AGENDA
IRVINE RANCH WATER DISTRICT
ENGINEERING AND OPERATIONS COMMITTEE MEETING
TUESDAY, JUNE 21, 2022

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

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

Via Web: https://irwd.webex.com/irwd/j.php?MTID=mae108464a00e0a54d2ee9a6e2d3834a2
Meeting Number (Access Code): 2489 272 8733
Meeting Password: pD7EpvemR43

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 McGehee	_____
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 Tuesday, June 21, 2022.

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.
4. Determine which items may be approved without discussion.

WORKSHOP

5. MID-CYCLE CAPITAL BUDGET UPDATE FOR FISCAL YEARS 2021-22 AND 2022-23 – AKIYOSHI / ROBINSON / BURTON

   Recommendation: That the Board receive and file the Mid-Cycle Capital Budget Update for Fiscal Years 2021-22 and 2022-23, and approve the recommended changes for the Fiscal Year 2022-23 Mid-Cycle Capital Budget Project additions as proposed.

INFORMATION

6. RESEARCH BUSINESS PLAN UPDATE – COLSTON / BURTON

   Recommendation: Receive and file.

ACTION

7. REPORT ON WATER QUALITY RELATIVE TO PUBLIC HEALTH GOALS – COLSTON / BURTON

   Recommendation: That a public hearing regarding the Report on Water Quality Relative to Public Health Goals be held on July 25, 2022, at IRWD's Regular Board meeting to accept any public comments that may be provided regarding the report.

8. CONDITION ASSESSMENT FOR PUMP STATIONS AND TANKS CONSULTANT SELECTION – ROBINSON / AKIYOSHI / BURTON

   Recommendation: That the Board authorize the General Manager to execute a Professional Services Agreement with HDR Engineering, Inc. in the amount of $367,800 for the Condition Assessment for Pump Stations and Tanks, Projects 12252 and 12254.

ACTION, Continued

9. FLEMING ZONE 8 RESERVOIR AND ZONE 8 TO 9 PUMP STATION – CHO / MOEDER / BURTON

   Recommendation: That the Board authorize the General Manager to execute a Professional Services Agreement with Tetra Tech in the amount of $330,000 for construction phase engineering services for the Fleming Zone 8 Reservoir and Zone 8 to 9 Pump Station, Project 10101.

10. SEWER SIPHON IMPROVEMENTS PHASE II CONSULTANT SELECTION – LU / CORTEZ / BURTON

    Recommendation: That the Board authorize the General Manager to execute a Professional Services Agreement with Woodard & Curran in the amount of $1,285,684 for design engineering services for the Sewer Siphon Improvements Phase II, Project 11841.

OTHER BUSINESS

11. Directors' Comments

12. Adjourn

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

Note: This page is intentionally left blank.

June 21, 2022
Prepared by: E. Akiyoshi / M. Robinson
Submitted by: K. Burton
Approved by: Paul A. Cook

ENGINEERING AND OPERATIONS COMMITTEE

MID-CYCLE CAPITAL BUDGET UPDATE FOR FISCAL YEARS 2021-22 AND 2022-23

SUMMARY:

The two-year Capital Budget for Fiscal Years (FY) 2021-22 and 2022-23 was approved by the Board on April 26, 2021. Staff will provide a presentation on the Mid-cycle Capital Budget Update for FY 2021-22 and 2022-23. Staff recommends the Board receive and file the update for the IRWD Capital Budget and approve the recommended changes to the FY 2021-22 and 2022-23 Capital Budget.

BACKGROUND:

In April 2021, the Board-approved Capital Budget included forecasted expenditures (forecasted work completed) for FY 2021-22 and FY 2022-23 of $116.7 million and $107.5 million, respectively.

Since April 2021, there have been Board-approved increases, and updates to project schedules. Staff's presentation summarizing the Mid-cycle Capital Budget Update, provided as Exhibit "A", highlights these changes to the total budget and the forecasted expenditures for FY 2021-22. Exhibit "A" also shows the proposed budget increases and additions of $6.5 million. The Capital Budget Project Additions list is provided as Exhibit "B".

FISCAL IMPACTS:

The following table presents the resulting total budget increase to the Capital Budget and forecasted expenditures for FY 2022-23 from the project additions.

Funding Source	Total Budget Increase ($)
Replacement Fund	$ 5.7 M
Developed Improvement Districts	$ 0.4 M
Developing Improvement Districts	$ 0.4 M
Total All Projects	$ 6.5 M

ENVIRONMENTAL COMPLIANCE:

Not applicable.

RECOMMENDATION:

That the Board receive and file the Mid-cycle Capital Budget Update for Fiscal Years 2021-22 and 2022-23, and approve the recommended changes for the Fiscal Year 2022-23 Mid-cycle Capital Budget Project additions as proposed.

LIST OF EXHIBITS:

Exhibit "A" – Mid-cycle Capital Budget Draft Presentation
Exhibit "B" – Mid-cycle Capital Budget Project Additions for FY 2022-23

FISCAL YEARS 2021-22 AND 2022-23 MID-CYCLE CAPITAL BUDGET UPDATE

ENGINEERING AND OPERATIONS COMMITTEE
JUNE 21, 2022

Irvine Ranch Water District

Irvine Ranch Water District

1

PRESENTATION OUTLINE

- Review FY 2021-22:
  - Approved Budget
  - Earned Value
  - Board Approved Increases
- Proposed Budget Increases and Additions
- FY 2022-23 Mid-Cycle Forecasted Expenditures

Irvine Ranch Water District

2

2

Original Forecast Expenditures Presented to the Board in April 2021

Capital Project Categories	2021-22 Forecast	2022-23 Forecast
Replacement - Facilities	$40.1M	$30.5M
Operational	$21.0M	$19.0M
Water Banking	$14.4M	$25.1M
OCSD - CORF - Solids Lease	$9.3M	$13.5M
Nonpotable Storage	$8.7M	$6.0M
Development	$6.0M	$2.1M
Property Management	$5.0M	$0.0M
Sewage Treatment	$2.6M	$5.4M
General Plant	$2.4M	$1.7M
Replacement-Business Software	$2.3M	$0.0M
Planning	$2.3M	$2.1M
Water Resources	$1.6M	$1.3M
OCWD Annexation	$0.6M	$0.6M
Baker WTP	$0.2M	$0.1M
Solids Handling	$0.1M	$0.0M
Total	**$116.7M**	**$107.5M**

3

Actual Capital Project Earned Value In FY 2021-22

Capital Project Categories	Original FY 21-22 Forecast	Actual Earned Value In FY 21-22	Difference in Forecast and Actual Earned Value
Replacement - Facilities	$40.1M	$36.4M	($3.7M)
Operational	$21.0M	$10.1M	($10.9M)
OCSD - CORF - Solids Lease	$9.3M	$8.9M	($0.4M)
Water Banking	$14.4M	$7.2M	($7.2M)
Property Management	$5.0M	$5.6M	$0.6M
Nonpotable Storage	$8.7M	$5.3M	($3.4M)
Development	$6.0M	$4.6M	($1.4M)
Replacement-Business Software	$2.3M	$1.6M	($0.8M)
Planning	$2.3M	$1.2M	($1.2M)
General Plant	$2.4M	$1.1M	($1.4M)
OCWD Annexation	$0.6M	$0.2M	($0.4M)
Water Resources	$1.6M	$0.2M	($1.4M)
Baker WTP	$0.2M	$0.0M	($0.1M)
Sewage Treatment	$2.6M	$0.0M	($2.6M)
Solids Handling	$0.0M	$0.0M	($0.0M)
Total	**$116.7M**	**$82.4M**	**($34.3M)**

4

Mid-Year Board Approved Changes for FY 2021-22 and 2022-23

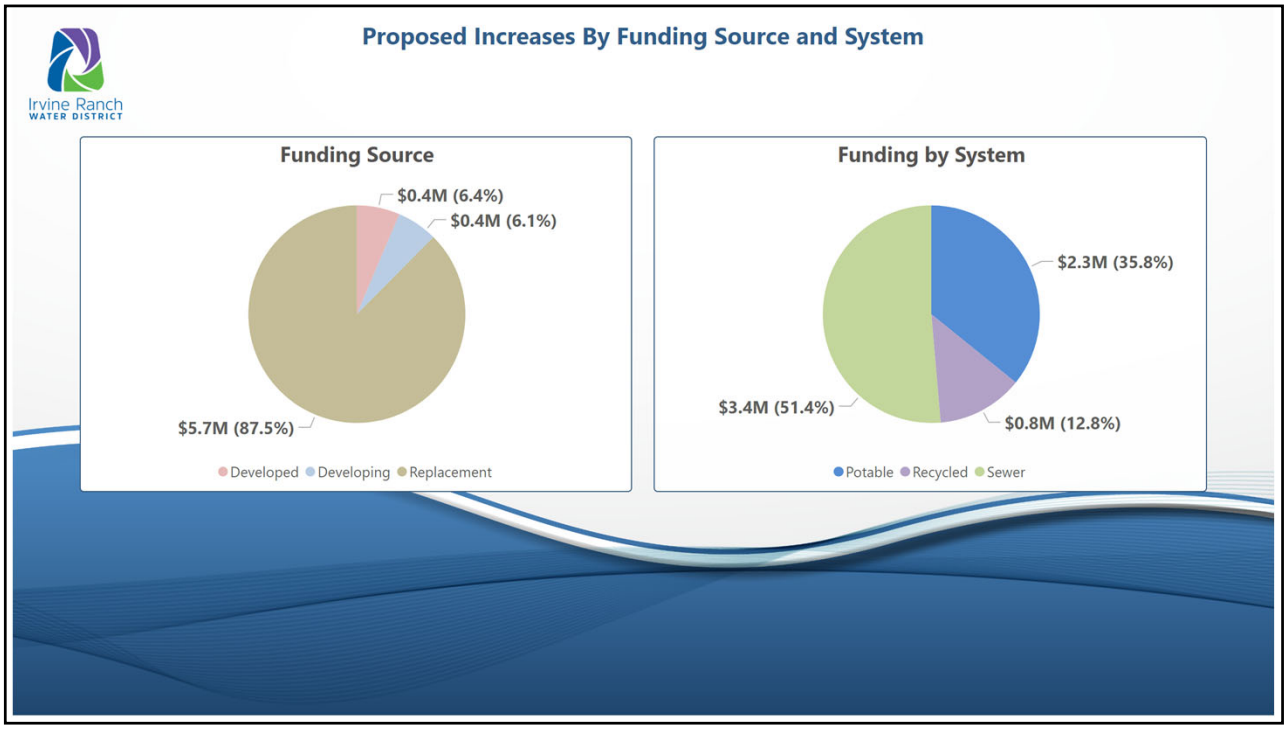
Project Number	Project Title	April 2021 Board Approved Total Budget	Mid-Year Board Approved Increases	Current Board Approved Budget
11123	LAKE FOREST WOODS SEWER ACCESS IMPROVEMENTS	$0.4M	$5.0M	$5.3M
11168	LAKE FOREST ZONE C RECYCLED WATER PUMP STATION	$3.8M	$4.7M	$8.5M
11571	WOODBRIDGE RECYCLED WATER PIPELINE REPLACEMENT	$11.0M	$4.2M	$15.2M
01398	SANTIAGO CANYON AREA PUMP STATION IMPROVEMENTS	$6.6M	$3.6M	$10.2M
05761	15 MG ZONE 1 RESERVOIR INTERIOR COATING	$2.7M	$2.4M	$5.2M
11122	HATS DIVERSION STRUCTURE REHABILITATION	$0.7M	$2.2M	$2.9M
12053	IBC APPURTENANCE RELOCATION		$0.9M	$0.9M
07886	SEWER SIPHON REHABILITATION	$9.7M	$0.8M	$10.5M
11869	SAND CANYON PROFESSIONAL CENTER - GENERAL OFFICE	$5.4M	$0.7M	$6.0M
11746	SITES RESERVOIR PLANNING AND ENVIRONMENTAL REVIEW	$0.7M	$0.5M	$1.2M
	Other	$4.9M	($2.8M)	$2.1M
Total		**$45.9M**	**$22.1M**	**$68.0M**

5

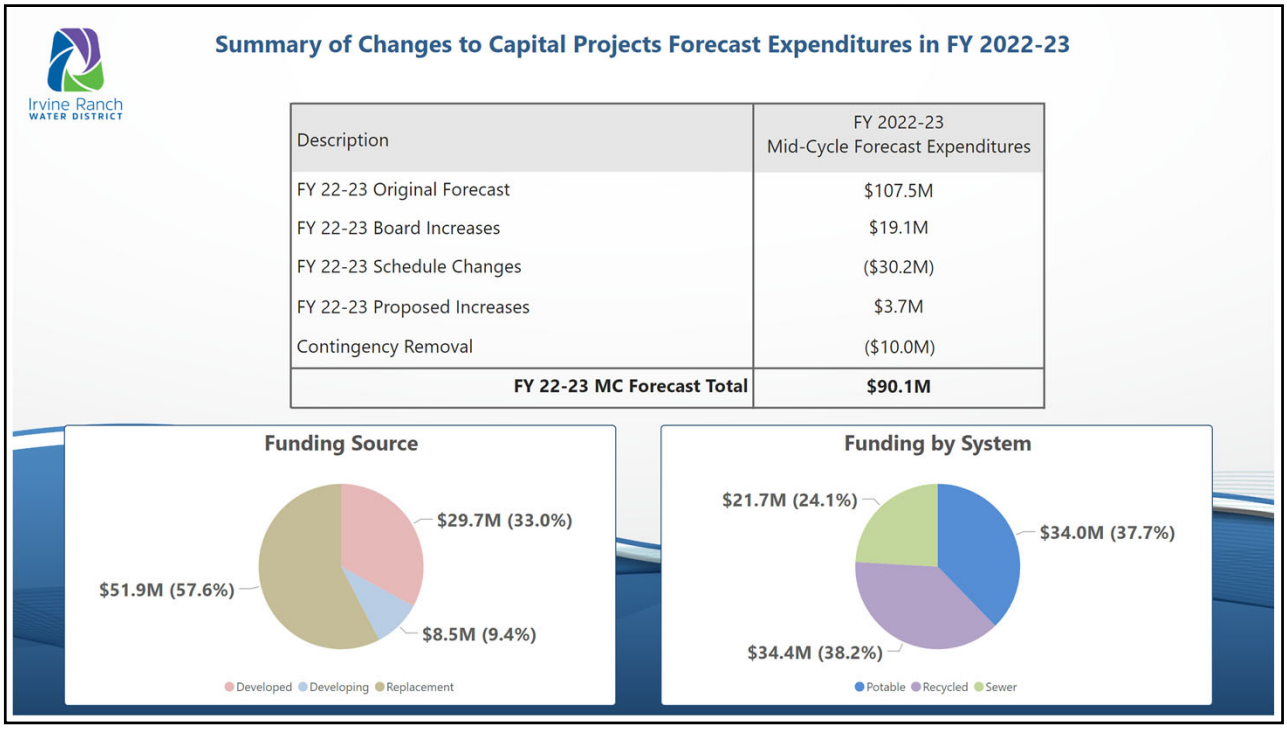
Proposed Budget Increases and Project Additions

Project Number	Project Title	Proposed Increases
12125	36 INCH SS RELOCATION AT SR133/SD CREEK	$1.2M
11845	WELL REHAB-DRWF 12	$0.8M
12215	RIPARIAN VIEW PAVEMENT REHABILITATION	$0.7M
12252	CIP AM - CONDITION ASSESSMENT DW	$0.5M
12254	CIP AM - CONDITION ASSESSMENT RW	$0.5M
12228	PA51 D5 HARRIER FROM CHINON TO LYNX 12DW CODE 7808	$0.5M
12296	MAIN/CARTWRIGHT MH REHABILITATION	$0.4M
12230	PA51 D5 D6 HARRIER FROM CHINON TO LYNX 10RW IRWD CODE 7808	$0.3M
12294	EL TORO RD SMH RAISE TO GRADE	$0.3M
11585	PUBLIC OUTREACH CAMPAIGN REPLACEMENTS	$0.3M
11584	PA12 REGIONAL ZONE A RW IMPROVEMENTS	$0.2M
12232	PA51 D5 D6 CHINON FROM HARRIER TO TREBLE 10RW IRWD CODE 7809	$0.2M
12229	PA51 D5 D6 HARRIER FROM CHINON TO LYNX 12_15SS IRWD CODE 7808	$0.2M
12289	NETWORK REDESIGN - DW	$0.2M
12290	NETWORK REDESIGN - SS	$0.2M
12278	MAXIMO UPGRADE DW	$0.2M
12279	MAXIMO UPGRADE SS	$0.2M
11939	PA51 MARINE AND BAKE 12DW	$0.2M
12203	ORACLE EBS DIRECT LABOR BENEFITS COST ALLOCATION - DW	$0.2M
12204	ORACLE EBS DIRECT LABOR BENEFITS COST ALLOCATION - SS	$0.2M
12205	ORACLE EBS DATABASE UPGRADE - DW	$0.1M
12206	ORACLE EBS DATABASE UPGRADE - SS	$0.1M
12231	PA51 D5 D6 CHINON FROM HARRIER TO TREBLE 12DW IRWD CODE 7809	$0.1M
01642	PA51 MASTER FACILITIES-SS	($0.2M)
01103	PA51 MASTER FACILITIES-RW	($0.4M)
01466	PA51 MASTER FACILITIES-DW	($0.6M)
Total		**$6.5M**

6


Irvine Ranch
WATER DISTRICT
Proposed Increases By Funding Source and System
Funding Source
$0.4M (6.4%)
$0.4M (6.1%)
$5.7M (87.5%)
Developed
Developing
Replacement
Funding by System
$2.3M (35.8%)
$3.4M (51.4%)
$0.8M (12.8%)
Potable
Recycled
Sewer

7


Irvine Ranch
WATER DISTRICT
Summary of Changes to Capital Projects Forecast Expenditures in FY 2022-23
Description
FY 2022-23
Mid-Cycle Forecast Expenditures
FY 22-23 Original Forecast
$107.5M
FY 22-23 Board Increases
$19.1M
FY 22-23 Schedule Changes
($30.2M)
FY 22-23 Proposed Increases
$3.7M
Contingency Removal
($10.0M)
FY 22-23 MC Forecast Total
$90.1M
Funding Source
$29.7M (33.0%)
$51.9M (57.6%)
$8.5M (9.4%)
Developed
Developing
Replacement
Funding by System
$21.7M (24.1%)
$34.0M (37.7%)
$34.4M (38.2%)
Potable
Recycled
Sewer

8

RECOMMENDATION

That the Board receive and file the Mid-Cycle Capital Budget Update for Fiscal Years 2021-22 and 2022-23, and approve the Fiscal Year 2022-23 Mid-Cycle Capital Budget Project additions as shown in the attached Exhibit “B.”

Irvine Ranch Water District

9

9

Note: This page is intentionally left blank.

EXHIBIT "B"

Irvine Ranch Water District
Fiscal Year 2021-23 Mid-Cycle Capital Budget
Project Additions

							Improvement District																
System	Project Number	Project Title	FP Start Date	FP End Date	Proposed Projects Increases	FY 22-23 Proposed Increases	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	2/28/2024	$1,223,000	$457,887										100.0									
Potable Capital	12252	CIP AM - CONDITION ASSESSMENT DW	5/1/2022	3/1/2023	$500,000	$400,321	100.0																		
Recycled Capital	12254	CIP AM - CONDITION ASSESSMENT RW	5/1/2022	3/1/2023	$500,000	$400,321										100.0									
Sewer Capital	12294	EL TORO RD SMH RAISE TO GRADE	5/1/2022	8/31/2023	$280,000	$231,970										100.0									
Sewer Capital	12296	MAIN/CARTWRIGHT MH REHABILITATION	5/1/2022	7/31/2024	$429,000	$95,270										100.0									
Potable Capital	12278	MAXIMO UPGRADE DW	5/1/2022	3/31/2023	$180,000	$147,273	100.0																		
Sewer Capital	12279	MAXIMO UPGRADE SS	5/1/2022	3/31/2023	$180,000	$147,273										100.0									
Potable Capital	12289	NETWORK REDESIGN - DW	1/1/2023	12/31/2023	$190,000	$95,000	100.0																		
Sewer Capital	12290	NETWORK REDESIGN - SS	1/1/2023	12/31/2023	$190,000	$95,000										100.0									
Potable Capital	12205	ORACLE EBS DATABASE UPGRADE - DW	5/1/2022	6/30/2023	$145,000	$124,286	100.0																		
Sewer Capital	12206	ORACLE EBS DATABASE UPGRADE - SS	5/1/2022	6/30/2023	$145,000	$124,286										100.0									
Potable Capital	12203	ORACLE EBS DIRECT LABOR BENEFITS COST ...	5/1/2022	12/31/2023	$160,000	$121,714		35.1	4.8	3.4	46.4	7.8	0.4	1.6	0.5										
Sewer Capital	12204	ORACLE EBS DIRECT LABOR BENEFITS COST ...	5/1/2022	6/30/2023	$160,000	$137,143											5.4	3.7	35.4	45.0		7.9	0.0	1.8	0.0
Recycled Capital	11584	PA12 REGIONAL ZONE A RW IMPROVEMENTS	7/1/2020	12/31/2022	$220,000	$13,334											8.8	4.2	15.3	49.2	7.9	13.1		1.5	
Recycled Capital	12232	PA51 D5 D6 CHINON FROM HARRIER TO TRE...	3/1/2022	4/1/2025	$215,000	$22,715											100.0								
Potable Capital	12231	PA51 D5 D6 CHINON FROM HARRIER TO TRE...	3/1/2022	4/1/2025	$84,000	$22,008			100.0																
Recycled Capital	12230	PA51 D5 D6 HARRIER FROM CHINON TO LYN...	3/1/2022	4/1/2025	$303,000	$23,190											100.0								
Sewer Capital	12229	PA51 D5 D6 HARRIER FROM CHINON TO LYN...	3/1/2022	4/1/2025	$213,000	$22,705											100.0								
Potable Capital	12228	PA51 D5 HARRIER FROM CHINON TO LYNX 1...	3/1/2022	4/1/2025	$496,000	$24,232			100.0																
Potable Capital	11939	PA51 MARINE AND BAKE 12DW	5/1/2021	6/30/2024	$163,000	$42,976			100.0																
Potable Capital	01466	PA51 MASTER FACILITIES-DW	7/1/2023	6/30/2029	($600,000)				100.0																
Recycled Capital	01103	PA51 MASTER FACILITIES-RW	7/1/2023	6/30/2029	($400,000)												100.0								
Sewer Capital	01642	PA51 MASTER FACILITIES-SS	7/1/2023	6/30/2029	($200,000)												100.0								
Potable Capital	11585	PUBLIC OUTREACH CAMPAIGN REPLACEMEN...	4/1/2020	12/31/2022	$250,000	$75,000	100.0																		
Sewer Capital	12215	RIPARIAN VIEW PAVEMENT REHABILITATION	3/1/2022	2/28/2024	$735,000	$264,839										100.0									
Potable Capital	11845	WELL REHAB-DRWF 12	4/21/2022	8/31/2023	$770,000	$638,778	100.0																		
Total					**$6,531,000**	**$3,727,520**																			

Note: This page is intentionally left blank.

June 21, 2022
Prepared by: J. Colston
Submitted by: J. Colston / 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 its evaluation and response 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 being 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 in order 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 update:

- Added: Biosolids Pellets Land Application Crop Study;
- Deleted: Life-Cycle Cost Analysis to Support Cost-Effective Enhanced Aquifer Recharge due to rejection by EPA of the Water Research Foundation grant request; and
- Declined: Collection system methane emissions study and Source separation devices to recover FOG for waste to energy. The former research request came days before the application deadline, and the later research is in conflict with our own waste to energy planned activities.

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	TBD (1-2 years)	OCSD conducted sampling of their trunklines at the end of 2021. Initial data review has begun by the research team. The next step in monitoring is underway to sample in three areas of the sewershed followed by a review of the Technical Advisory Committee.
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	Initial test buckets of biosolids pellets have been provided to UC Riverside researcher Nicole Dennis for analysis. Field study is planned to commence this summer.

Note: This page is intentionally left blank.

June 21, 2022
Prepared by: J. Colston
Submitted by: J. Colston / K. Burton
Approved by: Paul A. Cook

ENGINEERING AND OPERATIONS COMMITTEE

REPORT ON WATER QUALITY RELATIVE TO PUBLIC HEALTH GOALS

SUMMARY:

Staff is presenting the 2022 Report on Water Quality Relative to Public Health Goals, a triennial report required by the California Health and Safety Code summarizing constituents detected in IRWD's water supply at levels exceeding applicable Public Health Goals or Maximum Contaminant Level Goals during calendar years 2019, 2020 and 2021. Staff recommends that a public hearing regarding the report be held on July 25, 2022, at IRWD's Regular Board meeting to accept any public comments that may be provided regarding the report.

BACKGROUND:

The California Health and Safety Code, Section 116470, requires public water systems with more than 10,000 service connections to prepare a brief written report that provides information regarding the detection of any contaminants above the Public Health Goals adopted by the State Office of Environmental Health Hazard Assessment, or the Maximum Contaminant Level Goals set by the United States Environmental Protection Agency. These reports are intended to provide information to the public in addition to the Consumer Confidence Report that is provided annually to each customer. The California State Water Resources Control Board Division of Drinking Water does not require public water systems to take any action to reduce or eliminate any exceedance of a public health goal.

A public water system that is required to prepare a Public Health Goal Report is also required to hold a public hearing for the purpose of accepting and responding to public comments regarding the report. The public hearing may be part of any regularly scheduled meeting. Due to the detection of a number of contaminants in the IRWD potable water system above the Public Health Goals, IRWD is required to prepare a Public Health Goal Report and hold a public hearing. The report has been prepared and is provided as Exhibit "A", and a public hearing regarding the report will be held on July 25, 2022, at IRWD's Regular Board meeting to accept any public comments that may be provided regarding the report.

FISCAL IMPACTS:

None.

ENVIRONMENTAL COMPLIANCE:

Not applicable.

RECOMMENDATION:

That a public hearing regarding the Report on Water Quality Relative to Public Health Goals be held on July 25, 2022, at IRWD's Regular Board meeting to accept any public comments that may be provided regarding the report.

LIST OF EXHIBITS:

Exhibit "A" – Report on Water Quality Relative to Public Health Goals PWS #3010092

IRVINE RANCH WATER DISTRICT
REPORT ON WATER QUALITY
RELATIVE TO PUBLIC HEALTH GOALS
PWS #3010092

BACKGROUND:

Provisions of the California Health and Safety Code[1] specify that larger (>10,000 service connections) water utilities prepare a special report by July 1, 2022, if the utilities' water quality measurements have exceeded any Public Health Goals (PHGs). PHGs are non-enforceable goals established by the California Environmental Protection Agency's (Cal-EPA's) Office of Environmental Health Hazard Assessment (OEHHA). The law also requires that where OEHHA has not adopted a PHG for a constituent, the water suppliers are to use the Maximum Contaminant Level Goals (MCLGs) adopted by United States Environmental Protection Agency (USEPA). Only constituents which have a California primary drinking water standard and for which either a PHG or MCLG has been set are to be addressed.[2]

There are a few constituents that are routinely detected in water systems at levels usually well below the drinking water standards for which no PHG or MCLG has yet been adopted by OEHHA or USEPA. These will be addressed in a future required report after a PHG has been adopted.

The law specifies what information is to be provided in the report.[3]

If a constituent was detected in Irvine Ranch Water District's (IRWD) water supply in 2019, 2020 or 2021 at a level exceeding an applicable PHG or MCLG, this report provides the information required by law. Included is the numerical public health risk for associated with the MCL and the PHG or MCLG, the category or type of risk to health that could be associated with each constituent, the best treatment technology available that could be used to reduce the constituent level, and an estimate of the cost to install that treatment if it is appropriate and feasible.

<u>What Are PHGs?</u>

PHGs are set by OEHHA and are based solely on public health risk considerations. None of the practical risk-management factors that are considered by the USEPA or the California State Water Resources Control Board Division of Drinking Water (DDW) in setting drinking water standards (MCLs) are considered in setting the PHGs. These factors include analytical detection capability, treatment technology available, benefits and costs. The PHGs are not enforceable and are not required to be met by any public water system. MCLGs are the federal equivalent to PHGs.

---

[1] California Health and Safety Code Section 116470
[2] Table of Regulated Constituents with MCLs, PHGs or MCLGs
[3] See footnote 1 above

Water Quality Data Considered:

All of the water quality data collected by the IRWD system from 2019 to 2021 for purposes of determining compliance with drinking water standards was considered. This data was summarized in IRWD's Annual Consumer Confidence Reports which were distributed to all of IRWD's customers in 2019, 2020 and 2021.

Guidelines Followed:

The Association of California Water Agencies (ACWA) formed a workgroup which prepared guidelines for water utilities to use in preparing these required reports.[4] The ACWA guidelines were used in the preparation of this report including the cost estimates. No guidance was available from state regulatory agencies.

Best Available Treatment Technology and Cost Estimates:

Both the USEPA and DDW adopt what are known as Best Available Technologies (BATs) which are the best-known methods of reducing contaminant levels to the MCL. Costs can be estimated for such technologies. However, since many PHGs and all MCLGs are set much lower than the MCL, it is not always possible or feasible to determine what treatment is needed to further reduce a constituent downward to or near the PHG or MCLG, many of which are set at zero. Estimating the costs to reduce a constituent to zero is not impossible because it is not possible to verify by analytical means that the level has been lowered to zero. In some cases, installing treatment to try and further reduce very low levels of one constituent may have adverse effects on other aspects of water quality.

