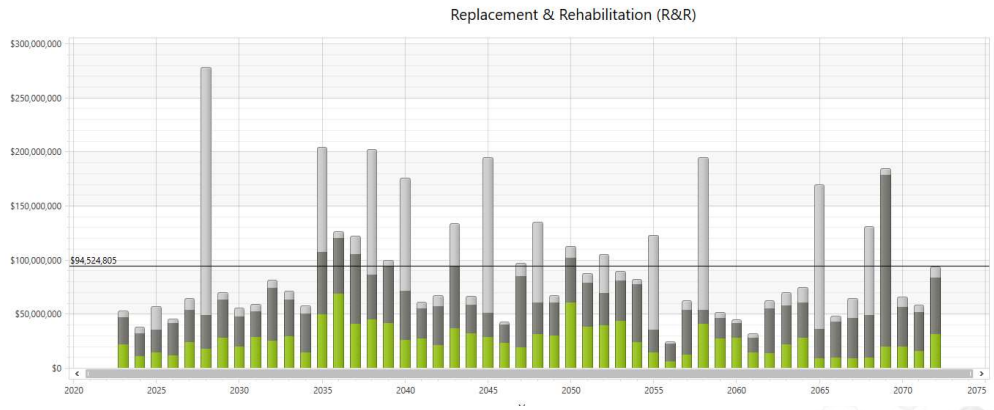
LTCP: REPLACEMENT PROJECTS

- Replacement Planning Model 50-Year Estimate = $4.7 billion (non-escalated)
- Average R&R = $94 million / Year



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LTCP: REGIONAL AND DEVELOPMENT PROJECTS

Component	Regional and Development Projects
Remaining LTCP on July 1, 2021	$602 M
Expenditures for FY 2021-22 and 2022-23	($50 M)
Mid-Cycle Regional and Development Board Approvals	$56 M
Regional and Development Project Additions	$9 M
Remaining LTCP: Regional and Development	**$617 M**

All costs and expenditures account for applicable offsets

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LONG-TERM CAPITAL PROGRAM SUMMARY

Component	Total
Replacement Projects	$4,700 M
Regional and Development Projects	$617 M
Total LTCP	**$5,317 M**

All costs and expenditures account for applicable offsets.

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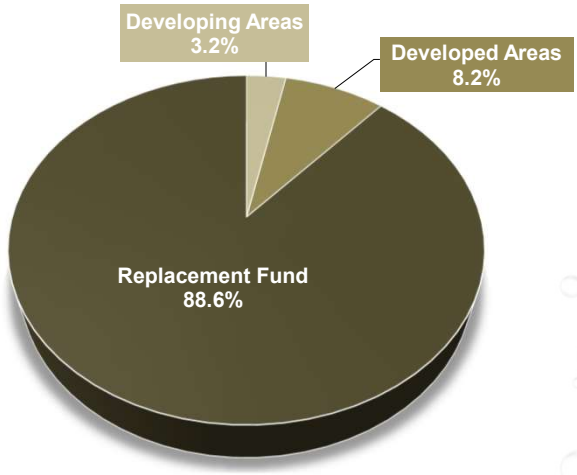
LONG-TERM CAPITAL PROGRAM FUNDING SOURCES

Long Term Capital Program = $5,317 Million



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RECOMMENDATION

That the Board adopt a Resolution approving IRWD's Capital Budget for Fiscal Year 2023-24 and 2024-25.

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Irvine Ranch Water District
Capital Budget for Fiscal Year 2023-24 and Fiscal Year 2024-25
Section 1 - Projected Expenditures by Project

System	Project Number	Project Title	Start	End	FY 2023-24 w/ G&A	FY 2024-25 w/ G&A	Total w/ G&A	Improvement Districts																	
								1100	1110	1120	1130	1250	1530	1540	1850	1880	2100	2120	2130	2220	2250	2400	2530	2560	2850	2880
Sewer Capital	12125	36 INCH SS RELOCATION AT SR133/SD CREEK	3/1/2022	7/31/2025	$730,450	$122,222	$1,223,000										100.0								
Potable Capital	12514	AMI IMPLEMENTATION - DW	1/1/2023	6/30/2025	$35,996	$36,005	$90,000		35.1	4.8	3.4	46.4	7.8	0.4	1.6	0.5									
Recycled Capital	12515	AMI IMPLEMENTATION - RW	1/1/2023	6/30/2025	$35,996	$36,005	$90,000											8.8	4.2	15.3	49.2	7.9	13.1		1.5
Potable Capital	11586	AUTOMATION CYBERSECURITY	7/1/2020	6/30/2024	$396,083	$0	$1,350,000		35.1	4.8	3.4	46.4	7.8	0.4	1.6	0.5									
Potable Capital	11593	BRIDGE 172 AT MODJESKA CANYON RD/MARKUSON RD DW IMPROVEMENTS	6/1/2023	7/31/2026	$15,923	$141,852	$564,900	100.0																	
Potable Capital	11588	BRIDGE 174 AT SILVERADO CANYON ROAD, COMMUNITY CENTER IMPROVEMENTS	5/1/2021	7/31/2024	$352,849	$4,562	$504,900	100.0																	
Potable Capital	11587	BRIDGE 175 AT SILVERADO CANYON RD, LADD CANYON DW IMPROVEMENTS	3/1/2020	9/30/2024	$443,835	$31,477	$674,900	100.0																	
Potable Capital	11589	BRIDGE 177 AT SILVERADO CANYON RD READ RESERVOIR DW IMPROVEMENTS	6/1/2023	7/31/2025	$154,965	$389,762	$564,900	100.0																	
Recycled Capital	07086	CALIFORNIA AVE RW PIPELINE-ACADEMY TO THEORY	6/1/2025	6/30/2027	$0	$7,508	$814,000										100.0								
Potable Capital	11782	CAPITAL PLANNING SUPPORT 23/24-24/25	7/1/2023	6/30/2025	$1,200,000	$1,200,000	$2,400,000		11.8	1.6	1.1	15.5	2.6	0.1	0.5	0.2		4.7	2.6	17.0	31.4	2.6	7.0	0.1	1.1	0.1
Potable Capital	12564	CIP AM CONDITION ASSESSMENT FY 23/24-24/25	7/1/2024	6/30/2025	$0	$500,000	$500,000	100.0																	
Sewer Capital	12563	CIP AM LAWRP CONDITION ASSESSMENT	12/1/2024	9/30/2025	$0	$350,000	$500,000										100.0								
Potable Capital	12537	CIP AM LINEAR DW	7/1/2024	6/30/2025	$0	$500,000	$500,000	100.0																	
Potable Capital	12534	CIP AM LINEAR PRIORITIZATION	7/1/2023	6/30/2024	$500,000	$0	$500,000		11.8	1.6	1.1	15.5	2.6	0.1	0.5	0.2		4.7	2.6	17.0	31.4	2.6	7.0	0.1	1.1	0.1
Recycled Capital	12538	CIP AM LINEAR RW	7/1/2024	6/30/2025	$0	$500,000	$500,000										100.0								
Sewer Capital	12539	CIP AM LINEAR SS	7/1/2024	6/30/2025	$0	$500,000	$500,000										100.0								
Potable Capital	11912	COASTAL ZONE 2 AND COASTAL ZONE 4 PUMP STATIONS REHABILITATION	3/15/2021	6/30/2025	$539,332	$624,813	$1,392,000	100.0																	
Recycled Capital	11568	COASTAL ZONE B AND COASTAL ZONE D PUMP STATIONS ELECTRICAL SYSTEM REPLACEMENT	6/1/2024	7/31/2026	$28,676	$344,110	$1,737,000										100.0								

System	Project Number	Project Title	Start	End	FY 2023-24 w/ G&A	FY 2024-25 w/ G&A	Total w/ G&A	Improvement Districts																				
								1100	1110	1120	1130	1250	1530	1540	1850	1880	2100	2120	2130	2220	2250	2400	2530	2560	2850	2880
Potable Capital	12543	CORE NETWORK UPGRADES	7/1/2024	12/30/2025	$0	$889,126	$1,000,000	33.4									66.6										
Potable Capital	06159	CP IMP-CANADA ROAD JOINT BONDING	6/1/2025	7/31/2027	$0	$7,308	$280,000	100.0																			
Potable Capital	06162	CP IMP-CRYSTAL COVE RECTIFIER-DW	6/1/2025	6/30/2027	$0	$4,646	$170,000	100.0																			
Recycled Capital	06163	CP IMP-CRYSTAL COVE RECTIFIER-RW	6/1/2025	7/31/2027	$0	$3,462	$155,000										100.0										
Recycled Capital	06164	CP IMP-CULVER CP5 RECT AND ANODE BED REPLACEMENT	6/1/2025	6/30/2027	$0	$7,394	$291,000										100.0										
Potable Capital	01414	CP IMP-SAND CANYON 16" DW ANODE REPLACEMENT	6/1/2025	6/30/2027	$0	$5,539	$278,100	100.0																			
Potable Capital	06169	CP IMP-ZN 8-9 PIPELINE ANODE BED LEAD WIRE REPLACEMENT	6/1/2025	6/30/2027	$0	$10,831	$385,000	100.0																			
Recycled Capital	12506	DAMS INSTRUMENTATION & DATA ACQUISITION UPGRADES	1/1/2024	1/30/2026	$265,664	$657,541	$1,386,000											8.8	4.2	15.3	49.2	7.9	13.1		1.5		
Potable Capital	11747	DELTA CONVEYANCE PROJECT PLANNING AND ENVIRONMENTAL REVIEW	12/1/2020	6/30/2025	$57,382	$57,382	$263,000		35.1	4.8	3.4	46.4	7.8	0.4	1.6	0.5											
Potable Capital	11570	DRWF WELLSITE REHAB GROUP 1	6/1/2023	6/30/2026	$945,892	$1,883,159	$4,000,000	100.0																			
Potable Capital	12620	DRWF WELLSITE REHAB GROUP 2	1/1/2025	6/30/2027	$0	$190,600	$1,588,000	100.0																			
Potable Capital	12575	EDUCATIONAL DISPLAYS AND SIGNAGE	7/1/2023	6/30/2025	$250,000	$250,000	$500,000	100.0																			
Sewer Capital	12294	EL TORO RD SMH RAISE TO GRADE	5/1/2022	8/31/2023	$24,280	$0	$280,000										100.0										
Potable Capital	11536	EMERGENCY GENERATOR FUEL STORAGE - DW	2/16/2017	6/30/2025	$1,420,917	$514,669	$2,567,800	80.0	7.0	1.0	0.7	9.3	1.5	0.1	0.3	0.1											
Sewer Capital	11537	EMERGENCY GENERATOR FUEL STORAGE - SS	2/16/2017	6/30/2025	$1,105,433	$403,431	$1,995,800										90.0	0.6	0.4	3.5	4.5		0.8		0.2		
Recycled Capital	12407	ENTERPRISE RW PIPE REPLACEMENT	11/1/2022	3/31/2024	$484,647	$0	$596,000										100.0										
Potable Capital	12544	ENTERPRISE SERVER UPGRADES	7/1/2024	12/30/2025	$0	$534,389	$650,000	33.4									66.6										
Potable Capital	10101	FLEMING DW RESERVOIR AND PUMP STATION IMPROVEMENTS	1/1/2018	12/30/2025	$4,163,680	$4,560,597	$16,740,000	10.5	89.5																		
Potable Capital	06176	FUTURE GROUNDWATER SUPPLY	6/15/2025	7/31/2034	$0	$18,600	$55,607,500		35.1	4.8	3.4	46.4	7.8	0.4	1.6	0.5											
Potable Capital	11774	GENERAL SYSTEM REPLACEMENTS AND MODIFICATIONS DW 23/24	7/1/2023	6/30/2024	$6,283,000	$0	$6,283,000	100.0																			
Potable Capital	11850	GENERAL SYSTEM REPLACEMENTS AND MODIFICATIONS DW 24/25	7/1/2024	6/30/2025	$0	$6,283,000	$6,283,000	100.0																			

System	Project Number	Project Title	Start	End	FY 2023-24 w/ G&A	FY 2024-25 w/ G&A	Total w/ G&A	Improvement Districts																				
								1100	1110	1120	1130	1250	1530	1540	1850	1880	2100	2120	2130	2220	2250	2400	2530	2560	2850	2880
Recycled Capital	11777	GENERAL SYSTEM REPLACEMENTS AND MODIFICATIONS RW 23/24	7/1/2023	6/30/2024	$2,103,000	$0	$2,103,000										100.0											
Recycled Capital	11851	GENERAL SYSTEM REPLACEMENTS AND MODIFICATIONS RW 24/25	7/1/2024	6/30/2025	$0	$2,103,000	$2,103,000										100.0											
Sewer Capital	11780	GENERAL SYSTEM REPLACEMENTS AND MODIFICATIONS SS 23/24	7/1/2023	6/30/2024	$1,785,000	$0	$1,785,000										100.0											
Sewer Capital	11852	GENERAL SYSTEM REPLACEMENTS AND MODIFICATIONS SS 24/25	7/1/2024	6/30/2025	$0	$1,785,000	$1,785,000										100.0											
Potable Capital	12586	GP_Dept 130_FY 23_24	7/1/2023	6/30/2024	$50,000	$0	$50,000	28.2	1.3	0.2	0.1	1.7	0.3		0.1		62.8	0.4	0.2	1.3	2.5	0.2	0.6		0.1			
Potable Capital	12590	GP_Dept 130_FY 24_25	7/1/2024	6/30/2025	$0	$40,000	$40,000	42.7	1.0	0.1	0.1	1.3	0.2				51.2	0.2	0.1	0.8	1.6	0.2	0.4		0.1			
Potable Capital	12587	GP_Dept 250_FY 23_24	7/1/2023	6/30/2024	$719,100	$0	$719,100	28.2	1.3	0.2	0.1	1.7	0.3		0.1		62.8	0.4	0.2	1.3	2.5	0.2	0.6		0.1			
Potable Capital	12591	GP_Dept 250_FY 24_25	7/1/2024	6/30/2025	$0	$642,800	$642,800	42.7	1.0	0.1	0.1	1.3	0.2				51.2	0.2	0.1	0.8	1.6	0.2	0.4		0.1			
Potable Capital	12606	GP_Dept 425_FY 23_24	7/1/2023	7/1/2023	$30,000	$0	$30,000	28.2	1.3	0.2	0.1	1.7	0.3		0.1		62.8	0.4	0.2	1.3	2.5	0.2	0.6		0.1			
Potable Capital	12607	GP_Dept 425_FY 24_25	7/1/2024	7/1/2024	$0	$31,048	$31,048	42.7	1.0	0.1	0.1	1.3	0.2				51.2	0.2	0.1	0.8	1.6	0.2	0.4		0.1			
Potable Capital	12588	GP_Dept 600_FY 23_24	7/1/2023	6/30/2024	$180,000	$0	$180,000	28.2	1.3	0.2	0.1	1.7	0.3		0.1		62.8	0.4	0.2	1.3	2.5	0.2	0.6		0.1			
Potable Capital	12592	GP_Dept 600_FY 24_25	7/1/2024	6/30/2025	$0	$180,000	$180,000	42.7	1.0	0.1	0.1	1.3	0.2				51.2	0.2	0.1	0.8	1.6	0.2	0.4		0.1			
Potable Capital	12589	GP_Dept 870_FY 23_24	7/1/2023	6/30/2024	$2,093,000	$0	$2,093,000	28.2	1.3	0.2	0.1	1.7	0.3		0.1		62.8	0.4	0.2	1.3	2.5	0.2	0.6		0.1			
Potable Capital	12593	GP_Dept 870_FY 24_25	7/1/2024	6/30/2025	$0	$1,513,150	$1,513,150	42.7	1.0	0.1	0.1	1.3	0.2				51.2	0.2	0.1	0.8	1.6	0.2	0.4		0.1			
Potable Capital	12513	HARDING CANYON DAM REHABILITATION	7/1/2023	6/30/2026	$201,026	$258,049	$951,500	100.0																				
Potable Capital	12550	HVAC SYSTEM REPLACEMENT AT SAND CANYON AND OPS DW	9/1/2023	6/30/2026	$113,529	$1,090,235	$2,294,000	100.0																				
Sewer Capital	12551	HVAC SYSTEM REPLACEMENT AT SAND CANYON AND OPS SS	9/1/2023	6/30/2026	$113,529	$1,090,235	$2,294,000										100.0											
Recycled Capital	12573	IDP PTP TREATMENT SYSTEM REPLACEMENT	1/1/2024	12/31/2026	$56,513	$113,026	$665,000										100.0											
Potable Capital	12529	IS GENERAL REPLACEMENTS 23/24-24/25	7/1/2023	6/30/2025	$50,000	$50,000	$100,000	33.4									66.6											
Potable Capital	12542	IS GENERAL UPGRADES 23/24-24/25	7/1/2023	6/30/2025	$100,000	$100,000	$200,000		29.3	4.0	2.8	38.7	6.5	0.3	1.3	0.5		6.3	4.3	41.1	52.5		9.3	0.5	2.1	0.5		
Potable Capital	10854	KERN FAN GROUNDWATER STORAGE	7/1/2018	6/30/2028	$4,659,500	$5,577,500	$115,410,500		35.1	4.8	3.4	46.4	7.8	0.4	1.6	0.5												
Recycled Capital	11582	LAKE FOREST NAKASE 24 ZB RW	1/1/2021	7/31/2025	$384,992	$39,579	$1,365,000											8.8	4.2	15.3	49.2	7.9	13.1		1.5			

System	Project Number	Project Title	Start	End	FY 2023-24 w/ G&A	FY 2024-25 w/ G&A	Total w/ G&A	Improvement Districts																				
								1100	1110	1120	1130	1250	1530	1540	1850	1880	2100	2120	2130	2220	2250	2400	2530	2560	2850	2880
Potable Capital	10096	LAKE FOREST NAKASE DW IMPROVEMENTS	1/1/2021	7/31/2025	$94,260	$128,705	$437,000					100.0																
Sewer Capital	11123	LAKE FOREST WOODS SEWER IMPROVEMENTS	7/1/2019	12/30/2025	$985,780	$3,175,375	$5,313,000										100.0											
Sewer Capital	11843	LAWRP SYSTEM REPLACEMENTS 23/24	7/1/2023	6/30/2024	$80,000	$0	$80,000										100.0											
Sewer Capital	11844	LAWRP SYSTEM REPLACEMENTS 24/25	7/1/2024	6/30/2025	$0	$80,000	$80,000										100.0											
Sewer Capital	01477	LAWRP TREATMENT PROCESS MODERNIZATION	6/1/2025	7/31/2034	$0	$3,077	$202,434,250										100.0											
Potable Capital	12580	LEAD AND COPPER RULE REVISION COMPLIANCE	2/1/2023	6/30/2026	$146,400	$146,400	$500,000		35.1	4.8	3.4	46.4	7.8	0.4	1.6	0.5												
Sewer Capital	11749	LF NAKASE 12 INCH SANITARY SEWER	7/1/2021	7/31/2025	$106,380	$119,818	$377,000														100.0							
Potable Capital	11888	MAXIMO SCHEDULER REPLACEMENT-DW	10/1/2021	12/30/2023	$16,597	$0	$75,000	100.0																				
Sewer Capital	11889	MAXIMO SCHEDULER REPLACEMENT-SS	10/1/2021	12/30/2023	$33,194	$0	$150,000										100.0											
Recycled Capital	12545	MPS2 PUMP BASE REPLACEMENT FOR PUMPS 1, 2, 3	1/2/2023	6/30/2024	$133,419	$0	$409,000										100.0											
Sewer Capital	12554	MWRP BIOSOLIDS CENTRATE TANK REPAIR	7/1/2023	6/30/2025	$81,000	$331,000	$412,000										100.0											
Sewer Capital	12556	MWRP BIOSOLIDS FOUL AIR SYSTEM REPAIR	7/1/2023	6/30/2025	$93,500	$593,500	$687,000										100.0											
Sewer Capital	12555	MWRP BIOSOLIDS HANDLING UPGRADES	7/1/2024	6/30/2026	$0	$157,500	$1,065,000										100.0											
Sewer Capital	12541	MWRP BIOSOLIDS LIFT STATION	2/1/2023	6/30/2026	$171,795	$171,795	$3,262,000											5.4	3.7	35.4	45.0		7.9	0.4	1.8	0.4		
Sewer Capital	12138	MWRP BIOSOLIDS MISC. IMPROVEMENTS	12/3/2021	7/30/2023	$73,912	$0	$1,520,000											5.4	3.7	35.4	45.0		7.9	0.4	1.8	0.4		
Sewer Capital	12552	MWRP DIGESTER REHABILITATION	7/1/2023	6/30/2028	$65,000	$940,000	$4,060,000										100.0											
Sewer Capital	11833	MWRP EXPANSION PHASE 3 (CAS) IMPROVEMENTS	6/1/2023	6/30/2029	$541,097	$552,297	$17,867,000											5.4	3.7	35.4	45.0		7.9	0.4	1.8	0.4		
Recycled Capital	01659	MWRP EXPANSION PHASE 3 (MBR)-RW	6/1/2023	6/30/2029	$656,097	$682,297	$21,258,000											8.8	4.2	15.3	49.2	7.9	13.1		1.5			
Sewer Capital	01797	MWRP EXPANSION PHASE 3 (MBR)-SS	6/1/2023	6/30/2029	$1,345,731	$1,404,731	$43,680,000											5.4	3.7	35.4	45.0		7.9	0.4	1.8	0.4		
Sewer Capital	12615	MWRP SERVICE A TRANSFORMER REPLACEMENT	7/1/2023	6/30/2026	$57,833	$68,918	$760,100										100.0											
Sewer Capital	12520	MWRP SOLIDS FORCE MAIN RELOCATION	2/1/2023	6/30/2024	$417,411	$0	$533,000										100.0											
Recycled Capital	07892	MWRP TERTIARY FILTER REHABILITATION	6/1/2018	8/31/2026	$1,768,264	$5,014,414	$9,875,600										100.0											

System	Project Number	Project Title	Start	End	FY 2023-24 w/ G&A	FY 2024-25 w/ G&A	Total w/ G&A	Improvement Districts																		
								1100	1110	1120	1130	1250	1530	1540	1850	1880	2100	2120	2130	2220	2250	2400	2530	2560	2850	2880
Sewer Capital	11832	MWRP TRIBUTARY GRAVITY DIVERSION TO LAWRP	6/1/2025	12/31/2027	$0	$2,632	$2,942,000											5.4	3.7	35.4	45.0		7.9	0.4	1.8	0.4
Recycled Capital	11792	NON-POTABLE WATER STUDIES 23/24-24/25	7/1/2023	6/30/2025	$37,500	$37,500	$75,000											8.8	4.2	15.3	49.2	7.9	13.1		1.5	
Potable Capital	05406	NTS-EL MODENA NTS MODIFICATIONS	6/1/2025	7/31/2027	$0	$6,066	$347,000	100.0																		
Sewer Capital	10502	OCSD CORF LONG TERM CAPITAL PROGRAM 2018 TO 2050	7/1/2017	6/30/2050	$7,817,000	$6,998,000	$210,379,000										72.7	0.9	0.9	9.0	13.3		2.6	0.1	0.4	0.1
Sewer Capital	10500	OCSD EQUITY LONG TERM CAPITAL PROGRAM 2018 TO 2050	7/1/2017	6/30/2050	$4,075,000	$5,177,000	$16,742,000											5.4	3.7	35.4	45.0		7.9	0.4	1.8	0.4
Potable Capital	10503	OCWD ANNEXATION LONG TERM CAPITAL PROGRAM 2018 TO 2050	7/1/2017	1/30/2050	$644,300	$654,000	$22,861,400		35.1	4.8	3.4	46.4	7.8	0.4	1.6	0.5										
Potable Capital	07881	OPERATIONS CENTER CNG, DIESEL, GASOLINE FUELING FACILITY-DW	7/1/2017	7/31/2025	$2,065,502	$556,918	$4,176,000	33.3	23.4	3.2	2.3	30.9	5.2	0.3	1.1	0.3										
Sewer Capital	07882	OPERATIONS CENTER CNG, DIESEL, GASOLINE FUELING FACILITY-SS	7/1/2017	7/31/2025	$4,131,003	$1,113,835	$7,974,000										33.3	4.8	2.6	16.9	31.4	2.7	7.0	0.1	1.1	0.1
Potable Capital	06160	OPERATIONS CENTER FACILITY REFRESH-DW	6/1/2025	6/30/2028	$0	$4,281	$370,000	100.0																		
Sewer Capital	06161	OPERATIONS CENTER FACILITY REFRESH-SS	6/1/2025	6/30/2028	$0	$8,562	$740,000										100.0									
Potable Capital	11854	OPERATIONS CENTER PURCHASING WAREHOUSE-DW	7/1/2021	12/31/2024	$513,111	$89,889	$797,000		35.1	4.8	3.4	46.4	7.8	0.4	1.6	0.5										
Sewer Capital	11855	OPERATIONS CENTER PURCHASING WAREHOUSE-SS	7/1/2021	12/31/2025	$163,030	$389,680	$797,000											5.4	3.7	35.4	45.0		7.9	0.4	1.8	0.4
Potable Capital	12557	OPERATIONS CENTER ROOF REPLACEMENT-DW, BUILDINGS 50, 60	6/1/2025	6/30/2027	$0	$4,397	$313,000	100.0																		
Sewer Capital	12559	OPERATIONS CENTER ROOF REPLACEMENT-SS, BUILDINGS 50, 60	6/1/2025	6/30/2027	$0	$4,397	$313,000										100.0									
Potable Capital	07376	ORA HTS N TRACT 17995 PH 1_12 DW	6/1/2023	7/31/2026	$25,191	$39,037	$176,000						100.0													
Potable Capital	07378	ORA HTS N TRACT 17995 PH 2_12 DW	6/1/2023	7/31/2026	$138,835	$228,658	$974,000						100.0													
Sewer Capital	07379	ORA HTS N TRACT 17995 PH 2_12 SS	6/1/2023	7/31/2026	$29,162	$48,225	$205,000																100.0			
Recycled Capital	07377	ORA HTS N TRACT 17995 PH1_1_6 RW	6/1/2023	7/31/2026	$23,234	$38,305	$162,800																100.0			
Recycled Capital	07380	ORA HTS N TRACT 17995PH2_ 6_8 RW	6/1/2023	7/31/2026	$69,733	$114,165	$487,000																100.0			
Sewer Capital	07484	ORA HTS S TRACT 16199 15 SS	6/1/2023	7/31/2026	$91,747	$156,567	$668,000																100.0			

System	Project Number	Project Title	Start	End	FY 2023-24 w/ G&A	FY 2024-25 w/ G&A	Total w/ G&A	Improvement Districts																	
								1100	1110	1120	1130	1250	1530	1540	1850	1880	2100	2120	2130	2220	2250	2400	2530	2560	2850	2880
Recycled Capital	07486	ORA HTS S TRACT 16199 RW	6/1/2023	7/31/2026	$114,275	$189,628	$808,000																100.0			
Potable Capital	07451	ORA HTS SANTIAGO CYN RD AND JAMBOREE 12 DW	6/1/2023	7/31/2026	$162,866	$317,761	$1,396,900						100.0													
Sewer Capital	07452	ORA HTS SANTIAGO CYN RD AND JAMBOREE 15 SS	6/1/2023	7/31/2026	$36,973	$113,239	$500,000																100.0			
Recycled Capital	07453	ORA HTS SANTIAGO CYN RD AND JAMBOREE RW	6/1/2023	7/31/2026	$319,422	$511,950	$2,228,300																100.0			
Potable Capital	07136	ORANGE HEIGHTS DOMESTIC WATER BPS	9/1/2023	12/31/2026	$139,261	$167,114	$3,165,900						100.0													
Potable Capital	07138	ORANGE HEIGHTS DOMESTIC WATER RESERVOIR	9/1/2023	12/31/2026	$392,159	$470,591	$10,263,800						100.0													
Recycled Capital	07139	ORANGE HEIGHTS RECYCLED WATER BPS	9/1/2023	12/31/2026	$139,261	$167,114	$3,165,900																100.0			
Recycled Capital	11500	PA1 JEFFREY RD EXT 6RW & 12RW	1/1/2020	7/31/2025	$28,905	$39,533	$163,000																100.0			
Recycled Capital	01722	PA1 NHB4 ORCHARD HILLS RW	7/1/2020	7/31/2026	$128,281	$364,944	$1,280,000																100.0			
Potable Capital	12511	PA12 INNOVATION PARK 12_DW (CODE 7963)	2/1/2023	3/31/2026	$35,909	$82,802	$245,000						100.0													
Potable Capital	12510	PA40 MARINE WAY INTERIM 12DW (CODE 7957)	2/1/2023	3/31/2026	$79,898	$180,416	$507,000			50.0			50.0													
Sewer Capital	05788	PA51 ALTON PKWY SS RELOCATION 12 AND 18	8/1/2014	7/31/2023	$15,632	$0	$1,232,300																100.0			
Potable Capital	05816	PA51 ALTON-TECHNOLOGY TO MUIRLANDS 12 DW	9/1/2014	7/31/2023	$2,219	$0	$177,100			20.9		79.1														
Sewer Capital	05817	PA51 ALTON-TECHNOLOGY TO MUIRLANDS SS RELOCATION	9/1/2014	7/31/2023	$21,064	$0	$1,326,300																100.0			
Potable Capital	05756	PA51 B ST FROM SOCIABLE TO IRVINE BLV 12 ZN 4	8/1/2014	7/31/2023	$3,026	$0	$243,100			98.2		1.8														
Recycled Capital	05757	PA51 B ST FROM SOCIABLE TO IRVINE BLV 16 ZN C	8/1/2014	7/31/2023	$3,005	$0	$240,900																99.6	0.4		
Recycled Capital	05758	PA51 CADENCE-PUSAN TO CHINON 12_16RW	8/1/2014	7/31/2023	$3,126	$0	$271,700																87.4	12.6		
Potable Capital	10796	PA51 D5 "P" ST & CHINON 12DW	1/1/2021	7/31/2025	$26,252	$34,321	$147,000			100.0																
Potable Capital	10343	PA51 D5 A ST 12 DW	4/1/2018	7/31/2023	$22,452	$0	$989,000			100.0																
Recycled Capital	10344	PA51 D5 A ST 12_10 RW	4/1/2018	7/31/2023	$38,616	$0	$1,059,000																100.0			
Recycled Capital	10864	PA51 D5 ASTOR 10RW	6/1/2019	7/31/2025	$54,169	$69,296	$342,000																100.0			
Potable Capital	10863	PA51 D5 ASTOR 12DW	6/1/2019	7/31/2023	$3,640	$0	$147,000			100.0																

System	Project Number	Project Title	Start	End	FY 2023-24 w/ G&A	FY 2024-25 w/ G&A	Total w/ G&A	Improvement Districts																		
								1100	1110	1120	1130	1250	1530	1540	1850	1880	2100	2120	2130	2220	2250	2400	2530	2560	2850	2880
Recycled Capital	10862	PA51 D5 BB ST 12 RW	6/1/2019	7/31/2025	$46,431	$59,397	$297,000											100.0								
Recycled Capital	10255	PA51 D5 CADENCE S 10RW	4/1/2018	7/31/2023	$2,406	$0	$138,000											100.0								
Potable Capital	10254	PA51 D5 CADENCE S 12DW	4/1/2018	7/31/2023	$2,367	$0	$138,000			100.0																
Sewer Capital	10117	PA51 D5 CADENCE S FROM O TO CHINON 12SS	4/1/2018	7/31/2023	$10,264	$0	$487,000											100.0								
Recycled Capital	10024	PA51 D5 CHINON 16 RW, 12 RW and 10 RW ZONE C	4/1/2018	7/31/2023	$11,028	$0	$457,000											100.0								
Sewer Capital	10023	PA51 D5 CHINON FROM SOUTH CADENCE TO CADENCE 12 SS	4/1/2018	7/31/2023	$12,451	$0	$502,000											100.0								
Potable Capital	10022	PA51 D5 CHINON FROM SOUTH CADENCE TO CADENCE, 12 DW ZONE 4R	4/1/2018	7/31/2023	$9,960	$0	$392,000			100.0																
Recycled Capital	12232	PA51 D5 D6 CHINON FROM HARRIER TO TREBLE 10RW IRWD CODE 7809	3/1/2022	7/31/2025	$101,579	$212,635	$365,000											100.0								
Potable Capital	12231	PA51 D5 D6 CHINON FROM HARRIER TO TREBLE 12DW IRWD CODE 7809	3/1/2022	7/31/2025	$65,371	$127,201	$234,000			100.0																
Recycled Capital	12230	PA51 D5 D6 HARRIER FROM CHINON TO LYNX 10RW IRWD CODE 7808	3/1/2022	7/31/2025	$112,082	$237,418	$403,000											100.0								
Sewer Capital	12229	PA51 D5 D6 HARRIER FROM CHINON TO LYNX 12_15SS IRWD CODE 7808	3/1/2022	7/31/2025	$156,306	$341,766	$563,000											100.0								
Recycled Capital	10865	PA51 D5 E ST 12RW	6/1/2019	7/31/2025	$25,795	$32,998	$181,000											100.0								
Recycled Capital	10878	PA51 D5 F ST N ST 12_10RW	6/1/2019	7/31/2025	$46,431	$59,397	$317,000											100.0								
Potable Capital	10875	PA51 D5 F ST N ST 12DW	6/1/2019	7/31/2023	$4,095	$0	$157,000			100.0																
Potable Capital	12228	PA51 D5 HARRIER FROM CHINON TO LYNX 12DW CODE 7808	3/1/2022	7/31/2025	$211,585	$472,201	$763,000			100.0																
Recycled Capital	10861	PA51 D5 MERIT 12_10_RW	6/1/2019	7/31/2025	$46,431	$59,397	$312,000											100.0								
Potable Capital	10860	PA51 D5 MERIT 12_DW	6/1/2019	7/31/2023	$1,820	$0	$72,000			100.0																
Potable Capital	12371	PA51 D5D6 MRWY EO SKYHWK 12_DW CODE 7902	6/1/2022	7/31/2025	$267,556	$642,498	$1,135,000			100.0																
Recycled Capital	12387	PA51 D5D6 MRWY EO SKYHWK 16_RW (CODE 7902)	8/1/2022	8/31/2025	$312,781	$1,016,700	$1,695,000											100.0								
Sewer Capital	12386	PA51 D5D6 MRWY EO SKYHWK 18_SS (CODE 7902)	8/1/2022	8/31/2025	$196,451	$532,155	$989,000											100.0								