CONSTITUENTS DETECTED THAT EXCEED A PHG OR A MCLG:

The following is a discussion of constituents that were detected in one or more of the IRWD's drinking water sources at levels above the PHG, or if no PHG, above the MCLG.

Arsenic:

The PHG for arsenic is 0.004 parts per billion (ppb). The MCL, or drinking water standard, for arsenic is 10 ppb. We have detected arsenic in four of IRWD's 18 Dyer Road Well Field (DRWF) wells at the following levels: 2.5 ppb in DRWF Well 4, 9.8 ppb in DRWF Well 5, 3.7 ppb in DRWF Well 6, and 4.7 ppb in DRWF Well 18. The water from all DRWF wells in operation is blended prior to entering the IRWD's drinking water distribution system. The highest concentration of arsenic measured at the entry point was 3.7 ppb. We have detected arsenic in five of IRWD's five Irvine Desalter Project (IDP) wells at the following levels: 3.2 ppb in IDP Well 76, 3.4 ppb in IDP Well 77, 3.7 ppb in IDP Well 107, 6.2 ppb in IDP Well 110 and 4.8 ppb in IDP Well 115. The

[4] Health Risk Information for Public Health Goal Report, February 2022

highest concentration of arsenic detected in product water from the IDP Potable Treatment Plant (IDP/PTP) was 2.8 ppb. We have detected arsenic in treated imported water produced at the Baker Water Treatment Plant (BWTP); the highest level detected was 2.2 ppb. These levels were below the MCL. The category of health risk associated with arsenic, and the reason that a drinking water standard was adopted for it, is that some people who drink water containing arsenic above the MCL over many years may experience skin damage or circulatory system problems and may have an increased risk of cancer. The numerical health risk for cancer at a PHG of 0.004 ppb is $1x10^{-6}$ (1 in 1,000,000). The numerical health risk for cancer at a MCL of 10 ppb is $2.5x10^{-3}$ (2.5 in 1,000). The BATs for arsenic to lower the level below the MCL are Reverse Osmosis (RO), Ion Exchange (IE), activated alumina, lime softening, electrodialysis reversal, oxidation/filtration or coagulation/filtration. RO or IE would be required to attempt to lower the arsenic levels to below the PHG. The IDP Potable Treatment Plant (PTP) is an RO facility which reduces arsenic levels in water from the IDP wells, though the plant would probably need to be operated with 0% bypass to meet the PHG. The estimated cost to install and operate such a treatment system on DRWF Wells 4, 5, 6 and 18 that would reliably reduce the arsenic levels to below the PHG would be approximately $20,960,000 per year including annualized capital and O&M costs. The estimated cost to install and operate such a treatment system at the BWTP that would reliably reduce the arsenic level to the MCLG would be approximately $9,396,000 per year including annualized capital and O&M costs. This would result in an assumed increased cost for each customer of $253 per year.

Bromate:

The PHG for bromate is 0.1 ppb. The MCL, or drinking water standard, for bromate is 10 ppb. Bromate was detected in imported water purchased from the MWD, the highest level detected was 5.9 ppb. These levels were below the MCL. The category of health risk associated with bromate, and the reason that a drinking water standard was adopted for it, is that people who drink water containing bromate above the MCL throughout their lifetime could experience an increased risk of cancer. The numerical health risk for a PHG of 0.1 ppb is $1x10^{-6}$ (1 in 1,000,000). The numerical health risk for a MCL of 10 ppb is $1x10^{-4}$ (1 in 10,000). The BATs for bromate to lower the level below the MCL is to control ozone dosage at the point of application in the treatment process. RO or IE would be required to attempt to lower the bromate level to below the PHG. The estimated cost to install and operate such a treatment system at each MWD turnout that would reliably reduce the bromate level to the PHG would be approximately $248,541,000 per year including annualized capital and O&M costs. This would result in an assumed increased cost for each customer of $2,071 per year.

Chlorite:

The PHG for chlorite is 0.05 parts per million (ppm). The MCL, or drinking water standard, for chlorite is 1.0 ppm. We have detected chlorite in the treated imported water produced at the Baker Water Treatment Plant (BWTP); the highest level detected was 0.57 ppm. These levels were below the MCL. The category of health risk associated

with chlorite, and the reason that a drinking water standard was adopted for it, is that people who drink water containing chlorite above the MCL throughout their lifetime could experience an increased risk of anemia (hemotoxicity) or neuro-behavioral effects (neurotoxicity). The numerical health risk for cancer at a PHG of 0.05 ppb is not applicable. The numerical health risk for cancer at a MCL of 10 ppb is not applicable. The BATs for chlorite to lower the level below the MCL is to control chlorine dioxide dosage at the point of application in the treatment process. The most cost-effective means to control chlorite levels to meet the PHG would be to discontinue chlorine dioxide application at the BWTP which would incur no new costs, so no cost estimate was prepared. However, this would eliminate the Santiago Reservoir as an emergency source of raw water supply to the BWTP facility.

Coliform Bacteria:

In the months of July 2019, April 2020, August 2020 and November 2020 1.3%, 0.8%, 0.7% and 0.7%, respectively, of drinking water samples collected from the potable distribution system were positive for total coliform bacteria. All total coliform positive samples were negative for *E. coli* bacteria. The MCL for coliform is 5% positive samples of all samples per month and the MCLG is zero. The reason for the coliform drinking water standard is to minimize the possibility of the water containing pathogens which are organisms that cause waterborne disease. Because coliform is only a surrogate indicator of the potential presence of pathogens, it is not possible to state a specific numerical health risk. While the USEPA normally sets MCLGs "at a level where no known or anticipated adverse effects on persons would occur", they indicate that they cannot do so with coliforms.

Coliform bacteria are an indicator organism that are ubiquitous in nature and are not generally considered harmful. They are used because of the ease in monitoring and analysis. If a positive sample is found, it indicates a potential problem that needs to be investigated and follow up sampling done. It is not at all unusual for a system to have an occasional positive sample. It is difficult, if not impossible, to assure that a system will never get a positive sample.

We add chlorine at our sources to assure that the water served is microbiologically safe. The chlorine residual levels are carefully controlled to provide the best health protection without causing the water to have undesirable taste and odor or increasing the Disinfection Byproduct (DBP) level. The one single action that would most likely decrease the possibility of a system having positive coliform results would be to significantly increase the disinfectant residual. This would likely result in increased DBPs which have adverse health consequences. The limits to the amount of disinfectant residual allowed in the distribution system are the maximum residual disinfectant levels (MRDLs) as established by the Disinfectants and Disinfection Byproducts Rule (D/DBPR). This careful balance of treatment processes is essential to continue supplying our customers with safe drinking water.

Other equally important measures that we have implemented include: an effective cross-connection control program, maintenance of a disinfectant residual throughout our system, an effective monitoring and surveillance program and maintaining positive pressures in our distribution system. Our system has already taken all of the steps described by DDW as "best available technology" for coliform bacteria in Section 64447, Title 22, California Code of Regulations.

Fluoride:

The PHG for fluoride is 1 ppm. The MCL, or drinking water standard, for fluoride is 2 ppm. We have detected fluoride above the PHG in two of IRWD's 27 wells at the following levels: 1.2 ppm in DRWF Well C8 and 1.6 ppm in DRWF Well C9. The level detected was below the MCL. The category of health risk associated with fluoride, and the reason that a drinking water standard was adopted for it, is that people who drink water containing fluoride above the MCL throughout their lifetime could experience an increased risk of musculoskeletal disease and tooth mottling. The numerical health risk for cancer at a PHG of 1 ppm is not applicable. The numerical health risk for cancer at a MCL of 2 ppm is not applicable. The water is blended with water pumped from up to 16 other wells located in the DRWF prior to delivery to the drinking water distribution system. The highest level of fluoride detected in the blended DRWF water was 0.91 ppm and the average level of fluoride in the blended DRWF was 0.60 ppm. Since the fluoride level in the blended DRWF water consistently does not exceed the PHG and the optimal level of fluoride in drinking water to prevent dental caries (or cavities) is 0.7 ppm no further treatment is necessary, so no cost estimate has been prepared.

Gross Alpha Activity (excluding Uranium):

OEHHA has not established a PHG for gross alpha activity. The MCLG for gross alpha activity is 0 picocuries per liter (pCi/l). The MCL, or drinking water standard, for gross alpha activity is 15 pCi/l. We have detected gross alpha activity in three of IRWD's 27 wells at the following levels: 3.4 pCi/l in IDP DRWF Well C8, 3.7 pCi/l in IDP Well 77 and 12 pCi/L in IDP Well 107. Gross alpha activity was detected in imported water purchased from the MWD, and the highest level was 3 pCi//l. Gross alpha activity was detected in Manning Water Treatment Plant (MWTP) product water and the highest level was 4.6 pCi//l. All levels were below the MCL. The category of health risk associated with gross alpha activity, and the reason that a drinking water standard was adopted for it, is that people who drink water containing gross alpha activity above the MCL throughout their lifetime could experience an increased risk of cancer. The numerical health risk for a MCLG of 0 pCi/l is 0. Since gross alpha activity is not a specific chemical contaminant, but rather a group of radioactive elements the numeric health risk at the MCL of 15 pCi/l depends on the specific alpha emitting radionuclides present and is estimated to range from $1.0x10^{-3}$ (1 in 1,000) to $1.9x10^{-4}$ (1.9 in 10,000). The BATs for gross alpha activity to lower the level below the MCL are RO, IE, lime softening or coagulation/filtration. RO or IE would be required to attempt to lower the gross alpha activity level to the MCLG. The IDP PTP is an RO facility which reduces gross alpha activity levels in water from the IDP wells, though the plant would probably need to be

operated with 0% bypass to meet the PHG. The estimated cost to install and operate such a treatment system at the BWTP that would reliably reduce the gross alpha activity level to the MCLG would be approximately $9,396,000 per year including annualized capital and O&M costs. The estimated cost to install and operate such a treatment system at each MWD turnout that would reliably reduce the gross alpha activity level to the MCLG would be approximately $248,541,000 per year including annualized capital and O&M costs. This would result in an assumed increased cost for each customer of $2,149 per year.

Gross Beta Activity:

OEHHA has not established a PHG for gross beta activity. The MCLG for gross beta activity is 0 pCi/l. The MCL or drinking water standard for gross beta activity is 50 pCi/l. Gross beta activity was detected in imported water purchased from the MWD and the highest level detected was 7 pCi/l. All levels were below the MCL. The category of health risk associated with gross beta activity, and the reason that a drinking water standard was adopted for it, is that people who drink water containing gross beta activity above the MCL throughout their lifetime could experience an increased risk of cancer. The numerical health risk for a MCLG of 0 pCi/l is 0. Since gross beta activity is not a specific chemical contaminant, but rather a group of radioactive elements the numeric health risk at the MCL of 50 pCi/l depends on the specific beta emitting radionuclides present and is estimated to range from $2.3x10^{-3}$ (2.3 in 1,000) to $4.5x10^{-4}$ (4.5 in 10,000). The BATs for gross beta activity to lower the level below the MCL are RO, IE, lime softening or coagulation/filtration. RO or IE would be required to attempt to lower the gross beta activity level to the MCLG. The estimated cost to install and operate such a treatment system at each MWD turnout that would reliably reduce the gross beta activity level to the MCLG would be approximately $248,541,000 per year including annualized capital and O&M costs. This would result in an assumed increased cost for each customer of $2,071 per year.

Uranium:

The PHG for uranium is 0.43 pCi/l. The MCL, or drinking water standard, for uranium is 20 pCi/l. We have detected uranium in five of IRWD's 27 wells at the following levels: 5.0 pCi/l in IDP Well 76, 3.1 pCi/l in IDP Well 77, 11 pCi/l in IDP Well 107, 4.5 pCi/l in IDP Well 107 and 1.1 pCi/l in Well 22. The IDP/PTP is an RO facility which reduces uranium levels in water from the IDP wells. Uranium was detected in the IDP/PTP product water at a level of 2.8 pCi/l. Uranium was detected in product water from the BWTP, the highest level detected was 2.1 pCi/l. Uranium was detected in imported water purchased from the MWD, the highest level detected was 3 pCi/l. These levels were below the MCL. The category of health risk associated with uranium, and the reason that a drinking water standard was adopted for it, is that people who drink water containing uranium above the MCL throughout their lifetime could experience kidney problems or an increased risk of cancer. The numerical health risk for cancer at a PHG of 0.43 pCi/l is $1x10^{-6}$ (1 in 1,000,000). The numerical health risk for cancer at a MCL of 20 pCi/l is $5x10^{-5}$ (5 in 100,000). The BATs for uranium to lower the level below the MCL

are RO, IE, lime softening or coagulation/filtration. RO or IE would be required to attempt to lower the uranium level to below the PHG. The IDP PTP and the Well 21/22 Desalter are RO facilities which reduce uranium levels in water from the IDP wells and Well 22, though the plants would probably need to be operated with 0% bypass to meet the PHG. The estimated cost to install and operate such a treatment system at the BWTP that would reliably reduce the uranium level to the MCLG would be approximately $9,396,000 per year including annualized capital and O&M costs. The estimated cost to install and operate such a treatment system at each MWD turnout that would reliably reduce the uranium level to the MCLG would be approximately $248,541,000 per year including annualized capital and O&M costs. This would result in an assumed increased cost for each customer of $2,149 per year.

Combined Treatment Cost

Since the same technology is utilized to treat all of the constituents included in this report each of the locations above would only require a single treatment facility each to reduce levels of all of these constituents to below the PHG or MCLG. The estimated cost to install and operate such a treatment system on DRWF Wells 4, 5 6 and 18 that would reliably reduce the levels of arsenic to levels below the PHG or MCLG would be approximately $20,960,000 per year including annualized capital and O&M costs. The estimated cost to install and operate such a treatment system at the BWTP that would reliably reduce the gross alpha activity and uranium levels (and chlorite levels, also) to the PHG or MCLG would be approximately $9,396,000 per year including annualized capital and O&M costs. The estimated cost to install and operate such a treatment system at each MWD turnout that would reliably reduce the bromate, gross alpha activity, gross beta activity and uranium levels to the PHG or MCLG would be approximately $248,541,000 per year including annualized capital and O&M costs. This would result in an assumed increased cost for each customer of $2,324 per year to lower the levels of Arsenic, gross alpha activity, gross beta activity and uranium to levels below the PHG or MCLG.

SUMMARY OF PHG EXCEEDENCES:

CONTAMINANT	UNITS	PHG [MCLG]	MCL	Level of Detection
Arsenic	ppb	0.004	10	ND – 9.8
Bromate	ppb	0.1	10	ND – 5.9
Chlorite	ppm	0.05	1.0	ND – 0.57
Coliform Bacteria	% Present	0	5	0 – 1.3
Fluoride	ppm	1	2	ND – 1.6
Gross Alpha Activity	pCi/L	[0]	15	ND – 12
Gross Beta Activity	pCi/L	[0]	50	ND – 7
Uranium	pCi/L	0.43	20	ND – 11

Perchlorate, nitrate/nitrite nitrogen and nitrate nitrogen were detected in one or more source wells above the PHG. However, the existing treatment processes in place reduced

the concentration of these constituents to nondetectable levels or to levels less than the PHG. No further assessment of these constituents is needed for this report.

RECOMMENDATIONS FOR FURTHER ACTION:

The drinking water quality of the Irvine Ranch Water District meets all DDW and USEPA drinking water standards set to protect public health. To further reduce the levels of the constituents identified in this report that are already significantly below the health-based Maximum Contaminant Levels established to provide "safe drinking water", additional costly treatment processes would be required. The effectiveness of the treatment processes to provide any significant reductions in constituent levels at these already low values is uncertain. The health protection benefits of these further hypothetical reductions are not at all clear and may not be quantifiable. Therefore, no action is proposed.

REFERENCES:

1. Excerpt from California Health & Safety Code: Section 116470 (b)
2. Table of Regulated Constituents with MCLs, PHGs or MCLGs
3. Health Risk Information for Public Health Goal Report, February 2022

REFERENCE NO. 1

CALIFORNIA PUBLIC HEALTH GOAL REQUIREMENTS

California Health and Safety Code
Section 116470

(b) On or before July 1, 1998, and every three years thereafter, public water systems serving more than 10,000 service connections that detect one or more contaminants in drinking water that exceed the applicable public health goal, shall prepare a brief written report in plain language that does all of the following:

(1) Identifies each contaminant detected in drinking water that exceeds the applicable public health goal.

(2) Discloses the numerical public health risk, determined by the office, associated with the maximum contaminant level for each contaminant identified in paragraph (1) and the numerical public health risk determined by the office associated with the public health goal for that contaminant.

(3) Identifies the category of risk to public health, including, but not limited to, carcinogenic, mutagenic, teratogenic, and acute toxicity, associated with exposure to the contaminant in drinking water, and includes a brief plainly worded description of these terms.

(4) Describes the best available technology, if any is then available on a commercial basis, to remove the contaminant or reduce the concentration of the contaminant. The public water system may, solely at its own discretion, briefly describe actions that have been taken on its own, or by other entities, to prevent the introduction of the contaminant into drinking water supplies.

(5) Estimates the aggregate cost and the cost per customer of utilizing the technology described in paragraph (4), if any, to reduce the concentration of that contaminant in drinking water to a level at or below the public health goal.

(6)Briefly describes what action, if any, the local water purveyor intends to take to reduce the concentration of the contaminant in public drinking water supplies and the basis for that decision.

(c) Public water systems required to prepare a report pursuant to subdivision (b) shall hold a public hearing for the purpose of accepting and responding to public comment on the report. Public water systems may hold the public hearing as part of any regularly scheduled meeting.

(d) The department shall not require a public water system to take any action to reduce or eliminate any exceedance of a public health goal.

(e) Enforcement of this section does not require the department to amend a public water system's operating permit.

(f) Pending adoption of a public health goal by the Office of Environmental Health Hazard Assessment pursuant to subdivision (c) of Section 116365, and in lieu thereof, public water systems shall use the national maximum contaminant level goal adopted by the United States Environmental Protection Agency for the corresponding contaminant for purposes of complying with the notice and hearing requirements of this section.

(g) This section is intended to provide an alternative form for the federally required consumer confidence report as authorized by 42 U.S.C. Section 300g-3(c).

MCLs, DLRs, and PHGs for Regulated Drinking Water Contaminants

(Units are in milligrams per liter (mg/L), unless otherwise noted.)

Last Update: S e p t e m b e r 1 4 , 2021

This table includes:

California's maximum contaminant levels (MCLs)

Detection limits for purposes of reporting (DLRs)

Public health goals (PHGs) from the Office of Environmental Health Hazard Assessment (OEHHA)

Also, the PHG for NDMA (which is not yet regulated) is included at the bottom of this table.

Regulated Contaminant	MCL	DLR	PHG	Date of PHG
Chemicals with MCLs in 22 CCR §64431—Inorganic Chemicals				
Aluminum	1	0.05	0.6	2001
Antimony	0.006	0.006	0.001	2016
Arsenic	0.010	0.002	0.000004	2004
Asbestos (MFL = million fibers per liter; for fibers >10 microns long)	7 MFL	0.2 MFL	7 MFL	2003
Barium	1	0.1	2	2003
Beryllium	0.004	0.001	0.001	2003
Cadmium	0.005	0.001	0.00004	2006
Chromium, Total - OEHHA withdrew the 0.0025-mg/L PHG	0.05	0.01	withdrawn Nov. 2001	1999
Chromium, Hexavalent - 0.01-mg/L MCL & 0.001-mg/L DLR repealed September 2017	--	--	0.00002	2011
Cyanide	0.15	0.1	0.15	1997
Fluoride	2	0.1	1	1997
Mercury (inorganic)	0.002	0.001	0.0012	1999 (rev2005)*
Nickel	0.1	0.01	0.012	2001
Nitrate (as nitrogen, N)	10 as N	0.4	45 as NO3 (=10 as N)	2018
Nitrite (as N)	1 as N	0.4	1 as N	2018
Nitrate + Nitrite (as N)	10 as N	--	10 as N	2018
Perchlorate	0.006	0.004	0.001	2015
Selenium	0.05	0.005	0.03	2010
Thallium	0.002	0.001	0.0001	1999 (rev2004)
Copper and Lead, 22 CCR §64672.3				
Values referred to as MCLs for lead and copper are not actually MCLs; instead, they are called "Action Levels" under the lead and copper rule				
Copper	1.3	0.05	0.3	2008

Lead	0.015	0.005	0.0002	2009
Radionuclides with MCLs in 22 CCR §64441 and §64443—Radioactivity				
[units are picocuries per liter (pCi/L), unless otherwise stated; n/a = not applicable]				
Gross alpha particle activity - OEHHA concluded in 2003 that a PHG was not practical	15	3	none	n/a
Gross beta particle activity - OEHHA concluded in 2003 that a PHG was not practical	4 mrem/yr	4	none	n/a
Radium-226	--	1	0.05	2006
Radium-228	--	1	0.019	2006
Radium-226 + Radium-228	5	--	--	--
Strontium-90	8	2	0.35	2006
Tritium	20,000	1,000	400	2006
Uranium	20	1	0.43	2001
Chemicals with MCLs in 22 CCR §64444—Organic Chemicals				
(a) Volatile Organic Chemicals (VOCs)				
Benzene	0.001	0.0005	0.00015	2001
Carbon tetrachloride	0.0005	0.0005	0.0001	2000
1,2-Dichlorobenzene	0.6	0.0005	0.6	1997 (rev2009)
1,4-Dichlorobenzene (p-DCB)	0.005	0.0005	0.006	1997
1,1-Dichloroethane (1,1-DCA)	0.005	0.0005	0.003	2003
1,2-Dichloroethane (1,2-DCA)	0.0005	0.0005	0.0004	1999 (rev2005)
1,1-Dichloroethylene (1,1-DCE)	0.006	0.0005	0.01	1999
cis-1,2-Dichloroethylene	0.006	0.0005	0.013	2018
trans-1,2-Dichloroethylene	0.01	0.0005	0.05	2018
Dichloromethane (Methylene chloride)	0.005	0.0005	0.004	2000
1,2-Dichloropropane	0.005	0.0005	0.0005	1999
1,3-Dichloropropene	0.0005	0.0005	0.0002	1999 (rev2006)
Ethylbenzene	0.3	0.0005	0.3	1997
Methyl tertiary butyl ether (MTBE)	0.013	0.003	0.013	1999
Monochlorobenzene	0.07	0.0005	0.07	2014
Styrene	0.1	0.0005	0.0005	2010
1,1,2,2-Tetrachloroethane	0.001	0.0005	0.0001	2003
Tetrachloroethylene (PCE)	0.005	0.0005	0.00006	2001
Toluene	0.15	0.0005	0.15	1999
1,2,4-Trichlorobenzene	0.005	0.0005	0.005	1999
1,1,1-Trichloroethane (1,1,1-TCA)	0.2	0.0005	1	2006
1,1,2-Trichloroethane (1,1,2-TCA)	0.005	0.0005	0.0003	2006
Trichloroethylene (TCE)	0.005	0.0005	0.0017	2009
Trichlorofluoromethane (Freon 11)	0.15	0.005	1.3	2014

1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon 113)	1.2	0.01	4	1997 (rev2011)
Vinyl chloride	0.0005	0.0005	0.00005	2000
Xylenes	1.75	0.0005	1.8	1997
(b) Non-Volatile Synthetic Organic Chemicals (SOCs)				
Alachlor	0.002	0.001	0.004	1997
Atrazine	0.001	0.0005	0.00015	1999
Bentazon	0.018	0.002	0.2	1999 (rev2009)
Benzo(a)pyrene	0.0002	0.0001	0.000007	2010
Carbofuran	0.018	0.005	0.0007	2016
Chlordane	0.0001	0.0001	0.00003	1997 (rev2006)
Dalapon	0.2	0.01	0.79	1997 (rev2009)
1,2-Dibromo-3-chloropropane (DBCP)	0.0002	0.00001	0.000003	2020
2,4-Dichlorophenoxyacetic acid (2,4-D)	0.07	0.01	0.02	2009
Di(2-ethylhexyl)adipate	0.4	0.005	0.2	2003
Di(2-ethylhexyl)phthalate (DEHP)	0.004	0.003	0.012	1997
Dinoseb	0.007	0.002	0.014	1997 (rev2010)
Diquat	0.02	0.004	0.006	2016
Endothal	0.1	0.045	0.094	2014
Endrin	0.002	0.0001	0.0003	2016
Ethylene dibromide (EDB)	0.00005	0.00002	0.00001	2003
Glyphosate	0.7	0.025	0.9	2007
Heptachlor	0.00001	0.00001	0.000008	1999
Heptachlor epoxide	0.00001	0.00001	0.000006	1999
Hexachlorobenzene	0.001	0.0005	0.00003	2003
Hexachlorocyclopentadiene	0.05	0.001	0.002	2014
Lindane	0.0002	0.0002	0.000032	1999 (rev2005)
Methoxychlor	0.03	0.01	0.00009	2010
Molinate	0.02	0.002	0.001	2008
Oxamyl	0.05	0.02	0.026	2009
Pentachlorophenol	0.001	0.0002	0.0003	2009
Picloram	0.5	0.001	0.166	2016
Polychlorinated biphenyls (PCBs)	0.0005	0.0005	0.00009	2007
Simazine	0.004	0.001	0.004	2001
Thiobencarb	0.07	0.001	0.042	2016
Toxaphene	0.003	0.001	0.00003	2003
1,2,3-Trichloropropane	0.000005	0.000005	0.0000007	2009
2,3,7,8-TCDD (dioxin)	$3x10^{-8}$	$5x10^{-9}$	$5x10^{-11}$	2010
2,4,5-TP (Silvex)	0.05	0.001	0.003	2014
Chemicals with MCLs in 22 CCR §64533—Disinfection Byproducts				
Total Trihalomethanes	0.080	--	--	--
Bromodichloromethane	--	0.0010	0.00006	2020

Bromoform	--	0.0010	0.0005	2020
Chloroform	--	0.0010	0.0004	2020
Dibromochloromethane	--	0.0010	0.0001	2020
Haloacetic Acids (five) (HAA5)	0.060	--	--	--
Monochloroacetic Acid	--	0.0020	--	--
Dichloroacetic Adic	--	0.0010	--	--
Trichloroacetic Acid	--	0.0010	--	--
Monobromoacetic Acid	--	0.0010	--	--
Dibromoacetic Acid	--	0.0010	--	--
Bromate	0.010	0.0050**	0.0001	2009
Chlorite	1.0	0.020	0.05	2009
Chemicals with PHGs established in response to DDW requests. These are not currently regulated drinking water contaminants.				
N-Nitrosodimethylamine (NDMA)	--	--	0.000003	2006
*OEHHA's review of this chemical during the year indicated (rev20XX) resulted in no change in the PHG.				
**The DLR for Bromate is 0.0010 mg/L for analysis performed using EPA Method 317.0 Revision 2.0, 321.8, or 326.0.				

OFFICE OF ENVIRONMENTAL HEALTH HAZARD ASSESSMENT

Public Health Goals

Health Risk Information for Public Health Goal Exceedance Reports

February 2022

Pesticide and Environmental Toxicology Branch
Office of Environmental Health Hazard Assessment
California Environmental Protection Agency

Health Risk Information for Public Health Goal Exceedance Reports

Prepared by

Office of Environmental Health Hazard Assessment
California Environmental Protection Agency

February 2022

NEW for the 2022 Report: New in this document are an updated Public Health Goal (PHG) for 1,2-dibromo-3-chloropropane (DBCP) and newly established PHGs for the trihalomethanes bromodichloromethane, bromoform, chloroform, and dibromochloromethane.

Background: Under the Calderon-Sher Safe Drinking Water Act of 1996 (the Act), public water systems with more than 10,000 service connections are required to prepare a report every three years for contaminants that exceed their respective PHGs.[1] This document contains health risk information on regulated drinking water contaminants to assist public water systems in preparing these reports. A PHG is the concentration of a contaminant in drinking water that poses no significant health risk if consumed for a lifetime. PHGs are developed and published by the Office of Environmental Health Hazard Assessment (OEHHA) using current risk assessment principles, practices and methods.[2]

The water system's report is required to identify the health risk category (e.g., carcinogenicity or neurotoxicity) associated with exposure to each regulated contaminant in drinking water and to include a brief, plainly worded description of these risks. The report is also required to disclose the numerical public health risk, if available, associated with the California Maximum Contaminant Level (MCL) and with the PHG for each contaminant. This health risk information document is prepared by OEHHA every three years to assist the water systems in providing the required information in their reports.

[1] Health and Safety Code Section 116470(b)
[2] Health and Safety Code Section 116365

Numerical health risks: Table 1 presents health risk categories and cancer risk values for chemical contaminants in drinking water that have PHGs.

The Act requires that OEHHA publish PHGs based on health risk assessments using the most current scientific methods. As defined in statute, PHGs for non-carcinogenic chemicals in drinking water are set at a concentration "at which no known or anticipated adverse health effects will occur, with an adequate margin of safety." For carcinogens, PHGs are set at a concentration that "does not pose any significant risk to health." PHGs provide one basis for revising MCLs, along with cost and technological feasibility. OEHHA has been publishing PHGs since 1997 and the entire list published to date is shown in Table 1.