System	Project Number	Project Title	Start	End	FY 2023-24 w/ G&A	FY 2024-25 w/ G&A	Total w/ G&A	Improvement Districts																		
								1100	1110	1120	1130	1250	1530	1540	1850	1880	2100	2120	2130	2220	2250	2400	2530	2560	2850	2880
Potable Capital	12432	PA51 D6 LYNX NO MRWY 12_DW CODE 7931	2/1/2023	3/31/2026	$35,909	$82,802	$245,000			100.0																
Sewer Capital	12433	PA51 D6 LYNX NO MRWY 15_SS CODE 7931	2/1/2023	3/31/2026	$35,909	$82,802	$245,000											100.0								
Potable Capital	11176	PA51 D6 MARINE AND ALTON 12DW	6/1/2022	7/31/2025	$160,523	$412,754	$688,000			100.0																
Recycled Capital	11177	PA51 D6 MARINE AND ALTON 16RW	6/1/2022	7/31/2025	$261,714	$591,851	$963,000											100.0								
Sewer Capital	10868	PA51 D6 P ST 18SS	6/1/2019	7/31/2023	$14,560	$0	$542,000											100.0								
Potable Capital	12404	PA51 D6 TRBLE_MRWY TO GP5 12_DW (CODE 7909)	8/1/2022	9/30/2025	$97,404	$302,153	$567,000			100.0																
Sewer Capital	12405	PA51 D6 TRBLE_MRWY TO GP5 18_SS (CODE 7909)	8/1/2022	9/30/2025	$226,534	$688,817	$1,296,000											100.0								
Recycled Capital	12406	PA51 D6 TRBLE_MRWY TO GP5 8_RW (CODE 7909)	8/1/2022	9/30/2025	$87,291	$238,776	$478,000											100.0								
Recycled Capital	06732	PA51 GP MAGNET (FROM RIDGE V. TO BOSQUE) 6 RW ZB	9/1/2015	7/31/2023	$2,795	$0	$206,800											87.4					12.6			
Recycled Capital	06595	PA51 GP TERRAPIN (TRABUCO TO CADENCE) 6 RW ZB	7/1/2015	7/31/2023	$2,365	$0	$180,400											87.4					12.6			
Potable Capital	12143	PA51 GP5 12DW CODE 7740	2/1/2017	7/31/2025	$91,935	$183,029	$468,000			100.0																
Recycled Capital	12145	PA51 GP5 8RW CODE 7740	2/1/2017	7/31/2025	$76,613	$152,525	$372,000											100.0								
Recycled Capital	05536	PA51 LQ ST FROM BOSQUE TO Z ST 12 RW	5/1/2014	7/31/2023	$4,841	$0	$416,900											99.6					0.4			
Sewer Capital	12146	PA51 MARINE AND ALTON CREEK 24SS CODE 7806	2/1/2017	7/31/2025	$919,355	$1,830,295	$3,435,000											5.4	3.7	35.4	45.0		7.9	0.4	1.8	0.4
Potable Capital	11939	PA51 MARINE AND BAKE 12DW	5/1/2021	7/31/2025	$218,205	$315,103	$663,000			100.0																
Sewer Capital	10574	PA51 MARINE WAY AT OCTA 18 SS	6/1/2019	7/31/2023	$33,952	$0	$970,000											100.0								
Potable Capital	06086	PA51 MARINE WAY FROM ALTON TO BARRANCA 12 DW ZN 3	1/1/2015	7/31/2023	$6,656	$0	$438,700			20.9		79.1														
Potable Capital	04153	PA51 MARINE WAY ZN3 DW	11/1/2012	7/31/2023	$5,179	$0	$420,200			20.9		79.1														
Sewer Capital	06476	PA51 MARINE WAY. RIDGE VALLEY TO 3000 FT EAST	6/1/2015	7/31/2023	$5,590	$0	$426,800																100.0			
Recycled Capital	06087	PA51 MARINE WAY-ALTON TO BARRANCA 16 RW ZN B	1/1/2015	7/31/2023	$7,160	$0	$481,600											87.4					12.6			
Sewer Capital	06048	PA51 MARINE WAY-ALTON TO BARRANCA 18 SS	1/1/2015	7/31/2023	$10,654	$0	$874,500											100.0								

System	Project Number	Project Title	Start	End	FY 2023-24 w/ G&A	FY 2024-25 w/ G&A	Total w/ G&A	Improvement Districts																	
								1100	1110	1120	1130	1250	1530	1540	1850	1880	2100	2120	2130	2220	2250	2400	2530	2560	2850	2880
Recycled Capital	10734	PA51 MARINE WY (BARRANCA TO OCTA) 16 RW	6/1/2019	7/31/2023	$15,925	$0	$512,000											100.0							
Recycled Capital	10804	PA51 P ST & CADENCE 12_10RW	6/1/2019	7/31/2023	$13,650	$0	$497,000											100.0							
Sewer Capital	10576	PA51 REACH B EAST 18 SS	6/1/2019	7/31/2023	$77,351	$0	$2,580,000											100.0							
Sewer Capital	10107	PA51 REACH B SOUTH 12" SEWER FROM BARRANCA TO 5-FWY	6/1/2025	12/31/2027	$0	$27,062	$2,555,000											100.0							
Potable Capital	12584	PALO VERDE IRRIGATION DISTRICT PROPERTY IMPROVEMENTS	7/1/2023	6/30/2025	$52,909	$35,091	$88,000		35.1	4.8	3.4	46.4	7.8	0.4	1.6	0.5									
Potable Capital	11800	POTABLE WATER STUDIES 23/24-24/25	7/1/2023	6/30/2025	$750,000	$750,000	$1,500,000		35.1	4.8	3.4	46.4	7.8	0.4	1.6	0.5									
Potable Capital	12565	R&R PS EAST IRVINE ZN 3-4	7/1/2023	6/30/2025	$950,000	$950,000	$1,900,000	100.0																	
Potable Capital	12566	R&R PS LAKE FOREST ZN 4-5 WEST	12/1/2023	11/30/2025	$641,667	$1,100,000	$2,200,000	100.0																	
Potable Capital	12567	R&R PS TURTLE ROCK ZN 3-4	7/1/2024	6/30/2026	$0	$400,000	$800,000	100.0																	
Potable Capital	12570	R&R TANK BENNER	12/1/2024	11/30/2026	$0	$145,833	$500,000	100.0																	
Potable Capital	12569	R&R TANK CHAPMAN	7/1/2024	6/30/2026	$0	$250,000	$500,000	100.0																	
Potable Capital	12568	R&R TANK SHAW	7/1/2023	6/30/2025	$250,000	$250,000	$500,000	100.0																	
Potable Capital	11154	RADIO TOWER IMPROVEMENTS-DW	7/1/2021	9/30/2024	$151,775	$18,780	$231,000		35.1	4.8	3.4	46.4	7.8	0.4	1.6	0.5									
Recycled Capital	11157	RADIO TOWER IMPROVEMENTS-RW	7/1/2021	9/30/2024	$155,525	$20,030	$236,000											8.8	4.2	15.3	49.2	7.9	13.1	1.5	
Sewer Capital	11156	RADIO TOWER IMPROVEMENTS-SS	7/1/2021	9/30/2024	$155,525	$20,030	$236,000											5.4	3.7	35.4	45.0		7.9	0.4	1.8	0.4
Recycled Capital	12101	RATTLESNAKE DAM REHABILITATION	7/1/2023	7/30/2025	$1,601,655	$1,601,655	$3,213,000										100.0								
Sewer Capital	12215	RIPARIAN VIEW PAVEMENT REHABILITATION	3/1/2022	7/31/2025	$11,000	$0	$735,000										100.0								
Recycled Capital	11797	RW CONVERSION IMPROVEMENTS FOR OFF-SITE 23/24	7/1/2023	6/30/2024	$200,000	$0	$200,000										100.0								
Recycled Capital	11798	RW CONVERSION IMPROVEMENTS FOR OFF-SITE 24/25	7/1/2024	6/30/2025	$0	$200,000	$200,000										100.0								
Recycled Capital	10580	RW PIPELINE REPLACEMENT-SILKWOOD, WILLOWLEAF	6/1/2024	6/30/2026	$1,720	$140,640	$423,000										100.0								
Recycled Capital	10379	SAN JOAQUIN RESERVOIR FILTRATION FACILITY	2/1/2019	7/31/2025	$14,188,817	$5,180,772	$23,455,000											8.8	4.2	15.3	49.2	7.9	13.1	1.5	
Recycled Capital	12505	SAND CANYON DAM SPILLWAY REHABILITATION	1/1/2025	6/30/2026	$0	$218,667	$656,000										100.0								

System	Project Number	Project Title	Start	End	FY 2023-24 w/ G&A	FY 2024-25 w/ G&A	Total w/ G&A	Improvement Districts																				
								1100	1110	1120	1130	1250	1530	1540	1850	1880	2100	2120	2130	2220	2250	2400	2530	2560	2850	2880
Potable Capital	01398	SANTIAGO CANYON AREA PUMP STATION IMPROVEMENTS	6/1/2018	9/30/2024	$2,401,721	$91,339	$10,185,300		100.0																			
Potable Capital	01813	SANTIAGO DAM OUTLET AND SPILLWAY	7/1/2013	12/31/2029	$1,996,896	$8,666,962	$139,307,000	94.8	1.8	0.2	0.2	2.3	0.4	0.1	0.1	0.1												
Recycled Capital	12423	SERRANO CREEK RAW WATER PIPELINE REPLACEMENT	8/1/2022	6/30/2024	$854,027	$0	$1,116,500										100.0											
Sewer Capital	11841	SEWER SIPHON REHABILITATION PHASE 2	2/1/2023	6/30/2027	$705,466	$3,970,168	$9,725,000										100.0											
Recycled Capital	11834	SGU PFAS TREATMENT	1/1/2022	6/30/2024	$2,386,068	$0	$5,137,950											8.8	4.2	15.3	49.2	7.9	13.1		1.5			
Potable Capital	11746	SITES RESERVOIR PLANNING AND ENVIRONMENTAL REVIEW	12/1/2020	6/30/2025	$269,782	$269,782	$1,236,500		35.1	4.8	3.4	46.4	7.8	0.4	1.6	0.5												
Sewer Capital	12596	SOCWA ALISO CREEK OCEAN OUTFALL BALLAST REPAIR	1/1/2024	6/30/2026	$12,121	$145,455	$300,000										100.0											
Sewer Capital	11189	SOCWA ETM AVAC VALVE REPLACEMENT REACHES D AND E (PC 21)	7/1/2019	12/31/2029	$11,111	$41,558	$500,000										100.0											
Sewer Capital	03750	SOCWA ETM PROTECTION-TRAIL BRIDGE CROSSING (PC 21)	7/1/2018	12/31/2028	$37,059	$37,059	$1,215,000										100.0											
Potable Capital	11815	SR 55 WIDENING DW RELOCATION	7/1/2021	12/31/2024	$37,390	$25,610	$132,000	100.0																				
Recycled Capital	03808	SYPHON RESERVOIR IMPROVEMENTS	6/1/2015	11/30/2028	$4,290,833	$7,247,729	$146,000,000											8.8	4.2	15.3	49.2	7.9	13.1		1.5			
Potable Capital	11840	TURTLE ROCK ZONE 3 RESERVOIR CHLORAMINE BOOSTER STATION	12/1/2020	6/30/2024	$2,248,860	$0	$4,013,000		35.1	4.8	3.4	46.4	7.8	0.4	1.6	0.5												
Recycled Capital	07535	TUSTIN LEGACY FLIGHT DR 6 RW	8/1/2016	7/31/2023	$3,494	$0	$270,000												100.0									
Recycled Capital	11171	WELL ET-1 PFAS TREATMENT	1/1/2020	6/30/2024	$2,270,877	$0	$5,167,450											8.8	4.2	15.3	49.2	7.9	13.1		1.5			
Potable Capital	11720	WELL OPA 1 PFAS TREATMENT	10/1/2020	9/30/2023	$9,036	$0	$363,000		35.1	4.8	3.4	46.4	7.8	0.4	1.6	0.5												
Potable Capital	12594	WELL REHAB - OPA1	3/2/2023	12/31/2023	$350,872	$0	$577,500		35.1	4.8	3.4	46.4	7.8	0.4	1.6	0.5												
Potable Capital	07087	WELL REHAB-DRWF 10	2/1/2018	11/30/2023	$66,693	$0	$1,410,000	100.0																				
Potable Capital	11845	WELL REHAB-DRWF 12	4/21/2022	8/31/2023	$46,221	$0	$1,370,000	100.0																				
Potable Capital	11847	WELL REHAB-IDP 110	7/1/2023	5/31/2026	$91,359	$577,997	$1,006,500	100.0																				
Potable Capital	11137	WELL REHAB-IDP 76	7/1/2023	8/31/2024	$378,424	$31,076	$409,500	100.0																				
Potable Capital	11856	WELL REHAB-TUSTIN DESALTER 21	6/1/2025	11/30/2026	$0	$25,361	$1,006,500	100.0																				

System	Project Number	Project Title	Start	End	FY 2023-24 w/ G&A	FY 2024-25 w/ G&A	Total w/ G&A	Improvement Districts																		
								1100	1110	1120	1130	1250	1530	1540	1850	1880	2100	2120	2130	2220	2250	2400	2530	2560	2850	2880
Potable Capital	12263	WELL REHAB-TUSTIN DESALTER 22	6/1/2025	11/30/2026	$0	$25,361	$1,006,500	100.0																		
Recycled Capital	12264	WELL REHAB-WELL 106	7/1/2023	8/31/2026	$117,308	$272,106	$1,041,500										100.0									
Potable Capital	11846	WELL REHAB-WELL 115R	7/1/2023	5/31/2026	$157,609	$368,391	$902,000	100.0																		
Recycled Capital	12262	WELL REHAB-WELL ET1	12/1/2022	7/31/2023	$35,125	$0	$748,000										100.0									
Recycled Capital	11858	WELL REHAB-WELL ET2	7/1/2023	12/31/2025	$82,000	$26,000	$1,076,300										100.0									
Potable Capital	11828	WELLS 51/52 EQUIPPING	6/1/2023	6/30/2026	$322,686	$410,499	$4,437,000		35.1	4.8	3.4	46.4	7.8	0.4	1.6	0.5										
Potable Capital	11829	WELLS 51/52 PIPELINES TO DRWF	6/1/2023	6/30/2026	$568,526	$690,802	$10,874,000		35.1	4.8	3.4	46.4	7.8	0.4	1.6	0.5										
Potable Capital	12289	WIFI NETWORK UPGRADES - DW	1/1/2023	12/31/2023	$111,000	$0	$190,000	100.0																		
Sewer Capital	12290	WIFI NETWORK UPGRADES - SS	1/1/2023	12/31/2023	$111,000	$0	$190,000										100.0									
Recycled Capital	11571	WOODBRIDGE RECYCLED WATER PIPELINE REPLACEMENT	2/1/2021	9/29/2023	$322,121	$0	$15,218,000										100.0									
Recycled Capital	05476	ZONE A TO RATTLESNAKE RESERVOIR PUMP STATION	6/1/2017	7/31/2025	$1,062,666	$0	$22,008,000										100.0									

$105,060,827 $111,040,742 $1,324,305,148

Irvine Ranch Water District
Capital Budget for Fiscal Year 2023-24 and Fiscal Year 2024-25
Section 2 - Flagged Projects

Project Number	Project Title	Flagged	Status
06176	FUTURE GROUNDWATER SUPPLY	Yes	Board Approved
11828	WELLS 51/52 EQUIPPING	Yes	Board Approved
11829	WELLS 51/52 PIPELINES TO DRWF	Yes	Board Approved
01659	MWRP EXPANSION PHASE 3 (MBR)-RW	Yes	Board Approved
01477	LAWRP TREATMENT PROCESS MODERNIZATION	Yes	Active
01797	MWRP EXPANSION PHASE 3 (MBR)-SS	Yes	Board Approved
11832	MWRP TRIBUTARY GRAVITY DIVERSION TO LAWRP	Yes	Board Approved

Irvine Ranch Water District
Capital Budget for Fiscal Year 2023-24 and 2024-25
Section 3 - Summary of Projected Expenditures by Category

Expenditure Category	FY 2023-24 Direct	FY 2024-25 Direct	Total Direct
Development - Lake Forest	$585,631	$288,102	$2,179,000
Development - Orange Heights	$1,682,120	$2,562,353	$24,201,600
Development - Other	$73,300	$115,919	$1,191,000
Development - PA1	$157,186	$404,477	$1,443,000
Development - PA40	$79,898	$180,416	$507,000
Development - PA51	$4,248,463	$8,805,347	$36,294,300
Development - Tustin Legacy	$3,494	$0	$270,000
General Plant	$3,072,100	$2,406,998	$5,479,098
Nonpotable Storage	$4,290,833	$7,247,729	$146,000,000
OC San - CORF	$11,892,000	$12,175,000	$227,121,000
OCWD Annexation	$644,300	$654,000	$22,861,400
Operational Improvements	$34,740,415	$13,817,936	$88,906,400
Planning	$1,883,900	$2,233,900	$4,475,000
Replacement - Facilities	$21,531,460	$38,724,079	$264,923,800
Replacement - FY System	$10,301,000	$10,301,000	$20,602,000
Replacement-Business Software	$49,791	$0	$225,000
Sewage Treatment	$2,714,720	$2,816,829	$291,443,250
Solids Handling	$73,912	$0	$1,520,000
Water Banking	$4,982,191	$5,882,373	$116,735,000
Water Resources	$1,079,375	$1,097,992	$57,950,500
Well Rehabilitation	$974,739	$1,326,292	$9,976,800
	$105,060,827	**$111,040,742**	**$1,324,305,148**

Irvine Ranch Water District
Capital Budget for Fiscal Year 2023-24 and Fiscal Year 2023-24
Section 4 - FY 2023-24 Details of Projected Expenditures by Category

	FY Exp Category	FY 23-24 w/ G&A	Total w/ G&A	FY Replacement	FY Developed	FY Developing
Development - Lake Forest						
10096	LAKE FOREST NAKASE DW IMPROVEMENTS	$94,260	$437,000	$0	$94,260	$0
11582	LAKE FOREST NAKASE 24 ZB RW	$384,992	$1,365,000	$0	$278,734	$106,258
11749	LF NAKASE 12 INCH SANITARY SEWER	$106,380	$377,000	$0	$106,380	$0
		$585,631	**$2,179,000**	**$0**	**$479,374**	**$106,258**
Development - Orange Heights						
07136	ORANGE HEIGHTS DOMESTIC WATER BPS	$139,261	$3,165,900	$0	$0	$139,261
07138	ORANGE HEIGHTS DOMESTIC WATER RESERVOIR	$392,159	$10,263,800	$0	$0	$392,159
07139	ORANGE HEIGHTS RECYCLED WATER BPS	$139,261	$3,165,900	$0	$0	$139,261
07376	ORA HTS N TRACT 17995 PH 1_12 DW	$25,191	$176,000	$0	$0	$25,191
07377	ORA HTS N TRACT 17995 PH1_1_6 RW	$23,234	$162,800	$0	$0	$23,234
07378	ORA HTS N TRACT 17995 PH 2_12 DW	$138,835	$974,000	$0	$0	$138,835
07379	ORA HTS N TRACT 17995 PH 2_12 SS	$29,162	$205,000	$0	$0	$29,162
07380	ORA HTS N TRACT 17995PH2_ 6_8 RW	$69,733	$487,000	$0	$0	$69,733
07451	ORA HTS SANTIAGO CYN RD AND JAMBOREE 12 DW	$162,866	$1,396,900	$0	$0	$162,866
07452	ORA HTS SANTIAGO CYN RD AND JAMBOREE 15 SS	$36,973	$500,000	$0	$0	$36,973
07453	ORA HTS SANTIAGO CYN RD AND JAMBOREE RW	$319,422	$2,228,300	$0	$0	$319,422
07484	ORA HTS S TRACT 16199 15 SS	$91,747	$668,000	$0	$0	$91,747
07486	ORA HTS S TRACT 16199 RW	$114,275	$808,000	$0	$0	$114,275
		$1,682,120	**$24,201,600**	**$0**	**$0**	**$1,682,120**
Development - Other						
11815	SR 55 WIDENING DW RELOCATION	$37,390	$132,000	$37,390	$0	$0
12511	PA12 INNOVATION PARK 12_DW (CODE 7963)	$35,909	$245,000	$0	$0	$35,909

FY Exp Category		FY 23-24 w/ G&A	Total w/ G&A	FY Replacement	FY Developed	FY Developing
		$73,300	**$377,000**	**$37,390**	**$0**	**$35,909**
Development - PA1						
01722	PA1 NHB4 ORCHARD HILLS RW	$128,281	$1,280,000	$0	$0	$128,281
11500	PA1 JEFFREY RD EXT 6RW & 12RW	$28,905	$163,000	$0	$0	$28,905
		$157,186	**$1,443,000**	**$0**	**$0**	**$157,186**
Development - PA40						
12510	PA40 MARINE WAY INTERIM 12DW (CODE 7957)	$79,898	$507,000	$0	$0	$79,898
		$79,898	**$507,000**	**$0**	**$0**	**$79,898**
Development - PA51						
04153	PA51 MARINE WAY ZN3 DW	$5,179	$420,200	$0	$0	$5,179
05536	PA51 LQ ST FROM BOSQUE TO Z ST 12 RW	$4,841	$416,900	$0	$0	$4,841
05756	PA51 B ST FROM SOCIABLE TO IRVINE BLV 12 ZN 4	$3,026	$243,100	$0	$0	$3,026
05757	PA51 B ST FROM SOCIABLE TO IRVINE BLV 16 ZN C	$3,005	$240,900	$0	$0	$3,005
05758	PA51 CADENCE-PUSAN TO CHINON 12_16RW	$3,126	$271,700	$0	$0	$3,126
05788	PA51 ALTON PKWY SS RELOCATION 12 AND 18	$15,632	$1,232,300	$0	$0	$15,632
05816	PA51 ALTON-TECHNOLOGY TO MUIRLANDS 12 DW	$2,219	$177,100	$0	$0	$2,219
05817	PA51 ALTON-TECHNOLOGY TO MUIRLANDS SS RELOCATION	$21,064	$1,326,300	$0	$0	$21,064
06048	PA51 MARINE WAY-ALTON TO BARRANCA 18 SS	$10,654	$874,500	$0	$0	$10,654
06086	PA51 MARINE WAY FROM ALTON TO BARRANCA 12 DW ZN 3	$6,656	$438,700	$0	$0	$6,656
06087	PA51 MARINE WAY-ALTON TO BARRANCA 16 RW ZN B	$7,160	$481,600	$0	$0	$7,160
06476	PA51 MARINE WAY. RIDGE VALLEY TO 3000 FT EAST	$5,590	$426,800	$0	$0	$5,590
06595	PA51 GP TERRAPIN (TRABUCO TO CADENCE) 6 RW ZB	$2,365	$180,400	$0	$0	$2,365
06732	PA51 GP MAGNET (FROM RIDGE V. TO BOSQUE) 6 RW ZB	$2,795	$206,800	$0	$0	$2,795
10022	PA51 D5 CHINON FROM SOUTH CADENCE TO CADENCE, 12 D	$9,960	$392,000	$0	$0	$9,960
10023	PA51 D5 CHINON FROM SOUTH CADENCE TO CADENCE 12 SS	$12,451	$502,000	$0	$0	$12,451
10024	PA51 D5 CHINON 16 RW, 12 RW and 10 RW ZONE C	$11,028	$457,000	$0	$0	$11,028

FY Exp Category		FY 23-24 w/ G&A	Total w/ G&A	FY Replacement	FY Developed	FY Developing
10117	PA51 D5 CADENCE S FROM O TO CHINON 12SS	$10,264	$487,000	$0	$0	$10,264
10254	PA51 D5 CADENCE S 12DW	$2,367	$138,000	$0	$0	$2,367
10255	PA51 D5 CADENCE S 10RW	$2,406	$138,000	$0	$0	$2,406
10343	PA51 D5 A ST 12 DW	$22,452	$989,000	$0	$0	$22,452
10344	PA51 D5 A ST 12_10 RW	$38,616	$1,059,000	$0	$0	$38,616
10574	PA51 MARINE WAY AT OCTA 18 SS	$33,952	$970,000	$0	$0	$33,952
10576	PA51 REACH B EAST 18 SS	$77,351	$2,580,000	$0	$0	$77,351
10734	PA51 MARINE WY (BARRANCA TO OCTA) 16 RW	$15,925	$512,000	$0	$0	$15,925
10796	PA51 D5 "P" ST & CHINON 12DW	$26,252	$147,000	$0	$0	$26,252
10804	PA51 P ST & CADENCE 12_10RW	$13,650	$497,000	$0	$0	$13,650
10860	PA51 D5 MERIT 12_DW	$1,820	$72,000	$0	$0	$1,820
10861	PA51 D5 MERIT 12_10_RW	$46,431	$312,000	$0	$0	$46,431
10862	PA51 D5 BB ST 12 RW	$46,431	$297,000	$0	$0	$46,431
10863	PA51 D5 ASTOR 12DW	$3,640	$147,000	$0	$0	$3,640
10864	PA51 D5 ASTOR 10RW	$54,169	$342,000	$0	$0	$54,169
10865	PA51 D5 E ST 12RW	$25,795	$181,000	$0	$0	$25,795
10868	PA51 D6 P ST 18SS	$14,560	$542,000	$0	$0	$14,560
10875	PA51 D5 F ST N ST 12DW	$4,095	$157,000	$0	$0	$4,095
10878	PA51 D5 F ST N ST 12_10RW	$46,431	$317,000	$0	$0	$46,431
11176	PA51 D6 MARINE AND ALTON 12DW	$160,523	$688,000	$0	$0	$160,523
11177	PA51 D6 MARINE AND ALTON 16RW	$261,714	$963,000	$0	$0	$261,714
11939	PA51 MARINE AND BAKE 12DW	$218,205	$663,000	$0	$0	$218,205
12143	PA51 GP5 12DW CODE 7740	$91,935	$468,000	$0	$0	$91,935
12145	PA51 GP5 8RW CODE 7740	$76,613	$372,000	$0	$0	$76,613
12146	PA51 MARINE AND ALTON CREEK 24SS CODE 7806	$919,355	$3,435,000	$0	$739,161	$180,194
12228	PA51 D5 HARRIER FROM CHINON TO LYNX 12DW CODE 7808	$211,585	$763,000	$0	$0	$211,585
12229	PA51 D5 D6 HARRIER FROM CHINON TO LYNX 12_15SS IRWD	$156,306	$563,000	$0	$0	$156,306

FY Exp Category		FY 23-24 w/ G&A	Total w/ G&A	FY Replacement	FY Developed	FY Developing
12230	PA51 D5 D6 HARRIER FROM CHINON TO LYNX 10RW IRWD CO	$112,082	$403,000	$0	$0	$112,082
12231	PA51 D5 D6 CHINON FROM HARRIER TO TREBLE 12DW IRWD	$65,371	$234,000	$0	$0	$65,371
12232	PA51 D5 D6 CHINON FROM HARRIER TO TREBLE 10RW IRWD C	$101,579	$365,000	$0	$0	$101,579
12371	PA51 D5D6 MRWY EO SKYHWK 12_DW CODE 7902	$267,556	$1,135,000	$0	$0	$267,556
12386	PA51 D5D6 MRWY EO SKYHWK 18_SS (CODE 7902)	$196,451	$989,000	$0	$0	$196,451
12387	PA51 D5D6 MRWY EO SKYHWK 16_RW (CODE 7902)	$312,781	$1,695,000	$0	$0	$312,781
12404	PA51 D6 TRBLE_MRWY TO GP5 12_DW (CODE 7909)	$97,404	$567,000	$0	$0	$97,404
12405	PA51 D6 TRBLE_MRWY TO GP5 18_SS (CODE 7909)	$226,534	$1,296,000	$0	$0	$226,534
12406	PA51 D6 TRBLE_MRWY TO GP5 8_RW (CODE 7909)	$87,291	$478,000	$0	$0	$87,291
12432	PA51 D6 LYNX NO MRWY 12_DW CODE 7931	$35,909	$245,000	$0	$0	$35,909
12433	PA51 D6 LYNX NO MRWY 15_SS CODE 7931	$35,909	$245,000	$0	$0	$35,909
		$4,248,463	**$33,739,300**	**$0**	**$739,161**	**$3,509,301**
Development - Tustin Legacy						
07535	TUSTIN LEGACY FLIGHT DR 6 RW	$3,494	$270,000	$0	$0	$3,494
		$3,494	**$270,000**	**$0**	**$0**	**$3,494**
General Plant						
12586	GP_Dept 130_FY 23_24	$50,000	$50,000	$45,500	$3,500	$1,000
12587	GP_Dept 250_FY 23_24	$719,100	$719,100	$654,381	$50,337	$14,382
12588	GP_Dept 600_FY 23_24	$180,000	$180,000	$163,800	$12,600	$3,600
12589	GP_Dept 870_FY 23_24	$2,093,000	$2,093,000	$1,904,630	$146,510	$41,860
12606	GP_Dept 425_FY 23_24	$30,000	$30,000	$27,300	$2,100	$600
		$3,072,100	**$3,072,100**	**$2,795,611**	**$215,047**	**$61,442**
Nonpotable Storage						
03808	SYPHON RESERVOIR IMPROVEMENTS	$4,290,833	$146,000,000	$0	$3,106,563	$1,184,270
		$4,290,833	**$146,000,000**	**$0**	**$3,106,563**	**$1,184,270**
OC San - CORF						

FY Exp Category		FY 23-24 w/ G&A	Total w/ G&A	FY Replacement	FY Developed	FY Developing
10500	OCSD EQUITY LONG TERM CAPITAL PROGRAM 2018 TO 2050	$4,075,000	$16,742,000	$0	$3,276,300	$798,700
10502	OCSD CORF LONG TERM CAPITAL PROGRAM 2018 TO 2050	$7,817,000	$210,379,000	$5,682,959	$1,743,191	$390,850
		$11,892,000	**$227,121,000**	**$5,682,959**	**$5,019,491**	**$1,189,550**
OCWD Annexation						
10503	OCWD ANNEXATION LONG TERM CAPITAL PROGRAM 2018 TO	$644,300	$22,861,400	$0	$525,105	$119,196
		$644,300	**$22,861,400**	**$0**	**$525,105**	**$119,196**
Operational Improvements						
07881	OPERATIONS CENTER CNG, DIESEL, GASOLINE FUELING FACILIT	$2,065,502	$4,176,000	$687,812	$1,121,567	$256,122
07882	OPERATIONS CENTER CNG, DIESEL, GASOLINE FUELING FACILIT	$4,131,003	$7,974,000	$1,375,624	$2,106,812	$648,568
10101	FLEMING DW RESERVOIR AND PUMP STATION IMPROVEMENT	$4,163,680	$16,740,000	$437,186	$3,726,493	$0
10379	SAN JOAQUIN RESERVOIR FILTRATION FACILITY	$14,188,817	$23,455,000	$0	$10,272,704	$3,916,114
11154	RADIO TOWER IMPROVEMENTS-DW	$151,775	$231,000	$0	$123,697	$28,078
11156	RADIO TOWER IMPROVEMENTS-SS	$155,525	$236,000	$0	$125,042	$30,483
11157	RADIO TOWER IMPROVEMENTS-RW	$155,525	$236,000	$0	$112,600	$42,925
11171	WELL ET-1 PFAS TREATMENT	$2,270,877	$5,167,450	$0	$1,644,115	$626,762
11586	AUTOMATION CYBERSECURITY	$396,083	$1,350,000	$0	$322,808	$73,275
11720	WELL OPA 1 PFAS TREATMENT	$9,036	$363,000	$0	$7,364	$1,672
11828	WELLS 51/52 EQUIPPING	$322,686	$4,437,000	$0	$262,989	$59,697
11829	WELLS 51/52 PIPELINES TO DRWF	$568,526	$10,874,000	$0	$463,348	$105,177
11834	SGU PFAS TREATMENT	$2,386,068	$5,137,950	$0	$1,727,513	$658,555
11840	TURTLE ROCK ZONE 3 RESERVOIR CHLORAMINE BOOSTER STA	$2,248,860	$4,013,000	$0	$1,832,821	$416,039
11854	OPERATIONS CENTER PURCHASING WAREHOUSE-DW	$513,111	$797,000	$0	$418,186	$94,926
11855	OPERATIONS CENTER PURCHASING WAREHOUSE-SS	$163,030	$797,000	$0	$131,076	$31,954
12407	ENTERPRISE RW PIPE REPLACEMENT	$484,647	$596,000	$484,647	$0	$0
12506	DAMS INSTRUMENTATION & DATA ACQUISITION UPGRADES	$265,664	$1,386,000	$0	$192,341	$73,323
12542	IS GENERAL UPGRADES 23/24-24/25	$100,000	$200,000	$0	$80,800	$19,200

	FY Exp Category	FY 23-24 w/ G&A	Total w/ G&A	FY Replacement	FY Developed	FY Developing
		$34,740,415	**$88,166,400**	**$2,985,270**	**$24,672,276**	**$7,082,869**
	Planning					
11782	CAPITAL PLANNING SUPPORT 23/24-24/25	$1,200,000	$2,400,000	$0	$939,600	$260,400
11792	NON-POTABLE WATER STUDIES 23/24-24/25	$37,500	$75,000	$0	$27,150	$10,350
12534	CIP AM LINEAR PRIORITIZATION	$500,000	$500,000	$0	$391,500	$108,500
12580	LEAD AND COPPER RULE REVISION COMPLIANCE	$146,400	$500,000	$0	$119,316	$27,084
		$1,883,900	**$3,475,000**	**$0**	**$1,477,566**	**$406,334**
	Replacement - Facilities					
01398	SANTIAGO CANYON AREA PUMP STATION IMPROVEMENTS	$2,401,721	$10,185,300	$0	$2,401,721	$0
01813	SANTIAGO DAM OUTLET AND SPILLWAY	$1,996,896	$139,307,000	$1,893,058	$81,873	$21,966
03750	SOCWA ETM PROTECTION-TRAIL BRIDGE CROSSING (PC 21)	$37,059	$1,215,000	$37,059	$0	$0
05476	ZONE A TO RATTLESNAKE RESERVOIR PUMP STATION	$1,062,666	$22,008,000	$1,062,666	$0	$0
07892	MWRP TERTIARY FILTER REHABILITATION	$1,768,264	$9,875,600	$1,768,264	$0	$0
10580	RW PIPELINE REPLACEMENT-SILKWOOD, WILLOWLEAF	$1,720	$423,000	$1,720	$0	$0
11123	LAKE FOREST WOODS SEWER IMPROVEMENTS	$985,780	$5,313,000	$985,780	$0	$0
11189	SOCWA ETM AVAC VALVE REPLACEMENT REACHES D AND E (P	$11,111	$500,000	$11,111	$0	$0
11536	EMERGENCY GENERATOR FUEL STORAGE - DW	$1,420,917	$2,567,800	$1,136,733	$231,609	$52,574
11537	EMERGENCY GENERATOR FUEL STORAGE - SS	$1,105,433	$1,995,800	$994,889	$88,435	$22,109
11568	COASTAL ZONE B AND COASTAL ZONE D PUMP STATIONS ELEC	$28,676	$1,737,000	$28,676	$0	$0
11570	DRWF WELLSITE REHAB GROUP 1	$945,892	$4,000,000	$945,892	$0	$0
11571	WOODBRIDGE RECYCLED WATER PIPELINE REPLACEMENT	$322,121	$15,218,000	$322,121	$0	$0
11587	BRIDGE 175 AT SILVERADO CANYON RD, LADD CANYON DW I	$443,835	$674,900	$443,835	$0	$0
11588	BRIDGE 174 AT SILVERADO CANYON ROAD, COMMUNITY CEN	$352,849	$504,900	$352,849	$0	$0
11589	BRIDGE 177 AT SILVERADO CANYON RD READ RESERVOIR DW I	$154,965	$564,900	$154,965	$0	$0
11593	BRIDGE 172 AT MODJESKA CANYON RD/MARKUSON RD DW I	$15,923	$564,900	$15,923	$0	$0
11841	SEWER SIPHON REHABILITATION PHASE 2	$705,466	$9,725,000	$705,466	$0	$0