Table 2 presents health risk information for contaminants that do not have PHGs but have state or federal regulatory standards. The Act requires that, for chemical contaminants with California MCLs that do not yet have PHGs, water utilities use the federal Maximum Contaminant Level Goal (MCLG) for the purpose of complying with the requirement of public notification. MCLGs, like PHGs, are strictly health based and include a margin of safety. One difference, however, is that the MCLGs for carcinogens are set at zero because the US Environmental Protection Agency (US EPA) assumes there is no absolutely safe level of exposure to such chemicals. PHGs, on the other hand, are set at a level considered to pose no *significant* risk of cancer; this is usually no more than a one-in-one-million excess cancer risk (1×10^{-6}) level for a lifetime of exposure. In Table 2, the cancer risks shown are based on the US EPA's evaluations.

For more information on health risks: The adverse health effects for each chemical with a PHG are summarized in a PHG technical support document. These documents are available on the OEHHA website (https://oehha.ca.gov/water/public-health-goals-phgs).

Table 1: Health Risk Categories and Cancer Risk Values for Chemicals with California Public Health Goals (PHGs)

Chemical	Health Risk Category[1]	California PHG (mg/L)[2]	Cancer Risk[3] at the PHG	California MCL[4] (mg/L)	Cancer Risk at the California MCL
Alachlor	carcinogenicity (causes cancer)	0.004	NA[5,6]	0.002	NA
Aluminum	neurotoxicity and immunotoxicity (harms the nervous and immune systems)	0.6	NA	1	NA
Antimony	hepatotoxicity (harms the liver)	0.001	NA	0.006	NA
Arsenic	carcinogenicity (causes cancer)	0.000004 (4×10^{-6})	1×10^{-6} (one per million)	0.01	2.5×10^{-3} (2.5 per thousand)
Asbestos	carcinogenicity (causes cancer)	7 MFL[7] (fibers >10 microns in length)	1×10^{-6}	7 MFL (fibers >10 microns in length)	1×10^{-6} (one per million)
Atrazine	carcinogenicity (causes cancer)	0.00015	1×10^{-6}	0.001	7×10^{-6} (seven per million)

[1] Based on the OEHHA PHG technical support document unless otherwise specified. The categories are the hazard traits defined by OEHHA for California's Toxics Information Clearinghouse (online at: https://oehha.ca.gov/media/downloads/risk-assessment//gcregtext011912.pdf).
[2] mg/L = milligrams per liter of water or parts per million (ppm)
[3] Cancer Risk = Upper bound estimate of excess cancer risk from lifetime exposure. Actual cancer risk may be lower or zero. 1×10^{-6} means one excess cancer case per million people exposed.
[4] MCL = maximum contaminant level.
[5] NA = not applicable. Cancer risk cannot be calculated.
[6] The PHG for alachlor is based on a threshold model of carcinogenesis and is set at a level that is believed to be without any significant cancer risk to individuals exposed to the chemical over a lifetime.
[7] MFL = million fibers per liter of water.

Table 1: Health Risk Categories and Cancer Risk Values for Chemicals with California Public Health Goals (PHGs)

Chemical	Health Risk Category[1]	California PHG (mg/L)[2]	Cancer Risk[3] at the PHG	California MCL[4] (mg/L)	Cancer Risk at the California MCL
Barium	cardiovascular toxicity (causes high blood pressure)	2	NA	1	NA
Bentazon	hepatotoxicity and digestive system toxicity (harms the liver, intestine, and causes body weight effects[8])	0.2	NA	0.018	NA
Benzene	carcinogenicity (causes leukemia)	0.00015	1×10^{-6}	0.001	7×10^{-6} (seven per million)
Benzo[a]pyrene	carcinogenicity (causes cancer)	0.000007 (7×10^{-6})	1×10^{-6}	0.0002	3×10^{-5} (three per hundred thousand)
Beryllium	digestive system toxicity (harms the stomach or intestine)	0.001	NA	0.004	NA
Bromate	carcinogenicity (causes cancer)	0.0001	1×10^{-6}	0.01	1×10^{-4} (one per ten thousand)
Cadmium	nephrotoxicity (harms the kidney)	0.00004	NA	0.005	NA
Carbofuran	reproductive toxicity (harms the testis)	0.0007	NA	0.018	NA

[8] Body weight effects are an indicator of general toxicity in animal studies.

Table 1: Health Risk Categories and Cancer Risk Values for Chemicals with California Public Health Goals (PHGs)

Chemical	Health Risk Category[1]	California PHG (mg/L)[2]	Cancer Risk[3] at the PHG	California MCL[4] (mg/L)	Cancer Risk at the California MCL
Carbon tetrachloride	carcinogenicity (causes cancer)	0.0001	1×10^{-6}	0.0005	5×10^{-6} (five per million)
Chlordane	carcinogenicity (causes cancer)	0.00003	1×10^{-6}	0.0001	3×10^{-6} (three per million)
Chlorite	hematotoxicity (causes anemia) neurotoxicity (causes neurobehavioral effects)	0.05	NA	1	NA
Chromium, hexavalent	carcinogenicity (causes cancer)	0.00002	1×10^{-6}	none	NA
Copper	digestive system toxicity (causes nausea, vomiting, diarrhea)	0.3	NA	1.3 (AL[9])	NA
Cyanide	neurotoxicity (damages nerves) endocrine toxicity (affects the thyroid)	0.15	NA	0.15	NA
Dalapon	nephrotoxicity (harms the kidney)	0.79	NA	0.2	NA
Di(2-ethylhexyl) adipate (DEHA)	developmental toxicity (disrupts development)	0.2	NA	0.4	NA

[9] AL = action level. The action levels for copper and lead refer to a concentration measured at the tap. Much of the copper and lead in drinking water is derived from household plumbing (The Lead and Copper Rule, Title 22, California Code of Regulations [CCR] section 64672.3).

Table 1: Health Risk Categories and Cancer Risk Values for Chemicals with California Public Health Goals (PHGs)

Chemical	Health Risk Category[1]	California PHG (mg/L)[2]	Cancer Risk[3] at the PHG	California MCL[4] (mg/L)	Cancer Risk at the California MCL
Di(2-ethylhexyl) phthalate (DEHP)	carcinogenicity (causes cancer)	0.012	1×10^{-6}	0.004	3×10^{-7} (three per ten million)
1,2-Dibromo-3-chloropropane (DBCP)	carcinogenicity (causes cancer)	0.000003 ($3x10^{-6}$)	1×10^{-6}	0.0002	7×10^{-5} (seven per hundred thousand)
1,2-Dichloro-benzene (*o*-DCB)	hepatotoxicity (harms the liver)	0.6	NA	0.6	NA
1,4-Dichloro-benzene (*p*-DCB)	carcinogenicity (causes cancer)	0.006	1×10^{-6}	0.005	8×10^{-7} (eight per ten million)
1,1-Dichloro-ethane (1,1-DCA)	carcinogenicity (causes cancer)	0.003	1×10^{-6}	0.005	2×10^{-6} (two per million)
1,2-Dichloro-ethane (1,2-DCA)	carcinogenicity (causes cancer)	0.0004	1×10^{-6}	0.0005	1×10^{-6} (one per million)
1,1-Dichloro-ethylene (1,1-DCE)	hepatotoxicity (harms the liver)	0.01	NA	0.006	NA
1,2-Dichloro-ethylene, cis	nephrotoxicity (harms the kidney)	0.013	NA	0.006	NA
1,2-Dichloro-ethylene, trans	immunotoxicity (harms the immune system)	0.05	NA	0.01	NA

Table 1: Health Risk Categories and Cancer Risk Values for Chemicals with California Public Health Goals (PHGs)

Chemical	Health Risk Category[1]	California PHG (mg/L)[2]	Cancer Risk[3] at the PHG	California MCL[4] (mg/L)	Cancer Risk at the California MCL
Dichloromethane (methylene chloride)	carcinogenicity (causes cancer)	0.004	1×10^{-6}	0.005	1×10^{-6} (one per million)
2,4-Dichloro-phenoxyacetic acid (2,4-D)	hepatotoxicity and nephrotoxicity (harms the liver and kidney)	0.02	NA	0.07	NA
1,2-Dichloro-propane (propylene dichloride)	carcinogenicity (causes cancer)	0.0005	1×10^{-6}	0.005	1×10^{-5} (one per hundred thousand)
1,3-Dichloro-propene (Telone II®)	carcinogenicity (causes cancer)	0.0002	1×10^{-6}	0.0005	2×10^{-6} (two per million)
Dinoseb	reproductive toxicity (harms the uterus and testis)	0.014	NA	0.007	NA
Diquat	ocular toxicity (harms the eye) developmental toxicity (causes malformation)	0.006	NA	0.02	NA
Endothall	digestive system toxicity (harms the stomach or intestine)	0.094	NA	0.1	NA
Endrin	neurotoxicity (causes convulsions) hepatotoxicity (harms the liver)	0.0003	NA	0.002	NA
Ethylbenzene (phenylethane)	hepatotoxicity (harms the liver)	0.3	NA	0.3	NA

Table 1: Health Risk Categories and Cancer Risk Values for Chemicals with California Public Health Goals (PHGs)

Chemical	Health Risk Category[1]	California PHG (mg/L)[2]	Cancer Risk[3] at the PHG	California MCL[4] (mg/L)	Cancer Risk at the California MCL
Ethylene dibromide (1,2-Dibromoethane)	carcinogenicity (causes cancer)	0.00001	1×10^{-6}	0.00005	5×10^{-6} (five per million)
Fluoride	musculoskeletal toxicity (causes tooth mottling)	1	NA	2	NA
Glyphosate	nephrotoxicity (harms the kidney)	0.9	NA	0.7	NA
Heptachlor	carcinogenicity (causes cancer)	0.000008 (8×10^{-6})	1×10^{-6}	0.00001	1×10^{-6} (one per million)
Heptachlor epoxide	carcinogenicity (causes cancer)	0.000006 (6×10^{-6})	1×10^{-6}	0.00001	2×10^{-6} (two per million)
Hexachloroben-zene	carcinogenicity (causes cancer)	0.00003	1×10^{-6}	0.001	3×10^{-5} (three per hundred thousand)
Hexachloro-cyclopentadiene (HCCPD)	digestive system toxicity (causes stomach lesions)	0.002	NA	0.05	NA
Lead	developmental neurotoxicity (causes neurobehavioral effects in children) cardiovascular toxicity (causes high blood pressure) carcinogenicity (causes cancer)	0.0002	$<1\times10^{-6}$ (PHG is not based on this effect)	0.015 (AL[9])	2×10^{-6} (two per million)

Table 1: Health Risk Categories and Cancer Risk Values for Chemicals with California Public Health Goals (PHGs)

Chemical	Health Risk Category[1]	California PHG (mg/L)[2]	Cancer Risk[3] at the PHG	California MCL[4] (mg/L)	Cancer Risk at the California MCL
Lindane (γ-BHC)	carcinogenicity (causes cancer)	0.000032	1×10^{-6}	0.0002	6×10^{-6} (six per million)
Mercury (inorganic)	nephrotoxicity (harms the kidney)	0.0012	NA	0.002	NA
Methoxychlor	endocrine toxicity (causes hormone effects)	0.00009	NA	0.03	NA
Methyl tertiary-butyl ether (MTBE)	carcinogenicity (causes cancer)	0.013	1×10^{-6}	0.013	1×10^{-6} (one per million)
Molinate	carcinogenicity (causes cancer)	0.001	1×10^{-6}	0.02	2×10^{-5} (two per hundred thousand)
Monochloro-benzene (chlorobenzene)	nephrotoxicity (harms the kidney)	0.07	NA	0.07	NA
Nickel	developmental toxicity (causes increased neonatal deaths)	0.012	NA	0.1	NA
Nitrate	hematotoxicity (causes methemoglobinemia)	45 as nitrate	NA	10 as nitrogen (=45 as nitrate)	NA
Nitrite	hematotoxicity (causes methemoglobinemia)	3 as nitrite	NA	1 as nitrogen (=3 as nitrite)	NA

Table 1: Health Risk Categories and Cancer Risk Values for Chemicals with California Public Health Goals (PHGs)

Chemical	Health Risk Category[1]	California PHG (mg/L)[2]	Cancer Risk[3] at the PHG	California MCL[4] (mg/L)	Cancer Risk at the California MCL
Nitrate and Nitrite	hematotoxicity (causes methemoglobinemia)	10 as nitrogen[10]	NA	10 as nitrogen	NA
N-nitroso-dimethyl-amine (NDMA)	carcinogenicity (causes cancer)	0.000003 (3×10^{-6})	1×10^{-6}	none	NA
Oxamyl	general toxicity (causes body weight effects)	0.026	NA	0.05	NA
Pentachloro-phenol (PCP)	carcinogenicity (causes cancer)	0.0003	1×10^{-6}	0.001	3×10^{-6} (three per million)
Perchlorate	endocrine toxicity (affects the thyroid) developmental toxicity (causes neurodevelop-mental deficits)	0.001	NA	0.006	NA
Picloram	hepatotoxicity (harms the liver)	0.166	NA	0.5	NA
Polychlorinated biphenyls (PCBs)	carcinogenicity (causes cancer)	0.00009	1×10^{-6}	0.0005	6×10^{-6} (six per million)
Radium-226	carcinogenicity (causes cancer)	0.05 pCi/L	1×10^{-6}	5 pCi/L (combined $Ra^{226+228}$)	1×10^{-4} (one per ten thousand)

[10] The joint nitrate/nitrite PHG of 10 mg/L (10 ppm, expressed as nitrogen) does not replace the individual values, and the maximum contribution from nitrite should not exceed 1 mg/L nitrite-nitrogen.

Table 1: Health Risk Categories and Cancer Risk Values for Chemicals with California Public Health Goals (PHGs)

Chemical	Health Risk Category[1]	California PHG (mg/L)[2]	Cancer Risk[3] at the PHG	California MCL[4] (mg/L)	Cancer Risk at the California MCL
Radium-228	carcinogenicity (causes cancer)	0.019 pCi/L	1×10^{-6}	5 pCi/L (combined $Ra^{226+228}$)	3×10^{-4} (three per ten thousand)
Selenium	integumentary toxicity (causes hair loss and nail damage)	0.03	NA	0.05	NA
Silvex (2,4,5-TP)	hepatotoxicity (harms the liver)	0.003	NA	0.05	NA
Simazine	general toxicity (causes body weight effects)	0.004	NA	0.004	NA
Strontium-90	carcinogenicity (causes cancer)	0.35 pCi/L	1×10^{-6}	8 pCi/L	2×10^{-5} (two per hundred thousand)
Styrene (vinylbenzene)	carcinogenicity (causes cancer)	0.0005	1×10^{-6}	0.1	2×10^{-4} (two per ten thousand)
1,1,2,2-Tetrachloro-ethane	carcinogenicity (causes cancer)	0.0001	1×10^{-6}	0.001	1×10^{-5} (one per hundred thousand)
2,3,7,8-Tetra-chlorodibenzo-*p*-dioxin (TCDD, or dioxin)	carcinogenicity (causes cancer)	5×10^{-11}	1×10^{-6}	3×10^{-8}	6×10^{-4} (six per ten thousand)

Table 1: Health Risk Categories and Cancer Risk Values for Chemicals with California Public Health Goals (PHGs)

Chemical	Health Risk Category[1]	California PHG (mg/L)[2]	Cancer Risk[3] at the PHG	California MCL[4] (mg/L)	Cancer Risk at the California MCL
Tetrachloro-ethylene (perchloro-ethylene, or PCE)	carcinogenicity (causes cancer)	0.00006	1×10^{-6}	0.005	8×10^{-5} (eight per hundred thousand)
Thallium	integumentary toxicity (causes hair loss)	0.0001	NA	0.002	NA
Thiobencarb	general toxicity (causes body weight effects) hematotoxicity (affects red blood cells)	0.042	NA	0.07	NA
Toluene (methylbenzene)	hepatotoxicity (harms the liver) endocrine toxicity (harms the thymus)	0.15	NA	0.15	NA
Toxaphene	carcinogenicity (causes cancer)	0.00003	1×10^{-6}	0.003	1×10^{-4} (one per ten thousand)
1,2,4-Trichloro-benzene	endocrine toxicity (harms adrenal glands)	0.005	NA	0.005	NA
1,1,1-Trichloro-ethane	neurotoxicity (harms the nervous system), reproductive toxicity (causes fewer offspring) hepatotoxicity (harms the liver) hematotoxicity (causes blood effects)	1	NA	0.2	NA

Table 1: Health Risk Categories and Cancer Risk Values for Chemicals with California Public Health Goals (PHGs)

Chemical	Health Risk Category[1]	California PHG (mg/L)[2]	Cancer Risk[3] at the PHG	California MCL[4] (mg/L)	Cancer Risk at the California MCL
1,1,2-Trichloro-ethane	carcinogenicity (causes cancer)	0.0003	$1x10^{-6}$	0.005	2×10^{-5} (two per hundred thousand)
Trichloro-ethylene (TCE)	carcinogenicity (causes cancer)	0.0017	1×10^{-6}	0.005	3×10^{-6} (three per million)
Trichlorofluoro-methane (Freon 11)	accelerated mortality (increase in early death)	1.3	NA	0.15	NA
1,2,3-Trichloro-propane (1,2,3-TCP)	carcinogenicity (causes cancer)	0.0000007 (7×10^{-7})	$1x10^{-6}$	0.000005 (5×10^{-6})	7×10^{-6} (seven per million)
1,1,2-Trichloro-1,2,2-trifluoro-ethane (Freon 113)	hepatotoxicity (harms the liver)	4	NA	1.2	NA
Trihalomethanes: Bromodichloro-methane	carcinogenicity (causes cancer)	0.00006	$1x10^{-6}$	0.080*	1.3×10^{-3} (1.3 per thousand)[11]
Trihalomethanes: Bromoform	carcinogenicity (causes cancer)	0.0005	$1x10^{-6}$	0.080*	2×10^{-4} (two per ten thousand)[12]

* For total trihalomethanes (the sum of bromodichloromethane, bromoform, chloroform, and dibromochloromethane). There are no MCLs for individual trihalomethanes.
[11] Based on 0.080 mg/L bromodichloromethane; the risk will vary with different combinations and ratios of the other trihalomethanes in a particular sample.
[12] Based on 0.080 mg/L bromoform; the risk will vary with different combinations and ratios of the other trihalomethanes in a particular sample.

Table 1: Health Risk Categories and Cancer Risk Values for Chemicals with California Public Health Goals (PHGs)

Chemical	Health Risk Category[1]	California PHG (mg/L)[2]	Cancer Risk[3] at the PHG	California MCL[4] (mg/L)	Cancer Risk at the California MCL
Trihalomethanes: Chloroform	carcinogenicity (causes cancer)	0.0004	$1x10^{-6}$	0.080*	2×10^{-4} (two per ten thousand)[13]
Trihalomethanes: Dibromochloro-methane	carcinogenicity (causes cancer)	0.0001	$1x10^{-6}$	0.080*	8×10^{-4} (eight per ten thousand)[14]
Tritium	carcinogenicity (causes cancer)	400 pCi/L	$1x10^{-6}$	20,000 pCi/L	5×10^{-5} (five per hundred thousand)
Uranium	carcinogenicity (causes cancer)	0.43 pCi/L	1×10^{-6}	20 pCi/L	5×10^{-5} (five per hundred thousand)
Vinyl chloride	carcinogenicity (causes cancer)	0.00005	1×10^{-6}	0.0005	1×10^{-5} (one per hundred thousand)
Xylene	neurotoxicity (affects the senses, mood, and motor control)	1.8 (single isomer or sum of isomers)	NA	1.75 (single isomer or sum of isomers)	NA

* For total trihalomethanes (the sum of bromodichloromethane, bromoform, chloroform, and dibromochloromethane). There are no MCLs for individual trihalomethanes.
[13] Based on 0.080 mg/L chloroform; the risk will vary with different combinations and ratios of the other trihalomethanes in a particular sample.
[14] Based on 0.080 mg/L dibromochloromethane; the risk will vary with different combinations and ratios of the other trihalomethanes in a particular sample.

Table 2: Health Risk Categories and Cancer Risk Values for Chemicals without California Public Health Goals

Chemical	Health Risk Category[1]	US EPA MCLG[2] (mg/L)	Cancer Risk[3] at the MCLG	California MCL[4] (mg/L)	Cancer Risk at the California MCL
Disinfection byproducts (DBPs)					
Chloramines	acute toxicity (causes irritation) digestive system toxicity (harms the stomach) hematotoxicity (causes anemia)	4[5,6]	NA[7]	none	NA
Chlorine	acute toxicity (causes irritation) digestive system toxicity (harms the stomach)	4[5,6]	NA	none	NA
Chlorine dioxide	hematotoxicity (causes anemia) neurotoxicity (harms the nervous system)	0.8[5,6]	NA	none	NA
Disinfection byproducts: haloacetic acids (HAA5)					
Monochloroacetic acid (MCA)	general toxicity (causes body and organ weight changes[8])	0.07	NA	none	NA

[1] Health risk category based on the US EPA MCLG document or California MCL document unless otherwise specified.
[2] MCLG = maximum contaminant level goal established by US EPA.
[3] Cancer Risk = Upper estimate of excess cancer risk from lifetime exposure. Actual cancer risk may be lower or zero. 1×10^{-6} means one excess cancer case per million people exposed.
[4] California MCL = maximum contaminant level established by California.
[5] Maximum Residual Disinfectant Level Goal, or MRDLG.
[6] The federal Maximum Residual Disinfectant Level (MRDL), or highest level of disinfectant allowed in drinking water, is the same value for this chemical.
[7] NA = not available.
[8] Body weight effects are an indicator of general toxicity in animal studies.

Table 2: Health Risk Categories and Cancer Risk Values for Chemicals without California Public Health Goals

Chemical	Health Risk Category[1]	US EPA MCLG[2] (mg/L)	Cancer Risk[3] at the MCLG	California MCL[4] (mg/L)	Cancer Risk at the California MCL
Dichloroacetic acid (DCA)	Carcinogenicity (causes cancer)	0	0	none	NA
Trichloroacetic acid (TCA)	hepatotoxicity (harms the liver)	0.02	NA	none	NA
Monobromoacetic acid (MBA)	NA	none	NA	none	NA
Dibromoacetic acid (DBA)	NA	none	NA	none	NA
Total haloacetic acids (sum of MCA, DCA, TCA, MBA, and DBA)	general toxicity, hepatotoxicity and carcinogenicity (causes body and organ weight changes, harms the liver and causes cancer)	none	NA	0.06	NA
Radionuclides					
Gross alpha particles[9]	carcinogenicity (causes cancer)	0 (^{210}Po included)	0	15 pCi/L[10] (includes radium but not radon and uranium)	up to $1x10^{-3}$ (for ^{210}Po, the most potent alpha emitter)

[9] MCLs for gross alpha and beta particles are screening standards for a group of radionuclides. Corresponding PHGs were not developed for gross alpha and beta particles. See the OEHHA memoranda discussing the cancer risks at these MCLs at http://www.oehha.ca.gov/water/reports/grossab.html.
[10] pCi/L = picocuries per liter of water.

Table 2: Health Risk Categories and Cancer Risk Values for Chemicals without California Public Health Goals

Chemical	Health Risk Category[1]	US EPA MCLG[2] (mg/L)	Cancer Risk[3] at the MCLG	California MCL[4] (mg/L)	Cancer Risk at the California MCL
Beta particles and photon emitters[9]	carcinogenicity (causes cancer)	0 (^{210}Pb included)	0	50 pCi/L (judged equiv. to 4 mrem/yr)	up to $2x10^{-3}$ (for ^{210}Pb, the most potent beta-emitter)

Note: This page is intentionally left blank.

June 21, 2022
Prepared by: M. Robinson / E. Akiyoshi
Submitted by: K. Burton
Approved by: Paul A. Cook

ENGINEERING AND OPERATIONS COMMITTEE

CONDITION ASSESSMENT FOR PUMP STATIONS AND TANKS
CONSULTANT SELECTION

SUMMARY:

The Condition Assessment for Pump Stations and Tanks project includes 11 pump stations and 11 tanks, with a focus on mechanical, electrical, and instrumentation and control. The work includes detailed condition assessment, cost estimating, and project packaging for design and construction. Staff recommends the Board authorize the General Manager to execute a Professional Services Agreement with HDR Engineering, Inc. in the amount of $367,800.

BACKGROUND:

Phase 1 of the Capital Improvement Plan (CIP) Asset Management Program was recently completed and identifies capital repair and rehabilitation (R&R) projects for over 150 pump stations, tanks, lift stations, and well facilities. As a result of the CIP Asset Management Program, staff initiated the pump stations and tanks condition assessment project to complete a detailed condition assessment on critical facilities as recommended from the Phase 1 project.

The project scope of work includes asset level condition assessments using Level I (visual, non-invasive condition assessment) and Level II (more involved testing like pump/motor vibration analysis and electrical insulation testing) evaluations and includes cost estimation and project packaging for design and construction.

Consultant Selection:

Staff invited seven consultants to propose on the project: AECOM, HDR, Hazen & Sawyer, GHD, Stantec, Jacobs, and West Yost. Two consultants, AECOM, and GHD, declined to submit proposals early in the proposal process. While all teams were well qualified, HDR presented a well-balanced team, clear project approach, and an excellent project understanding that meets IRWD's goals and objectives for this project.

- Project Team: HDR is a proven leader in the Southern California area and this team recently completed successful condition assessment projects for City of San Diego, Long Beach Water Department, and the City of Carlsbad. The project manager, Michael Flores, has extensive capital asset management project experience and has led several successful asset related planning projects for IRWD.
- Project Understanding: HDR's proposal demonstrated a clear methodology for completing the work and showcased its solid project management and technical experience with detailed condition assessments for pump stations and tanks. The level of effort at each facility is on point and the level of inspection for the different mechanical, electrical, and instrumentation and control assets match with IRWD's project requirements.

- Technical Approach: HDR articulated a clear approach to condition assessment that uses industry standard methods to evaluate and analyze assets for R&R. Throughout the proposal, a field inspection plan was presented based on IRWD's facility list, project workflow, and approach for estimating the remaining useful lives of the assets.

The consultant selection matrix is provided as Exhibit "A", and HDR's scope of work and fee proposal are provided as Exhibit "B". Staff anticipates that the Condition Assessment project for pump stations and tanks will be completed in January 2023.

FISCAL IMPACTS:

The CIP Asset Management Condition Assessment, Projects 12252 and 12254, will be funded through replacement funds and are included in the FY 2022-23 Capital Budget. The existing budgets are sufficient to fund this phase of the project.

ENVIRONMENTAL COMPLIANCE:

This study is exempt from the California Environmental Quality Act (CEQA) as authorized under the California Code of Regulations, Title 14, Chapter 3, Section 15262, which provides exemption for planning studies.

RECOMMENDATION:

That the Board authorize the General Manager to execute a Professional Services Agreement with HDR Engineering, Inc. in the amount of $367,800 for the Condition Assessment for Pump Stations and Tanks, Projects 12252 and 12254.

LIST OF EXHIBITS:

Exhibit "A" – Consultant Evaluation Matrix
Exhibit "B" – HDR Scope of Services and Cost Estimate

EXHIBIT "A"

CONSULTANT EVALUATION MATRIX

Condition Assessment for Pump Stations and Tanks
Mechanical, Electrical, I&C Focus

Item	Description	Weights	Jacobs		HDR		Stantec		Hazen and Sawyer		West Yost	
A	TECHNICAL APPROACH											
1	Project Understanding	30%	4		1		5		3		2	
2	Project Approach	40%	4		1		4		4		2	
3	Project Team	30%	4		1		4		3		2	
	Weighted Score	*100%*	*4.0*		*1.0*		*4.3*		*3.4*		*2.0*	
B	SCOPE OF WORK											
TASK			Task Hours	FEE	Task Hours	FEE	Task Hours	FEE	Task Hours	FEE	Task Hours	FEE
1	TASK 1 - Project Management		85	$18,223	148	$41,100	214	$54,680	92	$23,120	104	$27,760
2	TASK 2 - Condition Assessment		368	$75,606	700	$184,700	1,234	$296,426	485	$102,910	530	$275,088
3	TASK 3 - Capital Project Packagin and Prioritization		155	$30,489	316	$80,700	624	$142,078	140	$29,290	294	$72,764
4	TASK 4 - Pump Stations and Tanks Capital Planning Report		21	$4,053	274	$61,300	906	$205,538	122	$24,640	224	$54,246
	SUB-TOTAL ENGINEERING SERVICES, FEE		**629**	**$128,371**	**1,438**	**$367,800**	**2,978**	**$698,722**	**839**	**$179,960**	**1,152**	**$429,858**
9.1	Optional Tasks								74	$45,970		
	TOTAL ENGINEERING SERVICES, FEE		**629**	**$128,371**	**1,438**	**$367,800**	**2,978**	**$698,722**	**913**	**$225,930**	**1,152**	**$429,858**
	Avg $/hr			$204		$256		$235		$214		$373
D	OTHER											
	Miscellaneous Items											
	Multiplier		-		-		-		-		-	
	Conflict of Interest		No		No		No		No		No	
	Joint Venture		No		No		No		No		No	
	Addendum Acknowledgement		N/A		N/A		N/A		N/A		N/A	
	Scope of Work Exclusions		No		No		No		No		No	
	Exceptions taken to IRWD Std. Contract		No		No		No		No		Yes	
	Insurance (Professional & General Liability)		Yes, Certs Provided		Yes, Certs Provided		Yes, Certs Provided		Yes, Certs Provided		Yes, Certs Provided	
	Ranking of Consultants		**4**		**1**		**5**		**3**		**2**	

The "1" ranking is the staff recommended consulting team

Note: This page is intentionally left blank.

EXHIBIT "B"



Irvine Ranch WATER DISTRICT

PROPOSAL

Pump Stations and Tanks Condition Assessment Replacement and Rehabilitation Study

PR 12252, 12254, 12255

May 12, 2022

HDR





May 12, 2022

Irvine Ranch Water District
Mitch Robinson, Project Manager
15600 Sand Canyon Avenue
Irvine, CA, 92618

RE: Proposal – Pump Stations and Tanks Condition Assessment Replacement and Rehabilitation Study; PR 12252, 12254, 12255

Dear Mr. Robinson and Members of the Selection Committee,

Thank you for inviting HDR Engineering, Inc. (HDR) to propose on your Pump Stations and Tanks Condition Assessment Replacement and Rehabilitation Study Project. We are excited about this opportunity and have met with your staff over the course of the last year to fully understand your goals for this project. This project is important because it represents a new way for Engineering Planning to support facility asset investment planning through systematic data collection, condition assessment, asset evaluation and project packaging, as well as through increased coordination between operations, maintenance and planning business units. We have been providing these services in Southern California for over 60 years and bring extensive knowledge in condition assessment with standard methodologies and processes for collecting different levels of assessment data to develop capital plans and scopes. Our team includes asset management practitioners that are highly effective in asset management program implementation, and they will work with you in collecting and managing data, performing asset investment planning, and making optimal decisions. These processes can be scaled for future asset investment planning delivery using internal or external resources. We recently performed condition assessment of San Diego's Point Loma Wastewater Treatment deploying multiple inspection teams and standardized data collection and assessment to develop capital plans for the entire plant. Our approach will benefit this project and IRWD in the following ways:

Proven Leadership in Asset Management and Commitment to IRWD's Success.
Michael Flores, IAM leads HDR's Asset Management Practice Group and brings a deep understanding of condition assessment, asset management, and asset investment planning. He is certified in asset management by the Institute of Asset Management and understands how the outputs of this project fit into the larger picture of IRWD's asset management program development. He will manage HDR's project delivery team to stay on schedule and budget, streamline data collection to make the best use of the time spent by our respective teams, and he will guide our team to design smart project packages in alignment with IRWD's project delivery strategy and priorities.

Expertise in Data Collection at the Right Level of Detail to Make Optimal Decisions.
The up-front preparation for condition assessment field visits is critical to defining the right level of detail for data collection. We utilize a multi-level approach to data collection designed to collect the data necessary for decision-making. This reduces the burden for on-going condition monitoring data collection and reduces the "data noise" that can reduce asset evaluation efficiency. **Mandira Sudame, PE** and **Badri Badriyha, PhD, PE** utilized this approach for the Point Loma Wastewater Treatment Plant Condition Assessment, one of the largest treatment facilities in the nation. Using this approach, capital assets and select maintenance asset types will receive more detailed condition assessment with condition assessment criteria linked to primary failure modes enabling our evaluators to better estimate remaining useful life leading to improved decision-making and investment timing.

hdrinc.com
3230 El Camino Real, Suite 200, Irvine, CA 92602-1377
T 714.730.2300 **F** 714.730.2301

Efficient Work Execution.

Our team will be utilizing state-of-the-art data collection tools configured to collect code-based condition, reliability and performance data and organizing this data and photos according to the specific assets provided from IRWD's Maximo asset registry. **Tom McCormack** has managed multiple implementations of Survey123 for our condition assessment projects. Assessment data is transmitted to a cloud database in real-time, enabling both real-time progress tracking and asset evaluation and investment planning to occur in parallel with condition assessment data collection.

Smart Project Packaging Aligned with IRWD's Project Delivery Strategy.

HDR utilizes an asset evaluation process that uses business intelligence to enable efficient asset level decision-making and project packaging. **Shannon Wall, PE** will lead asset investment planning and project packaging. She joined HDR from Tacoma Water, where she was responsible for implementing asset management and asset investment planning. Shannon will collaborate closely with IRWD staff to design project packages in alignment with your project delivery strategies and constraints. She will be support by **Eric Packer, EIT**, the lead developer of HDR's asset management business intelligence tools.

Thank you for inviting us to propose on this project. HDR has been partnering with IRWD for many years bringing knowledge of your system and successful project delivery and we are excited for the opportunity to collaborate and partner with you. Michael and his team have the full support of HDR and my personal commitment that we will deliver a successful project that will deliver smart investment plan for your pump stations and tank as well as advance your evolution to a new way of delivering asset investment planning in an efficient, effective, and collaborative manner. Please contact Michael Flores at **714.730.2385** or **Michael.Flores@hdrinc.com** if you have any questions regarding our proposal.

Sincerely,
HDR Engineering, Inc.

Anna Lantin, PE
Vice President

Mike Flores, IAM
Project Manager

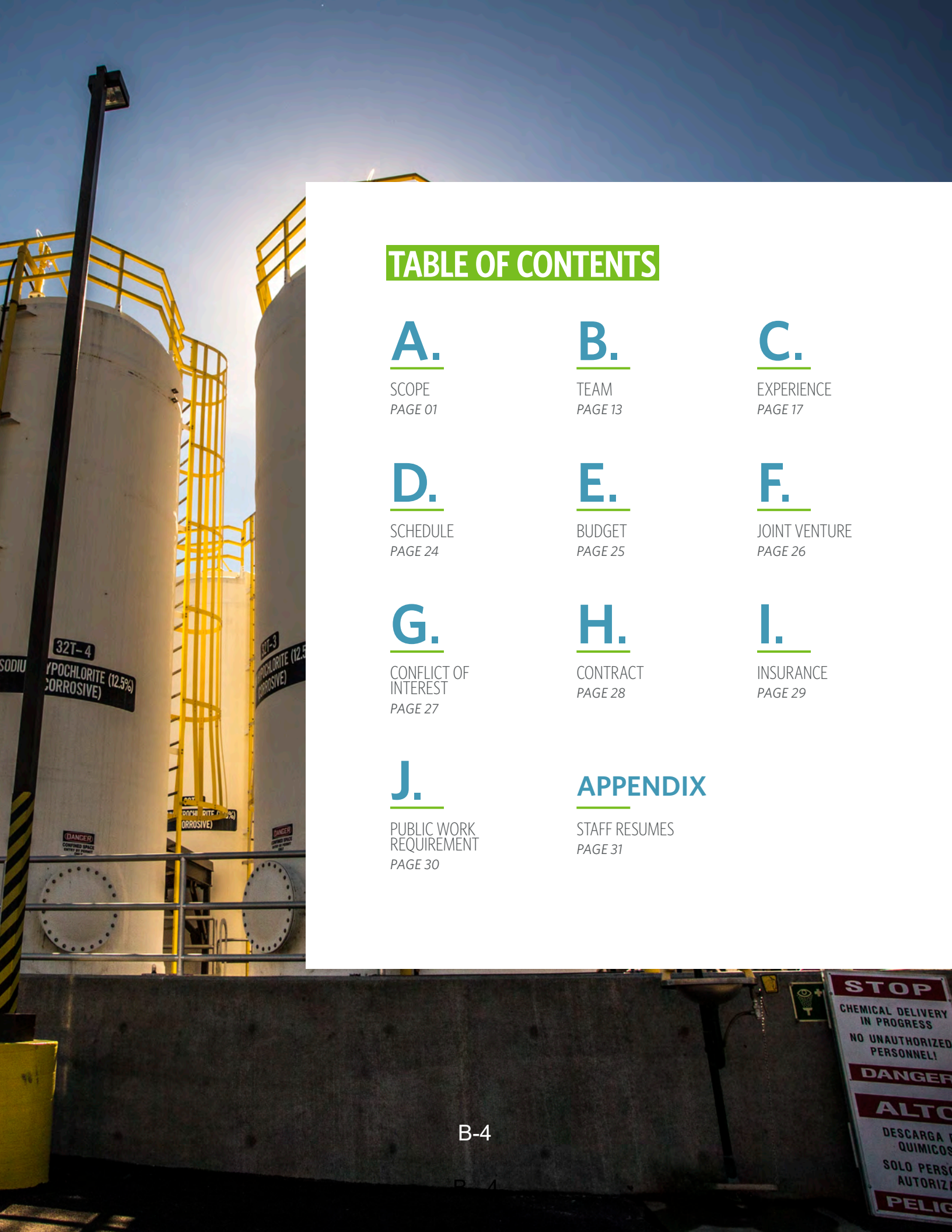


TABLE OF CONTENTS

A. SCOPE *PAGE 01*

B. TEAM *PAGE 13*

C. EXPERIENCE *PAGE 17*

D. SCHEDULE *PAGE 24*

E. BUDGET *PAGE 25*

F. JOINT VENTURE *PAGE 26*

G. CONFLICT OF INTEREST *PAGE 27*

H. CONTRACT *PAGE 28*

I. INSURANCE *PAGE 29*

J. PUBLIC WORK REQUIREMENT *PAGE 30*

APPENDIX STAFF RESUMES *PAGE 31*



A

SCOPE

A. SCOPE

PROJECT UNDERSTANDING

This project is more than just delivering a Condition Assessment Report; it is about understanding the importance and timing of repair and rehabilitation investments need at the District's higher risk pump stations and tanks to provide reliable service well into the future. HDR employs data-driven processes and tools to conduct objective, multi-faceted condition assessment and asset evaluation to prioritize future capital improvement investments so that your water facilities remain reliable, efficient, and able to serve your customers. We accomplish this by employing a high level of communication and collaboration throughout the project.

To visualize the process, we developed the Project Workflow diagram on the following page. The sections below describe each Task.

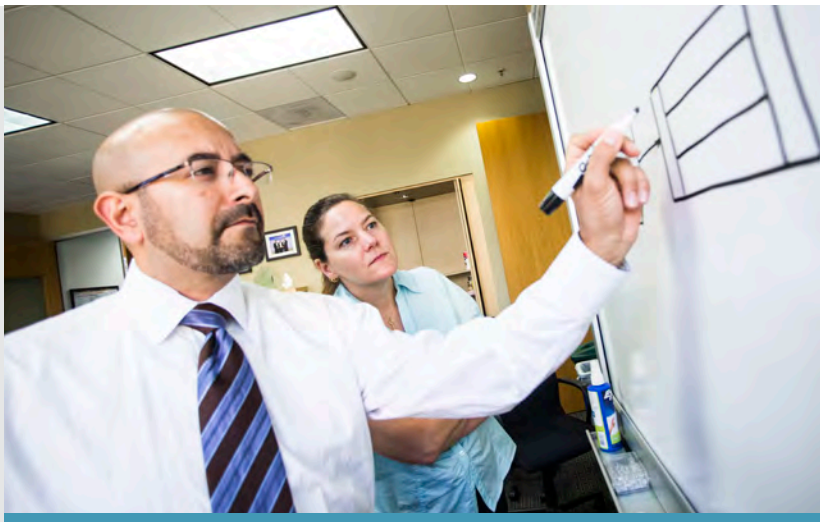
TASK 1: PROJECT MANAGEMENT

TASK OBJECTIVE

IRWD deserves a well-managed Project that includes frequent communication between District staff and the HDR team, which meets the schedule and stays within the approved budget. The following outlines our approach to managing your project to a successful conclusion.

TASK DELIVERABLES

Kickoff Meeting Agenda and Minutes; Project Management Plan; Project Action Item Tracking Log; Project Decision Tracking Log; Workshop Agendas and Minutes.



*Every project requires **oversight** and **management** to **stay on task and schedule.***

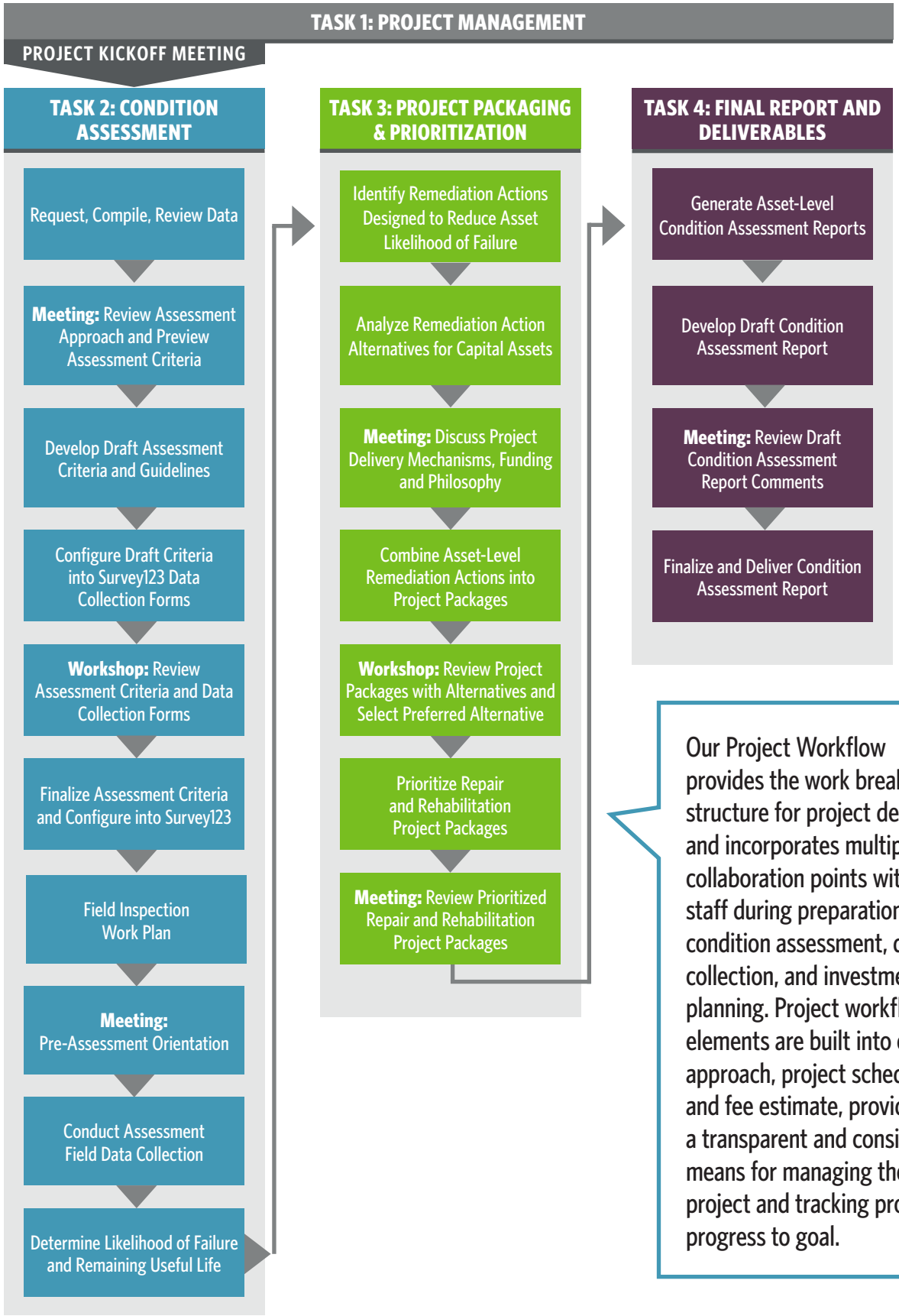
JOB SET-UP & PROJECT MANAGEMENT PLAN

HDR's internal job set-up will be completed upon receipt of the District's NTP. As part of initial job set-up and in accordance with HDR standards, we will prepare a Project Management Plan (PMP). The PMP guides the project throughout its life to provide effective management of work and delivery.

COMMUNICATION will be largely driven by Michael Flores to and from the District. We will define more detailed communication delegation and other protocols at the project kickoff meeting. We will rely heavily on email for informal communications, but we will contact you by phone or meet in person, as more efficient discussions are required.

REGULAR MEETINGS with the District will be the cornerstone of formal project interaction, which falls in line with our proposed progress informal meetings. Michael Flores would like to schedule bi-weekly meetings with Mitch Robinson, the District's Project Manager, to keep information flowing and to monitor our project risk register that we will include as part of our project management approach. It is anticipated these meetings will last no longer than 30-minutes, but will allow a free flow discussion on key items needing attention. HDR will also lead workshops at each major milestone, as requested in your RFP. This will not only inform the District of project progress but help expedite IRWD's review of submittals.

PROJECT WORKFLOW



Our Project Workflow provides the work breakdown structure for project delivery and incorporates multiple collaboration points with IRWD staff during preparation for condition assessment, data collection, and investment planning. Project workflow elements are built into our approach, project schedule and fee estimate, providing a transparent and consistent means for managing the project and tracking project progress to goal.

SAFETY is an embedded part of our culture and a consistent emphasis on every project. We problem solve and attack safety concerns head-on through pro-active training and site solutions that focus on improving project safety. We will implement a safety plan to address the safety, health, protection, and security for our personnel. Similar to any other hazard, COVID-19 also presents hazards and challenges. We will utilize a COVID-19 Checklist, follow Exposure Notification and Isolation Protocols, and communicate COVID-19 Health & Safety Measures to team members.

COST CONTROL is critical to delivering the scope of work for the approved budget. Project costs are monitored using business intelligence tools to provide a vivid picture of accomplishments, work in progress, milestones and future activities. Weekly project cost reports are generated internally from our Electronic Business System accounting based on actual timesheet charges by project staff. They will also be reviewed by Michael to assess current budget status. Our invoicing will include a project progress report outlining percent complete by task.

SCHEDULE CONTROL is critical to delivering the scope of work to meet the set project deadline. Project progression is monitored over multiple time frames to track percent complete along with remaining budget. The schedule for this project is 7 months and will require us to focus on not only delivering quality but meeting the schedule.

We've provided a custom schedule in Section D that identifies key deliverable dates along with key workshops and meetings with the District that is further outlined in our schedule approach.

QUALITY begins with a mindset shared by all members of our team. It starts by clearly understanding your expectations and making a commitment to meeting them every time. At the start of the project, HDR will prepare a four-part Quality Management Plan to provide seamless coordination, communication, and project execution. This document becomes a valuable reference guide for the entire team, including you, whether you want to contact someone on the team, identify milestones or review the budget, this document keeps the team focused on the project and meeting the expectations of District staff.

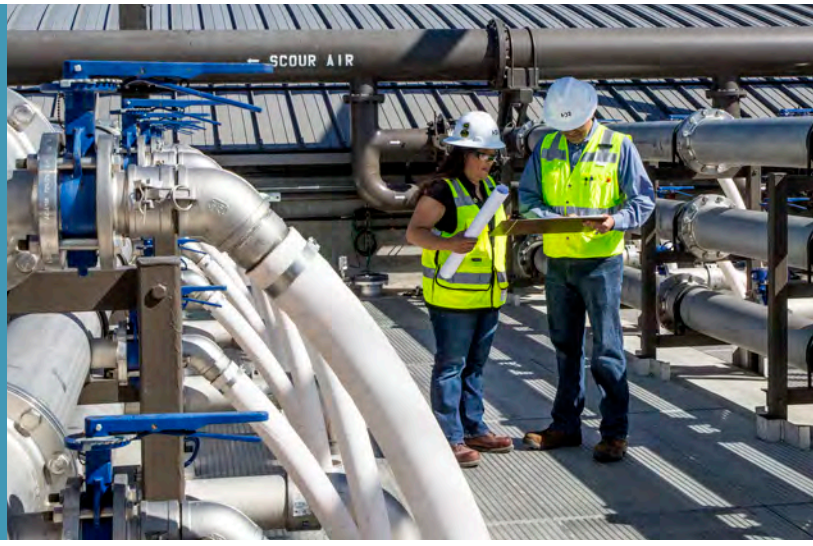
HDR performs **INDEPENDENT PEER REVIEWS** Before final production and delivery of submittals, all materials will be independently reviewed by knowledgeable staff who have not been involved in the development of the deliverables. These peer reviews will provide a fresh set of eyes on the deliverables to point out inconsistencies, remove redundancies and search for ways to benefit each deliverable without sacrificing quality.

INTERNAL MANAGEMENT REVIEWS at project inception and at intervals throughout the project confirm that scope, budget, and schedule are on track. Additional quality control is provided by technical leaders who perform technical reviews of deliverables during project execution. All of these activities and their outcomes are tracked in HDR's project management system to document that quality and risk management processes are followed and monitored.

At our **KICKOFF MEETING** we will introduce the team, review project goals and strategies, discuss the work plan and schedule, and identify next steps. Prior to the Kickoff meeting, we will complete our review of the information requested in Task 2 so that we can take the opportunity after the Kickoff meeting to discuss the information reviewed, verify our understanding, and identify additional actions to take during our initial analysis.

Throughout the project we will have workshops to present and discuss key milestones, obtain stakeholder input, and set the path forward for the remainder of the work.

We understand the importance of meeting project schedules. We can complete this project in ***7 months*** *to provide you a solid database of your assets and a* ***clear understanding of the repair and rehabilitation investments needed for the next 10 years.***



TASK 2: CONDITION ASSESSMENT

TASK OBJECTIVE

Understanding the condition of each asset helps to determine the likelihood of failure and remaining useful life. We will collect physical information on the condition of your facilities to enable identification of safety, maintenance, repair and rehabilitation actions to reduce risk.

TASK DELIVERABLES

Inspection logs and summarized condition, performance and reliability data; remaining useful life estimate; asset-level likelihood of failure framework and scores; workshop agenda and minutes.



HDR used Survey123 to perform objective and consistent condition assessments of more than 2,400 assets for the City of San Diego's Point Loma Wastewater Treatment Plant. We propose using Survey123 for this project to eliminate errors in data transfers and makes the field information instantly available to import into the risk model.

Our first effort, before the kickoff meeting, will be to prepare a data report so that we can review it and get a head start in understanding the assets being assessed. HDR will then compile asset data and perform a desktop assessment of assets using the asset age, materials, operating environment, available performance data and IRWD staff input. The goal is to sort the assets and identify the level of physical condition assessment required to appropriately decide on repair and rehabilitation actions. **This inexpensive desktop risk assessment is used to optimize the labor-intensive physical assessments.** This process will help reduce staff time when accompanying the inspection team. We will hold a workshop to review the desktop assessment and to confirm the assessment approach, including the level of visual, performance and reliability assessment for each type of asset.

HDR uses ArcGIS Survey123 to collect field data. Survey123 captures data, photos, videos, and notes that will be uploaded to cloud storage or stored on the mobile device for later upload via WIFI. Survey123 can generate high quality printable documents from data and photos captured with this platform. We have developed standard questions for each type of asset and will review these questions with you during our workshop and adjust the questions as mutually agreed. We will use these questions to methodically assess the physical condition of each asset based on visual observations, performance data and data collected using predictive maintenance tools.

As outlined in Task 2B of the RFP, the baseline approach is to conduct the condition assessment at the asset level. While asset level approach will unquestionably provide a comprehensive evaluation, **HDR has identified opportunities to streamline the analysis, reduce the condition assessment level of effort, and maintain high level condition assessment information to support decision-making**. A failure analysis approach would look critically at facilities and evaluate how failures occur and focus the in-depth condition assessment on those elements most likely to contribute to failures. Other items that fail without significant system impact or that have well-defined failure responses would receive a more limited condition assessment. IRWD has, in fact, already initiated this approach by designating assets as capital or maintenance and thereby identifying the typical response to failures. The failure analysis approach would be conducted during the workshop to Review Assessment Approach and Preview Assessment Criteria to identify the key failure modes and asset classes targeted for more detailed evaluation. One reason that this approach is feasible for this project is due to the project's focus on pump stations and tanks. There are many similarities across the facility pumping and tank sites and failure analysis results can be applied similarly to many of these site's facilities and rapidly reduce the number of assets requiring a detailed analysis. In the end, this approach will result in collection of high value data from the condition assessment effort and will limit the amount of data collection on assets not requiring action and in those areas that do not significantly impact the project objectives.

KEY ISSUE	OUR PROPOSED SOLUTION	BENEFIT TO IRWD	WHERE WE'VE DONE THIS BEFORE
Assessment Detail and Level of Effort. Condition assessment data can be expensive to collect. In some cases, a simple 1 to 5 condition assessment score is sufficient to support decision-making, yet for more complex and higher value assets, a simple 1 to 5 condition assessment score is not sufficient to support optimal decision-making. In addition, although IRWD has consequence of failure at the facility level, it is not clear whether this includes assessment of consequence of failure at the asset level. Depending on the purpose and configuration of specific assets in these pump station and tank systems and sub-systems, the failure of specific assets will have varying impact on the facility's ability to function and deliver service to customers.	**Asset Class Condition Assessment Criteria and Asset-Level Consequence.** HDR utilizes a standardized 1 to 5 condition assessment scoring for rapid condition assessment of assets for master planning-level condition assessment. In general, HDR will collect a 1 to 5 condition assessment score at the asset level for all assets. We will work closely with IRWD operations, maintenance and technical engineering staff to isolate and remove high-performing asset in good condition from further assessment, enabling our respective teams to focus more attention on assets requiring action. HDR maintains a comprehensive library of supplementary condition assessment criteria for various water facility asset classes to enable our condition assessment teams to document specific visual, performance, and measured data points using pulldown fields and code-based data collection. This enables our asset evaluation team the ability to easily drill down into specific field observations and quickly identify the set of safety, maintenance, repair and rehabilitation actions needed to reduce likelihood failure and extend asset life. HDR proposes to collect this more detailed condition assessment data for capital assets and select maintenance asset classes based on key failure modes discussion during review of preliminary assessment criteria.	**Data Collected at Right Level of Detail Needed to Make Optimal Decisions.** Collecting data at the right level of detail provides the asset evaluation team and IRWD with the information needed to efficiently make optimal decisions on actions IRWD can take to reduce facility failure risk, while at the same time minimizing the data "noise" created by collecting too much data, especially extraneous data not resulting in any form of action. This makes the best use of HDR staff time and both IRWD staff time and IRWD's capital investments.	**Contra Costa Water District.** HDR worked with Contra Costa Water District to assess asset condition using a 1 to 5 scale as well as through use of multiple drilldown inspection criteria.

PHYSICAL ASSESSMENTS PROVIDES THE BASIS FOR ANALYZING RISK

Visual assessment goes beyond what the eye can see. The following sections highlight the areas where we will focus our physical assessments and how we will collect certain data.

STRUCTURAL ELEMENTS

- All metal surfaces including but not limited to access hatches, stairs, handrails, platforms, pipe supports, beams and columns will be visually assessed for corrosion
- Visual observations of concrete surfaces, including walls, joints and linings will be documented with photographs and videos.
- As-needed in-site soluble salt testing beneath the lining blemishes to evaluate the concentration of aggressive ions (e.g., chloride, sulfate and nitrates) harmful to concrete.

MECHANICAL ELEMENTS

- All exposed and reasonably accessible mechanical equipment and components, including equipment, pump assemblies, motors, engines, gears, valves, piping and appurtenances will be visually inspected.
- From the manufacturer's name plates and maintenance information, HDR will record the following:
  - Pump head in feet;
  - Capacity in gallons per minute;
  - Impeller diameter in inches for each pump; and
  - Horsepower and RPM for the motors.
- HDR will observe the equipment for vibrations, sounds, temperature, alignment, and odor. Any field observations such as cavitation, vibration or noises will be made by sensory observation without the use of special instruments.
- Mechanical components identified by operators may be tested for thermography, vibration, insulation resistance, performance testing. Vibration will be monitored using a handheld accelerometer.
- The readily available operating logs at each facility will be reviewed.
- To the extent feasible, HDR will conduct performance testing by working with IRWD staff to operate the equipment within the typical operating ranges to simulate normal operating conditions.

ELECTRICAL ELEMENTS

- HDR will assess electrical components including the distributive Control Systems, power centers and Motor Control Centers.
- HDR will observe SCADA operations of specific assets.
- HDR will perform a visual assessment of the electrical gear to document MCC, switch gear, power supply systems and backup power generation. Visual assessment will include instrumentation such as pressure gauges, pressure switch, temperature switch, seal water, actuators, solenoid valves, pneumatic valves and flow meters.

SITE & SAFETY ELEMENTS

- Each building and structure will be assessed for condition and functionality of the space.
- Drainage and erosion around each structure and within the overall site will be documented.
- Visual inspections accompanied with photographic documentation will be provided.

It is expected that some assets will be difficult to assess and evaluate and HDR has identified approaches for this situation. The difficulty may arise for a variety of reasons, ranging from proprietary data limitations to physical access challenges, such as hazardous

We wrote the book! HDR is an industry leader in infrastructure condition assessment and has developed standard methodologies and guidelines for collecting different levels of condition assessment data (e.g. visual, non-destructive, destructive) for use at various phases of capital planning and project scoping. We re-publish our Condition Assessment and Rehabilitation Guide annually to provide our clients and industry with readily available information.