FY Exp Category		FY 23-24 w/ G&A	Total w/ G&A	FY Replacement	FY Developed	FY Developing
11912	COASTAL ZONE 2 AND COASTAL ZONE 4 PUMP STATIONS REH	$539,332	$1,392,000	$539,332	$0	$0
12101	RATTLESNAKE DAM REHABILITATION	$1,601,655	$3,213,000	$1,601,655	$0	$0
12125	36 INCH SS RELOCATION AT SR133/SD CREEK	$730,450	$1,223,000	$730,450	$0	$0
12215	RIPARIAN VIEW PAVEMENT REHABILITATION	$11,000	$735,000	$11,000	$0	$0
12289	WIFI NETWORK UPGRADES - DW	$111,000	$190,000	$111,000	$0	$0
12290	WIFI NETWORK UPGRADES - SS	$111,000	$190,000	$111,000	$0	$0
12294	EL TORO RD SMH RAISE TO GRADE	$24,280	$280,000	$24,280	$0	$0
12423	SERRANO CREEK RAW WATER PIPELINE REPLACEMENT	$854,027	$1,116,500	$854,027	$0	$0
12513	HARDING CANYON DAM REHABILITATION	$201,026	$951,500	$201,026	$0	$0
12520	MWRP SOLIDS FORCE MAIN RELOCATION	$417,411	$533,000	$417,411	$0	$0
12545	MPS2 PUMP BASE REPLACEMENT FOR PUMPS 1, 2, 3	$133,419	$409,000	$133,419	$0	$0
12550	HVAC SYSTEM REPLACEMENT AT SAND CANYON AND OPS DW	$113,529	$2,294,000	$113,529	$0	$0
12551	HVAC SYSTEM REPLACEMENT AT SAND CANYON AND OPS SS	$113,529	$2,294,000	$113,529	$0	$0
12552	MWRP DIGESTER REHABILITATION	$65,000	$4,060,000	$65,000	$0	$0
12554	MWRP BIOSOLIDS CENTRATE TANK REPAIR	$81,000	$412,000	$81,000	$0	$0
12556	MWRP BIOSOLIDS FOUL AIR SYSTEM REPAIR	$93,500	$687,000	$93,500	$0	$0
12565	R&R PS EAST IRVINE ZN 3-4	$950,000	$1,900,000	$950,000	$0	$0
12566	R&R PS LAKE FOREST ZN 4-5 WEST	$641,667	$2,200,000	$641,667	$0	$0
12568	R&R TANK SHAW	$250,000	$500,000	$250,000	$0	$0
12573	IDP PTP TREATMENT SYSTEM REPLACEMENT	$56,513	$665,000	$56,513	$0	$0
12575	EDUCATIONAL DISPLAYS AND SIGNAGE	$250,000	$500,000	$250,000	$0	$0
12594	WELL REHAB - OPA1	$350,872	$577,500	$0	$285,961	$64,911
12596	SOCWA ALISO CREEK OCEAN OUTFALL BALLAST REPAIR	$12,121	$300,000	$12,121	$0	$0
12615	MWRP SERVICE A TRANSFORMER REPLACEMENT	$57,833	$760,100	$57,833	$0	$0
		$21,531,460	**$253,762,700**	**$18,280,301**	**$3,089,599**	**$161,560**
Replacement - FY System						
11774	GENERAL SYSTEM REPLACEMENTS AND MODIFICATIONS DW 2	$6,283,000	$6,283,000	$6,283,000	$0	$0

FY Exp Category		FY 23-24 w/ G&A	Total w/ G&A	FY Replacement	FY Developed	FY Developing
11777	GENERAL SYSTEM REPLACEMENTS AND MODIFICATIONS RW 2	$2,103,000	$2,103,000	$2,103,000	$0	$0
11780	GENERAL SYSTEM REPLACEMENTS AND MODIFICATIONS SS 23	$1,785,000	$1,785,000	$1,785,000	$0	$0
11843	LAWRP SYSTEM REPLACEMENTS 23/24	$80,000	$80,000	$80,000	$0	$0
12529	IS GENERAL REPLACEMENTS 23/24-24/25	$50,000	$100,000	$50,000	$0	$0
		$10,301,000	**$10,351,000**	**$10,301,000**	**$0**	**$0**
Replacement-Business Software						
11888	MAXIMO SCHEDULER REPLACEMENT-DW	$16,597	$75,000	$16,597	$0	$0
11889	MAXIMO SCHEDULER REPLACEMENT-SS	$33,194	$150,000	$33,194	$0	$0
		$49,791	**$225,000**	**$49,791**	**$0**	**$0**
Sewage Treatment						
01659	MWRP EXPANSION PHASE 3 (MBR)-RW	$656,097	$21,258,000	$0	$475,014	$181,083
01797	MWRP EXPANSION PHASE 3 (MBR)-SS	$1,345,731	$43,680,000	$0	$1,081,968	$263,763
11833	MWRP EXPANSION PHASE 3 (CAS) IMPROVEMENTS	$541,097	$17,867,000	$0	$435,042	$106,055
12541	MWRP BIOSOLIDS LIFT STATION	$171,795	$3,262,000	$0	$138,123	$33,672
		$2,714,720	**$86,067,000**	**$0**	**$2,130,147**	**$584,573**
Solids Handling						
12138	MWRP BIOSOLIDS MISC. IMPROVEMENTS	$73,912	$1,520,000	$0	$59,425	$14,487
		$73,912	**$1,520,000**	**$0**	**$59,425**	**$14,487**
Water Banking						
10854	KERN FAN GROUNDWATER STORAGE	$4,659,500	$115,410,500	$0	$3,797,493	$862,008
11746	SITES RESERVOIR PLANNING AND ENVIRONMENTAL REVIEW	$269,782	$1,236,500	$0	$219,872	$49,910
12584	PALO VERDE IRRIGATION DISTRICT PROPERTY IMPROVEMENTS	$52,909	$88,000	$0	$43,121	$9,788
		$4,982,191	**$116,735,000**	**$0**	**$4,060,486**	**$921,705**
Water Resources						
11747	DELTA CONVEYANCE PROJECT PLANNING AND ENVIRONMENT	$57,382	$263,000	$0	$46,766	$10,616
11797	RW CONVERSION IMPROVEMENTS FOR OFF-SITE 23/24	$200,000	$200,000	$200,000	$0	$0

FY Exp Category		FY 23-24 w/ G&A	Total w/ G&A	FY Replacement	FY Developed	FY Developing
11800	POTABLE WATER STUDIES 23/24-24/25	$750,000	$1,500,000	$0	$611,250	$138,750
12514	AMI IMPLEMENTATION - DW	$35,996	$90,000	$0	$29,337	$6,659
12515	AMI IMPLEMENTATION - RW	$35,996	$90,000	$0	$26,061	$9,935
		$1,079,375	**$2,143,000**	**$200,000**	**$713,415**	**$165,960**
Well Rehabilitation						
07087	WELL REHAB-DRWF 10	$66,693	$1,410,000	$66,693	$0	$0
11137	WELL REHAB-IDP 76	$378,424	$409,500	$378,424	$0	$0
11845	WELL REHAB-DRWF 12	$46,221	$1,370,000	$46,221	$0	$0
11846	WELL REHAB-WELL 115R	$157,609	$902,000	$157,609	$0	$0
11847	WELL REHAB-IDP 110	$91,359	$1,006,500	$91,359	$0	$0
11858	WELL REHAB-WELL ET2	$82,000	$1,076,300	$82,000	$0	$0
12262	WELL REHAB-WELL ET1	$35,125	$748,000	$35,125	$0	$0
12264	WELL REHAB-WELL 106	$117,308	$1,041,500	$117,308	$0	$0
		$974,739	**$7,963,800**	**$974,739**	**$0**	**$0**
		$105,060,827	**$1,032,180,300**	**$41,307,060**	**$46,287,655**	**$17,466,112**

Irvine Ranch Water District
Capital Budget for Fiscal Year 2024-25 and Fiscal Year 2024-25
Section 4 - FY 2024-25 Details of Projected Expenditures by Category

	FY Exp Category	FY 24-25 w/ G&A	Total w/ G&A	FY Replacement	FY Developed	FY Developing
Development - Lake Forest						
10096	LAKE FOREST NAKASE DW IMPROVEMENTS	$128,705	$437,000	$0	$128,705	$0
11582	LAKE FOREST NAKASE 24 ZB RW	$39,579	$1,365,000	$0	$28,656	$10,924
11749	LF NAKASE 12 INCH SANITARY SEWER	$119,818	$377,000	$0	$119,818	$0
		$288,102	**$2,179,000**	**$0**	**$277,178**	**$10,924**
Development - Orange Heights						
07136	ORANGE HEIGHTS DOMESTIC WATER BPS	$167,114	$3,165,900	$0	$0	$167,114
07138	ORANGE HEIGHTS DOMESTIC WATER RESERVOIR	$470,591	$10,263,800	$0	$0	$470,591
07139	ORANGE HEIGHTS RECYCLED WATER BPS	$167,114	$3,165,900	$0	$0	$167,114
07376	ORA HTS N TRACT 17995 PH 1_12 DW	$39,037	$176,000	$0	$0	$39,037
07377	ORA HTS N TRACT 17995 PH1_1_6 RW	$38,305	$162,800	$0	$0	$38,305
07378	ORA HTS N TRACT 17995 PH 2_12 DW	$228,658	$974,000	$0	$0	$228,658
07379	ORA HTS N TRACT 17995 PH 2_12 SS	$48,225	$205,000	$0	$0	$48,225
07380	ORA HTS N TRACT 17995PH2_ 6_8 RW	$114,165	$487,000	$0	$0	$114,165
07451	ORA HTS SANTIAGO CYN RD AND JAMBOREE 12 DW	$317,761	$1,396,900	$0	$0	$317,761
07452	ORA HTS SANTIAGO CYN RD AND JAMBOREE 15 SS	$113,239	$500,000	$0	$0	$113,239
07453	ORA HTS SANTIAGO CYN RD AND JAMBOREE RW	$511,950	$2,228,300	$0	$0	$511,950
07484	ORA HTS S TRACT 16199 15 SS	$156,567	$668,000	$0	$0	$156,567
07486	ORA HTS S TRACT 16199 RW	$189,628	$808,000	$0	$0	$189,628
		$2,562,353	**$24,201,600**	**$0**	**$0**	**$2,562,353**
Development - Other						
07086	CALIFORNIA AVE RW PIPELINE-ACADEMY TO THEORY	$7,508	$814,000	$7,508	$0	$0
11815	SR 55 WIDENING DW RELOCATION	$25,610	$132,000	$25,610	$0	$0

FY Exp Category		FY 24-25 w/ G&A	Total w/ G&A	FY Replacement	FY Developed	FY Developing
12511	PA12 INNOVATION PARK 12_DW (CODE 7963)	$82,802	$245,000	$0	$0	$82,802
		$115,919	**$1,191,000**	**$33,117**	**$0**	**$82,802**
Development - PA1						
01722	PA1 NHB4 ORCHARD HILLS RW	$364,944	$1,280,000	$0	$0	$364,944
11500	PA1 JEFFREY RD EXT 6RW & 12RW	$39,533	$163,000	$0	$0	$39,533
		$404,477	**$1,443,000**	**$0**	**$0**	**$404,477**
Development - PA40						
12510	PA40 MARINE WAY INTERIM 12DW (CODE 7957)	$180,416	$507,000	$0	$0	$180,416
		$180,416	**$507,000**	**$0**	**$0**	**$180,416**
Development - PA51						
10107	PA51 REACH B SOUTH 12" SEWER FROM BARRANCA TO 5-FWY	$27,062	$2,555,000	$0	$0	$27,062
10796	PA51 D5 "P" ST & CHINON 12DW	$34,321	$147,000	$0	$0	$34,321
10861	PA51 D5 MERIT 12_10_RW	$59,397	$312,000	$0	$0	$59,397
10862	PA51 D5 BB ST 12 RW	$59,397	$297,000	$0	$0	$59,397
10864	PA51 D5 ASTOR 10RW	$69,296	$342,000	$0	$0	$69,296
10865	PA51 D5 E ST 12RW	$32,998	$181,000	$0	$0	$32,998
10878	PA51 D5 F ST N ST 12_10RW	$59,397	$317,000	$0	$0	$59,397
11176	PA51 D6 MARINE AND ALTON 12DW	$412,754	$688,000	$0	$0	$412,754
11177	PA51 D6 MARINE AND ALTON 16RW	$591,851	$963,000	$0	$0	$591,851
11939	PA51 MARINE AND BAKE 12DW	$315,103	$663,000	$0	$0	$315,103
12143	PA51 GP5 12DW CODE 7740	$183,029	$468,000	$0	$0	$183,029
12145	PA51 GP5 8RW CODE 7740	$152,525	$372,000	$0	$0	$152,525
12146	PA51 MARINE AND ALTON CREEK 24SS CODE 7806	$1,830,295	$3,435,000	$0	$1,471,557	$358,738
12228	PA51 D5 HARRIER FROM CHINON TO LYNX 12DW CODE 7808	$472,201	$763,000	$0	$0	$472,201
12229	PA51 D5 D6 HARRIER FROM CHINON TO LYNX 12_15SS IRWD	$341,766	$563,000	$0	$0	$341,766
12230	PA51 D5 D6 HARRIER FROM CHINON TO LYNX 10RW IRWD CO	$237,418	$403,000	$0	$0	$237,418

FY Exp Category		FY 24-25 w/ G&A	Total w/ G&A	FY Replacement	FY Developed	FY Developing
12231	PA51 D5 D6 CHINON FROM HARRIER TO TREBLE 12DW IRWD	$127,201	$234,000	$0	$0	$127,201
12232	PA51 D5 D6 CHINON FROM HARRIER TO TREBLE 10RW IRWD C	$212,635	$365,000	$0	$0	$212,635
12371	PA51 D5D6 MRWY EO SKYHWK 12_DW CODE 7902	$642,498	$1,135,000	$0	$0	$642,498
12386	PA51 D5D6 MRWY EO SKYHWK 18_SS (CODE 7902)	$532,155	$989,000	$0	$0	$532,155
12387	PA51 D5D6 MRWY EO SKYHWK 16_RW (CODE 7902)	$1,016,700	$1,695,000	$0	$0	$1,016,700
12404	PA51 D6 TRBLE_MRWY TO GP5 12_DW (CODE 7909)	$302,153	$567,000	$0	$0	$302,153
12405	PA51 D6 TRBLE_MRWY TO GP5 18_SS (CODE 7909)	$688,817	$1,296,000	$0	$0	$688,817
12406	PA51 D6 TRBLE_MRWY TO GP5 8_RW (CODE 7909)	$238,776	$478,000	$0	$0	$238,776
12432	PA51 D6 LYNX NO MRWY 12_DW CODE 7931	$82,802	$245,000	$0	$0	$82,802
12433	PA51 D6 LYNX NO MRWY 15_SS CODE 7931	$82,802	$245,000	$0	$0	$82,802
		$8,805,347	**$19,718,000**	**$0**	**$1,471,557**	**$7,333,790**
General Plant						
12590	GP_Dept 130_FY 24_25	$40,000	$40,000	$37,560	$1,960	$480
12591	GP_Dept 250_FY 24_25	$642,800	$642,800	$603,589	$31,497	$7,714
12592	GP_Dept 600_FY 24_25	$180,000	$180,000	$169,020	$8,820	$2,160
12593	GP_Dept 870_FY 24_25	$1,513,150	$1,513,150	$1,420,848	$74,144	$18,158
12607	GP_Dept 425_FY 24_25	$31,048	$31,048	$29,154	$1,521	$373
		$2,406,998	**$2,406,998**	**$2,260,171**	**$117,943**	**$28,884**
Nonpotable Storage						
03808	SYPHON RESERVOIR IMPROVEMENTS	$7,247,729	$146,000,000	$0	$5,247,355	$2,000,373
		$7,247,729	**$146,000,000**	**$0**	**$5,247,355**	**$2,000,373**
OC San - CORF						
10500	OCSD EQUITY LONG TERM CAPITAL PROGRAM 2018 TO 2050	$5,177,000	$16,742,000	$0	$4,162,308	$1,014,692
10502	OCSD CORF LONG TERM CAPITAL PROGRAM 2018 TO 2050	$6,998,000	$210,379,000	$5,087,546	$1,560,554	$349,900
		$12,175,000	**$227,121,000**	**$5,087,546**	**$5,722,862**	**$1,364,592**
OCWD Annexation						

FY Exp Category		FY 24-25 w/ G&A	Total w/ G&A	FY Replacement	FY Developed	FY Developing
10503	OCWD ANNEXATION LONG TERM CAPITAL PROGRAM 2018 TO	$654,000	$22,861,400	$0	$533,010	$120,990
		$654,000	**$22,861,400**	**$0**	**$533,010**	**$120,990**
Operational Improvements						
06161	OPERATIONS CENTER FACILITY REFRESH-SS	$8,562	$740,000	$8,562	$0	$0
07881	OPERATIONS CENTER CNG, DIESEL, GASOLINE FUELING FACILIT	$556,918	$4,176,000	$185,454	$302,406	$69,058
07882	OPERATIONS CENTER CNG, DIESEL, GASOLINE FUELING FACILIT	$1,113,835	$7,974,000	$370,907	$568,056	$174,872
10101	FLEMING DW RESERVOIR AND PUMP STATION IMPROVEMENT	$4,560,597	$16,740,000	$478,863	$4,081,735	$0
10379	SAN JOAQUIN RESERVOIR FILTRATION FACILITY	$5,180,772	$23,455,000	$0	$3,750,879	$1,429,893
11154	RADIO TOWER IMPROVEMENTS-DW	$18,780	$231,000	$0	$15,306	$3,474
11156	RADIO TOWER IMPROVEMENTS-SS	$20,030	$236,000	$0	$16,104	$3,926
11157	RADIO TOWER IMPROVEMENTS-RW	$20,030	$236,000	$0	$14,502	$5,528
11828	WELLS 51/52 EQUIPPING	$410,499	$4,437,000	$0	$334,557	$75,942
11829	WELLS 51/52 PIPELINES TO DRWF	$690,802	$10,874,000	$0	$563,004	$127,798
11854	OPERATIONS CENTER PURCHASING WAREHOUSE-DW	$89,889	$797,000	$0	$73,259	$16,629
11855	OPERATIONS CENTER PURCHASING WAREHOUSE-SS	$389,680	$797,000	$0	$313,303	$76,377
12506	DAMS INSTRUMENTATION & DATA ACQUISITION UPGRADES	$657,541	$1,386,000	$0	$476,060	$181,481
12542	IS GENERAL UPGRADES 23/24-24/25	$100,000	$200,000	$0	$80,800	$19,200
		$13,817,936	**$72,279,000**	**$1,043,786**	**$10,589,970**	**$2,184,180**
Planning						
11782	CAPITAL PLANNING SUPPORT 23/24-24/25	$1,200,000	$2,400,000	$0	$939,600	$260,400
11792	NON-POTABLE WATER STUDIES 23/24-24/25	$37,500	$75,000	$0	$27,150	$10,350
12563	CIP AM LAWRP CONDITION ASSESSMENT	$350,000	$500,000	$350,000	$0	$0
12564	CIP AM CONDITION ASSESSMENT FY 23/24-24/25	$500,000	$500,000	$500,000	$0	$0
12580	LEAD AND COPPER RULE REVISION COMPLIANCE	$146,400	$500,000	$0	$119,316	$27,084
		$2,233,900	**$3,975,000**	**$850,000**	**$1,086,066**	**$297,834**
Replacement - Facilities						

FY Exp Category		FY 24-25 w/ G&A	Total w/ G&A	FY Replacement	FY Developed	FY Developing
01398	SANTIAGO CANYON AREA PUMP STATION IMPROVEMENTS	$91,339	$10,185,300	$0	$91,339	$0
01414	CP IMP-SAND CANYON 16" DW ANODE REPLACEMENT	$5,539	$278,100	$5,539	$0	$0
01813	SANTIAGO DAM OUTLET AND SPILLWAY	$8,666,962	$139,307,000	$8,216,280	$355,345	$95,337
03750	SOCWA ETM PROTECTION-TRAIL BRIDGE CROSSING (PC 21)	$37,059	$1,215,000	$37,059	$0	$0
05406	NTS-EL MODENA NTS MODIFICATIONS	$6,066	$347,000	$6,066	$0	$0
06159	CP IMP-CANADA ROAD JOINT BONDING	$7,308	$280,000	$7,308	$0	$0
06160	OPERATIONS CENTER FACILITY REFRESH-DW	$4,281	$370,000	$4,281	$0	$0
06162	CP IMP-CRYSTAL COVE RECTIFIER-DW	$4,646	$170,000	$4,646	$0	$0
06163	CP IMP-CRYSTAL COVE RECTIFIER-RW	$3,462	$155,000	$3,462	$0	$0
06164	CP IMP-CULVER CP5 RECT AND ANODE BED REPLACEMENT	$7,394	$291,000	$7,394	$0	$0
06169	CP IMP-ZN 8-9 PIPELINE ANODE BED LEAD WIRE REPLACEMEN	$10,831	$385,000	$10,831	$0	$0
07892	MWRP TERTIARY FILTER REHABILITATION	$5,014,414	$9,875,600	$5,014,414	$0	$0
10580	RW PIPELINE REPLACEMENT-SILKWOOD, WILLOWLEAF	$140,640	$423,000	$140,640	$0	$0
11123	LAKE FOREST WOODS SEWER IMPROVEMENTS	$3,175,375	$5,313,000	$3,175,375	$0	$0
11189	SOCWA ETM AVAC VALVE REPLACEMENT REACHES D AND E (P	$41,558	$500,000	$41,558	$0	$0
11536	EMERGENCY GENERATOR FUEL STORAGE - DW	$514,669	$2,567,800	$411,735	$83,891	$19,043
11537	EMERGENCY GENERATOR FUEL STORAGE - SS	$403,431	$1,995,800	$363,088	$32,275	$8,069
11568	COASTAL ZONE B AND COASTAL ZONE D PUMP STATIONS ELEC	$344,110	$1,737,000	$344,110	$0	$0
11570	DRWF WELLSITE REHAB GROUP 1	$1,883,159	$4,000,000	$1,883,159	$0	$0
11587	BRIDGE 175 AT SILVERADO CANYON RD, LADD CANYON DW I	$31,477	$674,900	$31,477	$0	$0
11588	BRIDGE 174 AT SILVERADO CANYON ROAD, COMMUNITY CEN	$4,562	$504,900	$4,562	$0	$0
11589	BRIDGE 177 AT SILVERADO CANYON RD READ RESERVOIR DW I	$389,762	$564,900	$389,762	$0	$0
11593	BRIDGE 172 AT MODJESKA CANYON RD/MARKUSON RD DW I	$141,852	$564,900	$141,852	$0	$0
11841	SEWER SIPHON REHABILITATION PHASE 2	$3,970,168	$9,725,000	$3,970,168	$0	$0
11912	COASTAL ZONE 2 AND COASTAL ZONE 4 PUMP STATIONS REH	$624,813	$1,392,000	$624,813	$0	$0
12101	RATTLESNAKE DAM REHABILITATION	$1,601,655	$3,213,000	$1,601,655	$0	$0
12125	36 INCH SS RELOCATION AT SR133/SD CREEK	$122,222	$1,223,000	$122,222	$0	$0

FY Exp Category		FY 24-25 w/ G&A	Total w/ G&A	FY Replacement	FY Developed	FY Developing
12505	SAND CANYON DAM SPILLWAY REHABILITATION	$218,667	$656,000	$218,667	$0	$0
12513	HARDING CANYON DAM REHABILITATION	$258,049	$951,500	$258,049	$0	$0
12537	CIP AM LINEAR DW	$500,000	$500,000	$500,000	$0	$0
12538	CIP AM LINEAR RW	$500,000	$500,000	$500,000	$0	$0
12539	CIP AM LINEAR SS	$500,000	$500,000	$500,000	$0	$0
12543	CORE NETWORK UPGRADES	$889,126	$1,000,000	$889,126	$0	$0
12544	ENTERPRISE SERVER UPGRADES	$534,389	$650,000	$534,389	$0	$0
12550	HVAC SYSTEM REPLACEMENT AT SAND CANYON AND OPS DW	$1,090,235	$2,294,000	$1,090,235	$0	$0
12551	HVAC SYSTEM REPLACEMENT AT SAND CANYON AND OPS SS	$1,090,235	$2,294,000	$1,090,235	$0	$0
12552	MWRP DIGESTER REHABILITATION	$940,000	$4,060,000	$940,000	$0	$0
12554	MWRP BIOSOLIDS CENTRATE TANK REPAIR	$331,000	$412,000	$331,000	$0	$0
12555	MWRP BIOSOLIDS HANDLING UPGRADES	$157,500	$1,065,000	$157,500	$0	$0
12556	MWRP BIOSOLIDS FOUL AIR SYSTEM REPAIR	$593,500	$687,000	$593,500	$0	$0
12557	OPERATIONS CENTER ROOF REPLACEMENT-DW, BUILDINGS 50	$4,397	$313,000	$4,397	$0	$0
12559	OPERATIONS CENTER ROOF REPLACEMENT-SS, BUILDINGS 50,	$4,397	$313,000	$4,397	$0	$0
12565	R&R PS EAST IRVINE ZN 3-4	$950,000	$1,900,000	$950,000	$0	$0
12566	R&R PS LAKE FOREST ZN 4-5 WEST	$1,100,000	$2,200,000	$1,100,000	$0	$0
12567	R&R PS TURTLE ROCK ZN 3-4	$400,000	$800,000	$400,000	$0	$0
12568	R&R TANK SHAW	$250,000	$500,000	$250,000	$0	$0
12569	R&R TANK CHAPMAN	$250,000	$500,000	$250,000	$0	$0
12570	R&R TANK BENNER	$145,833	$500,000	$145,833	$0	$0
12573	IDP PTP TREATMENT SYSTEM REPLACEMENT	$113,026	$665,000	$113,026	$0	$0
12575	EDUCATIONAL DISPLAYS AND SIGNAGE	$250,000	$500,000	$250,000	$0	$0
12596	SOCWA ALISO CREEK OCEAN OUTFALL BALLAST REPAIR	$145,455	$300,000	$145,455	$0	$0
12615	MWRP SERVICE A TRANSFORMER REPLACEMENT	$68,918	$760,100	$68,918	$0	$0
12620	DRWF WELLSITE REHAB GROUP 2	$190,600	$1,588,000	$190,600	$0	$0
		$38,724,079	**$223,666,800**	**$38,038,781**	**$562,850**	**$122,448**

FY Exp Category		FY 24-25 w/ G&A	Total w/ G&A	FY Replacement	FY Developed	FY Developing
Replacement - FY System						
11844	LAWRP SYSTEM REPLACEMENTS 24/25	$80,000	$80,000	$80,000	$0	$0
11850	GENERAL SYSTEM REPLACEMENTS AND MODIFICATIONS DW 2	$6,283,000	$6,283,000	$6,283,000	$0	$0
11851	GENERAL SYSTEM REPLACEMENTS AND MODIFICATIONS RW 2	$2,103,000	$2,103,000	$2,103,000	$0	$0
11852	GENERAL SYSTEM REPLACEMENTS AND MODIFICATIONS SS 24	$1,785,000	$1,785,000	$1,785,000	$0	$0
12529	IS GENERAL REPLACEMENTS 23/24-24/25	$50,000	$100,000	$50,000	$0	$0
		$10,301,000	**$10,351,000**	**$10,301,000**	**$0**	**$0**
Sewage Treatment						
01477	LAWRP TREATMENT PROCESS MODERNIZATION	$3,077	$202,434,250	$3,077	$0	$0
01659	MWRP EXPANSION PHASE 3 (MBR)-RW	$682,297	$21,258,000	$0	$493,983	$188,314
01797	MWRP EXPANSION PHASE 3 (MBR)-SS	$1,404,731	$43,680,000	$0	$1,129,404	$275,327
11832	MWRP TRIBUTARY GRAVITY DIVERSION TO LAWRP	$2,632	$2,942,000	$0	$2,116	$516
11833	MWRP EXPANSION PHASE 3 (CAS) IMPROVEMENTS	$552,297	$17,867,000	$0	$444,047	$108,250
12541	MWRP BIOSOLIDS LIFT STATION	$171,795	$3,262,000	$0	$138,123	$33,672
		$2,816,829	**$291,443,250**	**$3,077**	**$2,207,673**	**$606,079**
Water Banking						
10854	KERN FAN GROUNDWATER STORAGE	$5,577,500	$115,410,500	$0	$4,545,663	$1,031,838
11746	SITES RESERVOIR PLANNING AND ENVIRONMENTAL REVIEW	$269,782	$1,236,500	$0	$219,872	$49,910
12584	PALO VERDE IRRIGATION DISTRICT PROPERTY IMPROVEMENTS	$35,091	$88,000	$0	$28,599	$6,492
		$5,882,373	**$116,735,000**	**$0**	**$4,794,134**	**$1,088,239**
Water Resources						
06176	FUTURE GROUNDWATER SUPPLY	$18,600	$55,607,500	$0	$15,159	$3,441
11747	DELTA CONVEYANCE PROJECT PLANNING AND ENVIRONMENT	$57,382	$263,000	$0	$46,766	$10,616
11798	RW CONVERSION IMPROVEMENTS FOR OFF-SITE 24/25	$200,000	$200,000	$200,000	$0	$0
11800	POTABLE WATER STUDIES 23/24-24/25	$750,000	$1,500,000	$0	$611,250	$138,750
12514	AMI IMPLEMENTATION - DW	$36,005	$90,000	$0	$29,344	$6,661

FY Exp Category		FY 24-25 w/ G&A	Total w/ G&A	FY Replacement	FY Developed	FY Developing
12515	AMI IMPLEMENTATION - RW	$36,005	$90,000	$0	$26,068	$9,937
		$1,097,992	**$57,750,500**	**$200,000**	**$728,587**	**$169,405**
Well Rehabilitation						
11137	WELL REHAB-IDP 76	$31,076	$409,500	$31,076	$0	$0
11846	WELL REHAB-WELL 115R	$368,391	$902,000	$368,391	$0	$0
11847	WELL REHAB-IDP 110	$577,997	$1,006,500	$577,997	$0	$0
11856	WELL REHAB-TUSTIN DESALTER 21	$25,361	$1,006,500	$25,361	$0	$0
11858	WELL REHAB-WELL ET2	$26,000	$1,076,300	$26,000	$0	$0
12263	WELL REHAB-TUSTIN DESALTER 22	$25,361	$1,006,500	$25,361	$0	$0
12264	WELL REHAB-WELL 106	$272,106	$1,041,500	$272,106	$0	$0
		$1,326,292	**$6,448,800**	**$1,326,292**	**$0**	**$0**
		$111,040,742	**$1,230,278,348**	**$59,143,771**	**$33,339,185**	**$18,557,786**

RESOLUTION NO. 2023 -

RESOLUTION OF THE BOARD OF DIRECTORS OF
IRVINE RANCH WATER DISTRICT
APPROVING A CAPITAL BUDGET FOR
FISCAL YEARS 2023-24 AND 2024-25

A. The Board of Directors of the Irvine Ranch Water District (IRWD) has considered the capital project needs of IRWD for Fiscal Years 2023-24 and 2024-25.

B. A Capital Budget, which includes both the capital expenditures projected for Fiscal Year 2023-24 and 2024-25 and entire project budgets for the listed projects, as set forth in the attached Exhibit "A" has been prepared for and reviewed by this Board of Directors.

C. During the review of the Capital Budget by the Board of Directors, the Board "flagged" certain capital expenditures for projects for further review by the Board.

The Board of Directors of IRWD therefore resolves as follows:

Section 1. The revenues that have been collected from connection fees and have been deposited in the capital funds of the Improvement Districts, to the extent not previously or hereafter committed or appropriated to pay reimbursement, bonding, and other financing or fund-management related costs for capital facilities, are hereby appropriated to pay costs of the projects shown in the Capital Budget.

Section 2. Subject in all respects to prior pledges for debt service requirements, including those contained in Resolution No. 2002-10, the Treasurer is hereby authorized and directed to allocate to the Replacement Fund 32% of the general 1% ad valorem property tax revenues for the 2023-24 and 2024-25 fiscal years, to be expended for qualified capital outlay projects.

Section 3. IRWD's Capital Budget for Fiscal Years 2023-24 and 2024-25 is in compliance with the provisions of Article XIIIB of the Constitution of the State of California.

Section 4. IRWD's Capital Budget for Fiscal Years 2023-24 and 2024-25, shown in the attached Exhibit "A", is hereby approved.

Section 5. The capital expenditures for projects set forth in the attached Exhibit "A" identified with "Yes" in the Flagged report section are "flagged" for further review by the Board of Directors prior to implementation, pursuant to the Policy Regarding Authorization of Expenditures.

ADOPTED, SIGNED, and APPROVED on April 24, 2023.

_____
President, IRVINE RANCH WATER DISTRICT

_____
Secretary, IRVINE RANCH WATER DISTRICT

APPROVED AS TO FORM:
Hanson Bridgett, LLP

By:_____
General Counsel

April 19, 2023
Prepared by: J. Colston
Submitted by: K. Burton
Approved by: Paul A. Cook

ENGINEERING AND OPERATIONS COMMITTEE

RESEARCH BUSINESS PLAN UPDATE

SUMMARY:

Staff will provide an update on the research projects in which IRWD is currently involved.

BACKGROUND:

Periodically IRWD receives requests to participate in various research projects pertaining to emerging technologies through either direct funding or dedication of in-kind staff resources. Guidelines were developed to assist staff with evaluating and responding to those requests. These guidelines were incorporated into the IRWD Research Business Plan, which also provides a tracking mechanism for the various requests and ongoing research projects and programs in which IRWD participates. The underlying purpose of the Research Business Plan is to ensure that IRWD's research resources are prioritized and utilized effectively.

One of the components of the Research Business Plan is for staff to provide a status update on the research projects to the Engineering and Operations Committee on a quarterly basis. IRWD actively participates in the Technology Approval Group (TAG) sponsored by Isle Utilities. The TAG hosts numerous developing technology providers to match interested agencies with their technologies. A status update on the current research projects is attached as Exhibit "A".

Changes since the last quarterly report include:

- New: Ammonia Monitoring at MWRP – On a recurring basis, Recycling Water Operations will request discrete hourly monitoring for ammonia from the wastewater treatment process to optimize treatment. Water Quality and Regulatory Compliance staff plan to test ammonia sensors to determine if more accurate and less time intensive monitoring may be completed via these sensors.
- Update: UCI Industry-University Research Center-Perfluorinated Compound Sources and Loading at Wastewater Treatment Plants – A Sewershed-Scale Analysis – Sampling was delayed due to sewer access challenges for UCI. Sampling is now scheduled to be complete in the first half of 2023. Identification of residential sources of PFAS will commence immediately upon the end of the sampling.

FISCAL IMPACTS:

Not applicable.

ENVIRONMENTAL COMPLIANCE:

Not applicable.

RECOMMENDATION:

Receive and file.

LIST OF EXHIBITS:

Exhibit “A” – Research Projects Summary Table

Exhibit "A"

Research Projects Summary Table

No.	Project Title	Project Description	IRWD Contact	Organizations Involved	Type of Research	IRWD Participation Resource	Start Date	Projected Completion Date	Comments/Next Steps
1	UCI Industry-University Research Center-Perfluorinated Compound Sources and Loading at Wastewater Treatment Plants-A Sewershed-Scale Analysis	This project will develop and implement methodology for sewershed analysis to identify raw wastewater sources of PFAS.	Weghorst/ Colston	UCI Industry-University Research Center	Case study, data review, best practice analysis and technical report.	Staff time for review of reports, sharing information, and site analysis. Also providing automated sampling equipment.	Sep-20	Dec-23	Wastewater collection from sub-sewershed locations in Orange County has commenced and is expected to finish by the first half of 2023. Based on data from samples analyzed so far, the mean concentration of PFAS in Orange County residential wastewater is 28.7 – 51.6 ng/L. UCI is currently recruiting volunteer households to complete sampling to identify major sources of PFAS from residences. Initial residential sampling indicate household contributions from toilets, laundry, showers and bathroom sinks.
2	Biosolids Pellets Land Application Crop Study	The primary goal is to determine if ~40-50 of the roughly 400 unregulated organic contaminants listed in the 'EPA contaminants in biosolids database' can be found in, or remain in, the edible portions of food and feed crops following land application at standard agronomic rates based on the nitrogen needs of the test crop.	Zepeda	UC Riverside/South Coast Research and Education Center in Irvine with funding by USEPA	Field study with laboratory analysis of biosolids and crops	Provide Class A biosoilds pellets (approximately 1-2 tons of material)	Apr-22	Jul-23	No change since last update: 175lbs. of biosolids was supplied in January 2023 for winter tree fertilization.
3	Ammonia Monitoring at MWRP	Recycling Water Operations requires discrete hourly monitoring for ammonia from the wastewater treatment processes in order to optimize treatment. WQ&RC plans to test ammonia sensors to determine if more accurate and less time intensive monitoring may be completed via these sensors.	Colston	IRWD	Field demonstration of new equipment	Staff time to set-up, maintain and monitor the ammonia sensors.	Mar-23	Dec-23	New project. Staff have identified sample sites and received bids from equipment suppliers. Next step will be to purchase and install the equipment.

Updated: 4/11/2023

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April 19, 2023
Prepared by: L. Haney
Submitted by: J. Colston / K. Burton
Approved by: Paul A. Cook

ENGINEERING AND OPERATIONS COMMITTEE

MICROPLASTICS OVERVIEW – PREPARING FOR SAMPLING AND MONITORING

SUMMARY:

Staff will introduce the topic of microplastics as a pollutant and will also provide information about new monitoring requirements for microplastics in drinking water.

BACKGROUND:

California law requires drinking water agencies to perform monitoring of source waters for microplastics. Since California was the first state in the nation to enact these requirements, the process has required the development of a definition of microplastics and approved methods to sample and analyze them. Now that these milestones have been achieved, the State Water Resources Control Board Division of Drinking Water is preparing to issue orders to the first water agencies that will be required to conduct monitoring with IRWD's Baker Water Treatment Plant being one of the first of 30 agencies that will begin monitoring by the end of the calendar year 2023.

At the Committee meeting, staff will provide an overview of microplastics and describe how the industry is preparing for the sampling and monitoring of microplastics. A draft powerpoint presentation is provided as Exhibit "A".

FISCAL IMPACTS:

Not applicable.

ENVIRONMENTAL COMPLIANCE:

Not applicable.

RECOMMENDATION:

Receive and file.

LIST OF EXHIBITS:

Exhibit "A" – Microplastics Overview Draft Presentation

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Irvine Ranch Water District
MICROPLASTICS OVERVIEW
PREPARING FOR SAMPLING AND MONITORING
ENGINEERING AND OPERATIONS COMMITTEE
APRIL 19, 2023

1


AGENDA
Introduction to Microplastics
Concerns and Action Items
Microplastics Investigative Order
Sampling and Monitoring
Questions
Irvine Ranch Water District
2

2

GREAT PACIFIC GARBAGE PATCH

- Ocean Landfill

Irvine Ranch Water District

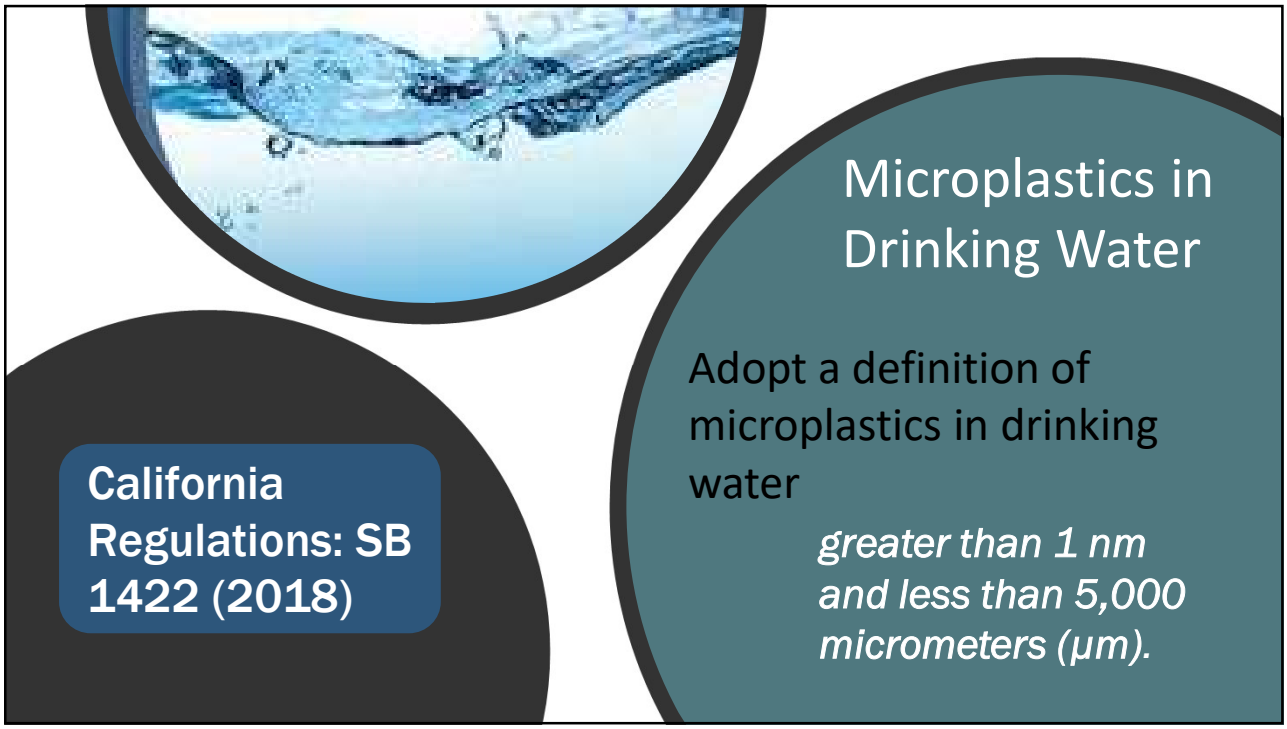
3

3

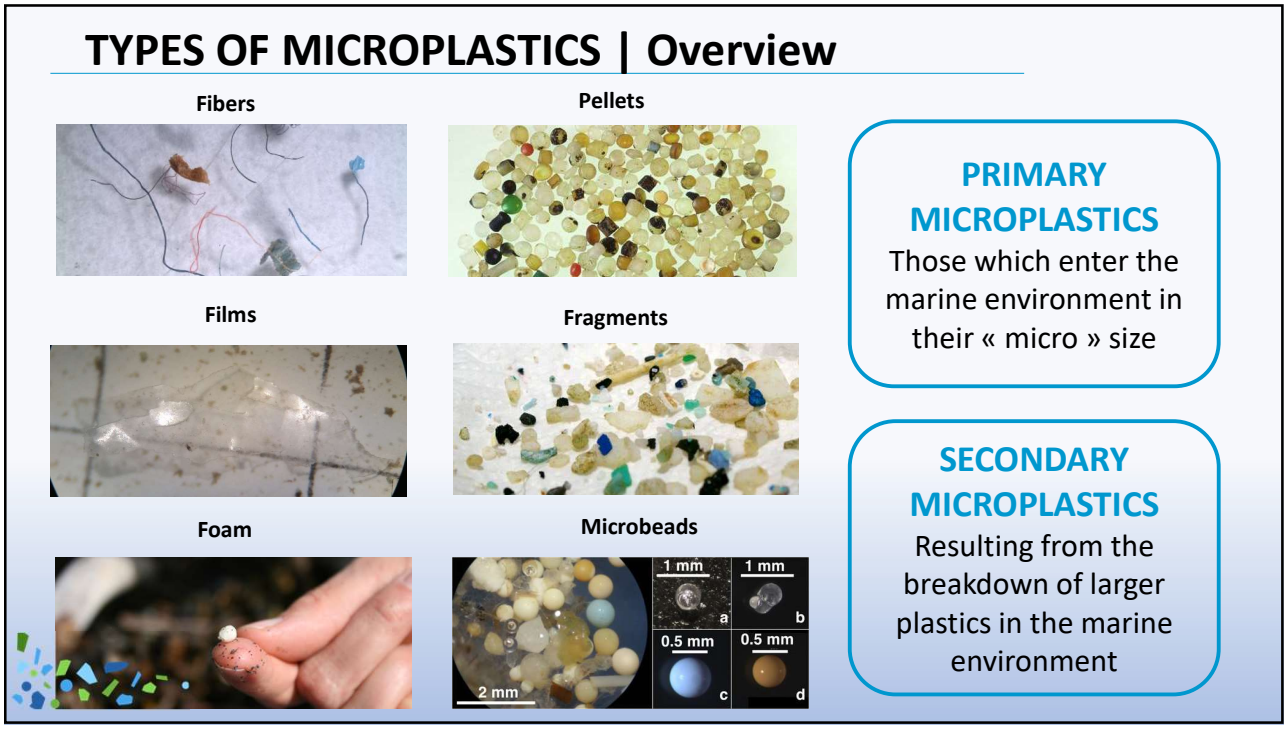
Plastic pollution size categories

Macro	Meso	Micro	Mini-micro
			
≥25mm	<25 - 5mm	<5 - 1mm	<1mm - 1μm

4


Microplastics in Drinking Water
Adopt a definition of microplastics in drinking water
greater than 1 nm and less than 5,000 micrometers (µm).
California Regulations: SB 1422 (2018)

5


TYPES OF MICROPLASTICS | Overview
Fibers
Pellets
Films
Fragments
Foam
Microbeads
1 mm
1 mm
a
b
0.5 mm
0.5 mm
c
d
2 mm
PRIMARY MICROPLASTICS
Those which enter the marine environment in their « micro » size
SECONDARY MICROPLASTICS
Resulting from the breakdown of larger plastics in the marine environment

6

Microplastics Research

Drinking Water

Ocean Water

Fish Tissue

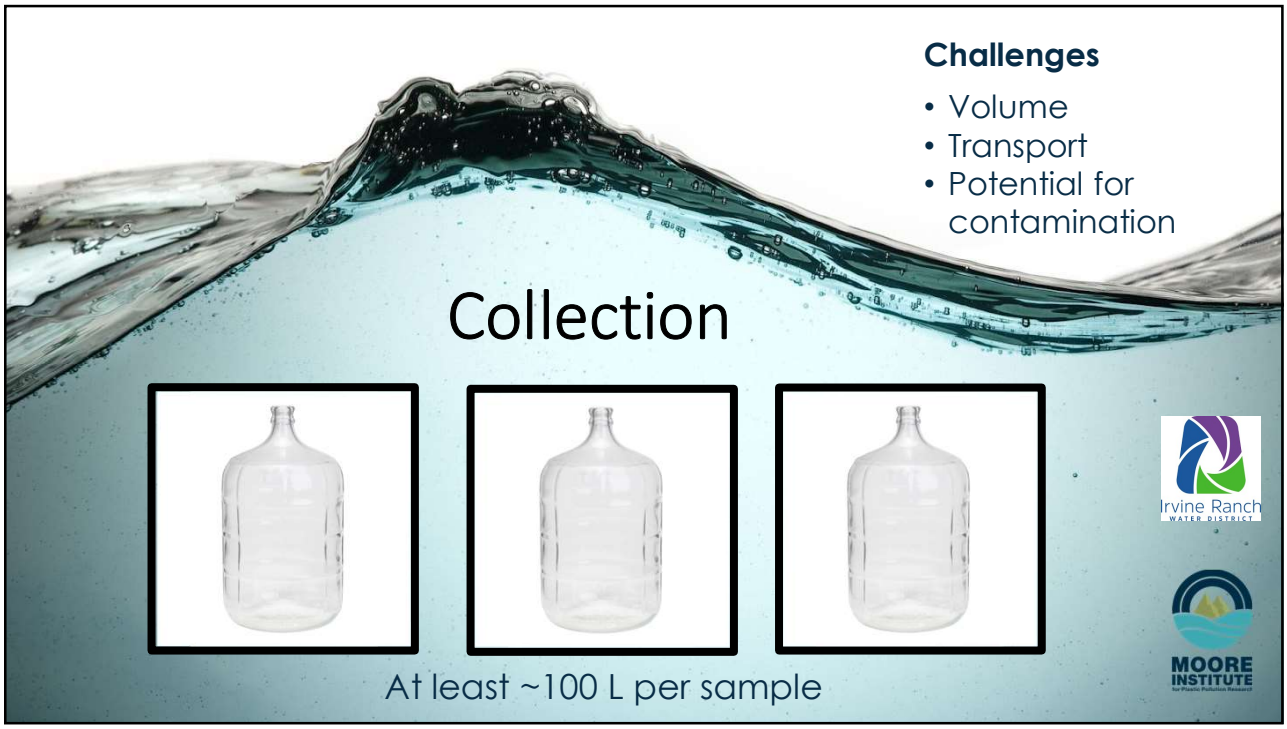
Sediment

The People Lab

MOORE INSTITUTE for Plastic Pollution Research

7

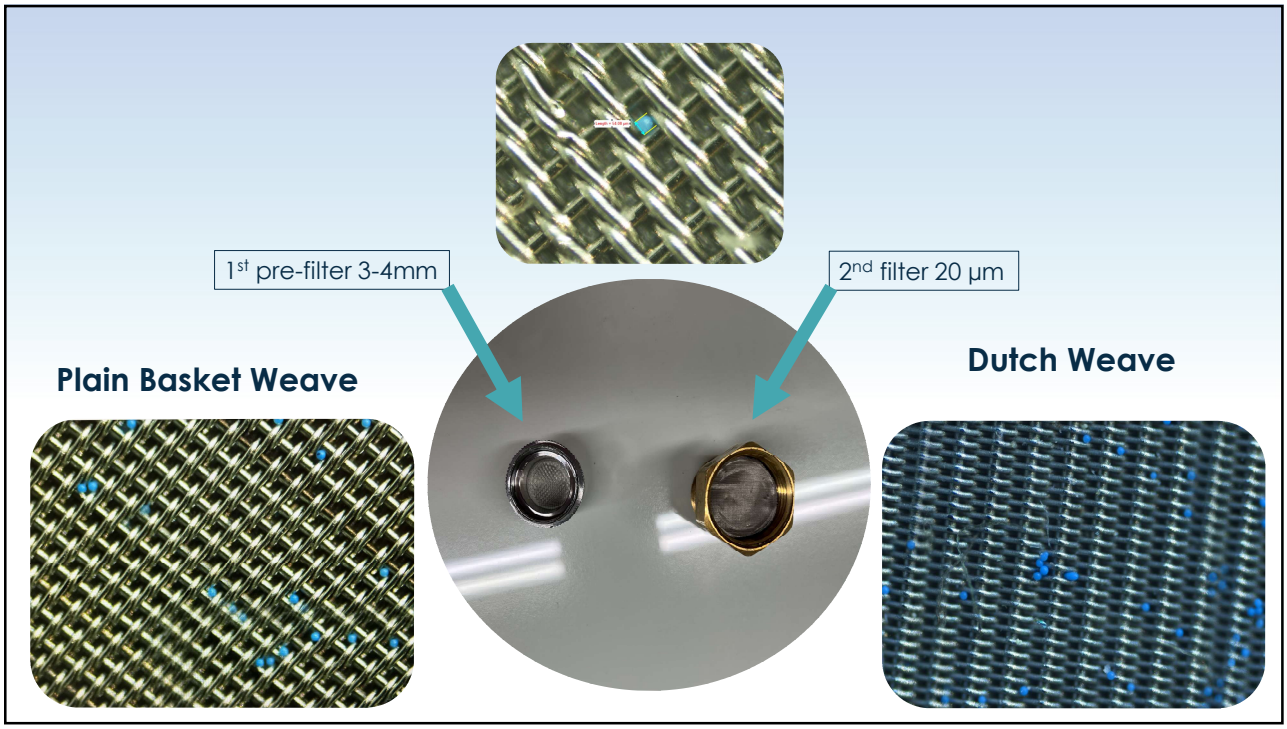
8


Challenges
• Volume
• Transport
• Potential for contamination
Collection
At least ~100 L per sample
Irvine Ranch WATER DISTRICT
MOORE INSTITUTE

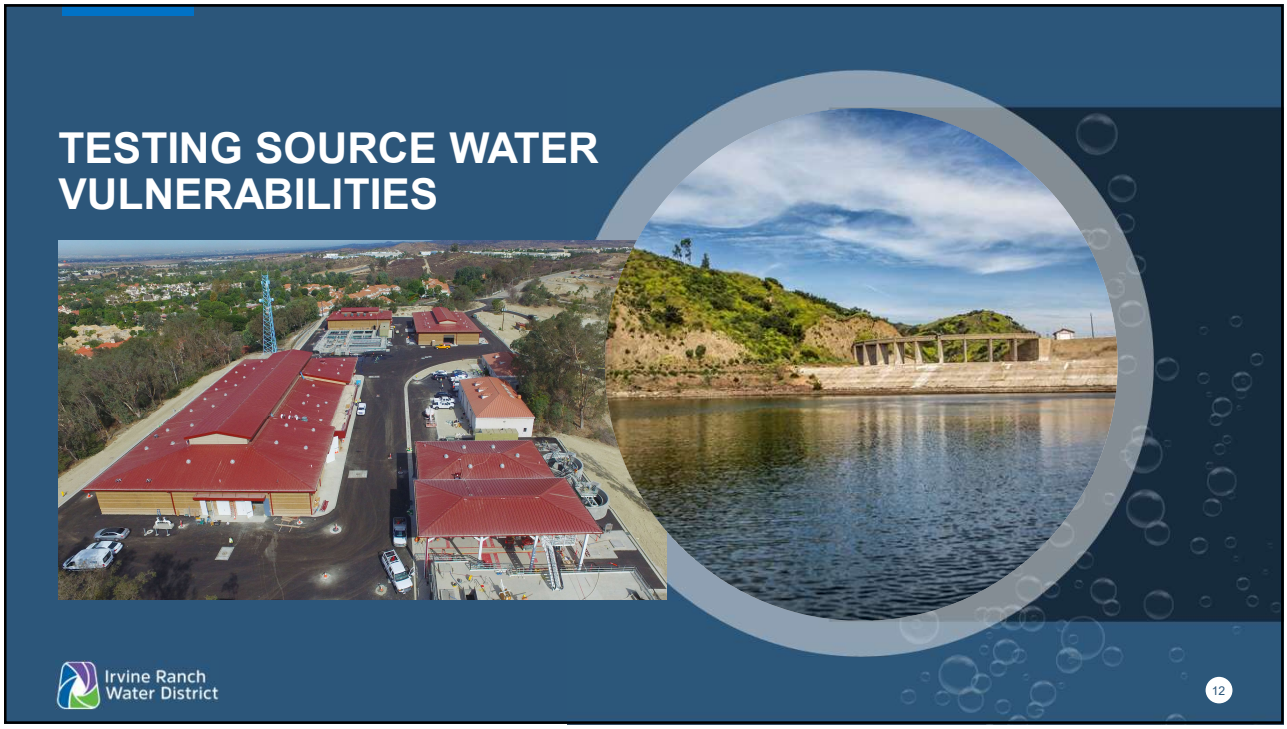
9


COLLECTION
TEANTECH
Irvine Ranch Water District
MOORE INSTITUTE
for Plastic Pollution Research
10

10


1st pre-filter 3-4mm
2nd filter 20 µm
Plain Basket Weave
Dutch Weave

11


TESTING SOURCE WATER VULNERABILITIES
Irvine Ranch Water District
12

12

ACWA
Association of California Water Agencies

CASA

ORANGE COUNTY WATER DISTRICT
SINCE 1933

MOORE INSTITUTE
for Plastic Pollution Research

Collaboration

13

THANK YOU!

Irvine Ranch Water District

14

14

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April 19, 2023
Prepared by: H. Cho / J. Moeder
Submitted by: K. Burton
Approved by: Paul A. Cook

ENGINEERING AND OPERATIONS COMMITTEE

RATTLESNAKE DAM GEOTECHNICAL INVESTIGATION AND STABILITY ANALYSIS
CONSULTANT SELECTIONS AND BUDGET ADDITION

SUMMARY:

The Rattlesnake Dam Geotechnical Investigation and Stability Analysis project will perform geotechnical investigations to obtain additional data that will be used to perform an in-depth stability analysis and seismic evaluation of the dam. Staff recommends that the Board:

- Authorize the General Manager to execute a Professional Services Agreement with AECOM in the amount of $741,115 for geotechnical investigation services;
- Authorize the General Manager to execute a Professional Services Agreement with HDR Engineering, Inc. in the amount of $624,865 for engineering services; and
- Authorize a budget addition for the Rattlesnake Dam Geotechnical Investigation and Stability Analysis in the amount of $2,331,000;

BACKGROUND:

The Irvine Company built Rattlesnake Dam in 1959; the dam and associated facilities were acquired by IRWD in 1971. The dam's earthen embankment was built on alluvium fill with a spillway crest at an elevation of 412-feet. The dam initially operated with a maximum storage volume of approximately 1,400 acre-feet of recycled water. In the early 1980's, IRWD and the Division of Safety of Dams (DSOD) evaluated the liquefaction potential of the alluvium foundation. Based on this evaluation, DSOD established a water level restriction six feet lower than the spillway crest to elevation 406-feet. Since 1982, this restriction has reduced the maximum storage volume of Rattlesnake Reservoir to 1,100 acre-feet of recycled water.

As a part of enhancing IRWD's dam safety program and integrating Risk Informed Decision Making (RIDM) as a core component of the program, HDR completed risk analysis on all five of IRWD's dams. Results of the risk analysis for Rattlesnake Dam identified uncertainties associated with seismic performance which led to prioritizing action items focused on reducing the risks. In October 2021, IRWD contracted with HDR to perform a preliminary seismic evaluation of the dam in advance of performing an in-depth seismic analysis and geotechnical investigations. This evaluation confirmed the need for additional geotechnical investigations and an in-depth seismic analysis. Following the evaluation, staff commenced operating the reservoir with a maximum water elevation of 395-feet as an interim risk reduction measure until the completion of an in-depth seismic analysis.

In addition to identifying uncertainties related to seismic performance, the risk analysis also identified opportunities to further understand the performance of the spillway and the potential for internal erosion. Collectively, these uncertainties will be evaluated in an Issue Evaluation Study (IES). Pursuant to completing the IES, HDR and staff completed initial planning activities

including data review, preparation of the Geotechnical Investigation Work Plan, and coordination with DSOD. DSOD completed its review of the Geotechnical Investigation Work Plan and authorized IRWD to proceed with the work.

Geotechnical Investigation Consultant Selection:

In December 2022, staff issued a request for proposal for the Rattlesnake Dam Geotechnical Investigation to six consultants: AECOM, GEI, Genterra, Geopentech, Geosyntec, and Stantec. Stantec declined to submit a proposal due to staffing issues, and Geosyntec teamed with Geopentech. Staff received proposals from AECOM, GEI, Genterra, and the Geopentech/Geosyntec team. Based on AECOM's local team, understanding of the project, experience with geotechnical investigation, and relatively lower fee, staff recommends the selection of AECOM. The consultant evaluation matrix is provided as Exhibit "A", and AECOM's proposal is provided as Exhibit "B".

Issue Evaluation Study Consultant Selection:

IRWD contracted with HDR in 2020 to enhance IRWD's Dam Safety Program and integrate RIDM as a core program component. They are intimately familiar with past evaluations related to the Issue Evaluation Study from their involvement with the risk analysis; and they continue to be a leader in the dam safety industry specifically with their experience in RIDM. In February 2023 at staff's request, HDR submitted a proposal for the Rattlesnake Dam Issue Evaluation Study and Alternatives Analysis. HDR's proposal includes support during the geotechnical investigation phase, performance of geologic and engineering evaluations based on the gathered geotechnical data, updates to the baseline risk analysis and development of risk mitigation measures, and preparation of an IES summary report. HDR's proposal is for $624,865 and is included in Exhibit "C".

FISCAL IMPACTS:

The Rattlesnake Dam Geotechnical Investigation and Stability Analysis, Project 12101, needs to be added to the FY 2022-23 Capital Budget as shown below. This project will be funded 100% by the Sewer Replacement Fund.

Project No.	Current Budget	Budget Addition	Total Budget
12101	$-0-	$2,331,000	$2,331,000

ENVIRONMENTAL COMPLIANCE:

This project is categorically exempt from the California Environmental Quality Act (CEQA), in conformance with California Code of Regulation, Title 14, Chapter 3, Section 15306; "Class 6, Information Collection". The Class 6 exemption is applicable for projects that consist of basic data collection, research, experimental management, and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource.

These may be strictly for information gathering purposes, or as part of a study leading to an action which a public agency has not yet approved, adopted, or funded. Pursuant to CEQA Guidelines Section 15062, staff filed a Notice of Exemption with the Orange County Clerk Recorder on October 20, 2022.

RECOMMENDATION:

That the Board authorize a budget increase for Project 12101, Rattlesnake Dam Geotechnical Investigation and Stability Analysis, to the FY 2022-23 Capital Budget in the amount of $2,331,000, authorize the General Manager to execute a Professional Services Agreement with AECOM in the amount of $741,115 for geotechnical investigation services, and authorize the General Manager to execute a Professional Services Agreement with HDR Engineering, Inc. in the amount of $624,865 for engineering services.

LIST OF EXHIBITS:

Exhibit “A” – Consultant Selection Evaluation Matrix
Exhibit “B” – AECOM Proposal
Exhibit "C” – HDR Engineering, Inc. Proposal

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Exhibit "A"

Rattlesnake Dam Geotechnical Investigation
Consultant Selection Matrix
4/6/2023

	Weights	AECOM	GEI	Genterra	Geopentech/Geosyntec
TECHNICAL APPROACH	50%				
Technical Approach	100%	1	2	3	4
Technical Approach		1.00	2.00	3.00	4.00
EXPERIENCE	50%				
Team	100%	1	2	3	4
Weighted Score (Experience)		1.00	2.00	3.00	4.00
Principal-in-Charge		Bryan Paine Org	Dan Wade Oak	Joe Kulikowski Irv	
Project Manager		Chris Goetz Org	Todd Crampton Oak	Joe Kulikowski Irv	Eric Fordham (GP) Irv
Field Geologist		Paul Salter, et al. Org	Scott Yehl, et al. Oak	Mike Wolff, et al. Irv	Rambpd Hadidi (GP) Irv
QA/QC		Steve FitzWilliam SD	Iqbal Ahmed Pas	Andrew Blystra Irv	Y. Moriwaki (GP)/D. Morley (GS) Irv
Technical Support		D. Schug/M. Smith	Nick Oettle, et al. Oak	Soma Balachandran Irv	GP and GS Staff
Laboratory/Testing		Adolph Camacho Org	AP Eng. & Testing et al	AP Eng. & Testing/Voss Laboratories	Hushmand Associates/Cooper Testing Labs
Drilling Contractor		Tri-County Drilling	Taper Drilling	Gregg Drilling	BC2 Environmental
Geophysics		GEOVision	GEOVision	Terra Physics	
CPT		Kehoe Testing and Drilling	Kehoe Testing and Drilling	Gregg Drilling	Conetec/Kehoe Testing
Sonic Drilling		BC2 Environmental	ABC Liovin		MR Drilling
Test Pit		Innovative Services Group	Innovative Services Group		
COMBINED WEIGHTED SCORE		1.00	2.00	3.00	4.00
		Man-hours	Man-hours	Man-hours	Man-hours
Task 1 Project Management		263	306	237	216
Task 2 Geotechnical Data Collection and Investigations		1,097	1,608	1,603	1,084
Task 2 Optional Tasks		83	0	69	76
TOTAL HOURS		1,443	1,914	1,909	1,376
FEE					
Task 1 Project Management		$45,440	$81,445	$58,685	$51,600
Task 2 Geotechnical Data Collection and Investigations		$618,056	$766,791	$999,643	$641,562
Task 2 Optional Tasks		$76,029	$1,520	$54,498	$56,051
Total with Included Optional		**$739,525**	**$849,756**	**$1,112,826**	**$749,213**
Average $/manhrs		512	444	583	544
FORCED RANKINGS:		1	2	3	4
Professional Liability Insurance		Yes	Yes	Yes	Yes
Comm. General Liability Insurance		Yes	Yes	Yes	Yes

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1. Scope

Our approach is centered on establishing high quality geotechnical data that is applicable, comprehensive, and easily incorporated into the Issue Evaluation Study (IES).



Project Understanding Background

Rattlesnake Dam is a large earthen embankment dam located on the Rattlesnake Canyon wash tributary to the Peters Canyon Wash, and ultimately San Diego Creek in Orange County. The dam was constructed in 1959 and is classified as an Extremely High downstream hazard potential structure.

Purpose of Proposed Investigation

IRWD is integrating Risk Informed Decision Making (RIDM) into its dam safety program. As part of the transition to a RIDM-based dam safety program, IRWD contracted with HDR, Inc. (HDR) to complete Semi-Quantitative Risk Analysis (SQRA) on IRWD's portfolio of five extremely high hazard earthen embankment dams. The risk analysis process identified Rattlesnake Dam as the highest total risk in IRWD's dam portfolio. The potential failure mode (PFM) that contributes the most to the total risk of Rattlesnake dam is seismically induced liquefaction of the alluvial foundation that impacts the stability of the embankment. The risk analysis identified areas of uncertainties and opportunities for re-evaluating the stability with current analysis methodologies. The risk analysis for Rattlesnake Dam also identified opportunities to improve the understanding of the potential for erosion and spillway failures. The recommended actions for Rattlesnake Dam include completing an Issue Evaluation Study (IES) for the following items.

- Perform a seismic response analysis of the embankment.
- Perform a study to understand the full history of seepage; including piezometers and drains and confirm the as constructed zoning and gradations.

To perform these recommended actions, a detailed site characterization is necessary. HDR developed a Geotechnical Investigation Work Plan (GIWP) outlining the required drilling, sampling, testing, instrumentation installation and monitoring/reporting to acquire the data for the site characterization which will serve as the basis for the IES. It is understood that the Engineer will utilize the data gathered by the geotechnical investigations to evaluate and update the risk analysis.

Geotechnical investigations in the dam embankment, foundation soils and bedrock, and in the upper spillway foundation are required to provide the necessary data to complete the Rattlesnake Dam IES. The site investigation program is designed to further characterize the geologic and geotechnical conditions at the site and address the potential dam safety issues and potential failure modes described below.

Seismic Stability: Additional information is required to evaluate the seismic stability of the downstream and upstream slopes/crest of Rattlesnake Dam.

Seepage Safety: Additional information is required to evaluate seepage conditions in the dam and foundation under a full range of reservoir operating conditions.

Spillway Channel Stability: Additional information is required along the upper portion of the existing spillway to better understand the erosion potential of the spillway and underlying bedrock materials under design flood loading conditions.

The additional data gathered as part of this site characterization program will be used during the IES evaluations to better understand the likelihood of the identified PFMs and reduce areas of uncertainty. The investigation program outlined in this GIWP is intended to utilize current best practices, procedures, and guidelines in order that the subsequent IES provides the maximum amount of high-quality information on which critical dam safety recommendations and decisions will be made.

Scope of Work

AECOM's scope and approach to implementing the GIWP are described herein. We have also taken the liberty to summarize various options that we believe would provide added value and enhance the geotechnical investigation.

AECOM's approach begins with selection of highly qualified engineers and geologists with extensive exploration and design experience for new and existing dam projects of all sizes in southern California. Staff having geotechnical exploration, as well as dam design experience, are more likely to recognize situations where it may be desirable to refocus efforts or employ another exploration or testing technique. Experienced staff also know how to summarize and document the exploration and testing programs in a succinct yet comprehensive data report. This allows the Engineer to quickly find needed information. Although the PDF of the data report will be created as a bookmarked and searchable document, we will also provide the data in their native format (e.g., GIS, CADD, Excel), allowing the Engineer to incorporate the data into the workflow with minimal effort.

Task 1 – Project Management

AECOM will conduct effective project management that adheres to the scope, schedule, and budget; provide efficient and frequent communication with IRWD and other project stakeholders; and implement AECOM's Quality Management System (QMS) to provide effective quality assurance/quality control. Project management encompasses:

A. Preparation of Project Status Reports

AECOM will prepare weekly and monthly project status reports for IRWD's management team. The weekly status reports will consist of a brief (one to two paragraphs) email summarizing work activities completed the previous week, along with activities planned for the upcoming week. Monthly status reports will provide more detail and summarize work for the previous and upcoming month. The monthly reports will include an updated project schedule (Microsoft Project Gantt Chart), a summary of budget expenditures to date per task, and budget remaining. In addition to the status reports, AECOM's Project Manager will maintain strong lines of communication with IRWD via email and telephone.

B. Meetings and Workshops

AECOM will organize and conduct meetings and workshops to keep the project team informed on work in progress, coordinate field activities, and present deliverables. We will prepare and submit meeting agendas for IRWD review and concurrence at least three days prior to the meeting. Draft and final minutes for all meetings and workshops will be prepared and submitted to IRWD within one week of each meeting. Exhibit 1.1 presents a summary of the meetings anticipated.

Exhibit 1.1 - Anticipated Meetings

Meetings/Workshops	Description
Kick-off Meeting	One (1) two-hour meeting
Monthly progress meetings	Four (4) one-hour meetings
Site visit (miscellaneous)	One (1) two-hour meeting
Present Draft Geotechnical Data Report	One (1) two-hour meeting
Present Final Geotechnical Data Report	One (1) two-hour meeting

C. Quality Assurance/Quality Control

AECOM will implement its QMS throughout the project to ensure consistent quality control for all project phases. The QMS system is based on the ISO 9001 standard and is required on all AECOM projects. Each project deliverable will undergo detail checking and an independent technical review. The detail checking review focuses on a review of grammar, spelling, drafting, boring and test pit logs, consistency of laboratory data with field exploration, and consistency in nomenclature for features and geologic descriptions. The independent technical review will be performed by experts in the related field who have not been involved in preparation of the deliverable. In addition, our laboratory is certified with the American Association of State Highway and Transportation Officials Accredited Program (AAP/AMRL), the US Department of Agriculture (Soil Receive Permit), the US Army Corps of Engineers, and the City of Los Angeles.

D. Project Schedule

AECOM will develop and maintain a Microsoft Project Schedule (Exhibit 4.1) that establishes the sequential logic of all tasks and milestones. Our Project Manager will monitor compliance with the schedule, update it monthly as necessary, and distribute it at monthly progress meetings. The schedule will include all primary work elements defined in the GIWP and scope of work, key milestones defined herein, deliverables, and IRWD review periods. If any issues arise that may cause delays, our Project Manager will develop proactive actions to recover and maintain the schedule.