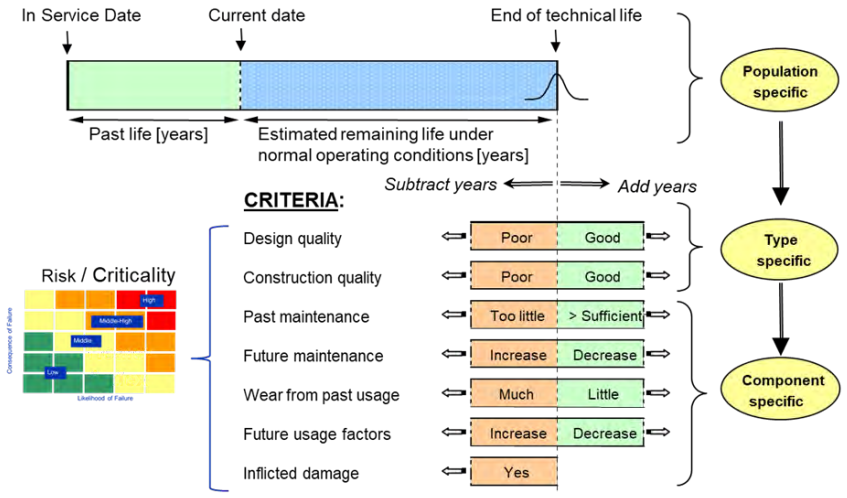


atmospheres. In these cases, HDR typically uses an approach that includes:

- Establish guidelines with the District during planning that identifies potential difficulties that may be encountered.
- Look to age-based analysis when condition-based analysis is challenging. While not as informative as condition-based, it does provide a baseline assessment of remaining useful life that can be included with other assets in the hierarchy to establish a provisional replacement priority.
- Consider a cursory failure analysis to supplement the age-based analysis. If the failure analysis or asset type indicates a low risk, the age rating will generally be appropriate.
- If the failure analysis shows a higher level of concern, we will recommend a higher level of inspection effort be undertaken, such as excavation or specialized testing. If the inspection costs, level of effort, or risk are prohibitive, the asset will be identified for early replacement due to the risk and information uncertainty. The approach provides a reasonable level of due diligence to justify the replacement action.
- Identify redesign elements to avoid the uninspectable situation in the future.

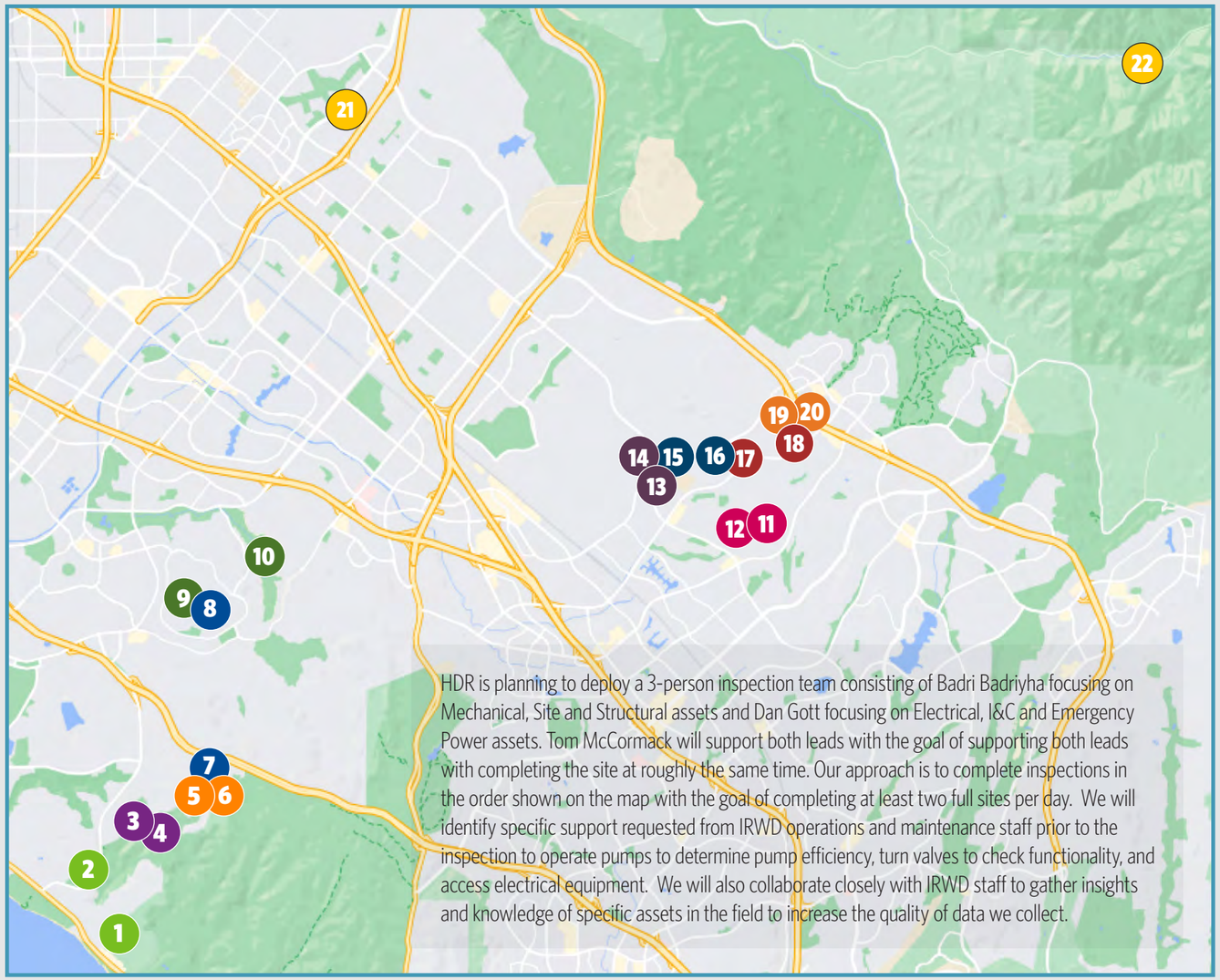
HDR has used this approach for projects including JCW and Springfield and it provides a positive way forward when these difficulties are encountered.

KEY ISSUE	OUR PROPOSED SOLUTION	BENEFIT TO IRWD	WHERE WE'VE DONE THIS BEFORE
Estimating Remaining Useful Life Based on Nominal Life and Age is Inaccurate at Asset Level. A typical method for estimating remaining useful life is to use asset age and nominal life. This method is inaccurate at the asset-level since actual asset life will depend on many factors including whether the asset was install correctly, how well the asset is maintained, the operating environment, etc.	**Use Available Knowledge of Operating Conditions, Maintenance Context, Visual Observations and Predictive Data to Evaluate Remaining Useful Life.** HDR will use available data and knowledge of assets to estimate remaining useful life at the asset level. For maintenance assets, HDR will utilize the 1 to 5 condition scoring collected at the asset level to estimate the percentage of nominal life remaining. For capital assets, HDR will incorporate additional criteria to further refine this evaluated remaining useful life.	**Improved Decision-Making and Investment Timing.** Having a more accurate estimate of remaining useful life will enable IRWD.	**Johnson County Wastewater Facility Asset Management Program**



HDR used condition assessment data to evaluate the remaining useful life of assets. Original remaining useful life estimates using age and nominal life resulted in many asset with negative remaining useful life indicating these assets were beyond useful life. Evaluation of the remaining useful life based on analysis of condition assessment and maintenance data resulted in remaining useful life estimate more aligned with staff intuition.

CONDITION ASSESSMENT FIELD INSPECTION PLAN



HDR is planning to deploy a 3-person inspection team consisting of Badri Badriyha focusing on Mechanical, Site and Structural assets and Dan Gott focusing on Electrical, I&C and Emergency Power assets. Tom McCormack will support both leads with the goal of supporting both leads with completing the site at roughly the same time. Our approach is to complete inspections in the order shown on the map with the goal of completing at least two full sites per day. We will identify specific support requested from IRWD operations and maintenance staff prior to the inspection to operate pumps to determine pump efficiency, turn valves to check functionality, and access electrical equipment. We will also collaborate closely with IRWD staff to gather insights and knowledge of specific assets in the field to increase the quality of data we collect.

GROUP	ID	FACILITY NAME	NUMBER OF ASSETS		
			Electrical, I&C and Emergency Power	Mechanical, Site and Structural	Total
1	1	Crystal Cove Zn 2-4 PS	31	43	74
	2	Coastal Zn 2 Tank	7	30	37
2	3	Coastal Zn 4 Tank	11	34	45
	4	Coastal Zn 4-6 PS	51	52	103
3	5	Coastal Zn 6 Tank	21	47	68
	6	Coastal Zn G Tank	4	21	25
4	7	Coastal Zn G-H PS	35	38	73
	8	Turtle Rock Zn 3-4 PS	50	64	114
5	9	Turtle Rock Zn 3 Tank	16	32	48
	10	Turtle Rock Zn A-B PS (TR Irr)	49	52	101
6	11	Lake Forest Zn D West Tank (LAWD ZnB)	3	9	12
	12	Lake Forest Zn 4-5 West PS (LAWD Zn 1-2)	25	30	55
7	13	East Irvine Zn 3-4 PS	38	39	77
	14	East Irvine Zn 3 Tank #1	31	55	86
8	15	East Irvine Zn 3 Tank #2	12	22	34
	16	East Irvine Zn 4 Tank	9	38	47
9	17	Foothill Zn 4-6 PS	67	74	141
	18	Lake Forest Zn D PS (LAWD Zn B)	29	36	65
10	19	Lake Forest Zn 5 (LAWD Zn 2) West Tank	15	46	61
	20	Lake Forest Zn 5-6 West PS (LAWD Zn 2-3)	36	27	63
11	21	Tustin Ranch 1-3 PS	48	53	101
	22	SCWD Chapman Tank	4	14	18
		Total Assets	**592**	**856**	**1448**

FIELD INSPECTION WORK PLAN

A field inspection work plan is a key component before conducting field inspections. The workplan serves as a road map delineating items such as but not limited to accessibility, safety, inspection procedures, data collection, recording protocols, and field forms customized to document observations, inspection efforts, tests, and detailed schedule.

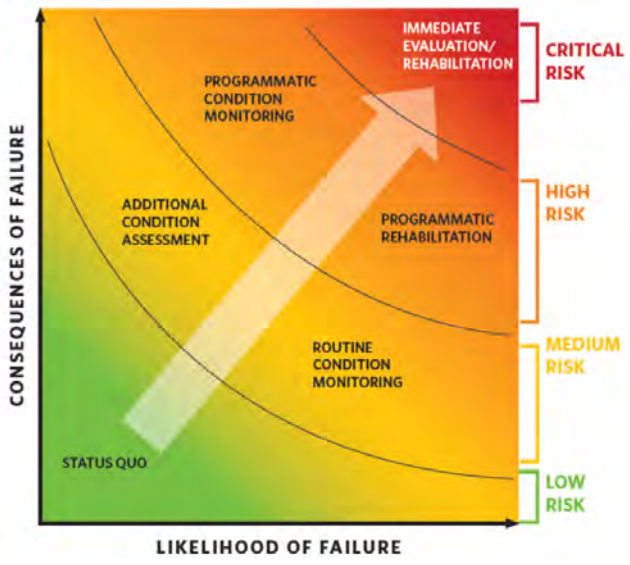
As part of developing the Work Plan, our team will schedule a day of field reconnaissance to visit critical/key pump stations and reservoir/tank sites to better assist in developing the work plan. The field reconnaissance will be schedule about two weeks after the kickoff meeting. A draft work plan will be submitted to IRWD and followed up with a review meeting. Once all review comments are reconciled, the final work plan will be submitted.

__Badri Badriyha__ and __Tom McCormack__ recently completed condition assessment inspection and capital improvement project development for mechanical, site and structural assets at City of San Diego's Point Loma Wastewater Treatment Plant. __Dan Gott__ recently led the electrical and instrumentation condition assessment inspections for Contra Costa Water District's Treated Water Rehabilitation and Replacement Plan, which included pump stations and tank assessment. __Tom McCormack__ configured the data collection tools and performed data management for both projects. Data is stored in a cloud database and available immediately for progress tracking and review. __Together, this team brings to IRWD the experience to efficiently collect high quality data and make the best use of IRWD staff time.__

To develop the initial renewal and improvement options, HDR will focus on the asset-level condition and risk assessment to develop an initial snapshot of asset risks. HDR will develop preliminary assessment factors for Likelihood of Failure (LOF) to combine with the District's Consequence of Failure (COF) for each asset type. The data will be compiled into an Asset Evaluation Database. Risk scores will be calculated for each asset to prioritize maintenance and capital asset needs. An Asset Health Dashboard will provide a visual means to analyze the data to support "drawing the line" on assets requiring near-term investments and those which can benefit from longer planning horizons.

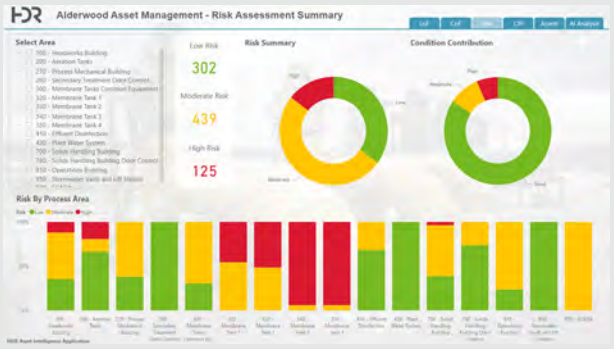
Failure in an asset management framework means not meeting the desired level of service. Level of service is a defined service goal that relates to capacity, availability, structural integrity, reliability, responsiveness, environmental acceptability, and cost. LoF is typically considered as the probability that an event will occur or as the projected frequency of occurrence of an event. Factors to estimate LOF include asset condition, remaining useful life, redundancy and work order history. This LoF score will combine with the District's CoF score for these facilities to determine how each asset compares to each other.

In a workshop we will work with IRWD staff to identify an appropriate mix of LOF factors and then link them to the COF factors to show how the resulting scores relate to achieving service levels. **Working with District staff, we will develop weighting factors so that the most important parameters receive the highest weight. This provides alignment between the risk assessment and what is most important to you and your facilities and optimize their performance. The figure below shows where your assets could fall on the risk spectrum.**



HDR is not including any additional consequence of failure assessment in the proposed scope and fee and will utilize IRWD's facility level consequence to prioritize projects. IRWD may wish to incorporate asset-level consequence into the assessment to enable the ability to enable the ability to refine project packaging decisions if financial constraints require downsizing the scope of packaged projects.

HDR will then finalize risk scoring that can be presented in the Asset Health Dashboard, similar to the one below that we prepared for the city of Alderwood which shows the risk results for all the assessed assets.



HDR developed tools for the City of Alderwood condition assessment project to support asset management decision-making, including a ***business intelligence dashboard*** *shown here. We can configure the decision-support tool to conform to the City's asset management needs. Mobile data collection tools* ***save data creation time, improves accuracy,*** *and can be* ***used by the City for future assessments.***

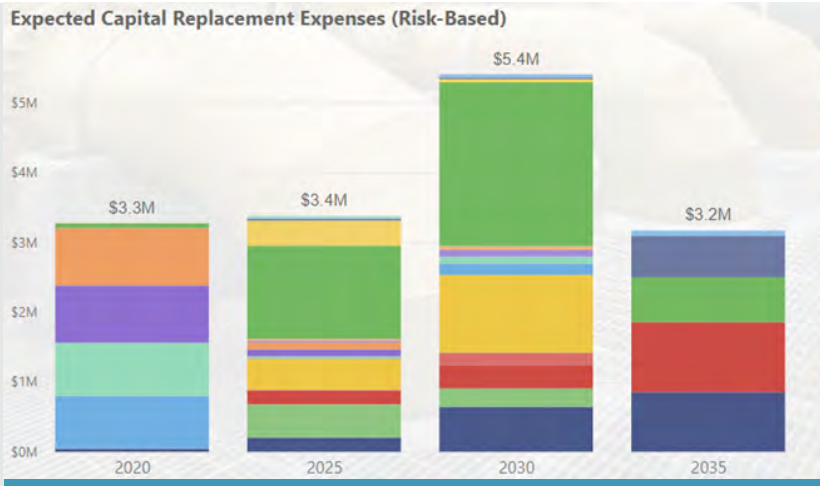
TASK 3: CAPITAL PROJECT PACKAGING AND PRIORITIZATION

TASK OBJECTIVE

A well thought-out plan with reliable estimated project costs will help IRWD schedule its repair and rehabilitation efforts over the next decade and beyond to extend asset life and save costs. This task will develop remedial activities, estimate their costs and develop a reasonable schedule for staff to implement.

TASK DELIVERABLES

Repair and Rehabilitation Recommendations; Estimated Costs for Asset Recommendations; Schedule for Implementation of the Various Recommendations; Workshop Agenda and Minutes.



*Example from the City of Alderwood showing **capital replacement risk-based expenses for a 15 year period by facility area.***

By prioritizing your capital and operational needs, you will achieve protection of health and safety, reduce risk, extend asset life, and reduce overall costs of your facilities. **Using defensible decision-making processes and decision support tools we will help you build an infrastructure plan over a 10-year planning horizon** and a longer horizon for more granular efforts when planning long-term renewal efforts. Knowing the deterioration rate of each asset we can estimate how much life remains and what repair or rehabilitation expenditures will be needed to extend the asset life or to replace the asset. This approach will reflect IRWD's utility performance goals, and acknowledge current budgetary and resource constraints and commitments.

In developing costs, HDR will use existing cost data for similar projects to develop planning level (AACE Class 5) costs. These costs will assist in developing project budgets and scheduling.

HDR will facilitate a workshop to confirm key assumptions, data inputs and methodology used to estimate project costs and schedule. We will also review preliminary observations and CIP recommendations to confirm alignment with your overall goals. We will also review maintenance recommendations for assets that need renewal but may have a lower priority. With input from IRWD staff, we will refine the near-term remedial action recommendations.

KEY ISSUE	OUR PROPOSED SOLUTION	BENEFIT TO IRWD	WHERE WE'VE DONE THIS BEFORE
Project Packaging Not Aligned with IRWD Project Delivery Strategy. The assessment will generate a wide array of repair and rehabilitation actions, which will need to be packaged into projects that are ideally aligned with IRWD's strategy for project delivery. If these project packages are not aligned with IRWD's project delivery strategy, this will require the projects to be disaggregated causing additional effort.	**Collaborative Process to Understand IRWD's Project Delivery Strategies and Funding Constraints.** HDR will facilitate a meeting with IRWD staff to understand IRWD's project delivery strategy and project packaging preferences. We will create project packages with sub-units that can be easily disaggregated, if needed. Asset level repair and rehabilitation decisions will drive the project scope and cost.	**Facilitates Constraints Analysis and Optimizing Investment Planning,** allowing IRWD to manage rates and cash flow. The remaining useful life of assets included in the project package combined with project prioritization will enable assignment of project timing.	**Alderwood Wastewater Treatment Plant Capital Investment Planning.** HDR assessed and developed prioritized project packages for Alderwood's Wastewater Treatment Plant.

TASK 4: FINAL REPORT AND DELIVERABLES



TASK OBJECTIVE

The Condition Assessment Report will be compiled such that it stands the test of time. We pride ourselves on well written, concise reports with appropriate figures and graphics that convey critical information efficiently and effectively.

TASK DELIVERABLES

Draft Condition Assessment Report; Comment Response Log; Final Condition Assessment Report.

*All deliverables will **document the decisions made** and **data generated** so you can make **informed decisions will into the future.***

Clear and concise documentation of the work efforts is a key element for a comprehensive assessment document like your Condition Assessment Report and gathering the information developed in Tasks 2 and 3 requires diligent planning and data management. The Condition Assessment Report will summarize and document the work developed during the assessment and asset investment planning effort, incorporate and integrate evaluations from each task, and provide a comprehensive set of project recommendations for your pump stations and tanks. Our Project Manager, Mike Flores, will lead the Report preparation, keeping your end goals in mind from the start of the project to promote understanding and acceptance of the key findings and recommendations.

Our approach begins with developing a report outline at the start of the project, identifying key elements, and preparing each deliverable in the prior tasks with the foresight that each will be integrated into the Condition Assessment Report. Upon completion of the analyses and assessments, the recommendations will then be discussed with IRWD staff in a workshop setting. This collaborative process allows for discussion of strategic and creative ideas, tempered with the realities of project execution constraints and affordability. Following this workshop, we will compile a clear and well documented draft Condition Assessment Report for your review and comment.

After IRWD provides comments, HDR will review and respond to those comments, followed by discussion with IRWD staff to address and resolve comments prior to incorporation into the final Condition Assessment Report. The report will be organized in a manner that you can utilize specific sections for presentations to various audiences, whether to your Board, staff, or the public.

KEY ISSUE	OUR PROPOSED SOLUTION	BENEFIT TO IRWD	WHERE WE'VE DONE THIS BEFORE
Data is Voluminous and Difficult to Understand. Wading through thousands of data points can be overwhelming. Many professionals are challenged with accessing, handling, and analyzing large volumes of data. Different stakeholders will find value in the data and analysis outcomes at different levels and for different purposes.	**Leverage Business Intelligent (BI) Dashboards to Easily Access and Display Data.** HDR is proficient in using Microsoft's Power BI to access, query and display data in a simple manner to quickly understand what the data means, key performance indicators, make intelligent decisions and inform stakeholders in a way that builds consensus.	**IRWD will have the Tools to Continue BI Access Long After Project is Complete.** IRWD is already using Power BI. The HDR Team will be using Power BI for project delivery and will leave these tools and dashboards with IRWD staff so you can continue interfacing with your data and grow with it over the years to come.	**City of San Diego, City of Alderwood, and Contra Costa Water District** are just a few of the clients that benefitted from the Power BI dashboard.

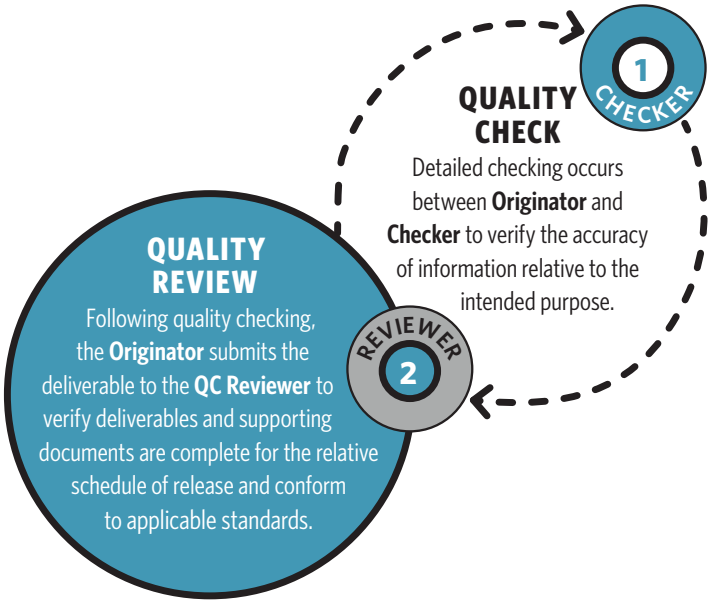
INTEGRATED QUALITY MANAGEMENT SYSTEM APPROACH

Project reviews occur throughout project execution to facilitate communication between the project manager and HDR management. Our quality management system utilizes the data, reports, and figures captured through project controls and project management plan. Managing the quality of deliverables is essential to minimizing cost and schedule overruns on projects.

Because quality is a critical element of our program, we use senior level subject matter experts to conduct an independent review of our deliverables before we submit them to you. This independent review provides consistency in all our deliverables, improves your product because of the depth of experience, and enhances the process for future submittals.

HDR will provide a QA/QC program that adheres to IRWD standards, regulations, policies, and procedures for all work performed for the duration of this contract. Our responsibilities for quality include all levels of HDR personnel—from our Chief Executive Officer to senior management to the project team. Responsibilities are documented in our procedures, defining how HDR delivers products and services to you. Our focus on and attention to quality also extends to our subconsultants, and typically includes our subconsultants developing and submitting a QA/QC Plan for review.





Our goal is to set the industry benchmark for excellence in services.

We accomplish this through work well done, staying true to purpose, and exercising discipline. To achieve quality in our work, we have developed a Quality Management System (QMS). Our QMS provides an important framework to reach the highest levels of quality—both for you and for ourselves.

We focus on continual opportunities for improvement throughout our daily activities to achieve client satisfaction and meet performance expectations. The QMS includes programs, policies, and business processes for:

- **Management Responsibility.** Management actively promotes quality in our business activities and defines responsibilities for maintaining our focus on quality.
- **Resource Management.** Resources are trained, available, and committed to providing quality services.
- **Professional Service Delivery.** Processes and procedures are in place that promote quality in the delivery of our products and services.
- **Measurement, Analysis, and Improvement.** Continual improvement is achieved through performance measurement and identification of areas for improvement.



B

TEAM

B. TEAM

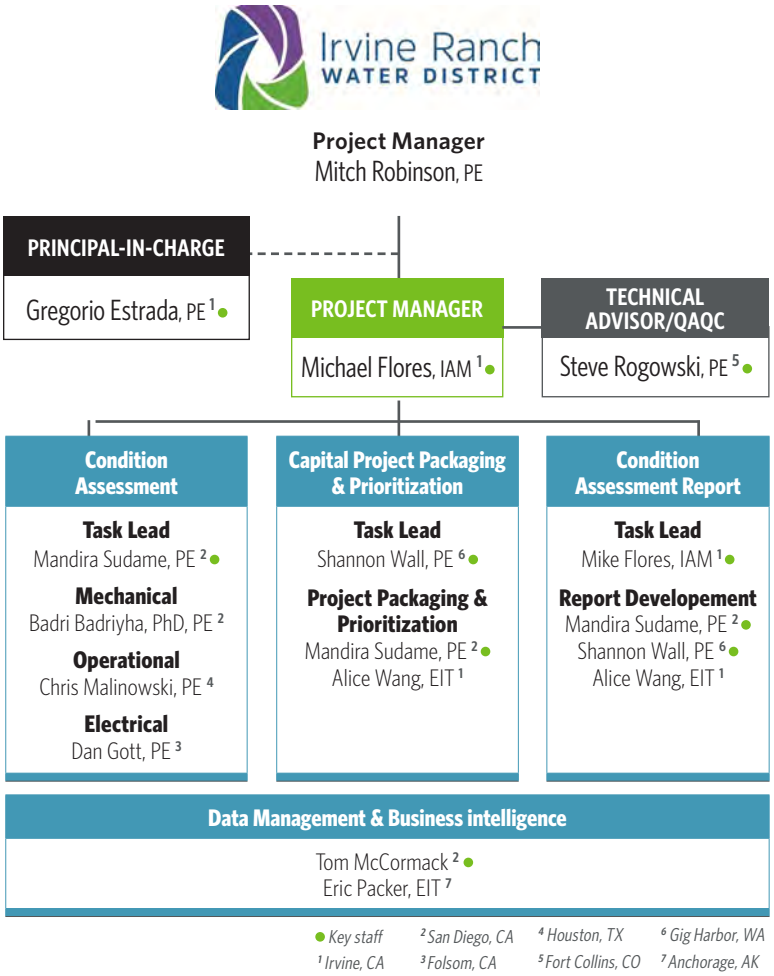
IRWD requires a highly qualified, capable team of experts that can help perform assessment, needs identification and planning required to deliver the Pump Stations and Tanks Condition Assessment Replacement and Rehabilitation Study. HDR is proposing an experienced team of fully committed staff that will work in partnership with your staff.

Michael Flores will serve as HDR's Project Manager and your primary point of contact on this project. Michael is a highly experienced project manager, serves as the chair of HDR's Asset Management Practice Group and leads HDR Facility Asset Management initiative. Michael has led facility condition assessment and asset investment planning for the Johnson County Wastewater Facility Asset Management Program and Point Loma Wastewater Treatment Plan Condition Assessment. Michael is also certified by the Institute of Asset Management as an asset management practitioner and is qualified to assess asset management programs to ISO 55000 series standards.

Michael will be supported by technical advisor, **Steve Rogowski**. Steve is a former Operations Manager, Asset Manager and Capital Program Manager for Metro Water Recovery in Denver, Colorado and was responsible for development of capital plans to manage system reliability. His experience working directly with Operations and Engineering staff to assess, identify and plan capital improvements is perfectly aligned with the scope of this project.

Mike is will also be support by task leads, **Mandira Sudame** and **Shannon Wall**. Mandira has more than 20 years of experience and offers our clients a practical design approach as well as easy-to-operate facilities. Mandira recently served as Project Manager for the condition assessment and recommended upgrades for 23 sewer pump stations for the City of San Diego. Shannon Wall has over 31 years of experience and has led asset management program development, capital asset investment portfolio management, and risk-based modeling for decision-making support. Prior to joining HDR, Shannon was the Planning & Engineering Manager at Tacoma Water where she led the development and implementation of the utility's $50 Million annual water infrastructure capital improvement program.

Complete resumes for staff listed on our organizational chart are available in the Appendix.



SCHEDULE OF TIME CONTRIBUTED

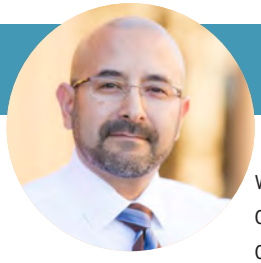
AVERAGE PERCENTAGE OVER LIFE OF PROJECT (%)

TEAM MEMBER | CLASSIFICATION	5	10	15	20
Michael Flores | Project Manager				
Steve Rogowski | Technical Advisor/QC				
Gregorio Estrada | Principal				
Mandira Sudame | Sr. Technical Expert				
Shannon Wall | Sr. Technical Expert				
Chris Malinowski | Sr. Technical Expert				
Badri Badriyha | Sr. Engineer				
Dan Gott | Sr. Electrical Engineer				
Tom McCormack | Utility Mgmt Consultant				
Alice Wang | EIT				
Eric Packer | EIT				

MEET THE TEAM

The key to efficient project delivery is assigning qualified profession staff who can deliver results. We have established working relationships with many municipalities and water districts and will bring those resources to support this project.