Task 2 – Geotechnical Data Collection and Investigations

The primary goal of the geotechnical investigation is to document and characterize the geologic and geotechnical conditions at the site for use by others in an IES for Rattlesnake Dam. The GIWP includes investigative borings, a test pit (optional) and seismic refraction lines at the embankment and spillway to evaluate subsurface conditions.

A. Geotechnical Investigations

This section of our proposal presents our general plan for the expeditious implementation of the field investigation. The field investigation includes the following items:

- 10 Cone Penetration Tests (CPTs) through embankment and foundation soils with a total length of approximately 790 feet.

- 5 seismic refraction lines (4,600 lineal feet).
- 7 SPT (Standard Penetration Test) borings through soil and bedrock with a total length of approximately 770 feet.
- 2 sonic boreholes with a total length of approximately 185 feet.
- Obtaining rock cores with a total length of up to 200 feet in all 7 SPT borings.
- Performing packer testing in bedrock to estimate hydraulic conductivity.
- Perform televiewer surveys in the bedrock portion of each SPT boring.
- 1 exploratory test pit (optional as directed by IRWD).
- 3 spillway core borings for sampling concrete lining and foundation bedrock samples to a total depth of 10 feet below the top of the spillway slab or the surface of the spillway approach channel.

The proposed locations of the explorations are shown on Exhibit 1.2 and a detailed summary of the exploration program including type, location, depth, instrumentation, in-situ and lab testing is provided in Exhibit 1.3.

The field investigations will be performed in two phases. The initial phase of work (Phase 1 Explorations) will include the CPTs and the Seismic Refraction lines. The data and information gathered during the Phase 1 investigation will be presented in a Preliminary Data Report. Following their review and evaluation of the Preliminary Data Report, IRWD and the Engineer will collaborate with AECOM to update and refine the Phase 2 Investigations. The updated program will include details related to the following:

- Anticipated number and locations of SPT tests in each boring
- Anticipated number and location of undisturbed tube samples to be obtained in each boring
- Anticipated locations and details related to instrumentation to be installed in the borings
- Other program changes as directed by IRWD and the Engineer

Pre-Exploration Activities

Health and Safety Plan

Safety is first and foremost. AECOM will complete a Site-Specific Health and Safety Plan (HASP). The HASP will be submitted to IRWD a minimum of 2 weeks prior to the initiation of any field activity for review and comment. AECOM's subsurface exploration subcontractors shall also prepare a HASP for their specific operations, with copies of the Exploration HASPs provided to IRWD's Project Manager prior to the initiation of any field exploration activities. AECOM's Field Exploration Manager will act as the Site Safety and Health Officer for field staff during the exploration field work. Safety tailgate meetings will be conducted prior to the start of exploration operations at the beginning work each day. The daily tailgate meetings will contribute to a good safety culture for the project.

Exploration Permitting and Utility Clearance

AECOM will obtain well/boring permits from Orange County Environmental Health department per the Orange County Well Ordinance (County Ordinance No. 26w07) for the SPT and sonic borings and the CPTs. No permitting will be necessary for the 10-foot-deep borings in the spillway.

AECOM will stake all the boring locations and the test pit location identified in the GIWP and notify Dig Alert (Underground Service Alert) to identify the potential for underground utilities. Dig alert will be notified a minimum of four working days prior to commencement of subsurface investigations.

Explorations

AECOM has carefully selected a team of highly qualified subcontractors that will implement the field investigation.

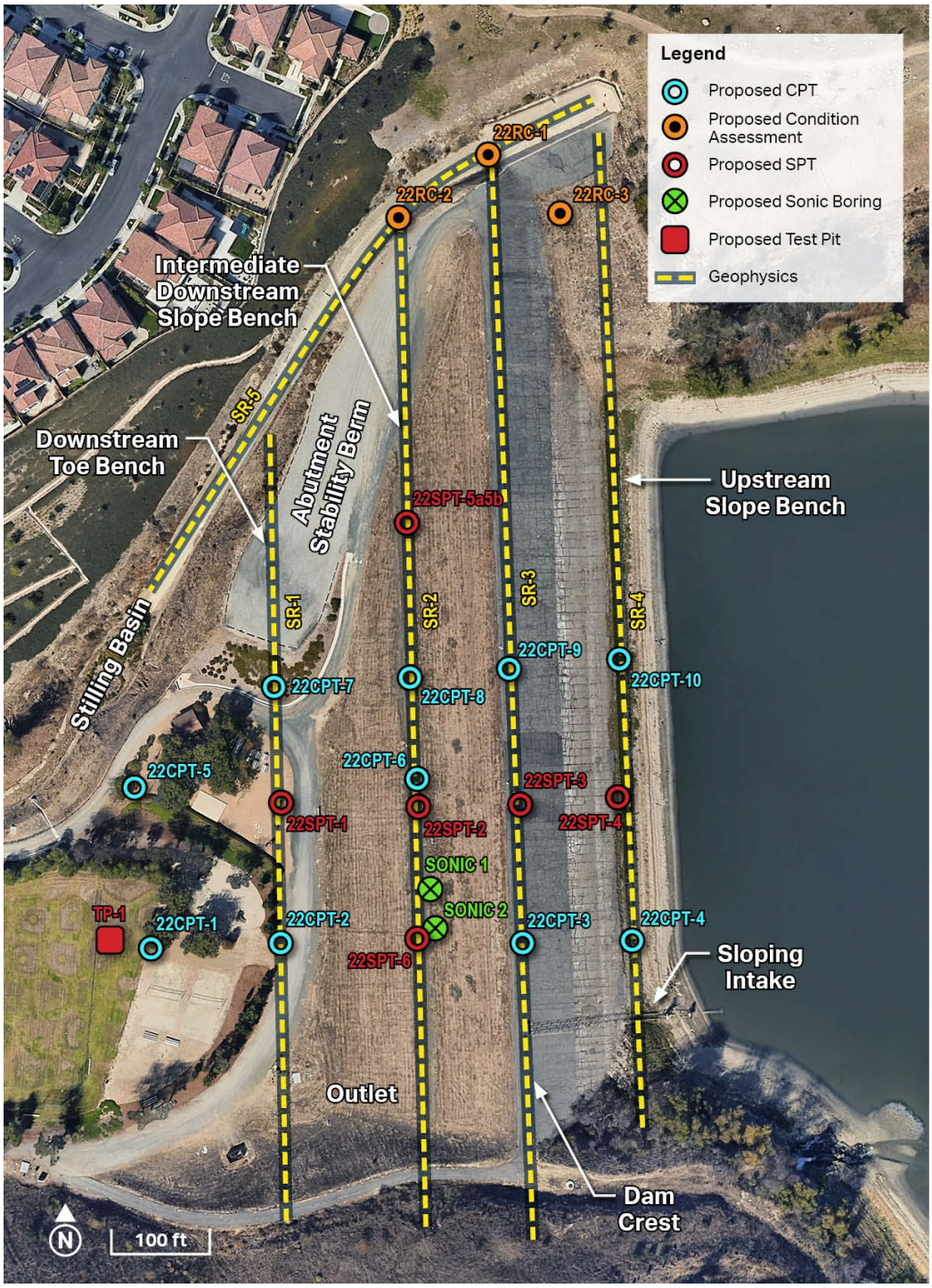

Exhibit 1.2 - Site Exploration Plan

Exhibit 1.3 - Summary of Explorations

ID	Type	Depth or Length (feet)	Instrumentation	In-situ Testing	Lab Testing
22CPT-1	Cone Penetration Test	60	Not Applicable	Pore pressure dissipation tests at 10-foot intervals	Not Applicable
22CPT-2	Cone Penetration Test	60	Not Applicable	Pore pressure dissipation tests at 10-foot intervals	Not Applicable
22CPT-3	Cone Penetration Test	100	Not Applicable	Pore pressure dissipation tests at 10-foot intervals	Not Applicable
22CPT-4	Cone Penetration Test	90	Not Applicable	Pore pressure dissipation tests at 10-foot intervals	Not Applicable
22CPT-5	Cone Penetration Test	65	Not Applicable	Pore pressure dissipation tests at 10-foot intervals	Not Applicable
22CPT-6	Cone Penetration Test	100	Not Applicable	Pore pressure dissipation tests at 10-foot intervals	Not Applicable
22CPT-7	Cone Penetration Test	20	Not Applicable	Pore pressure dissipation tests at 10-foot intervals	Not Applicable
22CPT-8	Cone Penetration Test	85	Not Applicable	Pore pressure dissipation tests at 10-foot intervals	Not Applicable
22CPT-9	Cone Penetration Test	120	Not Applicable	Pore pressure dissipation tests at 10-foot intervals	Not Applicable
22CPT-10	Cone Penetration Test	90	Not Applicable	Pore pressure dissipation tests at 10-foot intervals	Not Applicable
22SPT-1	HSA/HQ Core Boring	80	None	P-S Suspension, televiewer and packer testing	As per the laboratory testing schedule presented in the GIWP, to be adjusted during the field investigation
22SPT-2	HSA/HQ Core Boring	110	None	P-S Suspension, televiewer and packer testing	As per the laboratory testing schedule presented in the GIWP, to be adjusted during the field investigation
22SPT-3	HSA/HQ Core Boring	150	Two Open Standpipes with Vibrating Wire Piezometers and Data Logger	P-S Suspension, televiewer, and packer testing	As per the laboratory testing schedule presented in the GIWP, to be adjusted during the field investigation
22SPT-4	HSA/HQ Core Boring	125	None	P-S Suspension, televiewer, and packer testing	As per the laboratory testing schedule presented in the GIWP, to be adjusted during the field investigation
22SPT-5A	HSA/HQ Core Boring	90	Two Open Standpipes equipped with Vibrating Wire Piezometers and Data Logger	P-S Suspension, televiewer, and packer testing	As per the laboratory testing schedule presented in the GIWP, to be adjusted during the field investigation
22SPT-5B	HSA/HQ Core Boring	115	None	P-S Suspension, televiewer, and packer testing	As per the laboratory testing schedule presented in the GIWP, to be adjusted during the field investigation
22SPT-6	HSA/HQ Core Boring	100	None	P-S Suspension, televiewer, and packer testing	As per the laboratory testing schedule presented in the GIWP, to be adjusted during the field investigation
SONIC 1	Sonic Boring	90	None	None	As per the laboratory testing schedule presented in the GIWP, to be adjusted during the field investigation
SONIC 2	Sonic Boring	95	None	None	As per the laboratory testing schedule presented in the GIWP, to

ID	Type	Depth or Length (feet)	Instrumentation	In-situ Testing	Lab Testing
					be adjusted during the field investigation
TP-1 (optional task)	Test Pit	10-20	None	Sand Cone density tests at 5-foot intervals	As per the laboratory testing schedule presented in the GIWP, to be adjusted during the field investigation
22RC-1	NQ Core Boring	10	None	None	As per the laboratory testing schedule presented in the GIWP, to be adjusted during the field investigation
22RC-2	NQ Core Boring	10	None	None	As per the laboratory testing schedule presented in the GIWP, to be adjusted during the field investigation
22RC-3	NQ Core Boring	10	None	None	As per the laboratory testing schedule presented in the GIWP, to be adjusted during the field investigation
SR-1	Seismic Refraction Survey	800	Not Applicable	Not Applicable	Not Applicable
SR-2	Seismic Refraction Survey	1000	Not Applicable	Not Applicable	Not Applicable
SR-3	Seismic Refraction Survey	1100	Not Applicable	Not Applicable	Not Applicable
SR-4	Seismic Refraction Survey	1000	Not Applicable	Not Applicable	Not Applicable
SR-5	Seismic Refraction Survey	700	Not Applicable	Not Applicable	Not Applicable

Phase 1 Explorations

Cone Penetration Tests

Kehoe Testing and Engineering (Kehoe) will serve as our subconsultant for performing the 10 Cone Penetration Tests (CPT). Kehoe recently teamed with AECOM for geotechnical investigations at the Syphon Reservoir Improvement Project (SRIP) and has performed numerous other investigations for AECOM. Kehoe operates two 30-ton (4-axle) CPT rigs. By adding a fourth tag axle they can legally operate their rigs at a full 30 tons, which gives them the ability to push deeper and through denser soils. The rigs and tooling were specifically designed with the challenging soils often encountered in California. The air-conditioned testing area of the CPT rig contains the push frame, data acquisition system, portable computer and color printer. A 500-gallon stainless steel water tank is mounted in front of the push frame to provide even more ballast when required. For seismic shear wave measurements an air actuated hammer is built into the front jack pad of the CPT rig. This setup provides excellent coupling with the ground because of the weight of the rig. The powerful seismic hammer provides clear shear wave measurements to depths over 150 feet. The shear wave hammer is controlled by the operator inside the CPT rig (unlike many manual shear wave hammer setups) for maximum efficiency.

For sites that require limited travel over loose soils, Kehoe has mats that allow access for the CPT rig. AECOM suspects this will be required for accessing 22-CPT-4 and 22-CPT-10 which are along the upstream bench of the Rattlesnake Dam. Depending on the water level at the timing of the Phase 1 investigations, this bench may be partially saturated and soft and therefore present some access difficulty. AECOM has worked with Kehoe in the past with similar soft ground conditions and are confident they can access these two sites with their 30-ton four axle rig.

Seismic Refraction Lines

GEOVision Inc. (GEOVision) will serve as our subconsultant for performing the 5 seismic refraction lines. AECOM has worked with GEOVision on several of our recent dam projects, including the SRIP, Santa Anita Debris Dam Seismic Strengthening and Enlargement Project, Vail Dam Seismologic and Hydrologic Remediation Project, Tinemaha Dam and South Haiwee Dam Fault Study. GEOVision is a full-service geophysical service company that offers high-quality geophysical data acquisition, analysis, and imaging services. As the largest geophysical company in the local area (Corona), GEOVision has on staff five registered geophysicists to rapidly respond when called.

GEOVision will follow the procedure detailed in ASTM D 5777. The seismograph used during the investigation will consist of three to four Geometrics Geode 24-channel seismograph(s), or equivalent. The seismic energy source will consist of a truck or UTV-mounted accelerated weight drop (AWD), Betsy downhole percussion firing rod (DPFR), or sledgehammer and an aluminum plate. Receivers will consist of 4.5-, 8-, or 10-Hz vertical geophones aligned in a single and overlapping spreads of up to 96 geophones. Geophones will be spaced nominally 10 ft, for spread lengths of up to 950 feet. The actual number of geophones used, sources, geophone spacing, and line lengths will be determined in the field. Each line will be conducted with a minimum of 12 shot points occupied per spread: forward and reverse end shots, off end shots, and multiple interior shots. Additional care will be taken for SR-4, on the upstream bench, since this S-wave data will be combined with borehole data to obtain Vs30 measurements in the rock. MAS_LW may be required, which will require additional measurements. Seismic data will be stored on thumb drive or hard disk, and back up to laptop computer. Relative elevations along each seismic line will be measured with an engineer's transit and rod. The endpoints of the seismic lines will be surveyed with a submeter GPS unit. Seismic refraction data will be processed using seismic tomography techniques and/or the generalized reciprocal method (GRM).

The report for the seismic investigation will include a discussion of field procedures, geophysical techniques, data processing and interpretation, and the results of the geophysical survey. The report will also include a site map showing the location of the geophysical traverses, interpreted seismic sections. Original field data files will be provided electronically. The report will be reviewed and approved by a California Professional Geophysicist.

GEOVision has expressed some concerns regarding Seismic Line SR-5. They noted that the physics of the refraction require straight lines. So, if the lines on the spillway are required, it would necessitate at least two shorter and separate lines be done. The depth of investigation of these shorter lines would not be as deep. Furthermore, seismic refraction on concrete is not feasible due to signal loss (radiates everywhere). They recommend moving SR-5 to an alternative location adjacent to the southeast side of the spillway cute.

Phase 2 Explorations

The comprehensive drilling investigation described in the GIWP is the principal component of the field exploration. Successful, on time completion of the drilling will require careful planning and execution. As noted above the finding of the Phase 1 Explorations will be summarized in a draft data report, reviewed by IRWD and the Engineer, and then the planned details of the drilling program will be refined and implemented. The drilling investigation includes hollow stem auger (HSA)/HQ core borings and sonic borings at the dam, and shallow NQ core borings in the spillway chute and spillway approach channel. The following presents our approach to completing the Phase 2 explorations.

Hollow Stem Auger and Core Borings

Seven (7) borings with hollow stem auger through the dam embankment and HQ core drilling in the bedrock will be performed at the locations shown on Exhibit 1.2. In addition, 2 nested standpipe piezometers will be installed in two of the borings. P-S Suspension logging and acoustic or optical televiewer surveys will be performed in all seven of the borings. We estimate that approximately 30

packer permeability tests will be completed in the bedrock portions of these borings. AECOM will have a professional geologist (PG) certified in the State of California, log each boing. AECOM and its drilling subcontractors will adhere to the detailed description of the drilling and in-situ testing methodologies described in the GIWP. In particular we emphasize the importance of implementing extreme care in drilling and sampling through the dam embankment the underlying alluvium. Special precautions, as detailed in the GIWP will be implemented to prevent heave of the embankment fill into the auger, and to prevent hydrofracturing of the embankment fill.

Soil sampling will be performed in accordance with the GIWP and applicable ASTM standards. Rock coring will be collected using diamond core techniques, logged, and photographed in the core sleeve, and placed in core boxes. Soil samples and core boxes will be first taken to our geotechnical laboratory in Anaheim for cataloging and review. An engineering geologist will review the rock core with the field logs and will photograph the core boxes for the data report. A geotechnical engineer will review boring logs and soil samples and assign lab testing. We have a sample inventory and test tracking sheet for all samples, which is maintained on our server. We will send the proposed laboratory testing plan and field boring logs to the Engineer for review prior to testing. Upon completion of the tests, all samples remaining will be taken to the site and stored in container. AECOM will maintain a log of the samples collected at the site so they can be readily retrieved and inspected or tested further.

Tri-County Drilling will serve as our drilling subcontractor for the 7 Hollow Stem Auger (HSA) /Core borings (Borings 22SPT-1 through 22 SPT-6) that will be drilled through the embankment of the dam and into the underlying alluvium or bedrock. Tri-County Drilling, who recently completed four HSA/Core borings for AECOM at Syphon Reservoir, has worked with AECOM on several dam projects in southern California including the planned Ortega Reservoir, North Haiwee Dam, Green Acres Dam, Prado Dam Spillway, and Lee Lake Dam. The company has performed numerous dam investigations for AECOM, and has proven invaluable in high-quality core recovery, packer testing, and well installation. We are confident that Tri-County Drilling will continue its successful track record at Rattlesnake Reservoir.

Tri-County Drilling and AECOM have worked together on many dam projects in Southern California – Syphon Reservoir

All borings that are not completed with an open standpipe piezometer, or the lower portion of borings below the bottom of partial depth piezometers, will be backfilled with a neat cement grout in accordance with Orange County Environmental Health well permit requirements. Borings will be backfilled within 24 hours of completion. All investigation derived waste (IDW)including drill cuttings and well development water will be drummed, tested (analytical), and disposed of at an appropriate landfill facility. For cost estimating we have assumed that the IDW will be classified as non-hazardous.

Spillway Core Borings

Three core borings, two (22RC-1 and 22RC-2) extending 10 feet below the surface of the spillway chute and one (22RC-3) extending 10 feet below the surface of the spillway approach channel will be done to characterize the condition of the upper spillway chute section concrete lining and the erodibility of bedrock below concrete or approach channel armoring. The core borings will be performed by Tri-County Drilling. For accessing borings 22RC-1 and 22RC-2, Tri-County Drilling will lower and lift a limited access rig into

and out of the channel with a truck mounted crane. GEOVision will perform Ground Penetrating Radar surveys at the two proposed coring locations on the spillway concrete slab (Borings 22RC-1 and 22 RC-2), to locate and mark the rebar within the slab so it can be avoided when coring. These borings will be tremie grouted (with a cement/bentonite mixture) to the bottom of the concrete slab and allowed to set-up overnight. The slab section of the boreholes will be backfilled with a non-shrinking/high strength grout (e.g. Sika Grout 328). Prior to the placement of the Sika Grout, the borehole walls will be roughened and notched with a grinder. After the roughening and notching, the grout will be poured by hand to the top of the slab.

If steel reinforcement within the spillway slab is accidentally nicked or severed during coring, AECOM will provide a proposed repair detail for review and approval by DSOD. For example, recent repair work for the Prado Dam Spillway Modifications Project required cutting spillway slab rebars and those repairs included coating the cut rebar with an integral corrosion inhibitor, adding overlapping rebar dowels drilled and epoxied in place, and coating the roughened sides of the concrete hole with a bonding agent prior to placing a 5,000-psi concrete patch. Any spillway slab repairs required at Rattlesnake Dam would be consistent with recommendations included in the U.S. Bureau of Reclamation “Guide to Concrete Repair”, Second Edition (August 2015).

In addition to logging the shallow core borings, AECOM will use a downhole camera to video the contact between the bottom of the slab and the top of the bedrock to inspect the condition of the slab/bedrock contact (e.g., inspect for the possibility of voids between the concrete and the bedrock).

The drill cuttings will be drummed, tested (analytical), and disposed of at an appropriate landfill facility. For cost estimating we have assumed that the cuttings will be classified as non-hazardous.

Packer Testing (Lugeon Testing)

The GIWP indicates that Packer (Lugeon) testing shall be performed in the bedrock portions of the seven SPT borings. The packer tests will be performed with single packer testing using down-stage technique and shall follow procedures and evaluation methodology described by Houlsby (1976) and that testing intervals shall be selected in the field based on the observed conditions of the rock core. For cost estimating we have assumed that approximately 30 packer tests will be done in the SPT borings.

AECOM recently completed 146 packer tests at the SRIP, many of which were in the same bedrock formation that is at Rattlesnake Dam (the undifferentiated Vaqueros and Sespe Formations). Based on that experience we know what quality of rock is needed to get a tight seal of the packer to perform a successful test. We will utilize that experience in deciding where to place the packer to proceed with the test. If the rock is pervasively fractured and weathered with a poor Rock Quality Designation (RQD) we know that it is unlikely that a tight seal can be achieved, and a successful test accomplished. The down-stage technique of packer testing can be a significant delay for advancing the boring, so it’s important that an attempted test will be a successful test.

Packer testing is a skill set that relatively few drilling companies are proficient at. Tri-County Drilling has performed packer testing with AECOM on several dam projects, including the proposed Ortega Reservoir, the proposed Green Acres Dam, and the Prado Dam Spillway Modifications Project. We know they have the equipment and expertise to perform packer testing and we trust they can accomplish this relatively complex in-situ test.

Downhole Geophysics

Acoustic and optical televiewer surveys will be performed in the bedrock portions of the SPT borings that are below the HSA casing depth, which will likely be set a few feet into the uppermost bedrock. Six of the seven borings are planned to penetrate 25 feet into bedrock and one of the seven borings is planned to go 50 feet into bedrock.

AECOM will have GEOVision perform the P-S suspension and the televiewer surveys. GEOVision recently performed five (5) P-S Suspension Surveys and 24 televiewer surveys at the SRIP. They have also performed these services for AECOM on several other dam projects including Tinemaha Dam, South Haiwee Dam, Sawpit Debris Dam. GEOVision has on staff five registered geophysicists to rapidly respond when called. This will be particularly important when doing the downhole geophysics, as the completion of the borings will be reliant on the expeditious mobilization of the geophysicist to complete the geophysical survey.

VALUE ADDED

With a deep bench of local registered geophysicists, GEOVision has the capacity to quickly mobilize field resources when needed for downhole surveys.

GEOVision has brought to our attention that a 15-foot rat-hole (extra depth of the hole beyond the zone of interest) would be needed to acquire P-S suspension data to the planned depth of the holes (~25 feet and 50 feet below the top of rock). For your consideration, we are providing, as an optional task, a footage rate for extending each boring and extra 15 feet to facilitate the P-S suspension logging.

Well Installation and Development (Piezometers)

Borings 22SPT-3 and 22SPT-5a will be completed with standpipe piezometers equipped with vibrating wire piezometers (VWP) and data loggers. The standpipes will be 1.5-inch diameter PVC casings with a 0.020-inch machined slotted interval. The screened intervals of the piezometers will be backfilled with No. 3 sand filter pack. The screened intervals of piezometers for the filter pack will be 5, 10, or 20 feet long. The intervals will be determined by the Field Exploration Manager and based on the specific findings of the boring. Bentonite seals will be installed around the screened intervals. Upon completion, the piezometers will be properly developed by surging with a bailer and removing a specified volume of water as directed by the field personnel and in accordance with the procedures in the USBR (1995) Ground Water Manual.

Nested piezometers (multiple standpipe piezometers installed in the same borehole) designed to measure more than one zone of influence, might be installed. The installation of the nested piezometers will include a minimum 10-foot grout or bentonite seal between the screened zones. Specific intervals to be targeted for groundwater measurements will be determined during drilling by the Field Exploration Manager to correspond with soil/rock conditions encountered. The Field Exploration Manager will provide installation details to the AECOM PM, the IRWD and the Engineer for a quick check, prior to the installation.

For cost estimating, we have assumed that two standpipe piezometers will be installed in 22SPT-3 and two piezometers will be installed in 22SPT-5a. We have assumed that one standpipe will extend into bedrock, near the total depth of the boring, and the other piezometer will be installed to a depth near the base of the alluvium. However, we foresee a problem with installing a 1.5-inch PVC standpipe well in a HQ core hole which has a diameter of ~3.8 inches. A 1.5-inch casing has an outside diameter of 1.9 inches. In accordance with the Water Well Standard for the State of California, the annular seal would be required to be a minimum of 2 inches in radial thickness (in other words the borehole diameter needs to at least 4 inches larger than the outside diameter of the well casing). Thus a 6-inch hole would be needed to install the standpipe. The core boring could not be reamed to that size with the 8-inch HSA serving as the casing within the embankment and the alluvium. We believe the solution to this problem would be to forego using a standpipe and instead install a VW piezometer in the bottom of the HQ borehole using the fully grouted method. The VW piezometer would be installed to the desired depth with a PVC placement pipe and both the inside and outside of the PVC placement pipe would be tremie backfilled to the top of the HQ hole. The placement pipe would not be an open well, therefore the 2-inch minimum annular space would not be required. Prior to installation AECOM will discuss options for the wells that would meet the requirements of the DSOD, the State of California Well standards, and the Engineer.

Each of the piezometers will be finished with a flush mounted surface casing suitable for protecting the instrumentation and housing of the data loggers (a traffic-rated Christy box). Each surface casing shall be appropriately marked with the boring and instrumentation numbers for future reference and proper recording of instrumentation data. Groundwater level measurement shall be downloaded from the data loggers up to immediately prior to submittal of the Final GDR and the project schedule end date (November 30, 2023).

Slug Tests

Slug testing will be performed in 22SPT-3 and 22SPT-5a after the standpipe piezometers have been adequately developed. Slug tests (also known as falling/rising head tests) will be performed by rapidly inserting a solid mandrel (slug) to displace an excess head of water in the well, followed by monitoring of this excess head dissipation (a falling head test). Once the water level in the well reaches the approximate pre-test static water level, the mandrel is extracted, resulting in a water level drop that is monitored until it returns to a near static water level (a rising head test). The slug tests shall be performed based on the guidance presented in the USBR Ground Water Manual (1995) and in the United States Geological Survey GWPD 17 technical procedures (USGS, 2010). The water levels will be monitored during slug testing by a pressure transducer and automated data logger. From the recorded data, an estimate of hydraulic conductivity will be calculated using one of the methods recommended in the Ground Water Manual (USBR, 1995) based on the aquifer conditions and the position of the screened portion of the piezometer with respect to the groundwater or confining layers. The slug test (falling/rising head tests) will be repeated multiple times in the piezometers to evaluate the variability and repeatability of the test; a minimum of four tests will be performed within each piezometer slug testing is required.

Sonic Borings

Two (2) sonic drilling holes will be advanced on the intermediate downstream slope bench. Sonic drilling provides continuous soil sampling and will be used to collect soil samples and assess the condition of the chimney drain. The challenge of the sonic holes will be to successfully intersect the vertical portion of the chimney drain which is about greater than 40 feet below the upslope side of the bench and only about 7 feet wide. BC2 Environmental LLC (BC2) will be our subconsultant for these Sonic Borings. BC2 is an Orange County-based, full service environmental and geotechnical drilling company that has an extensive fleet of drill rigs suitable for varying geologic and access conditions. BC2 has a rubber-track-mounted sonic rig (Terra Sonic 150 CC) that AECOM has recently utilized on another project. We believe this rig is ideally suited for the narrow bench that the sonic borings will be advanced from. The bench is approximately 15 feet wide and the optimum drill hole location to intersect the chimney drain is at the upslope side of the bench. The TSI 150 CC, has a width of approximately 7 feet and length of approximately 19 feet and it can drill at an angle. These dimensions and capabilities will allow it to maneuver for the optimal set up to intersect the chimney drain (very close to the upslope side of the bench). It also has the ability to drill at an angle so if it is determined that a slight tilt (a few degrees from vertical) of the drill mast will be necessary to intersect the chimney, that can be accomplished. As requested in

Downstream slope of Rattlesnake Dam showing the intermediate bench where the two sonic borings will be drilled from.

Addendum No. 1 of the RFP, we are providing as an optional task the cost for advancing two additional sonic borings, that could be done should one or both initial borings not intersect the chimney.

We are expecting that the DSOD will require some special requirements for backfilling the sonic borings. We anticipate that the requirements will generally include grouting the zone beneath the chimney, placing about two feet of bentonite plug in the upper two feet of that zone, placing filter material in the area of the chimney, placing about six feet of bentonite plug above the chimney zone, and grouting the remaining length to the surface.

Test Pit (Optional)

The GIWP describes the excavation of an up to 20-foot-deep test pit located downstream of the downstream toe of the dam, east of the sand volleyball court as a possible means of providing direct testing and sampling of the foundation materials for the liquefaction evaluation. The purpose of the test pit would be to allow the visual logging of near surface soils and bedrock, the collection of large, disturbed bulk samples for laboratory testing, and in-situ density testing with sand cones. The in-situ density testing along with the bulk samples would be used to estimate the minimum and maximum density of the foundation soils and the density state (percent of maximum index density) indicated by the sand cone tests would add significant data for correlation of borehole SPT and CPT measurements. The sand cone density testing will be performed at 5-foot intervals as the test pit is progressively deepened. AECOM has assumed that up to 4 depth intervals would be tested (at 5-foot, 10-foot, 15-foot and 20 foot) if the test pit is advanced to a 20-foot depth.

The test pit is an optional task. AECOM, the IRWD and the Engineer will consider the information gathered from CPT-1, CPT-2, CPT-5 and CPT-7 to assess the potential for the test pit excavation to be successfully completed. We note that the GIWP requested that the subcontractor develop an approach for how to control wet, saturated, soft, yielding, sensitive, unstable conditions in the test pit. AECOM believes that such conditions will prevail once the groundwater table in the alluvium is encountered. For safety reasons AECOM believes that the test pit should not be entered for in-situ testing once it has for advance below the groundwater table. From our experience any attempt to dewater (lower the groundwater table) in the vicinity of the test pit would be prohibitively expensive. Should IRWD continue to desire advancing the test pit below the groundwater table, AECOM can discuss what it might take to successfully dewater the test pit area. However, at this time, we do not understand the conditions at the test pit site to develop a credible dewatering plan and cost estimate for this proposal. In lieu of advancing the test pit below the groundwater table, we are proposing, for your consideration, drilling an optional mud rotary soil boring adjacent to the test pit to a depth of 20 to 25 feet. Shelby tube samples would be collected from the boring and density testing can be performed on the Shelby tube samples.

Innovative Service Group Inc. (ISG) will be our excavation contractor for the test pit. ISG teamed with AECOM on the SRIP, performing 20 test pits, three fault trenches, excavation of two undisturbed block samples, and trail blazing (road establishment) to provide access for drill rigs. As part of that task, ISG did an outstanding job of excavating safe benched and shored fault trenches that allowed inspection of the fault by AECOM, IRWD and the DSOD. ISG has also teamed with AECOM on several other dam projects, including Vail Dam, Tinemaha Dam and the planned Ortega Reservoir.

Sample Logging, Collection, and Storage

Drive samples will be obtained using a Standard Penetration (SPT) sampler without liners, or a Modified California (MC) sampler with liners. The driller will provide an acceptable recent hammer energy calibration report to the Engineer for approval or shall calibrate the automatic hammer used for SPT borings prior to the execution of the SPT borings. Push samples shall be obtained using a Shelby Tube (3.0-inch diameter) sampler, or similar. Unless otherwise directed or indicated by the early CPT investigations, SPT sampling is to occur every five feet and Shelby Tube, or Modified California (MC) samples will be taken in between SPTs. The type of sampler used at each sampling depth interval shall

be carefully monitored in the field by the logging geologist and the field exploration manager based on the final sampling plan, or to match the material that is being encountered or expected.

Bedrock will be drilled and sampled with HQ-size (wire-line) rock coring methods. The coring shall be continuous with runs up to 5 feet in length using HQ-3 wire-line triple barrel system. Core runs will be photographed and logged in the core barrel inner sleeve before being transferred to a wooden core box. The core will be placed in the core boxes that will be labeled according to depth with wooden blocks. No recovery zones will be shown 2 to 3-inch diameter closed cell foam spacers. The labeled core boxes will be photographed with a folding ruler shown for scale. Core box photographs will be provided in an appendix of the GDR.

The soil and rock samples will be logged by a registered state of California Professional Geologist (PG) at the drill site as the drilling progresses. The logging will be done in general accordance with ASTM D5434 (Standard Guide for Field Logging of Subsurface Explorations of Soil and Rock), ASTM D2488 (Standard Practice for Description and Identification of Soils (Visual-Manual Procedures) and USBR Engineering Geology Field Manual (2001).

The GIWP requests that exploration samples be collected and stored in appropriate containers, bags, jars and core boxes and stored within a secured container to be placed at the site during the exploration program. Alternatively, if agreed to by IRWD, we propose that the soil samples and core boxes be taken to the AECOM geotechnical laboratory in Anaheim for temporary storage. In our laboratory each soil sample and core box can be photographed under fluorescent lighting to produce consistent sample photographs for inclusion in the Geotechnical Data Report (GDR). The soil samples and core boxes will be available at the laboratory for inspection by the Field Exploration Manager during his review of the field boring logs and by the geotechnical engineering team during assignment of laboratory tests. The samples will be stored at the laboratory until they are reviewed for selection of laboratory testing, and all logging and photographs are completed. Soil and rock samples will be returned to the project site and properly sealed and stored in a District provided 20-foot long conex storage box.

Deliverables:

a. *Health and Safety Plan*
b. *Permit Applications*
c. *Field Boring, CPT and Test Pit logs for inclusion in the Geotechnical Data Report (GDR)*
d. *Geophysical investigation report as an attachment to the GDR*

B. Laboratory Testing Program

Following the completion of boring and test pit exploration activities, recovered soil and rock samples will be reviewed for laboratory testing. Geotechnical laboratory testing shall be performed on selected soil and rock core samples from the borings and bulk samples from the text pit excavations to aid in classification and development of engineering parameters. Material classification tests are likely to include grain size tests, Atterberg Limits tests, moisture content, specific gravity and dry density, and compaction tests. Strength tests are anticipated to include shear strength tests of reconstituted and intact soil samples and compression tests of intact recovered rock core specimens. All laboratory testing shall be performed according to ASTM standards. For cost estimating purposes a Laboratory Testing Schedule was provided in the GIWP, Appendix C. AECOM will collaborate with IRWD and HDR engineers to revise the testing schedule as needed based on the finding of the field investigation.