MICHAEL FLORES PROJECT MANAGER / CONDITION ASSESSMENT REPORT LEAD

Michael (Mike) has more than 28 years of experience in the water and wastewater field with a primary focus on infrastructure management, operations, maintenance, and capital program planning. He has managed or served as a senior technical resource on several large and complex projects, focused on planning and implementing business process changes and information management solutions for wastewater collection system operations, maintenance, and capital planning programs. **Most recently, Michael was the Project Manager for the Orange County Sanitation District's Asset Management Plan Update which provided a roadmap for prioritizing the collection of condition assessment data, analyzing the likelihood and consequences of failure, and documenting the process to developing and updating the District's ongoing capital improvements**.

RELEVANT EXPERIENCE

- *Orange County Sanitation District, Asset Management Plan*
- *Johnson County Wastewater, Facility Asset Management Plan*
- *City of San Diego, Point Loma Wastewater Treatment Plant Facilities Condition Assessment and CIP*
- *City of Carlsbad, Water, Wastewater and Recycled Water Master Plan*
- *City of Los Angeles, Sewer Rehabilitation and Replacement Program Plan and Implementation*
- *Clark County Water Reclamation District, Facility Asset Management Implementation Roadmap*



STEVE ROGOWSKI, PE TECHNICAL ADVISOR

Steve has led asset management program development including facility condition assessment and rehabilitation, maintenance program development and computerized maintenance management system support of reliability initiatives, and facility rehabilitation programs. **He provided leadership across multiple assignments including strategic planning, comprehensive facility planning, and capital program management in excess of $100M/year.** He brings exceptional industry and practical utility experience with maintenance best practices, utility operations, and asset management program element implementation, paired with strong collaboration skills to develop cross-functional programs to achieve utility objectives.

RELEVANT EXPERIENCE

- *Dallas Water Utilities, Water Production Facilities Master Plan*
- *IRWD, Placement Planning Model Cost Update*
- *Metro Wastewater Reclamation District, 2018 Facility Plan*
- *Johnson County Wastewater, Facility Asset Mgmt. Plan, Ph. 3*
- *City of Springfield, Southwest Wastewater Treatment Plant Master Plan*
- *Clarifier Maintenance Program, City of St Petersburg, Florida*



GREGORIO ESTRADA, PE PRINCIPAL IN CHARGE

As the Principal-in-Charge, Gregorio has been working with IRWD for more than 13 years on critical projects ranging from planning, design, and construction. He has sucessfully delivered large-scale projects in advanced treatment such as IRWD's $167M Michelson Water Recycling Plant Biosolids and Energy Recovery Facilities as well as IRWD's $87.5M Michelson Water Recycling Plant's MBR Facility. He is also highly-skilled in building group-consensus amongst key stakeholders with differing agendas, performing economic evaluations and risk assessments, and assisting in negotiations with regulatory agencies. **His history and relationships with IRWD staff brings a solid understanding of all of IRWD's facilities, design standards, company culture, and staff preferences that will increase our team's efficiency and understanding for this project.**

RELEVANT EXPERIENCE

- *Irvine Ranch Water District, Michelson Water Reclamation Plant Expansion*
- *Irvine Ranch Water District, Water Quality Evaluation for Michelson Water Recycling Plant proposed Diversions to San Diego Creek and Newport Bay*
- *Irvine Ranch Water District, Biosolids/Energy, Management Plan*
- *City of San Mateo, Nutrient Removal and Wet Weather Flow Management Upgrade and Expansion*



MANDIRA SUDAME, PE CONDITION ASSESSMENT LEAD

Mandira has more than 20 years of experience in planning, designing, and constructing wastewater treatment facilities projects throughout Southern California. With her experience, creativity, and strong technical background, Mandira offers our client a practical design approach as well as easy-to-operate facilities. Mandira understands how to design wastewater facilities that staff can easily operate and run efficiently. **Recently, Mandira managed the condition assessment and recommended upgrades for 23 sewer pump stations for the City of San Diego. As Project Manager, Mandira effectively led the HDR team to deliver the best possible solutions for thr City of San Diego.**

RELEVANT EXPERIENCE

- *City of San Diego, Point Loma Wastewater Treatment Plant Facilities Condition Assessment and CIP*
- *Irvine Ranch Water District, Michelson Water Reclamation Plant Expansion*
- *Irvine Ranch Water District, Michelson Water Recycling Plant Tertiary Filters Improvements*



BADRI BADRIYHA, PhD, PE CONDITION ASSESSMENT (MECHANICAL)

Dr. Badri Badriyha is a Senior Project Engineer in the water group at our San Diego office. Dr. Badriyha has designed drinking water and wastewater treatment plants, pump stations, water transmission pipelines, and sewer systems. Mr. Badriyha conducted his research on micro- and nano-membrane use for water treatment and reverse osmosis, activated carbon adsorption of synthetic organic compounds, and biodegradation of pesticides in water. **Most recently, Dr. Badriyha completed the condition assessment inspection and capital improvement project development for mechanical, site and structural assets at City of San Diego's Point Loma Wastewater Treatment Plant.**

RELEVANT EXPERIENCE

- *City of San Diego, Point Loma Wastewater Treatment Plant Facilities Condition Assessment and CIP*
- *West Basin Municipal Water District, Recycled Water Master Plan Update*
- *Orange County Sanitation District, Asset Management Plan Update*
- *Poseidon Resources, Poseidon Ultimate New Intake Evaluation*



CHRIS MALINOWSKI, PE CONDITION ASSESSMENT (OPERATIONAL)

Chris Malinowski's engineering experience stems from his practical and hands-on knowledge of working with and operating pump stations, treatment plants, and water distribution systems. His involvement with start-up of facilities, such as with the City of San Jose, allows him to look for solutions that will optimize the long-term operations of facilities. **Similar to his work for the City of Dallas in assessing and developing a long-range capital improvements plan, Chris will work with the District to evaluate the mechanical, structural and electrical components of the systems to find opportunities for capital and operational improvements.** Chris' uncanny ability to anticipate operator's needs has been developed by working with municipalities and other industrial sites.

RELEVANT EXPERIENCE

- *Irvine Ranch Water District, Replacement Planning Model Cost Assumption Update*
- *Dallas Water Utilities, Water Production Facilities Strategic Plan*
- *San Jose Water Company, Montevina Water Treatment Plant Improvements Progressive Design-Build*



DAN GOTT, PE CONDITION ASSESSMENT (ELECTRICAL)

Dan has more than 29 years of experience administering and directing all aspects of electrical, instrumentation, and control systems for water, wastewater, and industrial facilities and systems. His experience has included planning, design, programming and configuration, construction support, equipment inspection and testing, facility startup, and training in system operations and maintenance (O&M) for water, wastewater treatment plants and pumping stations. **Dan recently led the electrical and instrumentation condition assessment inspections for Contra Costa Water District's Treated Water Rehabilitation and Replacement Plan.**

RELEVANT EXPERIENCE

- *Contra Costa Water District, Treated Water Rehabilitation and Replacement Plan*
- *Irvine Ranch Water District, Michelson Water Reclamation Plant*
- *Irvine Ranch Water District, Cienega Selenium Treatment Facility*
- *Central Coast Water Authority, Asset Management / Capital Improvement Program (CIP) Process Review*

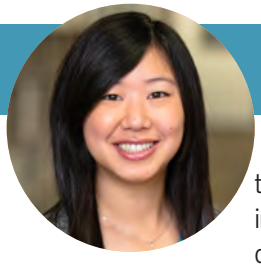


SHANNON WALL, PE CAPITAL PROJECT PACKAGING AND PRIORITIZATION LEAD

Shannon Wall is a licensed electrical engineer with over 31 years of experience in engineering, asset management, and utility management. Shannon has experience in leading asset management program development, capital asset investment portfolio management, and risk-based modeling for decision-making support. **In her role as Planning & Engineering Manager at Tacoma Water, Shannon led the development and implementation of the utility's $50 Million annual water infrastructure capital improvement program.**

RELEVANT EXPERIENCE

- *Tacoma Water, Planning & Engineering Manager*
- *Tacoma Power, Asset Investment Planning Manager*
- *Los Angeles Department of Water and Power, Asset Management Program Implementation*
- *Idaho Power, Asset Management Strategic Plan*



ALICE WANG, EIT PROJECT PACKAGING & PRIORITIZATION / REPORT DEVELOPMENT

Alice has worked on a variety of HDR's water and wastewater treatment projects throughout Texas and California. Responsibilities include analyzing drinking and sewage water quality data, performing condition assessments, providing construction services such as design calculations and submittal reviews, developing design plans and details, and modeling using GIS. Alice delivers enthusiasm, great attention to detail, strong communication, and a positive attitude within a team environment. **Alice has worked on several IRWD projects such as the Sewage Treatment Master Plan and the Salt Model Refresh Update bringing familiarity of your standard and protocols.**

RELEVANT EXPERIENCE

- *Irvine Ranch Water District, Sewer Treatment Master Plan*
- *Irvine Ranch Water District, Salt Model Update*
- *Goleta Water District, Corona Del Mar Water Treatment Plant Asset Inventory*
- *Orange County Sanitation District, Asset Management Plan Update*
- *Burbank Water and Power, Risk and Resilience Assessment and Emergency Response Plan for Compliance with America's Water Infrastructure Act*



TOM McCORMACK DATA MANAGEMENT/ BUSINESS INTELLIGENCE

Tom is a utility performance and information technology expert with 7 years of experience. His background includes work in Asset Management/CMMS development and updates to new systems as well as design, development, and implementation of new databases primarily in Microsoft Access. Tom has performed a wide range of work in ESRI ArcGIS using ArcSDE geodatabases and tools to manage geospatial data. **Tom has worked with Michael on the most recent OCSD Asset Management Plan Update where he served as Utilities Lead.**

RELEVANT EXPERIENCE

- *Contra Costa Water District, Treated Water Rehabilitation and Replacement Plan*
- *City of San Diego, Point Loma Wastewater Treatment Plant Facilities Condition Assessment and CIP*
- *City of San Diego, Recycled Water System Condition Assessment and Optimization Plan*
- *Orange County Sanitation District, Asset Management Plan Update*



ERIC PACKER, EIT DATA MANAGEMENT/ BUSINESS INTELLIGENCE

Eric is a business intelligence engineer and deputy-lead of HDR's national Power BI technology group. Eric's education background bridges mechanical engineering and data science, and his professional focus is on applying next-generation technology solutions to support data-driven engineering management decisions. Eric supports utility management projects throughout the country, and has developed custom data analysis solutions for clients in Washington, Idaho, New York, Texas, Tennessee, North Carolina, Nevada, and Alaska in the past year. **Eric developed Asset Management Business Intelligence Tools for Alderwood Wastewater Treatment Plant and will be leading development of business intelligence tools on this project.**

RELEVANT EXPERIENCE

- *City of Homer, Asset Management Plan*
- *City of Angleton, WWTP and Lift Station Assessment*
- *AWWU, ERWWTF Asset Management Plan*
- *Johnson County Wastewater, Integrated Plan Delivery*
- *Galveston County, WWTP Conditions Assessment*



C

EXPERIENCE

C. EXPERIENCE

Our team has worked on several similar projects to yours. The following projects below represent successful partnerships with our clients - providing cost-saving solutions, reaching performance goals, and creating programs that are right-sized for each client.



2021 Treated Water Master Plan

CONTRA COSTA WATER DISTRICT

HDR is developing a comprehensive, integrated water master plan that identifies capital improvements needed to meet current demands and expand the distribution system to accommodate future growth. The treated water distribution system consists of approximately 820 miles of pipeline, 40 water storage reservoirs with a total treated water storage capacity of approximately 72 million gallons, 31 pumping stations, and eight pressure zones. HDR updated water demand projects for existing and buildout conditions, updated the hydraulic model, and identified and developed capital improvements needed to address system deficiencies for existing, intermediate, and buildout conditions. The District desired to develop a proactive planning roadmap for its future, building on the diligent planning and sustainable maintenance programs already being implemented to deliver an uninterrupted supply of water to customers in an economically efficient and environmentally responsible manner. The master plan update provided an opportunity to evaluate existing and future conditions and identify potential responses for operational improvement and capital investment, as well as updating District planning tools for both current and ongoing decision making. HDR's team developed an effective Treated Water Master Plan for the District that provided the right balance to consider replacing aging infrastructure, as well as verifying reliability and increasing capacity in order to meet growth and development.

The master plan integrated evaluations and recommendations from the District Treated Water Pipeline Renewal and Replacement Study, which developed a sustainable, data-driven program for pipeline renewal and replacement that could be improved over time as better data are developed and analyses are refined. Guidelines and procedures were developed during this project that were integrated with the District's existing processes to provide a sustainable solution.

HDR developed a sustainable, 10-year pipeline renewal/replacement plan that provided the District with the ability to consistently make key capital-funding decisions for pipeline replacement. The approach developed pipeline risk factors (condition, likelihood of failure, and consequence of failure) to more effectively assess remaining useful life, calculate risk, and prioritize pipeline replacement.

Control of Costs: HDR is completing the project within budget. Project costs and metrics were tracked internally and reported monthly in client progress summaries.
Quality of Work: HDR has a strong working relationship with Client and continues to provide support services and evaluations on the Client systems. HDR selection for ongoing work is due to the quality of the project team and the work products delivered to the Client.
Ability to Meet Schedule: HDR is on target to meet all project deadlines. Schedules and milestones have been reviewed and coordinated with Client throughout the project duration.

CLIENT REFERENCE
Jill Mosley, Senior Engineer;
Contra Costa Water District, Contra Costa, CA
P: 925.688.8127
E: jmosley@ccwater.com

DATES
2020 - Ongoing

CONTRACT VALUE
$280K

The Treated Water Master Plan successfully executed a basis of planning approach, using early workshops to identify water supply boundaries, criteria, and level of service goals, which informed the analysis and evaluations of subsequent tasks.

Point Loma Wastewater Treatment Plant Facilities Condition Assessment and CIP

CITY OF SAN DIEGO

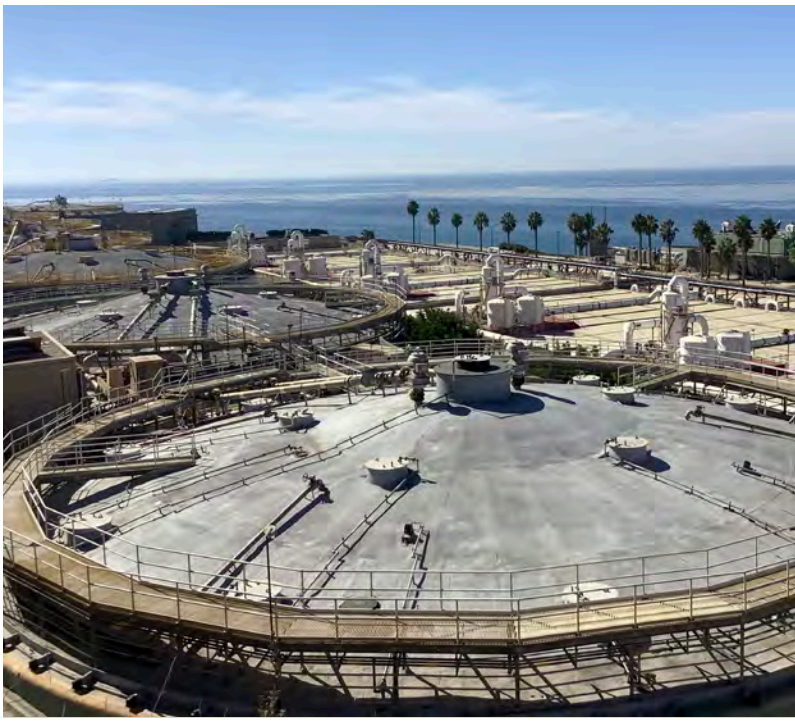
HDR completed a comprehensive system based, plant wide condition assessment of all liquid and solids process areas at the Point Loma Wastewater Treatment Plant (PLWTP) including the Gas Utilization Facility. PLWTP is the City of San Diego's largest wastewater treatment facility and has been operated since 1963 with several upgrades and modifications over the years. The last major upgrade occurred in the late 1990s under the Clean Water Program. PLWTP has a design capacity of 240 million gallons per day (mgd), a peak wet weather capacity of 432 mgd, and it treats an average flow of about 139 mgd.

The objective of this project included reducing maintenance efforts and running PLWTP more efficiently by:

- Assessing condition of structural, mechanical, and electrical components of assets within each process area
- Making recommendations for repair and rehabilitation
- Identifying upgrades and replacements
- Prioritizing improvements and presenting a preliminary schedule

HDR has conducted visual inspections and non-destructive tests to assess physical condition and functional characteristics of equipment and structures related to each process. HDR developed customized criteria specific assessment forms to inspect each asset within a process area. The assessment forms were developed for structural, mechanical and electrical components of each asset. ArcGIS's cloud-based Survey 123 platform was used to gather the inspection data.

HDR performed visual assessments of all 80+ asset classes at the Point Loma WTP using objective and consistent criteria; assessed asset risks and remaining useful life; and displayed the results using Power BI business intelligence tools. Our results identified a 10-year capital improvements and operations plan, allowing the City to budget and plan without interruption to service.



We developed a risk assessment framework to analyze the likelihood of failure and consequence of failure. This led to the development of a risk assessment strategy with a targeted timeframe to address each risk category.

We analyzed data collected during field inspection efforts and developed recommendations on projects for repair, rehabilitation, and replacement. The projects are categorized as activities that can be performed with City crews and as capital projects that require budgeting and scheduling. Costs were developed using a Class 5 cost estimate format. The final condition assessment report summarized the findings and recommendations.

Control of Costs: HDR completed the work on budget, including the increases the City added to cover additional scope items requested by the Client.

Quality of Work: HDR performed QC on the asset data, reports and cost estimates that allowed the City to clearly present options to stakeholders.

Ability to Meet Schedule: *All work and deliverables were provided on the mutually adjusted timeline that the parties adapted to perform field assessments during the height of the pandemic.*

CLIENT REFERENCE
Yazmin Morlan, Project Manager;
City of San Diego, CA
P: 619.432.9785
E: YMorlan@sandiego.gov

DATES
2019 - 2022

CONTRACT VALUE
$1.58M

Facility Asset Management Plan

JOHNSON COUNTY WASTEWATER (JCW)

HDR is providing implementation support for Johnson County Wastewater's Facility Asset Management Program. This program is focused on the improved usage of data and best practices to drive asset management decisions for pump station and treatment plant assets. This is enabling JCW to improve confidence in planning and delivery of renewal and improvement projects, operation and maintenance programs, and forecasting the corresponding CIP and O&M budgets needed to sustain a high level of service.

This program began with the assessment of JCW's current practices and identification of over 80 opportunities for improvement by the team and JCW. HDR facilitated a series of workshops to refine, prioritize and organize a multi-year implementation plan to improve asset management using a continual improvement approach.

HDR has focused on implementing near-term improvements to provide immediate benefits to JCW. This includes refining JCW's Asset Hierarchy within the Lucity CMMS. Early implementation efforts also focused on developing JCW's condition assessment program. HDR supported JCW with developing asset class inspection and scoring criteria to support consistent data collection. HDR and JCW staff conducted pilot inspections to test the inspection process leading to improvements in inspection criteria selection and increases in data collection efficiency. HDR also supported JCW with implementing risk assessment within wastewater facilities at the facility, process and asset levels. HDR also worked with JCW staff to develop asset onboarding protocol with a web-based portal to coordinate efforts between construction projects and maintenance activities to align asset data management with the program goals. These initial improvements to the condition assessment program, risk assessment and asset hierarchy have served as fundamental building blocks to help JCW achieve their long-term program goals.

Control of Costs: HDR has consistently completed project scope and achieved project goals on the Facility Asset Management Program within the authorized project budget. At the same time, HDR has continuously finds cost savings for O&M and capital projects.

Quality of Work: Client continues to expand scope and re-select HDR because of our quality performance.

Ability to Meet Schedule: Routinely meet interim and final milestones.

CLIENT REFERENCE
Aaron Witt, Chief Engineer; Johnson County Wastewater, Johnson County, KS
P: 913.715.8546
E: Aaron.Witt@jcw.org

DATES
2016 - Ongoing

CONTRACT VALUE
$835K



HDR is providing wide array to technical support to JCW to implement the Facility Asset Management Program ranging from asset management professionals, business analysts, condition assessment specialists, and information technology experts. HDR is bringing the right resources to the team to drive project success and to deliver results efficiently and with high quality. One example is the development of the condition assessment program, which required asset management professionals to reengineer the condition and risk assessment business processes, condition assessment specialists to work with JCW maintenance staff to refine assessment criteria and data collection forms, and information technology expertise to configure data collection devices and changes to JCW's Lucity maintenance management system to store the new data.



Tank Rehabilitation Master Plan

LONG BEACH WATER DEPARTMENT (LBWD)

The Long Beach Water Department owns 36 steel water tanks located at two tank farms: the Alamitos Reservoir complex and the J. Will Johnson Reservoir complex. The Alamitos Reservoir complex contains 21 potable water tanks and 3 recycled water tanks. J. Will Johnson Reservoir complex contains 12 potable water tanks. HDR provided engineering services for assessment and evaluation of existing interior coating, corrosion, cathodic protection, structural integrity, and seismic safety at all 36 water tanks.

Services included field investigations and developing and engineering report (Master Plan) detailing the findings of each tanks condition assessment, including existing interior coating and its estimated remaining useful life, sufficiency of current cathodic protection system, seismic risk for the tanks structure, and piping and appurtenances.

The Master Plan provides recommendations for rehabilitating each tank focusing on deficient items that may impact tank structural integrity, a tank rehabilitation schedule by priority, and the interim potential remedial methods to protect the current shell coating.

HDR also supported Long Beach Water Department with converting Alamitos Tank 19 and Tank 20 from potable water to recycled water and designed a new pump station, including all of the associated mechanical, electrical and instrumentation infrastructure.

Control of Costs: HDR completed all tasks under budget.
Quality of Work: HDR's approach and results focused the client on priorities.
Ability to Meet Schedule: All tasks were completed on schedule.

CLIENT REFERENCE
Danna Monzon, Project Manager;
Long Beach Water Department, Long Beach, CA
P: 562.570.2325
E: Danna.Monzon@lbwater.org

DATES
2019 - 2021

CONTRACT VALUE
$321K

HDR provided a consistent and comprehensive assessment of 36 reservoirs to prioritize the improvements over 15 years, allowing the City to make the needed investments at the right time.



Recycled Water Condition Assessment & Optimization Plan

CITY OF SAN DIEGO

HDR completed the San Diego Recycled Water Condition Assessment and Optimization Plan in 2020. We performed a market assessment for expansion of the non-potable system, hydraulic modeling and optimization of the distribution system operations, condition assessment of the 20 year old infrastructure, prioritization of asset improvements, conducted life cycle analyses, prepared business case evaluations for recommended projects, and developed a CIP schedule.

Using data from the City's EPANET hydraulic model we developed a criticality analysis of pipelines and valves, which informed consequence of condition assessment, rehabilitation and replacement projects. Through extensive field work and a desktop risk and performance analyses, we worked closely with City staff to identify pipeline, pump station, reservoir, chlorination facility and valve deficiencies to develop solutions that minimized risk and streamlined operations.

A final Recycled Water Master Plan and Condition Assessment report included several memoranda including SCADA, condition assessment and O&M manuals. Because of the excellent work we accomplished in doing condition assessment work for the recycled water system, we were asked to present a 4-day workshop to 40 of the City's potable water operations staff. The HDR team developed curricula for pipeline, pump station, valves and reservoirs assessment and attendees were awarded continuing education credits.

Control of Costs: HDR completed the project within budget.

Quality of Work: Client's satisfaction with primary scope items initiated additional tasks and emergency assistance by HDR.

Ability to Meet Schedule: HDR met all project deadlines.

CLIENT REFERENCE
Hooman Partow, Recycled & Potable Water Program Manager;
City of San Diego, CA
P: 619.533.7577
E: hpartow@sandiego.gov

DATES
2018 - 2021

CONTRACT VALUE
$1.68M

In collaboration with City staff, HDR developed a transparent assessment process, providing the basis of a 20-year CIP and Operations Master Plan, and equipped staff with the tools and training to continue the assessment process into the future.



Carlsbad Water, Wastewater and Recycled Water Master Plan

CITY OF CARLSBAD

HDR prepared Potable Water, Recycled Water and Sewer Master Plan Updates for the City of Carlsbad to identify needed improvements for existing and future conditions and development of a capital improvement plan to address deficiencies. To ensure consistency among the data analyzed, assumptions made, HDR took a basis of planning approach, so that the master plan documents are compatible, reliable, and defendable.

Over the past decade, the economic recession, combined with a multi-year drought, resulted in significantly reduced water and recycled water demands and sewer flows, and consequentially reduced revenues to Carlsbad. As the economy rebounds and extreme drought conditions recede, there is also a need to adjust the current plans to correspond with the new General Plan, to reflect a "new normal" in water use behaviors, and to incorporate new opportunities for supplies. By updating these three master plans, the resulting capital improvement programs will help guide Carlsbad in spending precious funds in the most cost-effective manner.

As part of this effort, HDR created a new water demand forecasting tool to help Carlsbad assess variables associated with water demand projections. The demand forecasting model developed for this Master Plan update incorporated the following elements:

- Spatial correlation of water demands at the parcel/TAZ level
- Alignment with SANDAG TAZ data, City's land use databases, general plan and other planning resources
- Integration with other platforms: hydraulic models/GIS DB/AM
- User friendly graphic and model interface dashboards
- Incorporation of potential water conservation savings into demand projections
- Bookend Forecasting for low, medium, and high ranges
- Scenario-based forecasting
- What-ifs and sensitivity analysis

Control of Costs: HDR completed the project within budget. Project costs and metrics were tracked internally and reported monthly in client progress summaries.

Quality of Work: Client continues to re-select HDR for ongoing services due to the quality of work performed and value of knowledge delivered.

Ability to Meet Schedule: *HDR met all project deadlines due to coordination with Client throughout the project duration.*

CLIENT REFERENCE
Stephanie Harrison, Asset Manager;
City of Carlsbad, CA
P: 760.603.7356
E: Stephanie.Harrison@carlsbadca.gov

DATES
2017 - 2021

CONTRACT VALUE
$1.12M

To prioritize operational and capital efforts, HDR used a performance based approach to evaluate the Carlsbad Water Facilities and produced a 10-year outlook that saves the City $13M per year.



AWIA Risk & Resilience and Emergency Response Planning Support

BURBANK WATER & POWER

Following the seven-step J100-10 process, as detailed by the American Water Works Association, HDR led a series of workshops to identify BWP's critical assets and determine their vulnerability to likely threats from both malevolent acts and natural hazards. HDR developed and used an Excel-based tool facilitate the process and document the J100-10 requirements. The process also included evaluating cyber systems, financial systems, and chemical storage for vulnerabilities. Using this information, we evaluated the consequences and risks of failure to develop mitigation measures.

HDR also assisted BWP with updating its Emergency Response Plan and conducted training of staff on using the ERP and responding to emergencies. The HDR team worked closely with BWP staff to develop the ERP and customize the operational requirements of BWP. Our innovative approach to ERP planning allows BWP staff to quickly transition into emergency response positions from their day-to-day roles.

Based on these collaborative efforts, BWP properly and timely certified compliance with the strict deadlines established by law.

Control of Costs: HDR provided monthly updates on the budget and percent spent, which allowed the client to track that the project costs were staying within budget.

Quality of Work: The HDR team provided high quality, detailed documents that the Client used to document next steps and garner approval for projects.

Ability to Meet Schedule: The project had regulatory deadlines and HDR beat these deadlines, helping the client to avoid penalty charges.

CLIENT REFERENCE
Asif Sheikh, Principal Civil Engineer;
City of Burbank Water and Power, CA
P: 818.238.3500
E: ASheikh@burbankca.gov

DATES
2019 - 2020

CONTRACT VALUE
$225K

Working closely with City staff, we identified and focused on critical assets to maximize return on investment and improve the overall resiliency of the system.