For this project, we propose to perform the laboratory testing described in the GIWP in our geotechnical laboratory in Anaheim, located about 20 minutes from Rattlesnake Reservoir. Since its creation, AECOM's laboratory (legacy Woodward- Clyde Consultants) has provided high-quality soils and soft rock testing services for various projects that include dams, levees, highways, bridges, industrial facilities, and

commercial buildings. The Anaheim laboratory provides testing services throughout California and across the US to internal and external clients. Our in-house laboratory is a convenient location to open samples and review logs while selecting samples for test assignments. As a full-service geotechnical laboratory, it is capable of providing all geotechnical testing needs for index properties, classification, and engineering properties. Index property testing includes unit weights, Atterberg Limits, and particle-size analysis among others. Our engineering testing capabilities include direct shear, torsional ring shear, triaxial testing (ICU, CD, UU), hydraulic conductivity, unconfined compression, and consolidation. Our laboratory is an AMRL/AASHTO-accredited, USACE- validated, and City of Los Angeles-licensed laboratory.

Deliverables

e. Proposed Laboratory Testing Plan

f. Laboratory test data and results for inclusion in the GDR

C. Geotechnical Data Report

Upon completion of the field investigation and the laboratory testing program, AECOM will submit Draft Exploration Program- Geotechnical Data report for review and comment. The GDR will be a comprehensive, well-organized compilation of all the geotechnical data acquired during the upcoming Geotechnical Investigation, with a succinct but comprehensive summary of the equipment and methodology used. We intend to provide all the information possible that could be useful to the Engineer. We will provide critical information, such as the energy efficiency ratio of the hammer used to drive the soil samplers, which is needed to correct the field-measured blow counts used to estimate soil strength, and for other purposes. AECOM will finalize the data report based on comments and comment resolution agreed to between the IRWD, the Engineer, and AECOM.

AECOM's experienced staff will know how to summarize and document the exploration and testing programs in a succinct yet comprehensive data report. This will allow the Engineer to quickly find needed information. Although the PDF of the report will be created as a bookmarked and searchable document, we will also provide the data in their native format (e.g., ASCII [text], GIS, CADD, Excel), allowing the Engineer to incorporate the data into their workflow with minimal effort.

Quality Geotechnical Data Report

Quality geotechnical data will result in efficient analyses. Since we are geotechnical engineers, we understand and recognize the importance of quality data.

- ✓ The GDR is critical for quality data
- ✓ The GDR will be thoroughly reviewed by experts in the field
- ✓ AECOM has delivered quality GDR's for many dams, including:
  - Syphon Reservoir Improvement Project
  - Santiago Creek Dam Outlet Tower and Spillway Improvement Project
  - Trampas Canyon Dam – Recycled Water Reservoir
  - Santa Anita Debris Dam Seismic Strengthening and Enlargement Project
  - North Haiwee Dam Seismic Improvement Project
  - Sawpit Debris Dam Seismic Strengthening
  - Vail Dam Seismic and Hydrologic Remediation Project

AECOM will implement our Quality Management System (QMS) throughout the project to provide consistent quality control for all project phases. The QMS is certified to the ISO 9001:2015 standard and is required on all of our projects. Each project calculation will undergo a detail checking review. Each project report and technical memorandum will undergo an independent technical review and a detail checking review. The independent technical reviews will be performed by experts in the subject matter who have not been involved in preparation of the deliverable. The detail checking review will focus on consistency of content, clarity, grammar, spelling, and notes. The detail checker will verify that the bookmarked, searchable PDF file has been properly assembled. AECOM will provide IRWD with review comment disposition forms, redlines, redline back-checks, and QMS forms upon request.

1. Supplemental Proposal Responses

Modifications Based on DSOD's Comments on the GIWP

1. **An additional CPT shall be included adjacent to 22-SPT-4. This additional CPT will be designated 22CPT-10 and will be extended to a depth of up to 100 feet. Pore pressure dissipation tests and seismic soundings shall be performed at 10-foot intervals.**
Acknowledged. The additional CPT has been added to the scope of work and an adjustment to the budget proposal was made.
2. **CPTs, sonic borings, and surface geophysical testing shall be completed, and information from these explorations shall be provided to IRWD for evaluation before completion of the SPT borings. Requirements for SPT borings (anticipated sampling types and locations as well as instrumentation installation intervals) will be provided to the Geotechnical Firm based on the initial CPT, sonic and surface geophysical investigation results.**
Acknowledged. This was initially understood to be the sequencing of the investigation process. This DSOD comment elicits no change to our proposal scope or budget.
3. **Sonic boring samples shall be photographed in the field, and samples selected for laboratory testing before bagging.**
Acknowledged. Sonic samples are immediately bagged in 0.6 Mil plastic sleeving when they are extruded from the sample barrel. The sleeving will be cut open with a knife and samples will be photographed. A tape measure for scale and appropriate markings that show depth below ground surface of the sample will be included in the photo. The geologist will also log the soil sample at this time. Immediately following the logging, the sample sleeves will be closed with duct tape. The samples will be stacked on pallets and securely covered with a tarp for temporary storage. After the project team has reviewed the boring logs and photographs, samples will be selected for testing. This DSOD comment elicits no change to our proposed scope or budget.
4. **All SPT sampling blow counts shall be recorded per inch, and sample descriptions shall include field estimates of the percent gravel.**
Acknowledged. AECOM geologists have recent experience recording blow counts on a per inch basis. When blow counts are recorded on a per inch basis, we consider it a standard practice to record a video of the drive sample blows. The videos will be reviewed in slow motion to help get an accurate count of the blows per inch. This DSOD comment elicits no change to the budget.
5. **SPT samples shall be driven every 2 ½ feet (rather than alternating with the Modified California sampler). Driller shall have Modified California sampler, and additional Shelby Tube and Pitcher Barrel sample tubes available for use if needed.**
Acknowledged. This comment elicits no change to the budget.
6. **The boring backfill neat cement-bentonite grout mixture shall be specified in writing three weeks before the start of drilling. Grout backfill shall use the tremie method, and procedures shall be implemented to prevent drill hole collapse.**
Acknowledged. This comment elicits no change to the scope or budget.
7. **The sonic borings shall be backfilled with cement-bentonite grout everywhere except within the filter/drain portion of the exploratory hole. The filter/drain zone shall be**

backfilled with the continuous sample obtained from the existing filter/drain zone and supplemented with imported filter/drain material. The gradation requirements of the imported filter/drain material shall be an approved ASTM C-33 fine aggregate unless otherwise specified by IRWD. The final supplemental filter/drain material gradation requirements will be provided by IRWD three weeks before the start of the sonic drilling.

Acknowledged. This method is similar to what we described in our proposal. This comment elicits no change to our scope or budget.

8. **The selected Geotechnical Firm shall prepare and submit to IRWD an installation plan for the open standpipe piezometers three weeks before the start of drilling. The plan shall provide details on layout, materials used and installation methods. A conceptual sketch is provided below for estimating costs for piezometers (from IRWD's Syphon Dam project; see the layout shown for Boring B-9). IRWD will provide the required instrument screen interval depths.**

Acknowledged. The layout shown in Boring B-9 is what we described in our proposal. As mentioned in our proposal we believe it would be necessary to forego using a standpipe in the bedrock portion of the boring due to space restrictions and the necessity to have 2" annular space in accordance with state well standards. The planned installation includes a standpipe piezometer (equipped with a vibrating wire piezometer) in the alluvial portion of the boring, and a grouted in place, vibrating wire piezometer in the bedrock portion of the boring, similar to our installation of B-9 at Syphon Reservoir. This comment elicits no change to our budget.

9. **The decision to excavate a test pit, as well as the technical requirement for the test pit at the downstream toe of the dam will be based on the results of all CPT, SPT and surface geophysical testing results. A test pit plan shall be prepared and submitted to IRWD for TP-1 four weeks before start of the test pit excavation. The plan shall include test pit layout (dimensions including depth, slopes, benching, shoring, etc.), control of groundwater and backfilling methods. Note that compaction requirements including equipment, moisture conditioning and number of passes/rolls shall be included. Compaction with the excavator bucket is not permitted.**

Acknowledged. We will comply with this request to submit a test pit excavation plan four weeks before the start of excavation and the requirement to not use the excavator bucket for compaction. The assumed compaction methodology in our proposal assumed that compaction could be performed in part by tamping with the excavator bucket. Additional costs will be incurred for utilization of a compaction wheel attachment for the excavator. The addition of the attachment has been added to the budget proposal for the optional test pit. A preliminary and conceptual estimate of the methodology that will be utilized to complete the test pit is provided below in our response to statement 16.

Modifications Based on Bidder's Comments and Requests for Clarifications

10. **SPT boring 22SPT-2 shall be extended 100 feet into bedrock. Downhole geophysics shall be completed to obtain a shear wave (Vs30) profile within the bedrock. Cost for this deeper rock coring at 22SPT-2 shall be shown separately in the proposal cost estimate**

Acknowledged. Extending 22SPT-2 100 feet into bedrock means that the boring will be 185 feet deep. This would be 75 feet deeper than previously assumed in our initial proposal. Additional cost

for the extra 75 feet will include additional drillers costs (extra footage, drilling time, packer tests, core boxes, etc.) and additional time for AECOM labor. There will be no additional cost for the downhole geophysical survey (Vs30). The cost for extending this deeper rock drilling is shown separately as an optional task in our budget proposal which is submitted as a separate pdf file. Note that this extra footage, which would be done by Tri-County Drilling, is being proposed as Optional Task 5 in our budget proposal.

11. **SPT angle boring 22SPT-5b shall extend 50 feet into bedrock. All other SPT borings shall be extended 20 feet into bedrock (except 22SPT-2 as noted above).**

Acknowledged. Extending boring 22SPT-5b fifty (50) feet into bedrock is consistent with what was assumed in our proposal. Extending all other SPT borings (except 22SPT-5b and 22SPT-2) 20 feet into bedrock is 5 feet less than what was previously suggested in Addendum 1 (25 feet into bedrock). However, the GIWP suggested that five of the borings will be advanced 15 to 25 feet into bedrock. Therefore, it is not clear to AECOM that the intent of this comment was to suggest a reduction in footage of 25 feet (5 feet less for 5 borings). Therefore, currently the comment elicits no change in our previously assumed scope of work and budget. If the intent was to reduce footage, there can be a reduction of drilling costs proportionate to the footage reduction.

12. **Piezometers shall be constructed in 22SPT-3 and 22SPT-5 as shown in the GIWP.**

Acknowledged. Piezometers will be installed as detailed in Appendix A, section A.11 of the GIWP. As described above in question 8, it is anticipated that the nested piezometer installation will include a standpipe piezometer in the alluvial portion of the boring, and a grouted in place vibrating wire piezometer in the bedrock portion of the boring. This comment elicits no change to the scope or budget.

13. **All CPT soundings will complete both pore pressure dissipation tests and seismic soundings at 10-foot intervals.**

Acknowledged. The initial proposal assumed that pore water dissipation tests would be done at 10-foot intervals but that no seismic tests would be done. This change of scope elicits a cost increase. The revised cost for the CPT sounding with both pore water dissipation and seismic soundings is shown in our budget proposal, which is submitted as a separate pdf file.

14. **Seismic refraction line SR-5 may be shifted south (toward the embankment dam) to move the line off the spillway concrete slabs. The selected Geotechnical Firm and IRWD will collaborate to identify the best location and alignment of the line.**

Acknowledged. This comment elicits no change to the scope or budget.

15. **IRWD recognizes that there are some technical challenges associated with performing and interpreting the surface geophysical work requirements of the GIWP. The primary purpose of the testing is to provide an estimate of the bedrock surface beneath the dam and the corresponding depths/limits of the foundation alluvium beneath the dam. The estimates of the bedrock surface shall be calibrated against the result of all CPT, Sonic, and SPT borings as well as the level of bedrock encountered in previous borings drilled at the site. Both compression and shear wave velocities shall be considered in the evaluation of the surface geophysical surveys. An initial and final interpretation of the testing results may be necessary and the Geophysical survey subconsultants should use the approach deemed necessary to obtain a reasonable final interpretation of the bedrock surface.**

Acknowledged. This comment is requesting that our Geophysical consultant (GEOVision) submit two reports for the surface geophysical surveys. An initial report with preliminary interpretations will be submitted shortly after completion of the Phase 1 geophysical surveys so that it can be provided to IRWD for evaluation before commencement of the Phase 2 SPT and sonic borings. After completion of the Phase 2 investigations, boring logs will be provided to the geophysical consultant so that they can calibrate their preliminary interpretations of the geophysical data with the boring data. This elicits a change of scope from 1 geophysical report to 2. The revised cost for the seismic refraction surveys with two reports is shown in our budget proposal which is submitted as a separate pdf file.

16. **Test pit TP-1 and the associated test pit plan (described above) shall be included as a separate item in the cost estimate. The bidder shall describe their approach to the test pit, develop a cost estimate as a separate optional line item, and describe what is included in the cost estimate. During the geotechnical exploration phase, the Geotechnical Firm shall develop a Test Pit plan for DSOD review that includes a 20-foot-deep excavation that is considered safe and reasonable based on current information. The plan and cost estimate for the pit will be reviewed and updated based on the CPT, SPT and surface geophysical testing results as requested by IRWD.**

As previously mentioned in our proposal, we consider it a particularly challenging and costly endeavor to excavate a safe test pit for entry and in-situ testing below the water table. We therefore continue to encourage IRWD to consider alternative methods of getting density information at depths below the groundwater table. That said, we have developed a cost estimate to excavate the test pit to 20 feet below ground surface (bgs) with some basic assumptions that are consistent with the potential failure mode (PFM) of seismically induced liquefaction of the alluvial dam foundation and based on current information presented in the GIWP. In particular we refer to Cross Section A-A' of the GIWP which shows groundwater in Piezometer P-66 recording a historic high-water level of about 5 feet below ground surface and a recorded range during a 12-month period (presumably circa 2018-2019) that was from 12 to 20 feet bgs. Based on this information we developed a cost estimate assuming that groundwater will be encountered at approximately 12 to 15 feet bgs. We also estimated that the soils will be a layered sequence of Holocene alluvium consisting of medium dense silty sand, sandy gravel, and soft sandy silt.

We added Griffin Dewatering Company to our team to provide the technical expertise to dewater the test pit site. Griffin has the expertise to engineer and design a custom dewatering system to create dry, stable conditions for the excavation. Griffin developed a conceptual wellpoint dewatering system to lower the shallow groundwater table about 10 feet for the excavation. We consider it important to have a very good understanding of the subsurface conditions very close to or at the test pit site, including subsurface soils, depth to groundwater, and the hydraulic properties of the soil. For that reason, we are recommending that a Hollow Stem Auger boring to 25 feet bgs be done directly at the test pit site during the Phase 1 investigations. A two-inch diameter standpipe piezometer will be installed in the boring to facilitate depth to groundwater measurements. This information will be used to develop the test pit plan that will be submitted four weeks before start of the excavation and it can be used to evaluate the effectiveness of the dewatering system installed by Griffin. Note that this boring with piezometer, which would be done by Tri-County Drilling, is being proposed as optional Task 6 in our budget proposal.

Griffin's conceptual plan for dewatering involves the installation of three dewatering wells around the perimeter of the planned test pit. Wells will be drilled up to about 35 feet deep utilizing Griffin's bucket auger drilling rig to drill an up to 24-inch diameter borehole. The drilled wells will come with screen, casing, riser pipe, and a select filter pack. The pumping system which will include submersible turbine pumps connected to a gas-powered generator, will presumably need to be in operation for about 1 week prior to the start of the excavation. For cost estimating we have assumed that the water from the dewatering system can be discharged into the Rattlesnake Reservoir with a

discharge/pipe hose. If this is not allowed, then additional costs may be necessary to acquire an industrial waste discharge permit for disposal into the local sewer system. Following the completion of the sand cone density test at 20-foot depth, the dewatering system will be shut down, the equipment (generator, pumps, discharge hose) will be dismantled and removed from the project site. The wells will be abandoned by pulling the casing, drilling out the well pack, and backfilling the hole with drill cuttings.

The conceptual plan is that the test pit will be excavated down to near the top of the local groundwater table with 1:1 H:V sloped or benched trench walls. Assuming that the groundwater is at 12 to 15 feet bgs, we estimate that the floor of the test pit should be 20 by 20 feet at 15 feet bgs and the test pit will have a disturbance footprint that is approximately 50 feet by 50 feet at existing grade. Three sand cone density tests will be performed at 5-foot-depth intervals as the test pit is advanced to 15 feet bgs. Following the third sand cone density test at approximately 15 feet, a trench box will be placed on the trench floor. From that point the trench box will be used for shoring. Excavation will be done with the excavator from within the trench box. The trench box will be lowered progressively as the excavation advances. A certified trench safety "competent person" will inspect the test pit daily to verify that the excavation is in accordance with all OSHA and Cal OSHA standards.

After completion of the sand cone density test at 20 feet, the trench box cannot be entirely removed at once, as the trench could collapse and therefore compaction to DSOD's standards would not be achieved. Therefore, the trench box will be gradually raised 2 feet and fill will be placed in 8-inch lifts and compacted with an excavator attachment (compaction wheel) in the bottom 2-3 feet before the trench box is raised again another ~2 feet for placement and compaction of another layer. This process will continue as needed until the trench box is entirely removed. After the trench box is removed and the center trench is backfilled, the upper sloped or benched portion of the test pit can be backfilled in 8-inch loose lifts and then compacted with both the excavator attachment and by track rolling with the 45,000 lb. excavator. Care must be taken that the compacted backfill replicates the native soil so that neither a hump (from under compaction) nor a depression (from over compaction) is created within the test pit footprint. We estimate the test pit excavation, in-situ testing, and backfilling of the bottom shore boxed portion of the trench will take 3 to 4 days to complete and that backfilling of the upper sloped portion of the trench will take an additional 2 days with an excavator and a loader.

Geologic logging and photographic documentation of the test pit will be done by a Professional Geologist (PG) and reviewed in the field by a Certified Engineering Geologist (CEG). The geologist will clean/scrape a 5-10 wide strip of the upper sloped or benched portion of the excavation to facilitate detailed inspection of the materials encountered. We understand that the trench box method of stabilization below 15 feet might hinder detailed logging, but we believe this is the only practical method to facilitate the local dewatering and provide safe entry to do the sand cone density test at 20 feet bgs. Some logging of the materials can be done of the excavation cut at the open end of the trench box and by examining the excavated materials. Furthermore, logging and sampling would be done of the optional HSA boring if IRWD elects to do that optional boring.

The change from our initial proposal which assumed a test pit that terminates at the groundwater table, to a test pit that will advance several feet below the groundwater table, will incur additional costs to our proposal. Additional cost will include the costs for the dewatering (Griffin), for drilling the proposed HSA boring (Tri-County Drilling), for the excavation contractor (ISG), and for AECOM labor. The revised cost for the test pit and for the optional HSA boring is shown in our budget proposal which is submitted as a separate pdf file. Note that the dewatering and excavation of the test pit is being proposed as optional Task 1 in our budget proposal and the HSA boring as optional Task 6.

AECOM understands that the proposed test pit location and details on the test pit dimensions and any special provisions for dewatering or excavation support will be cooperatively developed between the subcontractor, IRWD and the Engineer before the work is initiated. AECOM assumes that the plan

and cost estimate for the pit will be reviewed and updated based on the CPT, SPT, the surface geophysical testing results, and possibly the optional HSA Boring. If conditions are more favorable than assumed (e.g., groundwater depth very near or below the bottom of the 20-foot-deep test pit, and relatively dense soils) then the cost of the test pit can be substantially reduced by eliminating or reducing the dewatering system, and by using speed shores with plywood for the shoring system instead of a trench box. If groundwater is slightly above the bottom of the test pit test pit, dewatering could potentially be accomplished with sump pumps within the trench box excavation instead of the well point system proposed by Griffin. Alternatively, if conditions are less favorable than assumed (e.g., a shallower groundwater table), and if the DSOD requires special requirements, the costs could potentially increase from what is presented in our budget. Also note that if IRWD reconsiders the need to extend the test pit below the water table, then the test pit can be completed for close to the cost previously submitted in our initial proposal (with a nominal additional cost for the compaction wheel suggested by DSOD comment Number 9).

Questions About Laboratory Testing Qualifications

17. **Bidders shall provide a response to the following questions related to laboratory testing experience and capabilities:**
    a. **For the clay embankment materials – Describe your experience and capabilities in performing laboratory testing of undisturbed or prepare samples to develop a comprehensive shear strength model including: 1) Consolidation properties of the clay and estimates of the over consolidation ratio (OCR) for materials in the dam, 2) SHANSEP parameters from triaxial and direct shear testing, 3) Fully softened drained shear strength, 4) normally consolidated-undrained shear strength, and 5) potential for strength degradation due to seismic loading. The comprehensive shear strength model would be used to select the appropriate embankment properties for the different analyses that will be performed by others.**

    b. **For the sand, silty sand and sandy silt embankment and foundation alluvium – Describe your experience and capabilities in performing laboratory testing needed to support a liquefaction potential and triggering assessment including: 1) obtaining undisturbed samples in boreholes or test pits, 2) estimating the state line separating the contractive and dilative states of the different "sand-like" soil types that may be encountered at the Rattlesnake Dam site using both undisturbed and properly prepared disturbed (remolded) samples, and 3) providing other supporting laboratory testing information necessary for identifying if the foundation sands, and silty sands are above (contractive) or below (dilative) the state line.**

To enhance our capabilities to respond to questions 17a and 17b, AECOM has added TerraSense Laboratory (Lab Manager Gregory Thomas) to our team. The resume for Gregory Thomas is added as an attachment to this proposal supplement. TerraSense Lab CED, LLC (TerraSense) was formed in 2021 by Colliers Engineering & Design after the acquisition of TerraSense, LLC, a company that had been in operation since 2009 and which was a successor of several other ownerships during

which it has been known nationwide and internationally and has been in continual operation for over sixty years.

The laboratory is equipped and manned to provide a wide spectrum of soil and rock tests and facilities to handle large volume testing assignments. The testing provided covers all the primary tests such as water content, sieves, Atterberg Limits and chemical tests and a large number of tests not typically performed in smaller geotechnical laboratories such as triaxial testing (UC, UU, CIU, CID), consolidation, direct shear, direct simple shear (DSS), permeability and cyclical testing (triaxial and DSS). The laboratory is also equipped with facilities allowing it to be able to test many types of impacted soils. The laboratory is validated by the US Army Corps of Engineers and accredited by AASHTO (re:source).

The laboratory is equipped to perform all the standard index tests that may be required on a project of this type as well as numerous less common tests.

Many of the specimen preparation techniques in use today were developed in this laboratory or with personnel from the laboratory being actively involved in their development. The laboratory is equipped for handling intact tube samples from 1.5-inch to 5-inch diameter tubes and has also worked with block samples on several projects.

The laboratory is equipped with ten incremental consolidation systems, some with loading capacity of 165-tsf for standard 2.5-inch diameter specimens, all with automatic data recording systems for real time analysis and allowing load increment advancement based on completion of Primary and Definition of Secondary Compression.

The laboratory has seven mechanical triaxial load frames and one servo-hydraulic frame. The servo-hydraulic system and one of the mechanical load frames is programmable for either load or deformation-controlled stress-path tests. A wide selection of transducers is available, with loads from 100-lb maximum to 200,000-lbs as well as a selection of displacement transducers, pore pressure transducers, and four volume change measurement systems.

The laboratory has two Direct Shear devices and one Direct Simple Shear device, and typically performs about 100 Direct Simple Shear tests per year.

Regarding question 17a:

1) The consolidation systems available provide the capacity and resources needed to define the virgin compression line needed for the estimation of the specimen maximum past pressure and definition of OCR for almost every sample that can be obtained. The laboratory typically performs 200 to 300 tests per year.

2) Over the history of the laboratory, numerous projects have been studied for the development of SHANSEP parameters using Triaxial and Direct Simple Shear testing (we have never used the Direct Shear test for this purpose) by testing at prescribed levels of OCR.

3) Fully softened strengths have been studied for both drained and undrained conditions by performing post-cyclic static shear tests on the softened material.

4) The large selection of Triaxial chambers and systems available allow testing on specimens from 1-inch to 4-inch in diameter and to effective stresses of up to 300-psi. Either Drained or Undrained testing is available for all systems, with the laboratory typically performing more than 200 Undrained triaxial tests and 50 Drained triaxial tests per year.

5) Either stress or deformation controlled cyclic loading is available for both Triaxial and Direct Simple Shear specimens for studying strength degradation.

Regarding Question 17b

AECOM has performed high quality undisturbed sampling using fixed-piston thin-walled samplers in rotary wash drill holes with drilling mud. This technique was used for sampling alluvium at the Diamond Valley Lake East dam during design. In addition, specimens can be reconstituted from soils obtained from large (12-inch diameter) sand cone tests in test pits.

TerraSense laboratory is involved in several Tailings dam projects each year which involve the testing needed to evaluate the liquefaction potential and triggering assessment for the sand, silty sands, and sandy silts present.

2) Testing has been performed to estimate the state-line on many of these projects by performing both drained and undrained tests at a variety of void ratios to approach the line from both the contractive and dilative sides of the line. While these tests are largely performed on remolded specimens to allow better control of the range of void ratios of interest, some intact samples are usually also used to provide and understanding of the influence of the specimen preparation.

18. **Depending on the findings under item 17b above along with the results of SPT blow counts, CPT data evaluation, and consideration of surface geophysical testing, the selected Geotechnical Firm may be requested to perform 1) load controlled consolidated undrained (CU), or 2) drained stress path controlled triaxial testing on either undisturbed or remolded samples. Such tests would provide the basis to confirm liquefaction potential, identify the void ratio and mean normal effective stress at the time of sample collapse (liquefaction), and identify the liquefied undrained strength for comparison with estimates of the undrained shear strength from the SPT and CPT data. To clarify the Consultants capabilities and experience in performing laboratory testing to support estimation of collapse surface and undrained (liquefied) strength properties, the supplemental information shall further describe their ability to performed either or both triaxial testing methods described above. Costs associated with additional testing is not required at this time.**

To enhance our capabilities to respond to questions 18, AECOM has added TerraSense Laboratory (Lab Manager Gregory Thomas) to our team.

The standard high quality static tests the laboratory performs (along with the associated index property tests) are sufficient to obtain much of the data needed for this part of the assessment and when used in conjunction with the cyclic (and post cyclic) testing capabilities available present a selection of avenues to study the collapse (static liquefaction) potential.

An example of this is the testing performed in the laboratory to identify the probable cause of the Edenville Dam collapse. While testing was limited to standard testing on this project, more advanced techniques were considered if further testing had been needed.

Load frames to provide both a modified static deformation-controlled shear along with the capacity to switch to a static minimum stress after failure to follow the specimen collapse and the servo-hydraulic loading system which allows cyclic testing under anisotropic loading conditions could be used in this study if required.

Estimated Cost Breakdown of Total Fee (including Optional Tasks)
Irvine Ranch Water District (IRWD)
Rattlesnake Dam Issue Evaluation Study
March 28, 2023

Task No.	Task Description	AECOM Labor Hours								AECOM TOTAL HOURS	AECOM LABOR COSTS	AECOM SUB-CONTRACTOR COSTS (no mark-up)	AECOM DIRECT COSTS & MATERIALS[1]	TOTAL
		Project Manager / Principal Engineer / Architect	Senior Specialist / Consultant	Senior Engineer / Scientist / Geologist / Architect	Project Engineer / Scientist / Geologist / Architect	Senior Staff Engineer / Scientist / Geologist	Staff Engineer / Scientist / Geologist	Project Admin	Office / Clerical					
		$280	$250	$190	$170	$130	$110	$90	$80					
Task 1 - Project Management														
1.1	Project Management	50						40	40	130	$ 20,800			$ 20,800
1.2	Preparation and monthly update of Project Schedule	10					20			30	$ 5,000			$ 5,000
1.3	Meetings and Workshops (includes preparation of agendas and minutes)	25		32	8		16			81	$ 16,200		$ -	$ 16,200
1.4	Preparation of Monthly Status Reports	6					16			22	$ 3,440			$ 3,440
	SUBTOTAL TASK 1	**91**		**32**	**8**		**52**	**40**	**40**	**263**	**$ 45,440**	**$ -**	**$ -**	**$ 45,440**
Task 2 - Pre Exploration Activities														$ -
2.1	Health and Safety Plan	2		8		40				50	$ 7,280		$ 50	$ 7,330
2.2	Acquire Well Permits from OCHCA	2		4		40				46	$ 6,520	$ -		$ 6,520
2.3	Utility Clearance	2		2		8				12	$ 1,980	$ -		$ 1,980
	SUBTOTAL TASK 2	**6**		**14**		**88**				**108**	**$ 15,780**	**$ -**	**$ 50**	**$ 15,830**
Task 3 - Phase 1 Investigations														
3.1	Cone Penetration Tests	2		8		40				50	$ 7,280	$ 34,020	$ 360	$ 41,660
3.2	Seismic Refraction Lines	2		8		50				60	$ 8,580	$ 56,284	$ 360	$ 65,224
	SUBTOTAL TASK 3	**4**		**16**		**90**				**110**	**$ 15,860**	**$ 90,304**	**$ 720**	**$ 106,884**
Task 4 - Phase 2 Investigations														
4.1	SPT Borings	8		60		235				303	$ 44,190	$ 191,312	$ 3,200	$ 238,702
4.2	Sonic Borings	2		8		32				42	$ 6,240	$ 38,080	$ 360	$ 44,680
4.3	Downhole Geophysical Testing			2		8				10	$ 1,420	$ 36,992		$ 38,412
4.4	Well Installation and Development (includes 4 transducers and 2 data loggers)			2		8				10	$ 1,420	$ 9,420	$ 6,514	$ 17,354
4.5	Spillway Core Borings	2		4		32				38	$ 5,480	$ 27,114	$ 360	$ 32,954
4.6	Slug Testing			8		8				16	$ 2,560		$ 90	$ 2,650
	SUBTOTAL TASK 4	**12**		**84**		**323**				**419**	**$ 61,310**	**$ 302,918**	**$ 10,524**	**$ 374,752**
Task 5 - Sample Collection and Storage														
5.1	Samples taken to Anaheim Lab for temporary storage, photography, core review and testing			16						16	$ 3,040		$ 90	$ 3,130
5.2	Samples returned to Rattlesnake Dam for permanent storage in shipping container					8	8			16	$ 1,920		$ 90	$ 2,010
	SUBTOTAL TASK 5			**16**		**8**	**8**			**32**	**$ 4,960**	**$ -**	**$ 180**	**$ 5,140**
Task 6 - Laboratory Testing		2			16					18	$ 3,280		$ 38,430	$ 41,710
	SUBTOTAL TASK 6				**16**					**18**	**$ 3,280**	**$ -**	**$ 38,430**	**$ 41,710**
Task 7 - Geotechnical Data Reports														
7.1	Preliminary Geotechnical Data Report for Phase 1 Investigations	1	1	8		24	4			38	$ 5,610		$ -	$ 5,610
7.2	Draft Geotechnical Data Report	16	16	80	8	120	40			280	$ 45,040	$ 9,440	$ -	$ 54,480
7.3	Final Geotechnical Data Report	8	8	24	4	24	24			92	$ 15,240	$ -	$ -	$ 15,240
	SUBTOTAL TASK 7	**25**	**25**	**112**	**12**	**168**	**68**			**410**	**$ 65,890**	**$ 9,440**	**$ -**	**$ 75,330**
	TOTAL	**138**	**25**	**274**	**36**	**677**	**128**	**40**	**40**	**1,358**	**$ 212,520**	**$ 402,662**	**$ 49,904**	**$ 665,086**
Drill Extra Sonic Borings - Optional Task 2														
	Drill 2 Extra Sonic Borings					32		1		33	$ 4,250	$ 35,295	$ 360	$ 39,905
	SUBTOTAL OPTIONAL TASK 2					**32**		**1**		**33**	**$ 4,250**	**$ 35,295**	**$ 360**	**$ 39,905**
Extra Footage for SPT Borings (rat holes for P-S Suspension Logging) - Optional Task 3														
	Extra Footage for SPT Borings ("rat holes" for P-S Suspension logging)			2		16		1		19	$ 2,550	$ 8,820	$ 180	$ 11,550
	SUBTOTAL OPTIONAL TASK 3			**2**		**16**		**1**		**19**	**$ 2,550**	**$ 8,820**	**$ 180**	**$ 11,550**
Core Drill an Extra 75' for Boring 22SPT-2 to Penetrate bedrock 100 feet - Optional Task 5														
	Core Drill and Extra 75' for Boring 22SPT-2 to Penetrate Bedrock 100 feet	2		4		24		1		31	$ 4,530	$ 19,774	$ 270	$ 24,574
	SUBTOTAL OPTIONAL TASK 5	**2**		**4**		**24**		**1**		**31**	**$ 4,530**	**$ 19,774**	**$ 270**	**$ 24,574**
	OPTIONAL TASKS TOTAL	**2**		**6**		**72**		**3**		**83**	**$ 11,330**	**$ 63,889**	**$ 900**	**$ 76,029**
	GRAND TOTAL (BASE + OPTIONAL TASKS)	**140**	**25**	**280**	**36**	**749**	**128**	**43**	**40**	**1,441**	**$ 223,850**	**$ 466,551**	**$ 50,804**	**$ 741,115**

Notes:

1. Direct Costs / Materials provided with no markup and include costs such as geotechnical lab testing, sampling gear and field supplies, mileage to meetings and project site, use of AECOM fleet vehicles, boring well permits, courier fees, and document fees reproduction. costs.