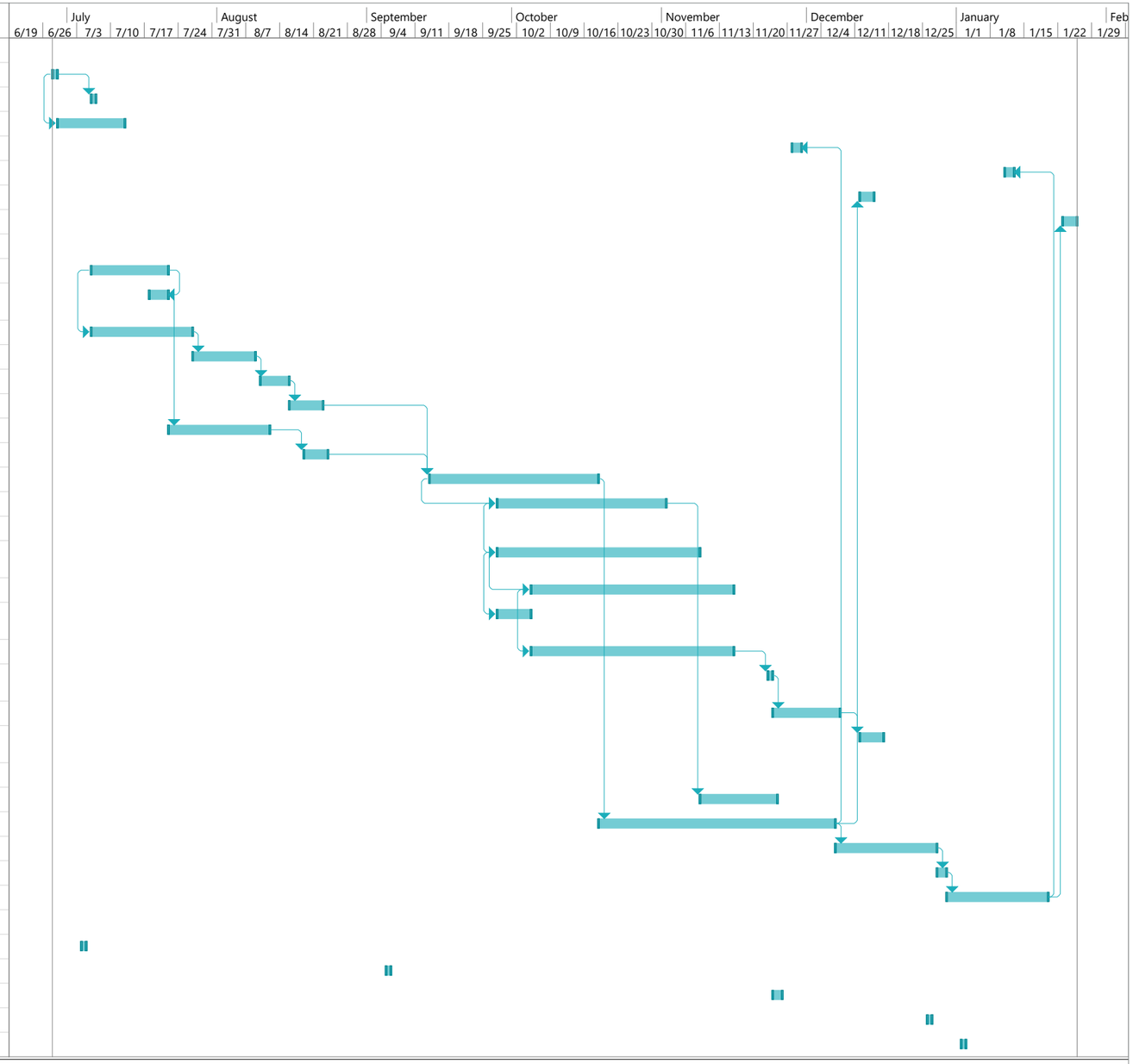


D

SCHEDULE

D. SCHEDULE

ID	Task	Task Name	Start	Finish
1	**1**	**Project Management**		
2		NTP	Tue 6/28/22	Tue 6/28/22
3	1.1	Kickoff Meeting	Wed 7/6/22	Wed 7/6/22
4	1.2	Project Management Plan	Wed 6/29/22	Tue 7/12/22
5	1.5a	Draft Report QA/QC	Mon 11/28/22	Tue 11/29/22
6	1.5b	Final Report QA/QC	Wed 1/11/23	Thu 1/12/23
7	1.6	Present Draft Condition Assessment	Mon 12/12/22	Wed 12/14/22
8	1.7	Present Final Condition Assessment	Mon 1/23/23	Wed 1/25/23
9	**2**	**Condition Assessment**		
10	2.1	Request, Compile & Review Data	Wed 7/6/22	Thu 7/21/22
11	2.2	Meeting – Review Assessment Approach and Preview Assessment Criteria	Mon 7/18/22	Thu 7/21/22
12	2.3	Develop Draft Assessment Criteria and Guidelines	Wed 7/6/22	Tue 7/26/22
13	2.4	Configure Draft Criteria into Survey123 Data Collection Forms	Wed 7/27/22	Mon 8/8/22
14	2.5	Workshop – Review Assessment Criteria and Data Collection Forms	Wed 8/10/22	Mon 8/15/22
15	2.6	Finalize Assessment Criteria and Configure into Survey123	Tue 8/16/22	Mon 8/22/22
16	2.7	Field Inspection Workplan	Fri 7/22/22	Thu 8/11/22
17	2.8	Meeting – Pre-Assessment Orientation	Fri 8/19/22	Tue 8/23/22
18	2.9	Conduct Assessment Field Data Collection	Wed 9/14/22	Tue 10/18/22
19	2.10	Determine Likelihood of Failure and Remaining Useful Life	Wed 9/28/22	Tue 11/1/22
20	**3**	**Capital Project Packaging and Prioritization**		
21	3.1	Identify Remediation Actions Designed to Reduce Asset Likelihood of Failure	Wed 9/28/22	Tue 11/8/22
22	3.2	Analyze Remediation Action Alternatives for Capital Assets	Wed 10/5/22	Tue 11/15/22
23	3.3	Meeting – Discuss Project Delivery Mechanisms, Funding and Philosophy	Wed 9/28/22	Tue 10/4/22
24	3.4	Combine Asset-Level Remediation Actions into Project Packages	Wed 10/5/22	Tue 11/15/22
25	3.5	Workshop – Review Project Packages with Alternatives and Select Preferred Alternative	Wed 11/23/22	Wed 11/23/22
26	3.6	Prioritize Repair and Rehabilitation Project Packages	Thu 11/24/22	Wed 12/7/22
27	3.7	Meeting – Review Prioritized Repair and Rehabilitation Project Packages	Mon 12/12/22	Fri 12/16/22
28	**4**	**Final Report and Deliverables**		
29	4.1	Generate Asset-Level Condition Assessment Reports	Wed 11/9/22	Thu 11/24/22
30	4.2	Develop Draft Condition Assessment Report	Wed 10/19/22	Tue 12/6/22
31		IRWD Review - Draft Condition Assessment Report	Wed 12/7/22	Tue 12/27/22
32	4.3	Meeting – Review Draft Condition Assessment Report Comments	Wed 12/28/22	Thu 12/29/22
33	4.4	Finalize and Deliver Condition Assessment Report	Fri 12/30/22	Thu 1/19/23
34		**Holidays**		
35		Independence Day	Mon 7/4/22	Mon 7/4/22
36		Labor Day	Mon 9/5/22	Mon 9/5/22
37		Thanksgiving	Thu 11/24/22	Fri 11/25/22
38		Christmas	Mon 12/26/22	Mon 12/26/22
39		New Year's	Mon 1/2/23	Mon 1/2/23



Project: IRWD_PS&TankCA_v1.m
Date: Wed 5/11/22

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



E

BUDGET



E. BUDGET

FEE ENCLOSED SEPARATELY

One copy of the budget proposal, including fee schedules and breakdown of the fee by task, is submitted separately in a sealed envelope per the RFP.



F

JOINT VENTURE



F. JOINT VENTURE

HDR is submitting as the prime consultant and not as a joint venture.

We will not be utilizing any subconsultants on this project.



G

CONFLICT OF INTEREST

G. CONFLICT OF INTEREST

We know there is potential for a conflict of interest when a firm works with a number of clients. And because we work with a lot of public agencies, the possibility of working with two agencies simultaneously that have conflicting interests does exist.

We are not aware of any projects or relationships that would cause a conflict-of-interest on this project. We have a strong set of protocols and guidelines in place to handle possible conflicts of interest. The following four points are keys to our Policy for Conflict of Interest Resolution:

EDUCATION

We educate employees on the principles of conflict-of-interest prevention. Employees are provided with a written policy outlining Engineering Business without Conflict.

DISCLOSURE

We fully disclose to each client any relationships, contracts, or teaming agreements that might present a conflict of interest or provide an unfair business advantage. Each person working on a project is responsible to disclose any circumstances that could present a conflict of interest.

DELINEATION

We structure teams and assign personnel in ways that avoid inappropriate sharing or crossover of confidential or sensitive information. When necessary due to project circumstances, individuals who are positioned on teams where information-sharing would present a conflict are reassigned to maintain clear separation between project teams.

DOCUMENTATION

We require formal commitment from our personnel with regard to avoiding conflict of interest. When necessary due to project circumstances, we require employees to sign a "Firewall Agreement Form" tailored to the client/project in question to formalize their commitment to maintaining separation between internal teams and/or sources of information that could give rise to a conflict of interest or unfair business advantage.

It is our understanding that HDR does not have any existing conflicts of interest prohibited by law to submit for the Pump Stations and Tanks Condition Assessment Replacement and Rehabilitation Study.







H

CONTRACT



H. CONTRACT

We have no modifications to the standard terms and conditions.



I

INSURANCE

I. INSURANCE

ACORD®

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 06/16/2021

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Willis Towers Watson Midwest, Inc. c/o 26 Century Blvd P.O. Box 305191 Nashville, TN 372305191 USA	CONTACT NAME: Willis Towers Watson Certificate Center PHONE (A/C, No, Ext): 1-877-945-7378 FAX (A/C, No): 1-888-467-2378 E-MAIL ADDRESS: certificates@willis.com
INSURED HDR Engineering, Inc. 1917 South 67th Street Omaha, NE 68106	INSURER A : Liberty Mutual Fire Insurance Company 23035 INSURER B : Ohio Casualty Insurance Company 24074 INSURER C : Liberty Insurance Corporation 42404 INSURER D : INSURER E : INSURER F :

COVERAGES **CERTIFICATE NUMBER:** W21262337 **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY CLAIMS-MADE X OCCUR X Contractual Liability X Deductible: $100,000 GEN'L AGGREGATE LIMIT APPLIES PER: POLICY X PRO-JECT X LOC OTHER:	Y	Y	TB2-641-444950-031	06/01/2021	06/01/2022	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$ 2,000,000 $ 1,000,000 $ 10,000 $ 2,000,000 $ 4,000,000 $ 4,000,000
A	AUTOMOBILE LIABILITY X ANY AUTO OWNED AUTOS ONLY HIRED AUTOS ONLY SCHEDULED AUTOS NON-OWNED AUTOS ONLY X Comp/Coll X Ded. $1,000	Y	Y	AS2-641-444950-041	06/01/2021	06/01/2022	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$ 2,000,000 $ $ $
B	UMBRELLA LIAB X OCCUR X EXCESS LIAB CLAIMS-MADE DED X RETENTION $ 0	Y	Y	EUO(22)57919363	06/01/2021	06/01/2022	EACH OCCURRENCE AGGREGATE	$ 10,000,000 $ 10,000,000
C	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANYPROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? Y/N No (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	N/A	Y	WA7-64D-444950-011	06/01/2021	06/01/2022	X PER STATUTE OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	$ 1,000,000 $ 1,000,000 $ 1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

Workers Compensation Deductible - $250,000

Certificate Holder is named as Additional Insured on General Liability, Automobile Liability and Umbrella/Excess Liability on a Primary, Non-contributory basis where required by written contract. Waiver of Subrogation applies on General Liability, Automobile Liability, Umbrella/Excess Liability and Workers Compensation where required by written contract. Umbrella/Excess policy is Follows Form over General Liability, Auto Liability and Employers Liability.

CERTIFICATE HOLDER

Sample

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Alicia J. Pavelko

© 1988-2016 ACORD CORPORATION. All rights reserved.

The ACORD name and logo are registered marks of ACORD

SR ID: 21227135 BATCH: 2132293



J

PUBLIC WORK REQUIREMENT

J. PUBLIC WORK REQUIREMENT



State of California
Department of Industrial Relations

(https://[illegible]r.ca.gov/)

Contractor Information

Legal Entity Name
HDR ENGINEERING, INC.
Legal Entity Type
Corporation
Status
Active
Registration Number
1000018262
Registration effective date
07/01/21
Registration expiration date
06/30/22
Mailing Address
3230 EL CAMINO REAL, SUITE 200 IRVINE 92602 CA United States of America
Physical Address
3230 EL CAMINO REAL, SUITE 200 IRVINE 92602 CA United States of America
Email Address
jennifer.freidin@hdrinc.com
Trade Name/DBA
License Number (s)
Other:1279161

Registration History

Effective Date	Expiration Date
06/14/18	06/30/19
06/19/17	06/30/18
06/30/16	06/30/17
07/07/15	06/30/16
04/06/15	06/30/15
07/01/19	06/30/20
07/01/20	06/30/21
07/01/21	06/30/22

Legal Entity Information

Corporation Entity Number: C0168406
Federal Employment Identification Number: 470680568
President Name: CHARLES OREILLY
Vice President Name:
Treasurer Name:
Secretary Name:
CEO Name: ERIC KEEN

Agency for Service:
Agent of Service Name: C T CORPORATION SYSTEM
Agent of Service Mailing Address: 1917 S. 67TH STREET OMAHA 68106 NE United States of America

Worker's Compensation

Do you lease employees through Professional Employer Organization (PEO)?: No
Please provide your current worker's compensation insurance information below:

	PEO	PEO	PEO
PEO Information	Name	Phone	Email

Insured by Carrier
Policy Holder Name: HDR ENGINEERING, INC.
Insurance Carrier: LIBERTY INSURANCE CORPORATION
Policy Number: WA7-64D-444950-011
Inception date: 06/01/21
Expiration Date: 06/01/22

June 21, 2022
Prepared by: H. Cho / J. Moeder
Submitted by: K. Burton
Approved by: Paul A. Cook

ENGINEERING AND OPERATIONS COMMITTEE

FLEMING ZONE 8 RESERVOIR AND ZONE 8 TO 9 PUMP STATION
CONSULTANT SELECTION

SUMMARY:

The Fleming Zone 8 Reservoir and Zone 8 to 9 Pump Station project includes removing the existing steel tank and pump station and replacing it with a new prestressed concrete tank, pump station, reservoir management system, and related facilities. Tetra Tech completed the design, and the project is currently being advertised for bids. Staff recommends the Board authorize the General Manager to execute a Professional Services Agreement in the amount of $330,000 with Tetra Tech to provide engineering services during construction.

BACKGROUND:

IRWD provides potable water supply service to approximately 2,500 customers in the Santiago area located in an unincorporated region of Orange County. This area is east of the Eastern Transportation Corridor (SR-241), north of Lomas Ridge, and west of Portola Hills and includes four distinct sub-areas including Santiago Canyon, Silverado Canyon, Williams Canyon, and Modjeska Canyon. Each canyon area contains a system of domestic water tanks and pump stations that relies on the existing 150,000-gallon steel Fleming Zone 8 tank and the existing Zone 8 to 9 booster pump station as the main source of supply. The facilities are located near the intersection of Santiago Canyon Road and Black Star Canyon Road as shown on Exhibit "A".

In 2017, IRWD completed the Santiago Area Distribution System Analysis, which included several recommended improvements for undersized infrastructure and requirements for additional storage in the Santiago Area. The study recommended increasing the storage capacity to 1.3 million gallons (MG) to meet the storage requirements for the area.

Fleming Zone 8 Reservoir and Zone 8 to 9 Pump Station Project Update:

In December 2019, Tetra Tech was retained to design a new 1.3 MG storage tank, a reservoir management system building with sodium hypochlorite and ammonia storage and feed systems, replacement of the emergency generator, and replacement of the existing pump station, which has reached the end of its service life. The project also includes a new office space that can be used as an emergency operations center for emergencies in the canyon area, a new storage building for emergency equipment and supplies, and various site electrical, telemetry, and control improvements.

Tetra Tech completed the design in May 2022, and the project went out to construction bid. The bid opening is scheduled for June 30, 2022, and the construction award is scheduled for the July 11, 2022 Board meeting.

Consultant Selection:

Staff requested Tetra Tech to submit a proposal for construction phase engineering services, and Tetra Tech submitted a proposal in the amount of $330,000. The proposal, which is provided as Exhibit "B", includes scope for submittal reviews, responses to contractor requests for information, site visits, record drawing preparation, development of energy control procedures, and construction coordination and engineering support commensurate with the requirements of the project. The engineer's estimate for the Fleming Zone 8 Reservoir and Zone 8 to 9 Pump Station project is $13,000,000.

Staff reviewed the proposal and recommends the Board authorize the General Manager to execute a Professional Services Agreement in the amount of $330,000 with Tetra Tech for the construction phase engineering services for the Fleming Zone 8 Reservoir and Zone 8 to 9 Pump Station.

FISCAL IMPACTS:

The Fleming Zone 8 Reservoir and Zone 8 to 9 Pump Station, Project 10101, is included in the FY 2021-22 Capital Budget and is funded through 89.5% existing customers (Improvement District 1110) and 10.5% replacement funds (Improvement District 1100). The existing budgets are sufficient to fund the recommendations presented herein.

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 14, 2021. Pursuant to State Guideline § 15073, the IS/MND was made available for public review for a period of 30 days from June 14, 2021, through July 13, 2021. The IS/MND was adopted by IRWD's Board of Directors on September 13, 2021. A Notice of Determination was filed with the Orange County Clerk/Recorder and the CA State Clearinghouse on September 14, 2021.

RECOMMENDATION:

That the Board authorize the General Manager to execute a Professional Services Agreement with Tetra Tech in the amount of $330,000 for construction phase engineering services for the Fleming Zone 8 Reservoir and Zone 8 to 9 Pump Station, Project 10101.

LIST OF EXHIBITS:

Exhibit "A" – Location Map
Exhibit "B" – Tetra Tech Scope of Work and Fee Proposal



LOCATION MAP - FLEMING RESERVOIR AND PUMP STATION

1 inch = 100 feet

Note: This page is intentionally left blank.

TETRA TECH

May 26, 2022

Transmitted via E-mail: *cho@irwd.com*

Mr. Harry Cho, P.E., Senior Engineer Dams & Storage
Irvine Ranch Water District
15600 Sand Canyon Avenue
Irvine, CA 92618

Reference: Proposal to Provide Construction Support Services for the 1.3 MG Fleming Zone 8 Reservoir and Zone 8 to 9 Pump Station, Project No. 10101

Dear Mr. Cho:

Tetra Tech has been working with the District on the 1.3 MG Fleming Zone 8 Reservoir and the Zone 8 to 9 Pump Station since December 2019. Tetra Tech has submitted the final signed plans and specifications. The District has requested Tetra Tech to provide construction support services for the project. By this correspondence, Tetra Tech is requesting approval of this proposal to provide construction support services for the 1.3 MG Fleming Zone 8 Reservoir and Zone 8 to 9 Pump Station project.

CONSTRUCTION SUPPORT SERVICES

The construction support services depend greatly on the Contractor's construction schedule, the adequacy of his submittals, and the amount of issues/conflicts that arise during the construction of the project. Tetra Tech does not control the amount of the submittals, RFIs or the issues that arise during the construction process. In addition, Tetra Tech does not control the adequacy of the submittals prepared by the Contractor or the level of additional information required by the Contractor. Based on the Contract Documents, the time for completion shall be within 730 calendar days (about 24 months) from the date of the Notice of Award.

In summary, Tetra Tech will perform these construction support services on a time and material basis while not exceeding the approved budget.

The following is a summary of the anticipated level of service for each task:

Task 1 – Project Management
Tetra Tech will include preparation of monthly invoices and invoice backup spreadsheets. We are assuming a duration of twenty-four (24) months.

Task 2 – Project Meetings
Tetra Tech will attend up to thirty (30) construction progress meetings of two (2) hours each during the construction duration.

Task 3 – Contractor's Request for Information (RFI)
Tetra Tech will respond up to eighty (80) Request for Information (RFI). We have assumed that ten (15) of these responses will require a corresponding sketch or exhibit.

Task 4 – Minor Plan Revisions
Tetra Tech will provide up to one hundred and fifty (150) hours of staff time for minor plan revisions to the construction drawings.

Tetra Tech, Inc.
17885 Von Karman Avenue, Suite 500, Irvine, CA 92614-6213
Tel 949.809.5000 Fax 949.809.5010 www.tetratech.com

Task 5 – Site Visits
Tetra Tech will conduct up to twenty (20) site visits of two (2) hours each as needed during construction.

Task 6 – Shop Drawing Submittals
Tetra Tech will review and respond up to three hundred (300) shop drawing submittals, including resubmittals. Based on the plans and specifications, we have estimated up to 220 shop drawings submittals with 80 resubmittals.

Task 7 – Energy Control Procedures
Tetra Tech will prepare Energy Control Procedures (ECP's) in accordance with California Occupational Safety and Health (Cal/OSHA) requirements for all equipment and operations that may store potential energy. Based on preliminary review, we anticipate more than 30 pieces of equipment will require preparation of ECP. Tetra Tech will include a budget of $40,000 for preparing the ECP's.

Task 8 – Record Drawings
Tetra Tech will prepare record drawings at the construction completion using Contractor's and District Inspector's red-lines. Tetra Tech will submit final record drawings including AutoCAD electronic files, and a single-color PDF electronic file of the entire signed plan set.

Task 9 – Additional Construction Coordination
Tetra Tech will provide additional construction coordination (labor/time spent in addition to responses to RFIs, review of submittals, and other task items listed above) and general engineering support to the District. This task will include: answering general IRWD/Contractor/County of Orange inquiries; coordination with IRWD, Contractor, County of Orange; coordination with and responding to inquiries from SCE, County of Orange, ATT, etc.; and general engineering support as requested by the District.

BUDGET

Tetra Tech will perform the above services on a Time and Material Basis and will provide status summaries to the District each month. The following is our requested budget for the Construction Support Services:

Task 1 – Project Management (24 months)	$ 6,100
Task 2 – Project Meetings (30)	$ 11,300
Task 3 – Contractor's Request for Information (80/15)	$ 36,200
Task 4 – Minor Plan Revisions (150 hours)	$ 18,000
Task 5 – Site Visits (20)	$ 7,900
Task 6 – Shop Drawing Submittals (220 & 80)	$ 138,800
Task 7 – Energy Control Procedures	$ 40,000
Task 8 – Record Drawings	$ 21,700
Task 9 – Additional Construction Coordination	$ 50,000
Hourly but Not-to-Exceed Budget	**$ 330,000**

The following page provides our person-hour estimate per task for this work. We have also included our proposed Hourly Rate Schedule.

Tetra Tech is pleased to submit this proposal to provide the above scope of services for a not-to-exceed fee amount of **$330,000**. It is our understanding that this work will be performed under a new Agreement for Professional Services including the corresponding new purchase order.

If you have any questions or require additional information, please do not hesitate to call.

Sincerely,

Mark Bush, P.E.
Vice President

P\200-09368-20001\ProjMgmt\Correspondence\Fleming Construction Support Services.doc

Attachments

Irvine Ranch Water District
1.3 MG Fleming Zone 8 Reservoir and Zone 8 to 9 Pump Station
Construction Phase Services
Fee Proposal

Task Description	Senior Project Manager	Project Engineer	Design Engineer	CADD	WP	Total Hours	Fees: Labor	Fees: Sub-Contractors Re-imbursables	TOTALS
Construction Support Services									
Project Management (24 months)	20	0	0	0	0	20	$6,100	$0	$6,100
Project Meetings (30)	10	50	0	0	0	60	$11,300	$0	$11,300
Request for Information (80/15)	8	160	30	30	0	228	$36,190	$10	$36,200
Minor Plan Revisions (150 hours)	0	10	16	124	0	150	$17,990	$10	$18,000
Site Visits (20)	8	32	0	0	0	40	$7,720	$180	$7,900
Shop Drawing Submittals (220/80)	30	480	300	90	8	908	$138,660	$140	$138,800
Energy Control Procedures	30	90	112	0	12	244	$40,000	$0	$40,000
Record Drawings	0	4	16	160	2	182	$21,380	$320	$21,700
Additional Construction Coordination	30	172	70	18	10	300	$49,900	$100	$50,000
Budget Request	136	998	544	422	32	2132	$329,240	$760	$330,000
TOTAL	**136**	**998**	**544**	**422**	**32**	**2132**	**$329,240**	**$760**	**$330,000**

TETRA TECH

2022
HOURLY CHARGE RATE AND EXPENSE REIMBURSEMENT SCHEDULE

Project Management	
Project Manager 1	$220.00
Project Manager 2	$270.00
Sr Project Manager	$305.00
Program Manager	$340.00
Principal in Charge	$340.00
Engineers	
Engineering Technician	$37.00
Engineer 1	$100.00
Engineer 2	$115.00
Engineer 3	$130.00
Project Engineer 1	$150.00
Project Coordinator	$165.00
Project Engineer 2	$165.00
Sr Engineer 1	$175.00
Sr Engineer 2	$185.00
Sr Engineer 3	$210.00
Principal Engineer	$300.00
Planners	
Planner 1	$104.00
Planner 2	$115.00
Sr Planner 1	$125.00
Sr Planner 2	$151.00
Sr Planner 3	$175.00
Designers & Technicians	
CAD Technician 1	$65.00
CAD Technician 2	$75.00
CAD Technician 3	$90.00
CAD Designer	$105.00
Sr CAD Designer 1	$125.00
Sr CAD Designer 2	$150.00
CAD Director	$155.00
Survey Tech 1	$50.00
Health & Safety	
H&S Administrator	$95.00
Sr H&S Administrator	$115.00
H&S Manager	$145.00

Construction	
Construction Project Rep 1	$80.00
Construction Project Rep 2	$90.00
Sr Constr Project Rep 1	$105.00
Sr Constr Project Rep 2	$120.00
Construction Manager 1	$170.00
Construction Manager 2	$190.00
Construction Director	$235.00
General & Administrative	
Project Assistant 1	$67.00
Project Assistant 2	$75.00
Project Administrator	$95.00
Sr Project Administrator	$120.00
Sr Graphic Artist	$130.00
Technical Writer 1	$97.00
Technical Writer 2	$124.00
Sr Technical Writer	$155.00
Information Technology	
Systems Analyst / Programmer 1	$77.00
Systems Analyst / Programmer 2	$115.00
Sr Sys Analyst / Programmer 1	$130.00
Sr Systems Analyst / Programmer 2	$196.00
Project Accounting	
Project Analyst 1	$90.00
Project Analyst 2	$114.00
Sr Project Analyst	$155.00

Reimbursable In-House Costs:	
Photo Copies (B&W 8.5"x11")	$ 0.15/Each
Photo Copies (B&W 11"x17")	$ 0.40/Each
Color Copies (up to 8.5"x11")	$ 2.00/Each
Color Copies (to 11"x17")	$ 3.00/Each
Compact Discs	$10/each
Large format copies	$0.40 S.F.
Mileage-Company Vehicle	$0.80/mile
Mileage-POV	$0.55/mile*

*current GSA POV mileage rate subject to change

All other direct costs, such as production, special photography, postage, delivery services, overnight mail, printing and any other services performed by subconsultant will be billed at cost plus 15%.

NOTE: Rates subject to change annually.

Note: This page is intentionally left blank.

June 21, 2022
Prepared by: M. Lu / M. Cortez
Submitted by: K. Burton
Approved by: Paul A. Cook

ENGINEERING AND OPERATIONS COMMITEE

SEWER SIPHON IMPROVEMENTS PHASE II CONSULTANT SELECTION

SUMMARY:

IRWD's sewer system includes 19 inverted siphons in various locations. Earlier this year, IRWD completed the Sewer Siphon Improvements Phase I that rehabilitated the four highest priority siphons. Phase II will rehabilitate the next seven prioritized siphons. Staff recommends the Board authorize the General Manager to execute a Professional Services Agreement with Woodard & Curran in the amount of $1,285,684 for engineering design services for the Sewer Siphon Improvements Phase II.

BACKGROUND:

In 2016, IRWD completed a preliminary assessment of its 19 siphons and assigned a rehabilitation priority considering risk and likelihood of failure. The top four siphons were recently completed as part of Phase I. Phase II will rehabilitate the next seven siphons: S1, S3, S5, S8, S9, S16, and S18. Siphon S16 is in the city of Newport Beach and the remaining six are located in the city of Irvine. General descriptions of the siphons are provided below.

1. Siphon S1 – San Diego Creek/University (constructed in 1966): This location consists of a three-barrel inverted siphon going under Sand Canyon Creek, along the bike trail between the San Diego Creek Channel and University Drive. The barrels are asbestos cement pipe (ACP) with diameters of 10-, 15- and 18-inches. There is no air jumper at this location;
2. Siphon S3 – Michelson/Riparian (constructed in 1976): This location consists of a two-barrel inverted siphon going under San Diego Creek at Michelson Drive, near Riparian View. The barrels are vitrified clay pipe (VCP) with diameters of 24- and 36-inches. The siphon includes a 21-inch air jumper. The 21-inch air jumper is reinforced polymer mortar pipe (RPMP) per the as-built;
3. Siphon S5 – Jamboree/Main (constructed in 1972): This location consists of a two-barrel inverted siphon going under the Barranca Channel, along Jamboree Road near Main Street. The two barrels are 8-inch diameter VCP. The as-built drawings show two 8-inch VCP stubs – one at the upstream manhole, and the other at the downstream manhole;
4. Siphon S8 – Jeffrey/Alton (constructed in 1988): This location consists of a two-barrel inverted siphon going under San Diego Creek, along Jeffrey Road. The barrels are VCP with diameters of 15- and 21-inches. There is a 15-inch polyvinyl chloride (PVC) air jumper at this location;
5. Siphon S9 – Sand Canyon/Barranca (constructed in 1987): This location consists of a two-barrel inverted siphon going under the Barranca Channel, along Sand Canyon Avenue. The barrels are VCP with diameters of 8- and 12-inches. There is no air jumper at this location;

6. Siphon S16 – University/Milano (constructed in 1998): This location consists of a two-barrel inverted siphon going under Bonita Creek, near SR-73. The two barrels are 16-inch diameter VCP. There is no air jumper at this location; and.
7. Siphon S18 – Harvard/University (constructed in 1978): This location consists of a two-barrel inverted siphon going under Sand Canyon Creek (culvert), along Harvard Avenue. The two barrels are 8-inch diameter VCP. There is no air jumper at this location.