Estimated Subcontractor/Subconsultant Costs

Irvine Ranch Water District (IRWD)

Rattlesnake Dam Issue Evaluation Study

March 28, 2023

Task No.	Task Description	Subconsultant/Subcontractor Costs					TOTAL
		Tri County Drilling	BC2 Environmental	Kehoe	Geovision	dot.dat.inc	
Task 3 - Phase 1 Investigations							
3.1	Cone Penetration Tests	$ -	$ -	$ 34,020	$ -	$ -	$ 34,020
3.2	Seismic Refraction Surveys	$ -	$ -	$ -	$ 56,284	$ -	$ 56,284
	SUBTOTAL TASK 2	**$ -**	**$ -**	**$ 34,020**	**$ 56,284**	**$ -**	**$ 90,304**
Task 4 - Phase 2 Investigations							
4.1	SPT Borings with Packer Testing, standby for geophysical testing, and backfill	$ 191,312	$ -	$ -	$ -	$ -	$ 191,312
4.2	Sonic Borings	$ -	$ 38,080	$ -	$ -	$ -	$ 38,080
4.3	Downhole Geophysical Testing	$ -	$ -	$ -	$ 36,992	$ -	$ 36,992
4.4	Well Installation and Development	$ 9,420	$ -	$ -	$ -	$ -	$ 9,420
4.5	Spillway Borings	$ 25,000	$ -	$ -	$ 2,114	$ -	$ 27,114
	SUBTOTAL TASK 3	**$ 225,732**	**$ 38,080**	**$ -**	**$ 39,106**	**$ -**	**$ 302,918**
7.1 & 7.2	Data Report (Draft and Final)	$ -	$ -	$ -	$ -	$ 9,440	$ 9,440
		$ -	**$ -**	**$ -**	**$ -**	**$ 9,440**	**$ 9,440**
	TOTAL	**$ 225,732**	**$ 38,080**	**$ 34,020**	**$ 95,390**	**$ 9,440**	**$ 402,662**

Estimated Subcontractor/Subconsultant Costs of Optional Tasks

Irvine Ranch Water District (IRWD)

Rattlesnake Dam - Issue Evaluation Study

March 28, 2023

Task No.	Task Description	Subcontract Amount ($)		TOTAL
		Tri County Drilling	BC2 Environmental	
Optional Tasks				
Optional Task 2	Drill 2 Extra Sonic Borings		$ 35,295	$ 35,295
Optional Task 3	Extra footage for SPT Borings ("rat holes" for P-S Suspension logging)	$ 8,820		$ 8,820
Optional Task 5	Extra Footage (75 feet) for Boring 22SPT-2	$ 19,774		$ 19,774
	TOTAL	$ 28,594	$ 35,295	$ 63,889

Geotechnical Investigation Laboratory Testing Schedule (Preliminary) for Rattlesnake Dam Issue Evaluation Study

Borehole /Test Pit No.	Sampling Method	Design Feature/Location	Sample Type	Approximate No. of Samples	USCS Class. ASTM D2487	Water Content ASTM D2216	Density ASTM D7263	Grain Size (ASTM D 6913) with Hydrometer (ASTM D7928)(2)	Atterberg ASTM D4318	Specific Gravity ASTM D854	Standard Proctor ASTM D698	Pinhole Dispersion Test ASTM D 4647	1-D Consolidation ASTM D2435 (3)	UU Triaxial ASTM D2850 (4)	CU Triaxial ASTM D4767 (5)	Flex. Wall Permeameter ASTM D5084 (6)	Slake Durability ASTM D4644	Rock Core Strength and Moduli ASTM D7012
		TOTAL:		**125**	**162**	**162**	**44**	**37**	**31**	**4**	**2**	**12**	**4**	**13**	**7**	**4**	**4**	**4**
		UNIT TEST COST, $			**$0**	**$23**	**$41**	**$239**	**$195**	**$162**	**$272**	**$329**	**$900**	**$173**	**$465**	**$386**	**$216**	**$340**
		COST SUBTOTAL, $			**$0**	**$3,726**	**$1,804**	**$8,843**	**$6,045**	**$648**	**$544**	**$3,948**	**$3,600**	**$2,249**	**$3,255**	**$1,544**	**$864**	**$1,360**
22SPT-1	Boring; Hollow Stem Auger with SPTs on 5-foot centers to bedrock then HQ wireline core continuous sampling in bedrock.	Foundation seepage and seismic stability assessment	Soil: Alluvium	11	11	11	6	2	1				1	1	1	1		
			Rock	15 to 25 feet continuous														1
22SPT-2	Boring; Hollow Stem Auger with continuous SPTs to bedrock then HQ wireline or continuous sampling in bedrock	Foundation and embankment seepage and seismic stability design	Soil: Embankment	8	8	8	4	2	2	1		1	1	1				
			Soil: Alluvium	9	9	9	2	2	1		1	1		1	1	1		
			Rock	15 to 25 feet continuous														1
22SPT-3	Boring; Hollow Stem Auger with continuous SPTs to bedrock then HQ wireline or dry core continuous sampling in bedrock	Foundation and embankment seepage and seismic stability design	Soil: Embankment	21	21	21	2	3	3			1		1	1	1		
			Soil: Alluvium	6	6	6	2	1	1			1		1				
			Rock	15 to 25 feet continuous														1
22SPT-4	Boring; Hollow Stem Auger with continuous SPTs to bedrock then HQ wireline or dry core continuous sampling in bedrock	Foundation and embankment seepage and seismic stability design	Soil: Embankment	15	15	15	2	3	3	1		1		1	1			
			Soil: Alluvium	7	7	7	2	2	1			1		1	1			
			Rock	15 to 25 feet continuous														1
22SPT-5a	Boring; Hollow Stem Auger to bedrock then HQ-size wireline coring or continuous dry sampling in bedrock.	Foundation and embankment seepage and seismic stability design, right abutment	Soil: Embankment	6	6	6	2	2	2			1	1	1	1			
			Soil: Alluvium	7	7	7	2	2	1	1		1		1		1		
			Rock	15 to 25 feet continuous														
22SPT-5b	Boring; HQ-size wireline coring or continuous dry sampling in bedrock	Right Abutment	Soil: Embankment	7	7	7	2	2	2			1		1				
			Soil: Alluvium	7	7	7	2	2	1		1	1		1	1			
			Rock	15 to 25 feet continuous														
22SPT-6	Boring; Hollow Stem Auger to bedrock then HQ-size wireline coring or continuous dry sampling in bedrock.	Foundation and embankment seepage and seismic stability design	Soil: Embankment	8	8	8	2	2	2			1	1	1				
			Soil: Alluvium	9	9	9	2	2	1	1		1		1				
			Rock	15 to 25 feet continuous														
Sonic 1	Boring; Sonic drilling to bedrock	Assessment of chimney drain and alluvium	Soil	Continuous sampling for 95 ft	19	19	4	4	4								2	
Sonic 2	Boring; Sonic drilling to bedrock	Assessment of chimney drain and alluvium	Soil	Continuous sampling for 90 ft	18	18	4	4	4								2	
TP-1	Exploratory Pit	Foundation seismic stability	Soil	4	4	4	4	2	2									
22RC-1	Boring; coring through spillway into bedrock	Spillway	Rock	10 ft continuous														
22RC-2	Boring; coring through spillway into bedrock	Spillway	Rock	10 ft continuous														
22RC-3	Boring; coring through spillway into bedrock	Spillway overflow	Rock	10 ft continuous														
																	TOTAL	**$38,430**

Notes and Assumptions:

1. Engineer may revise the testing schedule based on results observed in the field. The testing schedule above is provided for scheduling and cost estimate information only. Verify testing requirements with Engineer prior to starting the work.
2. Engineer may reduce gradation testing requirements for select samples by reducing gradation tests to a "wash No. 200", omitting test steps for sieving the portion retained on the #200 sieve.
3. Perform test with a rebound cycle at 5 ksf and a maximum axial stress of 20 ksf.
4. Compact 3 UU Triaxial specimens to develop envelope from each sample [95% ASTM D698 Maximum Dry Density (MDD) and Optimum Moisture Content (OMC) +2%]; confining pressure at 2 ksf, 6 ksf, and 18 ksf.
5. Compact 3 CU Triaxial specimens to develop envelope from each sample [95% MDD, OMC +2%]; consolidate to 2 ksf, 6 ksf, and 18 ksf. Use a minimum 4-inch diameter specimen for as-compacted strength testing of rock.
6. Compact Flex. Wall Permeameter specimen to 95% MDD, OMC, and complete test with 2 ksf confining pressure.
7. Complete testing in accordance with referenced ASTM Standard and information provided herein.

BC2 Environmental - Drilling Estimate for Sonic Borings

Task	Task Description	Unit	Quantity	Unit Rate	Total
4.2	Mobilization/demobilization	LS	1	$1,200	$1,200
4.2	Daily Crew Travel	Each	4	$300	$1,200
4.2	Sonic Rig & Crew on site up to 10 hours	Day	4	$5,000	$20,000
4.2	6" Borehole Backfill	Foot	185	$12	$2,220
4.2	Prevailing Wage Per man Per hour Portal to Portal up to 8 hours per day	Hour	96	$75	$7,200
4.2	Prevailing Wage Per man Per hour Portal to Portal over 8 hours per day	Hour	30	$112	$3,360
4.2	Delivery/Pick-Up Forklift	LS	1	$400	$400
4.2	Forklift Daily Rental	Day	4	$325	$1,300
4.2	Support Trucks	Day	4	$300	$1,200
Option 2	Drill Extra Sonic Borings	Each	2	$17,648	$35,295
				TOTAL	**$73,375**

dot.dat.inc - Estimate for gINT Services

	Unit	Quantity	Unit Rate	Total
Logs of Sonic Borings (soil only)	Hour	20	$80.00	$1,600
Logs of SPT Borings-mixed core and soil borings, including fracture sketches, packer tests, and piezometer installation information	Hour	80	$80.00	$6,400
Logs of Spillway Borings	Hour	10	$80.00	$800
Develop Stick logs for report figures	Hour	8	$80.00	$640
			TOTAL	**$9440**

GEOVision - Estimate for Surface Geophysics

Task	Task Description	Unit	Quantity	Unit Rate	Total
4.5	**Ground Penetrating Radar Slab Markout**				
4.5	Senior Geotechnical Technician	Hours	4	$196	$782
4.5	Geophysical Technician II	Hours	4	$196	$782
4.5	Utility Locating Vehicle	Day	1	$550	$550
3.2	**Seismic Refraction Geophysical Survey**				
3.2	Senior Staff Geophysicist	Hours	60	$196	$11,730
3.2	Staff Geophysicist	Hours	120	$196	$23,460
3.2	Equipment Fees: 48 Channel SRT System	Day	6	$830	$4,980
3.2	**Processing and Reporting**				
3.2	Staff Geophysicist	Hours	64	$100	$6,400
3.2	Senior Geophysicist	Hours	40	$190	$7,600
				TOTAL	**$56,284**

NOTES
1. The site will be easily accessible to GEOVision staff and vehicles at the time arranged for the survey

GEOVision - Estimate for Borehole Geophysics

Task	Task Description	Unit	Quantity	Unit Rate	Total
4.3	Mobilization /Demobilization	Hours	14	$196	$2,737
4.3	Borehole Logging	hours	50	$196	$9,775
	Equipment Fees				
4.3	Televiewer	Day	7	$610	$4,270
4.3	Suspension	Day	7	$1,100	$7,700
	Processing and Reporting				
4.3	Processing Each borehole	Each	56	$130	$7,280
4.3	report	Foot	27	$190	$5,130
				TOTAL	**$36,992**

NOTES

1. The site will be easily accessible to GEOVision staff and vehicles at the time arranged for the survey

2. GEOVision reserves the right to NOT log a borehole if conditions indicate that there is a strong possibility that we will lose a logging tool. This is rare, but it can happen. An example is, if there has been significant and continuing collapse in the borehole and attendant loss of circulation. Then the drill string gets stuck, etc.

Tri County - Estimate for Hollow Stem Auger / Core Drilling Including Packer Tests and Piezometer Installations

Task	Task Description	Unit	Quantity	Unit Rate	Total
4.1	Mobilization/demobilization	LS	1	$6,150	$6,150
4.1	Move and Set up drilling equipment each boring	Each	10	$1,280	$12,800
4.1	Drill rig operation for SPT Borings including packer testing	Day	30	$4,770	$143,100
4.1	Drill rig operation for Spillway Borings	Day	4	$4,570	$18,280
4.1	Crane move on and move off 3 day rental	LS	1	$6,720	$6,720
4.1	Wooden core boxes	Each	14	$88	$1,232
4.1	Diamond core bits, lifters, shoes, fluid additives, grout material	Feet	205	$9	$1,845
4.1	Backfill borings with cement grout by tremie methods	Feet	770	$5	$3,465
4.1	Directed standby for Geophysical Logging or other non drilling functions	Hour	30	$370	$11,100
4.1	Install 1 1/2 " PVC open tube piezomters in 2 borings, includes well development, PVC casing and scree, sand filter, grout seal, flush mounted surface vault set in 2'x2' concrete pad	Each	2	$4,710	$9,420
4.1	Drums for IDW with disposal at appropriate landfill-non hazardous	Each	35	$332	$11,620
Option 3	15 feet extra footage each SPT boring (optional)	Each	7	$1,260	$8,820
Option 5	Extra Footage (75 feet) for Boring 22SPT-2	Each	1	$19,774.00	$19,774
			TOTAL (without options)		**$225,732**
			TOTAL (with options)		**$254,326**

Kehoe Testing & Engineering Inc.- CPTs

Task	Task Decription	Unit	Quantity	Unit Rate	Total
3.1	CPT Soundings w/CPT Rig	Hour	32	$520.00	$16,640.00
3.1	CPT Soundings w/CPT Rig (Overtime)	Hour	10	$580.00	$5,800.00
3.1	Seismic Shear Wave Measurements	Each	144	$30.00	$4,320.00
3.1	Additional Direct Push Onsite for Grouting	Day	4	$1,200.00	$4,800.00
3.1	2" Disposable Tips for Grouting	Each	12	$10.00	$120.00
3.1	Portland Cement	Bags	70	$15.00	$1,050.00
3.1	Bentonite Powder	Bags	3	$30.00	$90.00
3.1	Decontamination with Steam Cleaner	Day	4	$250.00	$1,000.00
3.1	Fuel Surcharge	Day	4	$50.00	$200.00
3.1	Pore Pressure Dissipation Tests	Each	110	$0.00	$0.00
				TOTAL	**$34,020.00**

AECOM Anaheim Geotechnical Laboratory
2023 Unit Test Rates

1515 S. Sunkist Street, Suite J, Anaheim, CA 92806

Test Number	Test Symbol	IDENTIFICATION, CLASSIFICATION AND CHEMICAL TESTS	Reference Test Procedure	ANA Unit Price
102	VC	**Soil Description and Classification** (no charge for ASTM D2487 classification with associated tests)	ASTM D2488	$22
103	WC	**Water Content**	ASTM D2216	$23
104	UW	**Total Unit Weight with Water Content**	ASTM D7263	$41
105	OM	**Organic Content of Soil**	ASTM D2974	$114
106		**Atterberg Limits**		
110	PI	Liquid and Plastic Limit - multi-point test	ASTM D4318	$181
111		Liquid Limit, blenderized multi-point test	EM 1110-2-1906	$267
112		Liquid Limit, multi-point test	ASTM D4318	$195
113		Liquid Limit, single point test	ASTM D4318	$131
114		Plastic Limit, 2 points	ASTM D4318	$68
		Particle Size Tests		
120		Sample Processing (hourly)	ASTM D421	$113
121	SA	Sieve Analysis; Std. sieve set, with wet wash	ASTM D6913	$171
122	MA	Combined Sieve and Hydrometer Analysis	ASTM D7928 with ASTM D6913	$255
130	HYDR	Hydrometer Analysis only	ASTM D7928	$239
131	DBH	Double Hydrometer Analysis	ASTM D4221	$272
140	WA	Percent Fines (minus No. 200 sieve only)	ASTM D1140	$108
		Specific Gravity		
141	Gs	Specific Gravity of minus No. 4 sieve material	ASTM D854	$162
142	BGs	Bulk Specific Gravity (Chunk Density)	ASTM C127	$162
150	MP4	**Modified Impact Compaction Test (Method A & B)**	ASTM D1557	$272
151	MP6	**Modified Impact Compaction Test (Method C)**	ASTM D1557	$318
152	MP1	**One-point Modified impact compaction**	ASTM D1557	$176
160	SP4	**Standard Impact Compaction Test (Method A & B)**	ASTM D698	$216
161	SP6	**Standard Impact Compaction Test (Method C)**	ASTM D698	$239
162	SP1	**One-point Standard impact compaction**	ASTM D698	$141
170	R	**R-Value**	ASTM D2844	$408
180	Corr	**Corrosivity Suite**		$295
181	pH	pH on soil specimen	ASTM D4972	$81
182	SO	Sulfate on soil specimen for corrosion	CTM417	$81
183	CL	Chloride Content on soil specimen for corrosion	CTM422	$81
184	Res	pH and Resistivity of Soil	CTM643	$140
190	PIN	**Pinhole**	ASTM D4647	$329
191	CRU	**Dispersive Characteristics by Crumb Test**	ASTM D6572	$68
		ROCK and AGGREGATE TESTING		
200	UC r	**Unconfined Compressive Strength (rock)** oven dry or as-prepared specimen with strain by platen to platen measurements	ASTM D7012	$340
210	RH	**Rebound Hardness (using "Schmidt" hammer)**	ASTM D5873	$55
220	PtL	**Point Load Strength**	ASTM D5731	$69
230	SD	**Slake Durability (up to 2 cycles)**	ASTM D4644	$82
231		each additional cycle		$68
232	SE	**Sand Equivalent**	ASTM D2419	$118

AECOM Anaheim Geotechnical Laboratory
2023 Unit Test Rates

1515 S. Sunkist Street, Suite J, Anaheim, CA 92806

ENGINEERING PROPERTY TESTS

Test Number	Test Symbol		Reference Test Procedure	
		PERMEABILITY (HYDRAULIC CONDUCTIVITY) TESTING		
300	HC	**Standard Triaxial Permeability (Hydraulic Conductivity)** (standard sample type using flexible-wall permeameter and de-ionize water with permeability between 1x10-5 cm/sec and 1x10-8 cm/sec on standard specimen and test pressures)	ASTM D5084	$386
301	Hci	Incremental Stage (per point)		$164
		CONSOLIDATION and EXPANSION TESTING includes graphical presentation with end of primary, cv data calculated		
310	CON	**Incremental Consolidation** (up to 10 loads)	ASTM D2435	$560
311		additional load increments		$68
312		rebound-reload loop, per load		$68
		Swell Pressure or collapse at one stress level (other stress levels charged per load increment)	ASTM D4546	
321	SWa	Method A - *4-point curve , wetted-after-loading*	ASTM D4546	$686
322	SWb	Method B - *single point, wetted-after-loading (rebound-reload upon request)*	ASTM D4546	$340
323	SWc	Method C - *loaded-after-wetting,* (referenced with ASMT D2435)	ASTM D4546	$411
324	Swi	Additional Load increment (up to 16 tsf and 24 hrs)	ASTM D4546	$68
325	EI	**Expansion Index**	ASTM D4829	$171
		STATIC STRENGTH TESTING Note: Test data includes water content, total unit weight and graphical presentation of data unless otherwise stated.		
		DIRECT SHEAR TESTS		
330	DS	**Direct Shear Series - CD, 3 specimens**	ASTM D3080	$313
		TORSIONAL RING SHEAR TESTS		
340	RS r	Ring Shear - 3 point residual stress	ASTM D6467	$662
341	RS fs	Ring Shear - Fully Softened Condition, peak stress	ASTM D7608	$378
		STANDARD TRIAXIAL TESTS Note: Basic prices are for a single point shear phase on standard tube sample specimens.		
350	UC s	**UC - Unconfined Compression**	ASTM D2166	$140
360	UU	**UU - Unconsolidated-Undrained Triaxial**	ASTM D2850	$173
370	ICU	**CIU' - Consolidated-Isotropically Undrained Triaxial** with backpressure and pore water pressure measurements on saturated specimen	ASTM D4767	$465
380	ICD	**CD - Consolidated-Drained Triaxial** with volume measurements on saturated specimen	USBR 5755	$735
400	Tse	**Tube Sample Extrusion** Note: Tube extrusion charge applied for sample extrusion without engineering tests.		$68
410	Rmld	**Specimen fabrication (remolding)**		$76
420	trim	**Specimen trimming**		$76

AECOM Anaheim Geotechnical Laboratory
2023 Unit Test Rates

1515 S. Sunkist Street, Suite J, Anaheim, CA 92806

A

SAMPLING MATERIALS AND FIELD EQUIPMENT

FIELD EQUIPMENT

510	**Sand Cone Kit (per day)**	$49
511	**Nuclear Density Gauge (per day)**	$82
512	**Trimble GPS Unit (per hour)**	$22
520	**Double-Ring Infiltrometer (per day)**	$241
530	**Point Load Test Aparatus (per day)**	$69

SAMPLING SUPPLIES

540	**6-inch SS Liners (2.5" dia. X 6" long)** includes liner with end caps	$10.80
541	**6-inch Brass Liners (2.5" dia x 6" long)** includes liner with end caps	$12.96
542	**Shelby Tubes (3" dia. X 30" length)** includes Shelby tube, end caps, o-ring seal Note: prices will vary for different Shelby tube diameters and/or lengths	$37.80
543	**Bucket with Lid**	$9.72
544	**Sample Bags**	$0.37

Assumptions

- This proposal is strictly geotechnical and assumes that contaminated soil or groundwater will not be encountered at the site. If the soil or groundwater appears to be contaminated, we will stop work and review the situation with IRWD and make any adjustments to the scope of work and the agreement for services that may be required.

- AECOM will not be liable for injury, or direct or consequential damages related to damage to utilities or subterranean structures (pipes, culverts, vaults, underground tanks, tunnels, etc.) that are not correctly and clearly shown on plans provided to us or otherwise located in the field prior to our investigation, or marked by Underground Service Alert of Southern California. AECOM will review any utility plans that are furnished by IRWD or others but has not budgeted to search for or reproduce such plans.

- It may become necessary to change a subcontractor named herein or add a subcontractor. If this is necessary, we will ask for IRWD's approval of our selection.

- The laboratory test table in the GIWP specifies USCS Classification per ASTM D2487. Because the USCS Classification is assigned to soil for which Atterberg Limits and particle-size distribution tests are performed, we include the provision of the USCS Classification as part of the tests themselves. Thus, we indicate that the cost for the USCS Classification column is zero.

- Project delays may affect our costs. If these delays are not within our control, an adjustment to the project fees will be made. Examples of delays not within our control include IRWD-initiated changes to the schedule, increases to the Scope of Services

February 15, 2023

Mr. Jacob Moeder
Engineering Manager – Dams & Storage
Irvine Ranch Water District
15600 Sand Canyon Avenue
Irvine, California 92618

Subject: Rattlesnake Dam Issue Evaluation Study and Alternatives Analysis Proposal

Dear Mr. Moeder,

Introduction and Understanding

The recently completed Implementation Plan for the IRWD Dam portfolio identified dam safety actions and recommendations to reduce uncertainties and risks associated with Rattlesnake Dam. Recommended actions related to first tier potential failure modes (PFMs) include the completion of an Issue Evaluation Study (IES), which addresses the following recommended actions:

- Rattlesnake Canyon RC 3: *Perform a seismic response analysis of the embankment. Consider all available information and the need for additional site characterization to define the extent, continuity, and properties of liquefiable materials.*
- Rattlesnake Canyon RC 4: *Perform a study to understand the full history of seepage; including piezometers and drains; confirm the as constructed zoning and gradations. Consider all available information and consider if additional field data should be collected.*

HDR has recently completed an interim risk reduction measure (IRRM) seismic evaluation study as part of recommended action RC 1: *Consider IRRMs to reduce the risk to the downstream population at risk on an interim basis until permanent risk reduction can be accomplished.* That study confirmed IRWD's decision to target a maximum reservoir pool to Elevation 395 feet and discourage storing water above the targeted maximum water level. That study also generally outlined the recommended work elements for the Rattlesnake IES including needed site characterization activities to reduce uncertainties associated with liquefaction potential; undrained shear strength of embankment and undrained liquefied strength of foundation soils; and seepage conditions in the dam, foundation, and abutments.

The Implementation Plan also recommended action RC 2: *Perform a site specific probabilistic seismic hazard analysis and develop appropriate suite of ground motion time histories for seismic analysis.* Because of its proximity, the recently completed site specific Seismic Hazard Assessment for the Syphon Reservoir Improvement Project (AECOM, 2020) will be used for this IES. The Syphon Dam site is approximately 2 miles to the south of Rattlesnake dam and reservoir. The seismic loading conditions and time histories included in that study are considered appropriate for this planning-level IES. Should final designs be developed in the future for Rattlesnake Dam, a site-specific Seismic Hazard Assessment should be considered.

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This proposal is for completion of the IES that will address recommended actions RC-3 and RC-4. Included in this scope of work is the following:

(1) Support to be provided by HDR during the planned site characterization program (borings, cone testing, geophysical testing, test pit excavation, and laboratory testing) intended to provide data on the dam embankment and foundation materials required to complete analyses and evaluations under the IES,

(2) Development of a Geologic/Geotechnical Model of the dam site including the embankment, foundation soils and bedrock. The model will include the internal seepage provisions (filters, drains, drainpipes, etc.) based on both investigation and lab testing results as well as information from the record drawings,

(3) Assessment of seepage properties of the embankment and foundation materials along with seepage model development, calibration, and analyses to characterize seepage conditions in the dam, foundation, and abutments. Using these results, assess the overall seepage safety of the dam.

(4) Analyses of the site characterization and laboratory testing information to estimate the shear strength and other engineering properties of the embankment and foundation soils including (a) density and associated liquefaction potential of the foundation colluvium/alluvium materials, (b) the shear strength and strain softening properties of the embankment materials, (c) the potential for liquefaction triggering, and (d) post-earthquake stability analyses and evaluations.

(5) Revisit the baseline risk estimates for critical Rattlesnake Dam PFMs considering the site characterization results and corresponding updated seepage and stability analyses.

(6) Prepare a summary IES report describing site characterization results, seepage and stability analyses, and updated baseline risks.

(7) Assume that both seepage and seismic stability risk reduction modifications to Rattlesnake Dam are required and develop measures that will address the identified PFMs. Combine the measures into comprehensive alternatives, prepare screening level cost estimates and conduct an alternatives analysis.

(8) Prepare an Alternatives Analysis Report describing measures and alternatives for risk reduction, alternatives risk analyses, alternatives evaluation and recommendations for risk reduction that should be completed at the site.

The GIWP requests that CPT and SPT borings along with surface geophysical testing be performed early in the scope of work and draft results provided to HDR for early assessment of the potential to complete a test pit at the site. HDR will provide additional guidance on the requirements for the test pit including dewatering, insitu density testing, disturbed and undisturbed sampling, and laboratory testing that would be completed as part of the test pit program. This assessment information would be provided to IRWD, and ultimately to DSOD for approval of the test pit program.

With the assumption that significant seepage and stability risks exceeding the IRWD's dam safety guidelines will be confirmed, HDR will identify a range of potential corrective actions that would reduce the risk of the critical potential failure modes to acceptable levels. Conceptual layouts will then be developed. Once a range of potential corrective actions are identified, the potential risk reduction associated with each of the corrective action alternatives will be estimated to support selection of a preferred approach and preliminary configuration that could be carried into final design if necessary.

Scope of Services

The uncertainties associated with the Rattlesnake dam critical PFM 122 (seismic instability) makes scoping of required seismic response analyses and evaluations difficult until site characterization and laboratory testing work using modern investigation and testing procedures is complete and the initial (IRRM level) liquefaction potential assessment including any undrained liquefied strength estimates, and post-earthquake stability analyses are updated. To address these uncertainties in the most efficient way possible, the IES for Rattlesnake dam will be performed in a stepwise fashion. Under a previous scope of work, a geotechnical investigation work plan (GIWP) has been prepared by HDR to obtain site characterization data necessary for the seismic and seepage IES. We understand that IRWD will contract with a separate consultant to execute the site characterization program.

We propose to complete the IES and an Alternatives Analysis under eight major tasks outlined below.

TASK 1 | PROJECT MANAGEMENT AND MEETINGS

1.1 PROJECT MANAGEMENT

Activities include management of a Project Management and Quality Control Plan, staff coordination, schedule and budget monitoring, coordination of internal quality assurance reviews, and submission of monthly progress reports and invoices for our work.

For purposes of estimating the level of effort and direct costs associated with project management, we have assumed that the duration of the IES Phase 2 work will be up to 18 months A total of up to 18 progress reports are included under this task. To facilitate communications with IRWD's PM, monthly meetings will be held to discuss project status and upcoming activities. Up to 18 calls will be held.

1.2 PROJECT MEETINGS

Progress meetings at key milestones in the project will be held with IRWD. HDR's PM and up to three other staff will attend meetings to discuss the following:

1. Exploration Results
2. Engineering Evaluation and Preliminary Results
3. IES Results and Check Point Meeting
4. Evaluation Criteria, Risk Reduction Measure Development and Engineering Analyses Results

5. Alternatives Analysis Results and Selection of Preferred Alternative
6. Presentation to California Division of Safety of Dams (DSOD) on IES and Alternatives Analysis

DELIVERABLES

- Monthly Progress Reports
- Project Meeting Presentations
- Project Meeting Notes

ASSUMPTIONS

- Project meetings 1, 2, and 4 with IRWD will be virtual and last 2 hours. No travel is required.
- Project meetings 3 and 5 will be 4-hour meetings held at IRWD's office.
- Project meeting 6 will be a 2-hour meeting held at DSOD's Sacramento office.
- Reports in this study will be submitted in electronic (pdf) form only.

TASK 2 | SITE CHARACTERIZATION SUPPORT

2.1 SITE CHARACTERIZATION SUPPORT

As noted above, the site characterization program will be conducted by others in accordance with the GIWP. All activities including field investigations (including borings, cone penetration tests, seismic refraction lines, downhole testing, and piezometer installation), permitting, site clearing, and restoration will be the responsibility of a separate consultant that is under contract with IRWD. HDR will work with the site investigation consultant and IRWD to confirm the approach to completing the test pit and will evaluate the test pit and associated laboratory testing results. HDR will conduct up to three (3) periodic site visits during the field investigation program to observe those activities and provide recommendations to IRWD on any adjustments to the field program if necessary.

Laboratory testing will be conducted by IRWD's field investigation consultant on embankment and foundation soil, and bedrock samples collected from the borings. Testing will include index properties (gradation, moisture content, unit weight, specific gravity, and Atterberg Limits), and other more advanced testing such as consolidation, shear strength (unconfined compression, direct simple shear, both consolidated-drained (CD) and consolidated-undrained (CU – with pore pressure measurement triaxial testing), and permeability. HDR will review draft boring logs and CPT results and provide recommendations for any adjustments to the laboratory testing program presented in the GIWP if deemed necessary. HDR will participate in up to 3 one-hour meetings with the investigation consultant regarding the setup, completion and evaluation of laboratory testing results. The field investigation consultant should not implement laboratory testing without input from HDR.

HDR will review the field investigation consultant's Geotechnical Data Report (GDR) and provide written comments to IRWD. Those comments should be addressed before the GDR is finalized.

DELIVERABLES

- Site visit reports including recommendations for adjustments in the field investigation approach (if necessary)

- Recommendations for the laboratory testing program
- Review comments on the draft GDR

ASSUMPTIONS

- Three separate one-day visits will be conducted to observe field investigation activities.
- IRWD will complete coordination with DSOD to achieve approval of the GIWP and to coordinate DSOD site visits during field investigations.
- The field investigation consultant will have at least one qualified person to observe each drill rig operation as required to meet standard of practice and DSOD requirements.

TASK 3 | GEOLOGIC AND ENGINEERING EVALUATIONS

3.1 SITE GEOLOGIC/GEOTECHNICAL MODEL

Using the site data gathered in Tasks 2, HDR will develop a preliminary 3-dimensional (3D) geologic/geotechnical model of the dam site. A key element of the model will be the extents of embankment materials (including the internal drainage systems and the “strip and flip” zone), the foundation alluvium/colluvium, and the top of bedrock contact. The model will be used to confirm the appropriate method for modeling embankment seepage and stability.

3.2 ENGINEERING PROPERTIES

Using the site characterization and laboratory test data gathered in Task 2, HDR will update our previous estimates of the engineering properties of the embankment dam, foundation alluvium, and bedrock materials for use in the seepage, liquefaction potential and triggering, and static and post-earthquake stability analyses. Included will be the potential for strength reduction of the embankment material during seismic shaking and estimates of the post-liquefaction undrained strengths of the foundation alluvial materials using the residual strength correlation methods proposed by Weber (2015).

3.3 SEEPAGE ANALYSES

HDR will develop a seepage evaluation model for the dam embankment and foundation to understand seepage conditions in the embankment, foundation soils and abutment/foundation bedrock under both current (restricted) and maximum reservoir storage conditions. The seepage model will include internal drainage features and will be calibrated to the historic piezometric data. Once calibrated, seepage analyses under a range of reservoir storage conditions will be used to inform the seepage safety evaluation as well as the static and post-earthquake stability evaluations.

Seepage models (2D) will be developed for 1) the maximum section of the dam, and 2) for a second section closer to the right abutment (where elevated historic seepage conditions have been reported). The GeoStudio program SEEP/W will be used. For this seepage evaluation, existing as well as new material properties will be considered to estimate the range of permeabilities of the embankment and foundation soil material and the hydraulic conductivities of the foundation bedrock. The model will be calibrated to the observed water levels in instrumentation near the maximum section and right abutment areas of the dam.

Various reservoir pool levels will be evaluated, including maximum pool and normal operating pool levels. Seepage model results will include 1) the phreatic surface through the dam, 2) expected seepage pressures, gradients, and flow directions within embankment, exiting into embankment drains, and in the foundation, and 3) seepage flux (flow) through the 2D cross-sections. The results of the seepage analyses will be used as the baseline conditions in subsequent static and post-earthquake stability analyses described below. The results will also be used to complete the seepage component of the IES, and complete recommended actions related to RC-4.

3.4 PRELIMINARY LIQUEFACTION POTENTIAL AND SLOPE STABILITY ANALYSES

The results of site characterization work (CPT, SPT and surface geophysical surveys) will be used to complete an updated assessment of the engineering properties of the embankment and foundation soils, liquefaction potential in the foundation alluvium, and a liquefaction triggering analysis of the foundation alluvial materials. Simplified methods will be used for this initial liquefaction potential and triggering analyses. In addition, using the results of both field and laboratory tests, a complete shear strength model of the embankment and foundation soils will be assessed, and appropriate shear strength assumptions will be developed for static and post-earthquake stability analyses.

HDR will update the previously developed stability model along the maximum section of the dam based on the site characterization results, and complete updated static and post-earthquake stability analyses. The GeoStudios program SLOPE/W will be used to model the stability of the dam embankment and foundation.

DELIVERABLES

- None.

ASSUMPTIONS

- Slope stability considerations will be controlled by post-earthquake conditions considering the undrained (liquefied residual) strength. Should that post-earthquake condition not be the critical case, additional analyses of seismic deformations of existing conditions during the earthquake may be required. Those evaluations are not included in this scope of work.
- A seismic hazard assessment is not included in this task. The recently completed Seismic Hazard Assessment for the Syphon Reservoir Improvement Project (AECOM, 2020) will be used for this Seismic IES.

TASK 4 | REVISE BASELINE RISK ANALYSIS AND DETERMINE MITIGATION REQUIREMENT

HDR will update the risk analysis for Rattlesnake Dam that was completed in 2021 considering the site characterization and laboratory testing data that will be completed as part of the GIWP along with the IES seepage and stability analyses (Task 3 and 4). HDR will conduct a one-day virtual workshop to establish new baseline semi-quantitative risk analyses (SQRA) for critical individual PFMs and total risk estimates for the dam. Critical PFMs will include both first tier and second tier PFMs that have previously been identified as well as any new PFMs that become apparent through the site characterization program.

HDR will also consider other investigations that have been completed at Rattlesnake Dam such as the recent left abutment stability evaluation and the condition survey of the outlet pipe that was completed in 2022. The 2022 outlet works pipe condition assessment found significant corrosion and loss of pipe section suggesting the pipe is near the end of its useful life and in need of replacement. These findings will be carefully reviewed and assessed, and a new PFM and risk analysis associated with the pipe condition will be conducted as appropriate.

HDR will also revisit the preliminary seismic stability analyses and consideration of restricted reservoir pool levels that were developed in 2021. HDR will identify if there is a risk basis to modify the current restricted pool level.

DELIVERABLES

- None.

ASSUMPTIONS

- Up to two new PFMs will be developed for the updated baseline risk analysis. One of those PFMs will be associated with the condition assessment of the outlet pipe.
- Reporting on the revised baseline risk analysis will be included in the IES Summary Report (Task 5)

TASK 5 | IES SUMMARY REPORT PREPARATION

An IES Summary Report will be prepared that summarizes the key findings of Tasks 2, 3 and 4. The results of the site characterization, laboratory testing, and engineering analyses will be described. The updated baseline risk analysis will be presented, along with the determination of whether risk reduction measures are required.

A draft IES Summary Report will be submitted for IRWD review. A check point meeting will then be held with IRWD to review the results of the IES, including the updated baseline risk analysis and other identified issues. A half day in-person meeting will be held to review the IES results and discuss the approach for an alternatives analysis (if needed). If scope adjustments are needed, they will be made after the check point meeting. The IES Summary Report will then be revised to address all comments and finalized.

For scoping purposes for the alternatives analysis (Task 6 to 8 below), we have assumed the conditions listed below will be found at Rattlesnake Dam after considering the results of the site characterization and IES, including the updated baseline risk analysis:

- Liquefaction and post-earthquake instability are indeed an issue, so risk reduction actions are required.
- Seepage analyses and the seepage safety evaluation will demonstrate that embankment seepage provisions in the dam/foundation are inadequate and require modifications to reduce seepage failure mode risks.
- The outlet pipe requires replacement.
- Spillway chute erosion is an issue, and risk reduction actions are required.

DELIVERABLES

- Issue Evaluation Study Summary Report (Draft and Final)
- Presentation to IRWD for Check Point meeting on IES including the updated baseline risk analysis

ASSUMPTIONS

- A 4-hour Check Point meeting will be held at IRWD's office to review the updated baseline risk analysis and the items that will be addressed in an alternatives analysis. Attendance and travel to the meeting is covered under Task 1.2- Project Meetings.

TASK 6 | DEVELOP EVALUATION CRITERIA, MITIGATION MEASURES AND ENGINEERING ANALYSES

6.1 DEVELOP EVALUATION CRITERIA

Under this task, HDR will develop the criteria that will be used to evaluate alternatives that will be developed as part of Task 7. The criteria may include items such as technical considerations, construction costs, risk reduction, operational considerations, regulatory acceptance and permitting factors. The proposed evaluation criteria and approach will be presented to IRWD for review and input.

6.2 DEVELOP MITIGATION MEASURES

HDR will also identify, develop and evaluate dam safety risk reduction measures that could be implemented to reduce the risk of identified PFMs. For the dam, such measures could include installation of filters and drains within the embankment and foundation, removal and replacement of select portions of the embankment and foundation materials, in situ foundation strength improvement, and dam buttressing.

For the spillway, removal and replacement of the existing spillway liner with a modern chute and energy dissipation structure meeting current best practices would be considered. Alternative stilling basins for the spillway will be identified and described and a preferred type of stilling basin will be incorporated into the overall spillway rehabilitation concept.

For the outlet works, measures including lining of the existing outlet pipe or replacement of the existing pipe will be evaluated.

Overall, the rehabilitation measures will be evaluated to confirm they adequately address slope instability, seepage, and spillway and outlet works potential failure mode risks. The list of potential measures will be evaluated and screened to determine which will be carried forward. The measures will include potential removal of the dam and ecological restoration of the reservoir pool.

6.3 CONDUCT ENGINEERING ANALYSES

To support the evaluation of alternative mitigation measures, HDR will perform engineering analyses and evaluate mitigated conditions. Such analyses and evaluations will include concept-level seepage, slope stability, simplified seismic response deformation and internal erosion analyses for the dam. Conceptual level hydraulic and structural analyses of the alternative spillway

and outlet work mitigation measures will be performed. The intent will be to develop the configuration of individual measures that will address associated PFM risks, meet deterministic design criteria and help reduce risk to tolerable levels consistent with IRWD's risk tolerance guidelines.

DELIVERABLES

- Presentation for meeting with IRWD on evaluation criteria, measure development and engineering analyses.

ASSUMPTIONS

- IRWD will provide the condition assessments for the existing outlet pipe, which will form the basis for the need for mitigation measures.
- Reporting on criteria, measure development and engineering analyses will be included in the Alternatives Analyses Report (Task 8)

TASK 7 | CONDUCT AN ALTERNATIVES ANALYSIS

7.1 DEVELOP COMPREHENSIVE ALTERNATIVES

HDR will take the dam safety risk reduction mitigation measures developed under Task 6 and combine them into comprehensive risk reduction alternatives. Each PFM considered related to seepage, seismic performance, spillway performance, etc. may have multiple measures that can be considered to reduce risk. Through the alternatives analysis process, the multiple measures will be narrowed and combined into three comprehensive mitigation alternatives, each with its own combination of risk reduction and associated costs. In addition, HDR will also consider a "do nothing" alternative that may include continuing to operate under a restricted reservoir pool, along with an alternative that involves removal of the embankment dam and restoration of the reservoir and dam footprint areas. In total, five alternatives will then be considered in the analysis.

7.2 CONCEPTUAL LAYOUTS AND COST ESTIMATES

HDR will develop combined conceptual level layouts of each alternative. The layouts will be in detail sufficient to estimate the risk reduction associate with each alternative and to prepare a screening level cost estimate. HDR will develop quantities and construction cost estimates (ACEC Level 4 to 5) for each alternative, to be used for alternative evaluation.

7.3 ESTIMATE RISK REDUCTION AND RANK ALTERNATIVES

HDR will then estimate the risk of the key potential failure modes for each alternative. Developing the individual PFM and total risk estimates for each alternative and comparing those estimates with the baseline risk estimates for the existing dam, spillway and outlet work will identify the level of risk reduction that can be achieved by each alternative. HDR's risk team will develop screening level risk estimates for each alternative at a one day virtual workshop. During the workshop, the risk estimating team will review the PFMs and estimate the individual and total risk for each alternative. Once the risk estimates are completed, the total risk will be compared to the baseline risk estimate for the existing dam and identify the level of risk reduction provided by each alternative for all critical PFMs.

HDR will then complete an analysis of the five alternatives by completing a qualitative ranking of each alternative using the evaluation criteria established under Task 6 for IRWD to consider.

DELIVERABLES

- None.

ASSUMPTIONS

- Reporting on the alternatives analyses process and findings will be included in the Alternatives Analyses Report (Task 8)
- Five alternatives will be developed, including three dam safety mitigation alternatives, one "do nothing" alternative and one dam removal alternative.
- HDR's analysis of the dam removal alternative will not include an assessment of impacts to IRWD's recycled water operations and costs.
- IRWD will provide high level assessment of each alternative's environmental assessment and permitting requirements for consideration in the alternatives analysis.
- A full day, virtual workshop will be required to estimate risk reduction associated with each alternative for all PFMs. IRWD will participate in the workshop.

TASK 8 | ALTERNATIVES ANALYSIS REPORT PREPARATION AND WORKSHOPS

8.1 DEVELOP ALTERNATIVES ANALYSIS REPORT

HDR will prepare a draft Alternatives Analysis Report that documents the evaluations and findings of Tasks 6 and 7. The report will describe evaluation criteria, measure development, engineering analyses, alternatives including concept layouts, risk reduction estimation, cost estimates and the alternative evaluation including qualitative rankings. This draft report will not include the selection of a preferred alternative.

8.2 ALTERNATIVES ANALYSIS REVIEWS AND WORKSHOPS

HDR will hold a half day meeting with IRWD to review the alternatives analysis findings and initial ranking. HDR and IRWD will then work to identify a preferred alternative for risk reduction measures at Rattlesnake Dam. The Alternatives Analysis report will then be finalized, including resolutions of all IRWD comments on the draft report and a description of the preferred alternative.

A briefing will then be held with DSOD to review the findings of the IES and the Alternatives Analysis. A two-hour meeting will be held at DSOD's offices in Sacramento, including a presentation of findings and a discussion. IRWD will then transmit the final IES and Alternatives Analysis reports to DSOD for review.

DELIVERABLES

- Alternatives Analysis Report (draft and final)
- Presentation to IRWD on findings of Alternatives Analysis
- Presentation to DSOD on findings of IES and Alternatives Analysis

ASSUMPTIONS

- A half day, in person meeting will be held at IRWD's office to review the Alternatives Analysis and select a preferred alternative.
- A two-hour, in person meeting will be held at DSOD's office in Sacramento to review the IES and Alternatives Analysis.
- Preparation for the IRWD and DSOD review meetings are included in this subtask. Meeting attendance is covered under Task 1.2 – Project Meetings.

Proposed Budget

The proposed budget for this scope of work is summarized by task below. Attached is a detailed budget estimate for each task including personnel, estimated hours and direct costs.

Task 1	PROJECT MANAGEMENT	$ 89,885
Task 2	SITE CHARACTERIZATION SUPPORT	$ 52,449
Task 3	GEOLOGIC AND ENGINEERING EVALUATIONS	$ 115,518
Task 4	**REVISE BASELINE RISK ANALYSIS AND DETERMINE MITIGATION REQUIREMENT**	$ 42,644
Task 5	IES SUMMARY REPORT PREPARATION	$ 56,875
Task 6	**DEVELOP EVALUATION CRITERIA, MITIGATION MEASURES AND ENGINEERING ANALYSES**	$ 87,134
Task 7	**CONDUCT AN ALTERNATIVES ANALYSIS**	$ 105,242
Task 8	**ALTERNATIVES ANALYSIS REPORT PREPARATION**	$ 75,118
	Total	$ 624,865

Proposed Schedule

We have assumed a notice to proceed date of April 3, 2023, and a duration of approximately 16 months. A preliminary project schedule is attached, and shows the work breakdown schedule, key project meetings and workshop, IRWD review periods and key deliverables. We anticipate that the field investigation and laboratory testing program will take approximately 4 months to complete. As shown, the start of the IES and Alternatives Evaluation (Task 3 to 8) are dependent on the site investigation consultant's completion of field investigations, laboratory testing and reporting.

Closure

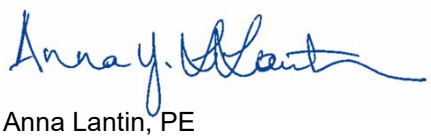
Please let us know if you have any questions or desire further information. We are prepared to discuss and update the scope of work and level of effort necessary to meet the needs of IRWD going forward.

Please contact Andy Gong at (619) 674-4986 or at andy.gong@hdrinc.com if you have any questions or require additional information.

Sincerely,

HDR Engineering, Inc.

Andy Gong, PE, CFM
Project Manager

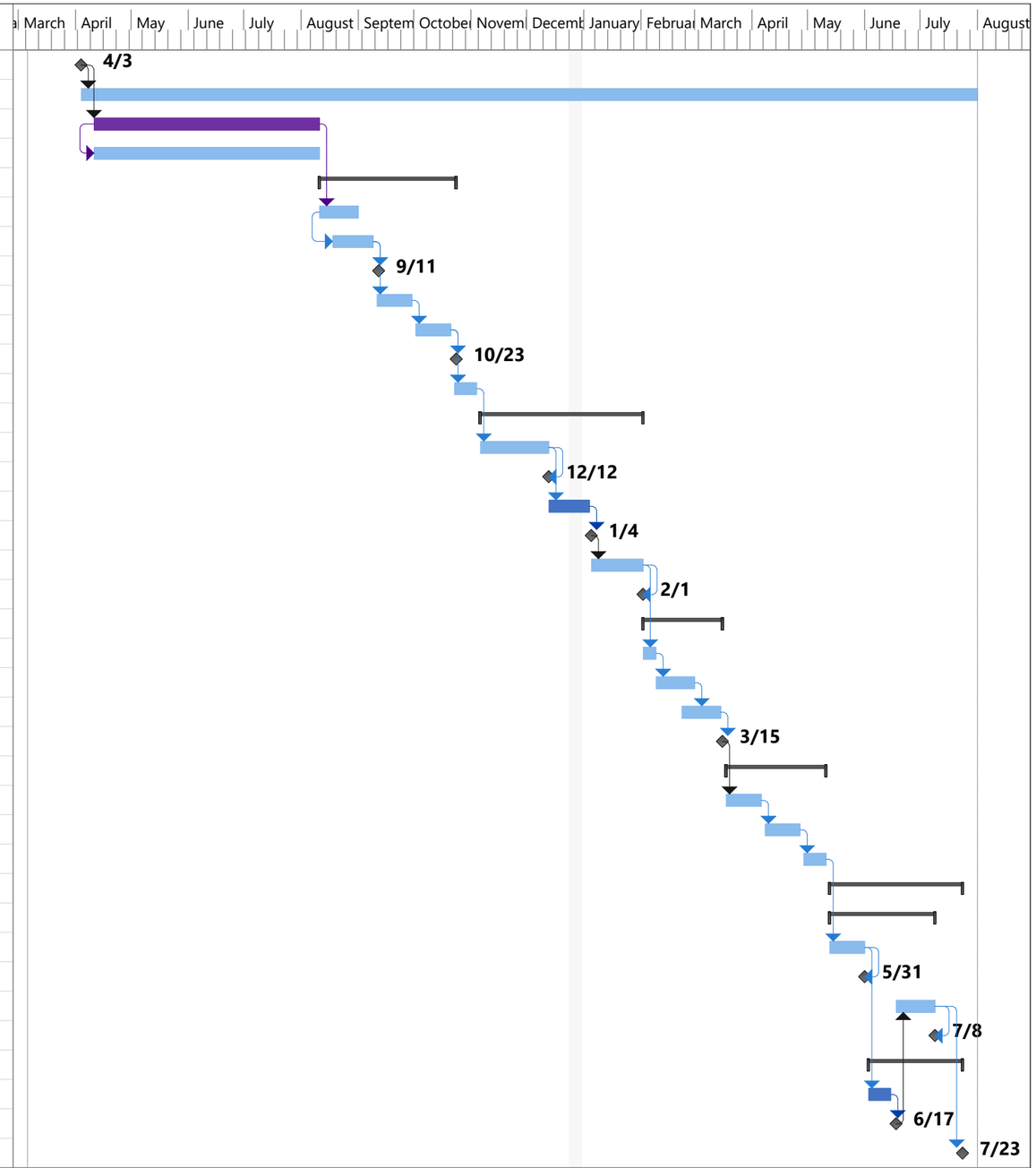


Anna Lantin, PE
Vice President

Irvine Ranch Water District
Rattlesnake Dam IES and AA
Estimated Level of Effort and Fee

TASKS		LEVEL OF EFFORT																FEE			
No.	Description	Project Manager	Senior Technical Advisors	QC Reviewer	Technical Lead, EOR	Site Characterization Lead	Engineering Evaluations Lead	Sr Engineer	Engineer	Sr. Geologist	Geologist	Civil Design	CADD	Cost Estimator	Project Administrator	Project Accountant	Total Labor	Labor	Direct Costs	Total	TOTAL
	Key Staff	Gong	Ferguson, Osmun	Harder, Stanley	Krivanec	Buga, Harris	Pace, Harris	Crosariol, Backman	Wong, Satyal	Buga	Tanner	Quintrall	Jackson	Williams	Pittman	Malek					
	Client Billing Rates	*$295*	*$365*	*$370*	*$362*	*$295*	*$265*	*$205*	*$155*	*$270*	*$145*	*$260*	*$217*	*$185*	*$135*	*$135*	*$259*		*Calc*	*Calc*	*0*
1	**Project Management and Meetings**																				
1.1	Project Management	104													24	19	147	$36,485	$0	$36,485	
1.2	Project Meetings	46	48		48												142	$48,466	$4,934	$53,400	
	Subtotal 1 | Project Management and Meetings	**150**	**48**	**0**	**48**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**24**	**19**	**289**	**$84,951**	**$4,934**	**$89,885**	**$89,885**
2	**Site Characterization Support**																				
2.1	Site Characterization Support	2	32		50	19	16			32					6		157	$49,665	$2,784	$52,449	
	Subtotal 2 | Site Characterization Support	**2**	**32**	**0**	**50**	**19**	**16**	**0**	**0**	**32**	**0**	**0**	**0**	**0**	**6**	**0**	**157**	**$49,665**	**$2,784**	**$52,449**	**$52,449**
3	**Geologic and Engineering Evaluations**																				
3.1	Geologic Model		8	4	8					31	80						131	$27,266	$0	$27,266	
3.2	Engineering Properties		8	4	8		16	24	40	12							112	$25,896	$0	$25,896	
3.3	Seepage Analyses		8	4	10		16	32	48								118	$26,260	$0	$26,260	
3.4	Liquefaction Potential and Triggering Analysis		8	4	8		12	12	24								68	$16,656	$0	$16,656	
3.5	Post-Earthquake Stability Analyses		8	4	10		12	16	32								82	$19,440	$0	$19,440	
	Subtotal 3 | Geologic and Engineering Evaluations	**0**	**40**	**20**	**44**	**0**	**56**	**84**	**144**	**43**	**80**	**0**	**0**	**0**	**0**	**0**	**511**	**$115,518**	**$0**	**$115,518**	**$115,518**
4	**Revise Baseline Risk Analysis, Determine Mitigation Req**																				
4.1	Revise Baseline Risk Analysis, Determine Mitigation Req	2	48	4	32		6	24	32								148	$42,644	$0	$42,644	
	Subtotal 4 | Revise Baseline Risk Analysis, Determine Mitigation Req	**2**	**48**	**4**	**32**	**0**	**6**	**24**	**32**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**148**	**$42,644**	**$0**	**$42,644**	**$42,644**
5	**IES Summary Report Preparation**																				
5.1	IES Summary Report Preparation	2	32	8	40			54	40	16	31				8		231	$56,875	$0	$56,875	
	Subtotal 5 | IES Summary Report Preparation	**2**	**32**	**8**	**40**	**0**	**0**	**54**	**40**	**16**	**31**	**0**	**0**	**0**	**8**	**0**	**231**	**$56,875**	**$0**	**$56,875**	**$56,875**
6	**Evaluation Criteria, Mitigation Measures, Engr. Analyses**																				
6.1	Develop Evaluation Criteria		6		24		8	20									58	$17,098	$0	$17,098	
6.2	Develop Mitigation Measures		8		24		4	16	32			4			4		92	$22,488	$0	$22,488	
6.3	Conduct Engineering Analyses		8	6	24		32	60	80						4		214	$47,548	$0	$47,548	
	Subtotal 6 | Evaluation Criteria, Mitigation Measures, Engr. Analyses	**0**	**22**	**6**	**72**	**0**	**44**	**96**	**112**	**0**	**0**	**4**	**0**	**0**	**8**	**0**	**364**	**$87,134**	**$0**	**$87,134**	**$87,134**
7	**Conduct an Alternatives Analysis**																				
7.1	Develop Comprehensive Alternatives		8		40			12				12	16				88	$26,452	$0	$26,452	
7.2	Conceptual Layouts and Cost Estimates		8	6	24			18	50			24	42	26			198	$45,432	$0	$45,432	
7.3	Estimate Risk Reduction and Rank Alternatives	2	32		24		8	32	24								122	$33,358	$0	$33,358	
	Subtotal 7 | Conduct an Alternatives Analysis	**2**	**48**	**6**	**88**	**0**	**8**	**62**	**74**	**0**	**0**	**36**	**58**	**26**	**0**	**0**	**408**	**$105,242**	**$0**	**$105,242**	**$105,242**
8	**Alternatives Analysis Report Preparation and Workshops**																				
8.1	Develop Alternatives Analysis Report	2	24	8	40			50	37			17	16	16	12		222	$55,247	$0	$55,247	
8.2	Alternatives Analysis Reviews and Workshops	2	21	4	28												55	$19,871	$0	$19,871	
	Subtotal 8 | Alternatives Analysis Report Preparation and Workshops	**4**	**45**	**12**	**68**	**0**	**0**	**50**	**37**	**0**	**0**	**17**	**16**	**16**	**12**	**0**	**277**	**$75,118**	**$0**	**$75,118**	**$75,118**
	TOTAL, hours	**162**	**315**	**56**	**442**	**19**	**130**	**370**	**439**	**91**	**111**	**57**	**74**	**42**	**58**	**19**	**2,385**				
	TOTAL, dollars																	**$617,147**	**$7,718**	**$624,865**	**$624,865**

ID	Task Name	Duration	Start	Finish	Predecessors
1	Notice to Proceed	1 day	Mon 4/3/23	Mon 4/3/23	
2	1.0 Project Management	335 days	Tue 4/4/23	Wed 7/31/24	1
3	*Site Characterization, Lab Testing, Reporting (by others)*	*85 days*	*Tue 4/11/23*	*Thu 8/10/23*	*1FS+1 wk*
4	2.0 Site Characterization Support	85 days	Tue 4/11/23	Thu 8/10/23	3SS
5	**3.0 Geologic and Engineering Analyses**	**51 days**	**Fri 8/11/23**	**Mon 10/23/23**	
6	3.1 Site Geologic/Geotechnical Model	15 days	Fri 8/11/23	Thu 8/31/23	3
7	3.2 Engineering Properties	15 days	Fri 8/18/23	Fri 9/8/23	6SS+1 wk
8	*Meeting on Exploration Results*	*1 day*	*Mon 9/11/23*	*Mon 9/11/23*	*7*
9	3.3 Seepage Analyses	15 days	Mon 9/11/23	Fri 9/29/23	7
10	3.4 Liquefaction and Slope Stability	15 days	Mon 10/2/23	Fri 10/20/23	9
11	*Meeting on Engr Evaluation and Preliminary Results*	*1 day*	*Mon 10/23/23*	*Mon 10/23/23*	*10*
12	4.0 Revise Baseline Risk, Determine Mitigation Requirement	10 days	Mon 10/23/23	Fri 11/3/23	10
13	**5.0 IES Summary Report Preparation**	**56 days**	**Mon 11/6/23**	**Thu 2/1/24**	
14	5.1 Prepare Draft IES Report	25 days	Mon 11/6/23	Tue 12/12/23	12
15	*Submit Draft IES Report*	*0 days*	*Tue 12/12/23*	*Tue 12/12/23*	*14FF*
16	*5.2 IRWD Review*	*10 days*	*Wed 12/13/23*	*Wed 1/3/24*	*14*
17	*Meeting on IES Results, Check Point meeting*	*1 day*	*Thu 1/4/24*	*Thu 1/4/24*	*16*
18	5.3 Prepare Final IES Report	20 days	Fri 1/5/24	Thu 2/1/24	17
19	*Submit Final IES Report*	*0 days*	*Thu 2/1/24*	*Thu 2/1/24*	*18FF*
20	**6.0 Develop Criteria, Mitigation Measures, Analyses**	**31 days**	**Fri 2/2/24**	**Fri 3/15/24**	
21	6.1 Develop Evaluation Criteria	5 days	Fri 2/2/24	Thu 2/8/24	18
22	6.2 Develop Mitigation Measures	15 days	Fri 2/9/24	Thu 2/29/24	21
23	6.3 Conduct Engineering Analyses	15 days	Fri 2/23/24	Thu 3/14/24	22FS-1 wk
24	*Meeting on Criteria, Measures and Analysis Results*	*1 day*	*Fri 3/15/24*	*Fri 3/15/24*	*23*
25	**7.0 Conduct an Alternatives Analysis**	**40 days**	**Mon 3/18/24**	**Fri 5/10/24**	
26	7.1 Develop Comprehensive Alternatives	15 days	Mon 3/18/24	Fri 4/5/24	24
27	7.2 Conceptual Layouts and Cost Estimates	15 days	Mon 4/8/24	Fri 4/26/24	26
28	7.3 Estimate Risk Reduction and Rank Alternatives	10 days	Mon 4/29/24	Fri 5/10/24	27
29	**8.0 Alternatives Analysis Report and Workshops**	**52 days**	**Mon 5/13/24**	**Tue 7/23/24**	
30	**8.1 Develop Draft Alternatives Analysis Report**	**41 days**	**Mon 5/13/24**	**Mon 7/8/24**	
31	8.1.1 Develop Draft AAR	15 days	Mon 5/13/24	Fri 5/31/24	28
32	*Submit Draft AAR*	*0 days*	*Fri 5/31/24*	*Fri 5/31/24*	*31FF*
33	8.1.2 Finalize AAR	15 days	Tue 6/18/24	Mon 7/8/24	37
34	*Submit Final AAR*	*0 days*	*Mon 7/8/24*	*Mon 7/8/24*	*33FF*
35	**8.2 Alternatives Analysis Reviews and Workshops**	**37 days**	**Mon 6/3/24**	**Tue 7/23/24**	
36	*8.2.1 IRWD Review of Draft AAR*	*10 days*	*Mon 6/3/24*	*Fri 6/14/24*	*31*
37	*8.2.2 AAR Workshop*	*1 day*	*Mon 6/17/24*	*Mon 6/17/24*	*36*
38	*8.2.3 DSOD Presentation on Findings*	*1 day*	*Tue 7/23/24*	*Tue 7/23/24*	*33FS+2 wks*



Project: Rattlesnake - DRAFT IE
Date: Wed 2/15/23

Task	Project Summary	Manual Task	Start-only	Deadline			
Split	Inactive Task	Duration-only	Finish-only	Progress			
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress			
Summary	Inactive Summary	Manual Summary	External Milestone				

April 19, 2023
Prepared by: M. Marcacci/J. McGhee/R. Mori
Submitted by: K. Burton
Approved by: Paul A. Cook

ENGINEERING AND OPERATIONS COMMITTEE

REHABILITATION OF WELL OPA-1 BUDGET ADDITION AND CHANGE ORDER

SUMMARY:

In accordance with the Per- and Polyfluroalkyl Substances (PFAS) Treatment Facilities Agreement between IRWD and Orange County Water District (OCWD), OCWD is funding and managing the design and construction of an ion exchange (IX) treatment system to remove PFAS from the water produced at Well Orange Park Acres (OPA)-1. Construction of the treatment system is underway. During construction, the contractor performed a downhole video survey of the well that identified the need to rehabilitate the well prior to placing the IX treatment system into service. In accordance with the Agreement, the costs associated with well rehabilitation are IRWD's responsibility. Staff recommends that the Board:

- Authorize the addition of Project 12594 to the FY 2022-23 Capital Budget in the amount of $557,500; and
- Authorize the General Manager to accept OCWD's construction contract change order with Innovative Construction Solutions (ICS) in the amount of $387,476.40.

BACKGROUND:

PFAS compounds have emerged as "contaminants of concern" primarily due to human health impacts. Several of these compounds have been detected in significant concentrations in parts of the groundwater basin. IRWD's Well OPA-1 is impacted by the PFAS contamination as are drinking water wells operated by nine other groundwater producer agencies. The location of Well OPA-1 is shown on Exhibit "A".

In response to the contamination of the groundwater basin, OCWD is implementing its PFAS Policy that was developed with input from IRWD consistent with IRWD policy principles. OCWD developed a program to work with the impacted groundwater producer agencies to fund a substantial portion of the design, construction, operation, and maintenance of facilities to remove PFAS from water produced from drinking water wells in the affected areas of the groundwater basin.

In 2020, IRWD entered into an Agreement with OCWD and nine other groundwater producer agencies that facilitates OCWD funding 100% of the design and construction costs and 50% of the operation and maintenance costs for treatment facilities to remove PFAS contamination at affected drinking water wells. Last year, OCWD awarded a construction contract to ICS to construct an IX treatment system to remove PFAS from the water produced at IRWD's Well OPA-1. Construction of the treatment system is underway.

Rehabilitation of Well OPA-1 Change Order:

During construction of the IX treatment facilities, the contractor performed a downhole video survey of Well OPA-1 that identified the need to rehabilitate this well. OCWD negotiated a change order with ICS in the amount of $387,476.40, for the rehabilitation work. Rehabilitation activities include mechanical cleaning, nylon and/or wire brushing, air bursting, chemical addition, swabbing, air lifting, and mechanical development to break up and remove consolidated material caused by microbial and inorganic fouling. In accordance with the Agreement, the costs associated with well rehabilitation are IRWD's responsibility.

Staff reviewed the change order, presented as Exhibit "B", and found it acceptable. The proposed well rehabilitation activities are similar in scope and fee to other recently completed IRWD well rehabilitation projects. Best Drilling, who will perform the well rehabilitation work as a subcontractor to ICS, has successfully performed these same services on many of IRWD's other wells.

The OCWD Board approved the construction contract change order on March 15, 2023.

FISCAL IMPACTS:

Rehabilitation of Well OPA-1, Project 12594, needs to be added to the FY 2022-23 Capital Budget as shown below. This project will be funded 100% by the Water Replacement Fund.

Project No.	Current Budget	Addition <Reduction>	Total Budget
12594	$-0-	$557,500	$557,500

ENVIRONMENTAL COMPLIANCE:

This project is subject to the California Environmental Quality Act (CEQA) and in conformance with California Code of Regulations Title 14, Chapter 3, Article 6, a Notice of Intent to adopt a Mitigated Negative Declaration was filed with the County of Orange on June 15, 2011. Pursuant to State Guideline § 15073, the IS/MND was made available for public review for a period of 30 days from June 15, 2011 through July 14, 2011. The IS/MND was modified and circulated for a review period of 30 days from April 23, 2012 to May 24, 2012. The IS/MND was adopted by IRWD Board of Directors at its meeting on June 11, 2012. Addendum No. 1 was prepared to the IS/MND pursuant to CEQA Section 15164 and was approved and adopted by the IRWD Board on September 27, 2021. A Notice of Determination for Addendum No. 1 was filed on September 28, 2021.

RECOMMENDATION:

That the Board authorize the addition of Project 12594, Rehabilitation of Well OPA-1, to the FY 2022-23 Capital Budget in the amount of $557,500 and authorize the General Manager to accept OCWD's construction contract change order with Innovative Construction Solutions in the amount of $387,476.40.

LIST OF EXHIBITS:

Exhibit “A” – Location Map
Exhibit “B” – ICS Change Order

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Exhibit "A" - Location Map

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innovative construction solutions LIC# 764815 A-HAZ-C21

Change Order Request

DATE: 3/20/2023

CHANGER ORDER #	004	CLIENT NAME:	OCWD
ICS PROJECT NO.:	SC-22-1012	CLIENT ADDRESS:	18700 WARD ST
PROJECT NAME:	IRWD OPA WELL 1 PFAS TREATMENT SYSTEM		FOUNTAIN VALLEY, CA 92708
PROJECT LOCATION:	678 N GRAVIER ST ORANGE, CA 92869	CLIENT REFERENCE NO.	

Pursuant to the Contract and Schedule of Values executed on 5/02/2022, this Change Order Request is issued to incorporate the following changes into our above agreement:

Section 1: Change in scope of work and reason: **Well Rehab Work Requested By Owner**

Section 2: Change in contract price (if any) and basis: **$387,476.40**

**The price includes all labor, materials, tools, and equipment in order to properly complete the specified scope of work. The work will be performed in accordance with industry standards and applicable regulatory requirements*.*

Section 3. Time required to perform the change in scope of work: 50 Days

Section 4. Change to contract schedule: 50 Days

Section 5. Change Orders are incorporated as a formal contract change of the contract. ICS agrees to diligently perform the change in scope of work described in Section "1" above. All work will be performed in accordance with the conditions outlined in the Purchase Order, Contract, and accompanying contract documents.

Original Contract Amount …….	**$3,485,000.00**
Total Previous Change Orders ……	**$175,766.28**
SUBTOTAL ……..	**$3,660,766.27**
Amount of this Change Order ……	**$387,476.40**
CURRENT CONTRACT AMOUNT ……	**$4,048,242.67**

Submitted By: _____ Chris Baker 3/20/2023

Project Manager Signature | Print Name | Date

UNDERSTOOD AND ACCEPTED:

Approved By: _____ _____ _____

Client Representative Signature | Print Name | Date

OCWD IRWD OPA WELL 1 PFAS TREATMENT SYSTEM

SECTION 1		WELL REHAB	HOURS/WEEKS	QUANTITY	TOTAL	RATE	COST	MU%	TOTAL		
SUB	3	BEST DRILLING & PUMP		1	LS	$ 333,600.00	$ 333,600.00	15%	$ 383,640.00		
									$ 383,640.00		
		SUBTOTAL							**$383,640.00**		
BOND PREMIUM	1	Bond Premium		1	LS			1%	$ 3,836.40		
		TOTAL							$387,476.40		

Best Drilling and Pump
1640 Pellisier Rd
Colton, CA 92324

Date: 3/2/2023

SCHEDULE OF VALUES AND LABOR PROJECTIONS

Project No:
Contract #
Project: Rehabilitation of IRWD OPA 1
Contractor: Best Drilling and Pump Inc.
Trade: C-57

Bid Item #	DESCRIPTION	UM	QTY	Unit Price	Labor	Material	SCHEDULED VALUE
	Schedule - IRWD OPA-1						
1	**Mobilization/ Demobilization**	LS	1	$ 25,000.00	$25,000.00		$ 25,000.00
2	Well Redevlopment Air Burst**- Air Burst Crew (Typically 2 Men w/ a Truck and Air Burst Equipment) Additionally Best Supplys a Pump Rig with an operator. Air-Burst crew/ Equipment- $15780/ Best Crew with Pump Rig $465HR X 8 = $ 3720**	LS	1	$ 19,500.00	$19,500.00		$ 19,500.00
3	Chemical Treatment **(1220 Gallons Of Water Solv BC) approximate 6-8 days of a 2-3 man crew with a Pump Rig and a Support Truck; (8 Days @ $3720 = $ 29,760) 4 Totes 305 gallons each of waterSolv BC $15,000 each)**	LS	1	$ 95,000.00	$30,000.00	$65,000.00	$ 95,000.00
4	**Mechanical Development**	HRs	60	$ 550.00	$33,000.00		$ 33,000.00
5	Treatment and Discharge of redevlopment water **(Typically 2 -21K Baker Tanks, 2-3 Months on site, plus hoses, WQ monitoring equipement, Meters, Trash pumps, etc and cleaning and hauling of some fluids) (Banker Tank Rentals $ 5,000 month per tank)**	LS	1	$ 30,000.00	$10,000.00	$20,000.00	$ 30,000.00
6	**Video Survey**	EA	2	$ 1,500.00	$3,000.00		$ 3,000.00
7	Install and Remove Test Pump **(Typically 6-8 days of crew to install pump and temporary Discharge and use of Test Pump, Column, tube and shaft, Test Engine/ or VFD (8 Days @ $3720= $29760: Test Engine Month= $7500 Test Pump Rental Month = $ 2,740)**	LS	1	$ 40,000.00	$40,000.00		$ 40,000.00
8	**Pumping Development**	HRs	80	$ 550.00	$44,000.00		$ 44,000.00
9	**Step Test & Constant Rate Test**	Hrs	24	$ 550.00	$13,200.00		$ 13,200.00
10	**Dynamic Spinner Survey**	LS	1	$ 8,300.00	$8,300.00		$ 8,300.00
11	**Depth Specific Samples**	EA	5	$ 460.00	$2,300.00		$ 2,300.00
12	**Post Pumping Video**	LS	1	$ 1,500.00	$1,500.00		$ 1,500.00
13	**Static Spinner Survey**	LS	1	$ 4,500.00	$4,500.00		$ 4,500.00
14	**Conduct Well Disinfection and Clean up**	LS	1	$ 5,500.00	$5,000.00	$500.00	$ 5,500.00
15	**Stand By Time W/ Active Rig**	Hrs	16	$ 350.00	$5,600.00		$ 5,600.00
16	**Stand By Time W/ Inactive Rig**	HRs	16	$ 200.00	$3,200.00		$ 3,200.00
	TOTAL				$248,100.00	$85,500.00	**$ 333,600.00**

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