The 2016 assessment noted issues of corrosion, lining failure, lack of flow control device, and site access inadequacy. The likelihood of failure for these seven siphons ranges from high to extreme.

It was recognized in Phase I that having a well-defined and thorough consultant scope of work that includes sewer cleaning and inspection would have helped better define the contractor scope of work and minimize the amount of change orders. Due to this "lessons learned" from Phase I, the consultant scope of work for Phase II includes this additional sewer cleaning and inspection work as requested in the request for proposal, which accounts for approximately $300,000 of the consultant scope of work. This type of cleaning and inspection is a specialized task that the District staff are not well-suited to perform.

An alternative to performing this work would be to include several alternative bid items in the contractor's bid schedule in the hopes of addressing any issues that may potentially arise during construction. This method of bidding can result in unnecessary time wasted when the contractor needs to secure materials or equipment (e.g., for cured-in-place pipe) to address any construction issues not previously anticipated during design.

Consultant Selection:

On April 27, 2022, staff issued a request for proposal for engineering design services for the project to four consultants: Psomas, Stantec, West Yost, and Woodard & Curran. Psomas and West Yost withdrew after receiving the request for proposal citing insufficient staff availability and experience. Proposals were received from the remaining two consultants on June 2. Staff completed its evaluation of the proposals and found the following merits in Woodard & Curran's proposal.

- Woodard & Curran's team has more experience overall with sewer systems, sewer siphons and condition assessment, which is relevant to this Phase II project;
- Woodard & Curran provided preliminary evaluations and implementable solutions to the Phase II siphons with greater details, such as flow control device improvements at Siphons S1 and S5, maintenance/access and odor control improvements at Siphon S9, and potential location of a grit trap at Siphon S3;
- As part of the lessons learned from Phase I, Woodard & Curran understands the importance of completing a condition assessment of the siphon barrels and Laser 3-dimensional scanning of the interiors of the existing upstream and downstream vaults. Woodard & Curran is providing a substantial effort in condition assessment of the siphons to determine the need for cured-in-place-pipe lining. The effort proposed

matches what is required for this project, including dewatering, barrel cleaning, dewatering and closed-circuit-tv inspection. Secondly, accurate measurements of the interior of the vaults are required to minimize additional cost claims from the contractor due to encountering field conditions that differ from record drawing information; and

- Woodard & Curran was the design consultant in Phase I and is thus familiar with the IRWD's expectations on siphon evaluations and design.

Based upon these merits, staff recommends awarding a Professional Services Agreement to Woodard & Curran in the amount of $1,285,684. The consultant selection matrix is provided in Exhibit "A" and Woodard & Curran's proposal is provided in Exhibit "B".

FISCAL IMPACTS:

Sewer Siphon Improvements Phase II, Project 11841, is included in the FY 2021-22 Capital Budget. The existing budget is sufficient to fund the project's design phase.

ENVIRONMENTAL COMPLIANCE:

This project is subject to the California Environmental Quality Act (CEQA) and in conformance with the California Code of Regulations Title 14, Chapter 3, Section 15303. Section 15303 provides exemption of new, small facilities or structures; installation of small new equipment and facilities in small structures; water main, sewage, electrical, gas or other utility extensions, including street improvements of reasonable length to serve such construction. A Notice of Exemption will be prepared for the project and filed with the County of Orange.

RECOMMENDATION:

That the Board authorize the General Manager to execute a Professional Services Agreement with Woodard & Curran in the amount of $1,285,684 for design engineering services for the Sewer Siphon Improvements Phase II, Project 11841.

LIST OF EXHIBITS:

Exhibit "A" – Consultant Selection Matrix
Exhibit "B" – Woodard & Curran Proposal and Fee

Note: This page is intentionally left blank.

EXHIBIT "A"
Sewer Siphon Improvements Phase II
Project 11841
Consultant Selection Matrix

	Weights	Woodard & Curran		Stantec	
TECHNICAL APPROACH	50%				
*Project Approach	60%	1		2	
*Scope of Work	40%	1		2	
Weighted Score (Technical Approach)		1.00		2.00	
EXPERIENCE	50%				
*Firm/Team	50%	1		2	
*Sewer Siphon and Condition Assessment Experience	50%	1		2	
Weighted Score (Experience)		1.00		2.00	
COMBINED WEIGHTED SCORE		**1.00**		**2.00**	
Project Manager		Mirko Maher	24	Joe Long	31
Project Engineer		Justin Kraetsch	7	Patrick Stahl	11
QC/QA		Jen Glynn	27	Jim Cathcart	44
Technical Advisor		Glenn Hermanson	30	Umeth Murthy	30
Design Engineer		Oliver Saeby		Bita Sadri	18
Structural		Tom Scalese	12	Simon Lin	18
Sewer Modelling		Cathy Greenman	20	Jeff Dunn	28
Condition Assessment		V&A		Pro-Pipe	
Traffic Control		TCE		Stantec	
CCTV		NPS		Pro-Pipe	
Surveying		Calvada		Stantec	
LABOR HOURS		Hours		Hours	
Task 1 - Project Management		391		388	
Task 2 - Preliminary Design		630		898	
Task 3 - Final Design		2,261		1,919	
Task 4 - Bid Support		79		74	
TOTAL HOURS		3,361		3,279	
TOTAL SHEETS		63		59	
FEE					
Task 1 - Project Management		$105,150.00		$78,925.00	
Task 2 - Preliminary Design		$376,069.00		$280,479.00	
Task 3 - Final Design		$499,265.00		$326,925.00	
Task 4 - Bid Support		$17,880		$19,240	
Optional CCTV		$287,320		$391,115 *	
				*includes dewatering $160,000	
Grand Total excluding Optional Task		$998,364.00		$705,569.00	
Grand Total including Optional Task		**$1,285,684.00**		**$1,096,684.00**	
Number of Drawings		63	dwgs	59	dwgs
Final Design Unit Prices ($/dwg) (excluding optional task)		$15,847		$11,959	
Professional Liability Insurance		Yes		Yes	
General Liability Insurance		Yes		Yes	
FORCED RANKINGS:					
1 - First		1		2	
2 - Second					

Note: This page is intentionally left blank.

Irvine Ranch WATER DISTRICT

EXHIBIT "B"

Woodard & Curran



Engineering Design Services for the Sewer Siphon Improvements Phase II

June 13, 2022 Revision

24422 Avenida de la Carlota
Suite 180
Laguna Hills, CA 92653
www.woodardcurran.com

T 800.426.4262
T 949.420.5300

Via Electronic Mail

June 2, 2022

Mr. Michael Lu
Irvine Ranch Water District
Michelson Water Recycling Plant
3512 Michelson Drive
Irvine, CA 92612

Re: **Proposal for Engineering Design Services for the Sewer Siphon Improvements Phase II**

Dear Mr. Lu:

Irvine Ranch Water District (IRWD) is seeking Engineering Design Services for the Sewer Siphon Improvements Phase II. Woodard & Curran has a full understanding of IRWD's project and unmatched qualifications for sewer siphon design. Based on our review of the request for proposal and discussions and meetings with IRWD staff, we have developed a comprehensive proposal to meet IRWD's needs and goals.

Woodard & Curran offers a team of highly qualified engineers with the technical expertise and local siphon knowledge to address IRWD's needs for the project. We propose **Mirko Maher** to serve as project manager and **Justin Kraetsch** as project engineer, each are experts in sewer design. Mirko has over 20 years of project management and sewer design experience, and Justin has recently completed the Sewer Siphon Project for IRWD and a similar project for the City of Anaheim. They will be supported by **Glenn Hermanson** and **Jen Glynn**, Technical Advisors and QA/QC, experts in sewer siphon design and trenchless technologies who have recently worked with Justin and IRWD on the Sewer Siphon Improvements Project Phase I. In addition, we have partnered with four specialty subconsultants: V&A for Condition Assessment, Calvada for surveying, TCE for traffic control and National Plant for CCTV.

Woodard & Curran's team members have extensive experience in sewer siphon design and trenchless projects throughout California. We **understand the challenges and local site conditions** having **recently completed the Sewer Siphon Improvements Phase I**. Our team members' thorough understanding of the unique challenges associated with this project will make this project a success for IRWD.

If you have any questions about our proposal, please contact me at khiggins@woodardcurran.com or (949) 420-5313 or Mirko Maher at Mmaher@woodardcurran.com or (925) 212-3757.

Sincerely,

Mirko Maher, PE
Project Manager

Kathleen Higgins, PE
Principal-in-Charge



A. Scope

Project Understanding

IRWD's sewer system includes 19 inverted siphons in various locations. In 2016, the District completed a preliminary assessment and ranking of the siphons considering their risk of failure. Four (4) siphons were rehabilitated in Phase I as designed by Woodard & Curran working closely with IRWD staff. This Phase II project will evaluate the next seven siphons and design the necessary rehabilitation improvements.

The seven inverted siphons are listed below. Six of the siphons are located in the City of Irvine, and one is located in the City of Newport Beach.

1. **Siphon S1 – San Diego Creek/University (constructed in 1966):** This location consists of a three-barrel inverted siphon going under Sand Canyon Creek. The barrels are asbestos cement pipe (ACP) with diameters of 10-, 15- and 18-inches. There is no air jumper at this location.
2. **Siphon S3 – Michelson/Riparian (constructed in 1976):** This location consists of a two- barrel inverted siphon going under San Diego Creek at Michelson Drive, near Riparian View. The barrels are vitrified clay pipe (VCP) with diameters of 24- and 36-inches. The siphon includes a 21-inch air jumper. The 21-inch air jumper is reinforced polymer mortar pipe (RPMP) per the as-built.
3. **Siphon S5 – Jamboree/Main (constructed in 1972):** This location consists of a two-bar rel inverted siphon going under the Barranca Channel, near Main Street. The two barrels are 8-inch diameter VCP. The as-built drawings show two 8-inch VCP stubs – one at the upstream manhole, and the other at the downstream manhole.
4. **Siphon S8 – Jeffrey/Alton (constructed in 1988):** This location consists of a two-barrel inverted siphon going under San Diego Creek, along Jeffrey Road. The barrels are VCP with diameters of 15- and 21-inches. There is a 15-inch polyvinyl chloride (PVC) air jumper at this location.
5. **Siphon S9 – Sand Canyon/Barranca (constructed in 1987):** This location consists of a two- barrel inverted siphon going under the Barranca Channel, along Sand Canyon Avenue. The barrels are VCP with diameters of 8- and 12-inches. There is no air jumper at this location.
6. **Siphon S16 – University/Milano (constructed in 1998):** This location consists of a two-barrel inverted siphon going under Bonita Creek, near SR-73. The two barrels are 16-inch diameter VCP. There is no air jumper at this location.
7. **Siphon S18 – Harvard/University (constructed in 1978):** This location consists of a two-barrel inverted siphon going under Sand Canyon Creek (culvert), along Harvard Avenue. The two barrels are 8-inch diameter VCP. There is no air jumper at this location.

   This project requires resolving many challenges for each siphon, including maintenance access, odor, flow control, and constructibility. To solve these challenges, our approach focuses on providing you the following three key elements:

   » **A specialized and experienced local team that is ready to hit the ground running:** Our team of engineers have successfully worked together with IRWD on the Sewer

Siphon Phase I project, are thoroughly knowledgeable about what is required for the project and understand the needs of IRWD. The team's institutional knowledge will shorten the "learning curve" to facilitate siphon condition assessment and rehabilitation designs that address the needs of IRWD.

- **Leverage Recent Experience on Phase I with Flow Control Devices and Other Critical Items:** Woodard & Curran will use our experience from the Phase I Project to streamline the design of the flow control devices (stop logs or gates) and other critical items, such as the siphon barrel and vault condition assessment/rehabilitation, vault access improvements, and flow bypassing. Our team of engineers will utilize their invaluable experience from Phase I to provide a design that minimizes change orders, improves the reliability and performance of these critical siphons, and factors in O&M throughout the process.
- **Provide Implementable Proven Solutions for each Siphon:** Woodard & Curran team has reviewed the RFP documents in detail, including existing as-built information, and have developed an approach for each siphon using the latest industry methods that have been successfully implemented at numerous siphons, including IRWD's S2, S4, S6, and S10 siphons as part of the Phase I project.

Approach

Our extensive sewer siphon expertise and recent Phase I experience allowed Woodard & Curran's team of engineers and siphon experts to craft an approach that results in a design that will achieve IRWD's goals of restoring structural integrity and hydraulic capacities, reducing cleaning frequency, improving operation and maintenance, and mitigating odors at the seven siphons.

A SPECIALIZED AND EXPERIENCED LOCAL TEAM THAT IS READY TO HIT THE GROUND RUNNING

We have selected our team based on their experience on the Phase I project. We included team members that have worked with IRWD previously specifically related to this project's scope of work; and have developed solutions for siphons with similar challenges. Challenges that were previously address in similar projects include site access restrictions, limited O&M access into the vaults that adds cost and complexity to routine maintenance, poor hydraulics leading to reduced capacity from accumulated sediment/debris, and odor issues. **Several team members, including Justin Kraetsch, Glenn Hermanson, Jen Glynn, and Oliver Saeby were involved in the Phase I project from the condition assessment phase through construction** and are already familiar with the related work and IRWD's concerns with addressing the issues related to each of the seven siphons included in this project scope.

This project will be managed from our Laguna Hills Office located minutes from the project sites. Mirko Maher, PE, will be project manager. The project engineer will be Justin Kraetsch, PE, with technical advisors Glenn Hermanson and Jen Glynn and design engineer Oliver Saeby.

Mirko has over 20 years' experience in sewer design, trenchless design, and condition assessment. Mirko will lead the design with the support of Justin Kraetsch, PE. Justin brings his strong technical background with design and has recently completed IRWD's Phase I Sewer Siphon Improvement Project, City of Santa Rosa Trunk Sewer and Siphon Condition Assessment Project, and City of Anaheim Magnolia and Broadway Sewer Siphon Rehabilitation Design.

Woodard & Curran's project team includes renowned sewer design and trenchless technical experts, Jen Glynn and Glenn Hermanson, to provide senior technical guidance and quality control and quality assurance reviews, as well as input for solutions to minimize risks and service disruptions. They bring a nearly combined 60 years of project design experience and will support the team from planning to final document preparation to ensure high quality peer reviewed project documents are delivered while being mindful of constructability and reducing and eliminating project risks.

Condition assessment services will be required for this projects scope of work, as it is critical to understand each siphon's condition and as-built measurements in order to address the key project element of rehabilitation. Woodard & Curran has partnered with team member V&A Consulting Engineers because they bring their many years of condition assessment expertise. They will perform accurate field measurements and LiDAR 3D scanning while inside the vaults to ensure the design improvements and construction documents accurately reflect the as-built conditions.

Another critical element for the design of this project is performing topographic survey of each siphon location at the upstream and downstream structures, including dipping the invert elevations of the siphon barrels and inlet/outlet sewer for verification of record drawings and model information. Woodard & Curran has selected Cal-Vada for topographic survey services to ensure accurate construction documents may be developed.

National Plant Services will provide siphon barrel cleaning, dewatering, and closed-circuit television (CCTV) inspection support as an optional task during final design. We have worked closely with them on numerous projects.

Due to our teams' experience with IRWD's Phase I Siphon Project, we have a shortened "learning curve" and are ready to hit the ground running providing IRWD cost effective and implementable solutions. As provided in more detail in the following sections and scope of work, our team is ready to discuss some of these approaches and solutions with you at the kickoff meeting.

LEVERAGE RECENT EXPERIENCE ON PHASE I WITH FLOW CONTROL DEVICES AND OTHER CRITICAL ITEMS

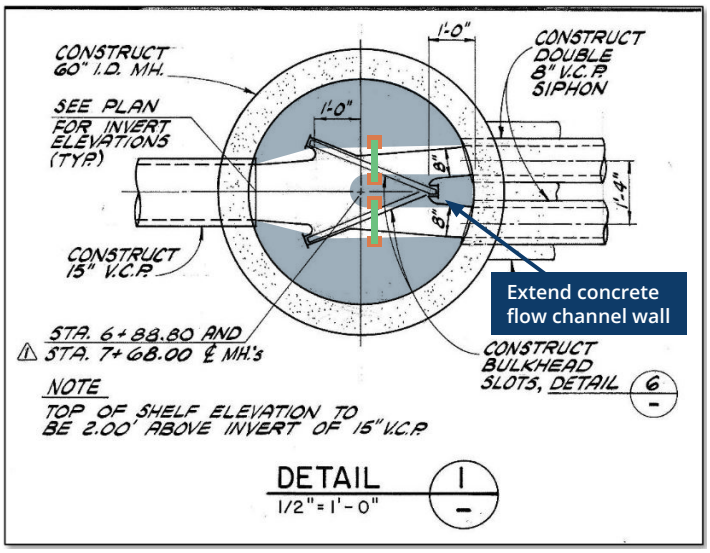
There is no "national standard" for inverted sewer siphon design. Inverted siphons are by nature prone to sediment accumulation due to their geometry and difficult to access for cleaning, inspection, and repairs, adding cost and complexity to routine maintenance. Engineers with less experience tend to make decisions with impacts that aren't apparent for years. The Woodard & Curran team has the invaluable experience from the design and construction of the Phase I Project and a deep knowledge for rehabilitating siphons. Our experience will be applied to this Phase II Project to optimize and streamline the condition assessments and design of critical components such as the flow control devices, siphon barrel and vault rehabilitation improvements, grit traps, and flow bypassing.

Flow Control Devices

To improve siphon operation and reduce maintenance requirements, flow control devices such as stop logs or stop gates will be installed in the upstream structures to direct all dry weather flows to a single barrel. This will result in higher flow velocities in that dedicated "duty" barrel, and in turn reduce rate of sediment accumulation in that barrel. During wet weather flows, the flow would then be diverted into the other "standby" barrel(s).

Flow control devices such as stop logs and stop gates also provide the ability to easily isolate siphon barrels for maintenance or construction activities.

Woodard & Curran will evaluate the existing flow control devices and alternatives for the seven siphons. The design for the flow control systems will be part of an overall siphon operation plan that maximizes the operation of each siphon to improve reliability and performance, reduce maintenance requirements and confined space entries, and provides full barrel isolation for future cleaning, CCTV, and rehabilitation activities.



The existing Siphon S5 upstream and downstream structures have long bulkheads. The new stop gates will be shortened to facilitate removal through the access cover. This will require reconfiguring the channels to provide adequate space behind the logs/gates to allow CCTV equipment to be inserted into the siphon barrels.

As part of the Phase I Project, Woodard & Curran completed a thorough evaluation of flow control devices for the four siphons, including stop logs, stop gates, and sluice gates. Stainless steel stackable stop logs with frames embedded in the concrete channels were ultimately incorporated into the design documents and constructed. In preparation to construct the stop log frames at one of the siphons, it was discovered that the benches and flow walls were narrower than shown on the design plans. This change resulted in additional demolition and reconstruction requirements to accommodate the new embedded stop log frames. Accurate field measurements during design to compare against the record drawings could have prevented this construction change. In the Phase II Project, Woodard & Curran will have their condition assessment subconsultant, V&A Consulting Engineers, record accurate field measurements inside each structure and their surveying subconsultant, Cal-Vada, will perform LiDAR 3D scanning to obtain measurements of the structures, pipe openings, and any existing equipment inside the structures.



The existing upstream structure for Siphon S1 was not constructed per the record drawings. Accurate field measurements of the flow walls and bench will be critical in order to determine how to make a stop gate/log frame fit.

Vault Condition Assessments and Rehabilitations

Woodard & Curran's subconsultant, V&A Consulting Engineers, will perform a condition assessment of the upstream and downstream siphon structures, including physical testing of the concrete and liner (if present), and visual assessment of the hatches, inlet and outlet pipe connections, and sluice gates and stop logs (if present). Based on a review of the RFP documents, 10 of the 14 vaults are lined with PVC liner and the remaining four vaults are lined with polyurethane or a similar spray-type corrosion protection liner. During the Phase I Project, the condition assessment identified delamination and bulging of the existing PVC liner in the vaults, indicating potential corrosion of the concrete behind the liner. During construction, it was discovered that the concrete in S4, S6, and S10 vaults was in primarily good condition after the existing PVC liner was removed. Behind-the-liner concrete testing, consisting of cutting back the liner to assess the concrete behind it via sounding, penetration measurements, and surface pH, is commonly employed to get an accurate condition assessment of lined concrete. Performing behind-the-liner concrete testing can help reduce costly liner removal and reapplication work by providing a more complete assessment of the existing structure. These behind-the-liner concrete tests will be performed by V&A Consulting Engineers as part of the condition assessments.

Grit Traps

The addition of grit traps on gravity sewer lines upstream of inverted siphons can reduce long-term maintenance requirements and cleaning frequencies by capturing sediments before they enter the barrels. The primary criteria for determining the need for a grit trap upstream of siphon include the configuration of the sewer system, flows, and maintenance access to the proposed grit trap. They should be located as close to the siphon as possible with minimum number of laterals or sewer connections between the trap and siphon, in an area where a vactor/combo truck can park without significant traffic impact and where O&M staff can safely access the manhole to vacuum out the grit.

Grit traps were installed upstream of Siphon S2 and S10 as part of the Phase I Project. IRWD has expressed satisfaction with their performance to-date based on the quantity of debris removed during each cleaning and the relatively straightforward cleaning process. This matches the positive feedback from other clients with grit traps designed by Woodard & Curran: Oro Loma Sanitary District and City of Santa Clara. The Phase 1 grit traps upstream of Siphons S2 and S10 were installed in live flow using flow-through plugs and did not require sewer service interruptions.



Grit Trap constructed in live flow on 42-inch RCP sewer upstream of Siphon S10 as part of the Phase 1 Sewer Siphons Project.

Woodard & Curran has evaluated preliminary locations of grit traps for the seven Phase II siphons based on a detailed review of the RFP documents and site visits. At Siphon S3, the highest flow siphon of this project, a grit trap could be located approximately 700 feet upstream of the siphon on the 51-inch RCP San Diego Creek Interceptor line within IRWD's 20-foot-wide easement. Their easement runs along an Orange County Flood Control District access road parallel to the San Joaquin Channel. Woodard & Curran will perform and detailed evaluation of the feasibility and benefits of adding grit traps upstream of Siphons S1, S3, S5, S8, S9, S16, and S18 during the preliminary design phase.

Flow Bypassing

Flow bypassing will be required to construct the rehabilitation improvements inside the siphon upstream and downstream structures and to complete cleaning/dewatering/CCTV inspection and rehabilitation of the barrels. Flow bypassing for siphons is typically performed by one of the following:

1. Installing a temporary above-ground pumping system upstream of the siphon and discharging flows into a manhole downstream of the siphon; or
2. Installing flow-through plugs inside the siphon upstream and downstream structures if a single barrel (for dual barrel configurations) or two barrels (for triple barrel configurations) can handle peak dry weather flows.

Woodard & Curran will evaluate these bypass options during the preliminary design phase. The flow-through plug option was successfully implemented at each siphon for the Phase I project and is the preferred approach over installing above-ground bypass pumps and piping where feasible. This is dependent on the peak dry weather flow through the siphon and capacity of the siphon barrels. For dual-barrel configurations, such as at S3, S5, S8, S9, S16, and S18, one barrel would remain active while flow-through plugs are in operation. For the triple-barrel configuration at S1, up to two barrels could remain active at all times. As part of the hydraulic analysis of the Phase II siphons, Woodard & Curran will confirm the estimated the peak dry weather flow requirements and determine if the siphons have the capacity to handle the peak dry weather flows with one barrel out of service.



Flow-through plugs installed at S2 siphon structures to provide flow bypass during vault and siphon barrel rehabilitation work as part of the Phase I Sewer Siphon Project.

Sewer Cleaning, Dewatering, and CCTV Inspections

As part of the Phase II Project, the ACP and VCP siphon barrels will be cleaned, dewatered, and inspected with CCTV to assess their condition and recommend rehabilitation improvements. A sanitary sewer flow bypass system must be implemented to isolate each siphon barrel for this work. As previously discussed, a passive flow bypass system utilizing flow-through plugs in the upstream and downstream structures is the preferred approach over installing above-ground pumps and piping where feasible. Woodard & Curran will evaluate the different bypass options after completing the hydraulic analysis as part of the preliminary design phase. The Preliminary Design Report (PDR) will include the recommendations for cleaning and CCTV inspections at each siphon and the bypass system required to complete the work.

The cleaning, dewatering, and CCTV inspections can be performed during the final design phase after the completion of the hydraulic analysis and PDR or during the construction phase. The S2, S4, S6, and S10 siphon barrels were inspected during the construction phase for the Phase I project, and the results of the inspections were used to execute the bid items associated with rehabilitation using cured-in-place pipe (CIPP) liners. This approach was successfully implemented and is the recommended option if there are existing flow control devices such as sluice gates that must be demolished by a contractor in order to complete the work (installing flow-through plugs, cleaning, dewatering, and CCTV of isolated barrels).

Based on the condition of the existing barrels and flow control devices per the RFP documents, the existing stop gate frames at S1, S8, S9, S16, and S18 are likely too corroded and would not provide an adequate seal to complete cleaning and CCTV. The current devices in S3 and S8 are stuck-in-place and would obstruct cleaning and CCTV equipment; thus, requiring demolition to proceed with the work. The table below includes a summary of the existing sluice gates and stop logs based on the RFP documents:

Summary of Existing Flow Control Devices and Flow Through Barrels from RFP Documents

Siphon	Barrels	Existing Flow Control Devices	Status
S1 – San Diego Creek/ University	10”, 15”, and 18”	None	All open, flowing
S3 – Michelson/Riparian	24” and 36”	Redwood baffles, stuck halfway in guide frames	All open, flowing under frozen baffles
S5 – Jamboree/Main	Two 8”	None	All open, flowing
S8 – Jeffrey/Alton	15” and 21”	Sluice gates and stop gates	All open, flowing
S9 – Sand Canyon/ Barranca	8” and 12”	Sluice gates, gate partially closed on 8”	12” flowing, 8” closed
S16 – University/Milano	Two 16”	Stop logs, one installed	One flowing, one closed
S18 – Harvard/University	Two 8”	None	All open, flowing

The condition of the existing flow control devices and flow through the barrels will be assessed and documented as part of the condition assessment.

The pros and cons of performing the cleaning, dewatering, and CCTV during the final design phase versus the construction phase are summarized in the table on the following page.

Pros and Cons for Performing Siphon Barrel Cleaning, Dewatering, and CCTV During Final Design vs. During Construction

Phase	Pros	Cons
Final Design Phase	• Define rehabilitation requirements (CIPP or spot repairs) prior to Bid. • Reduced construction cost.	• Extends design schedule by 2-3 months. • Increased design fee. • Pay CCTV subcontractor for cost to furnish and install bypass system and demolish existing interfering gates/logs. (ballpark = $30,000 - $40,000)
Construction Phase	• Cost savings for utilizing Contractor's bypass system. • Reduced design schedule and fee. • Successful implementation in Phase 1 siphon project.	• Additional bid items for initial cleaning, dewatering, and CCTV of siphons. • Provide alternate bid items for rehabilitation work pending inspection results (CIPP or spot repairs).

As shown in the Scope of Work and Fee Estimate, Woodard & Curran has included cleaning, dewatering, and CCTV inspection as an optional task as part of our scope of work. If authorized by IRWD, we would execute a contract with our CCTV subconsultant, National Plant Services, to complete the work during the final design phase.

PROVIDE IMPLEMENTABLE PROVEN SOLUTIONS FOR EACH SIPHON

Woodard & Curran's team has reviewed the RFP documents in detail, including existing as-built information, and have developed an approach for each siphon using the latest industry methods that have been successfully implemented at numerous siphons, including IRWD's S2, S4, S6, and S10 siphons as part of the Phase I project. Based on our experience, we have developed solutions for each siphon which include access improvements to pull up to each of the structures, which would allow for future equipment cleaning and maintenance need. Our team has reviewed the information specific to the seven siphons included in this scope (S1, S3, S5, S8, S9, S16, and S18) and provided a potential approach for each siphon as outlined in the table at the end of this section. In addition, we have provided an example of some more detailed thoughts and some solutions for one of the more difficult siphons to access, Siphon S9.

S9 Maintenance and Access

1. To address safety and operational needs, we will investigate removing the metal sluice gates and adding other means to control flow, which would be implemented from surface at the top of the vault. These could be stop logs that can be installed and removed from the ground surface through new composite manhole covers. Providing flow control that reduces or eliminates the need for its confined space entry into the structure and will improve safety for IRWD O&M staff.
2. On both the upstream and downstream sides, building up the ground to surface to be level with the top of the structure adjacent to the bike path will improve access to the structures. This could be implemented by construction of a wingwall to allow vehicles to back up to the access covers. At locations where the access if flush to adjacent grade, use of curb walls and grading will be investigated.
3. On the upstream side of this siphon, reduce and eliminate sediment accumulation within the siphon by constructing a grit trap. A grit trap could be installed on the 18-inch inlet

sewer within approximately 20 feet of the inlet structure on the bike path at this location. This 18-inch sewer is within IRWD's existing 20-foot wide easement.

S9 Odors and Odor Control

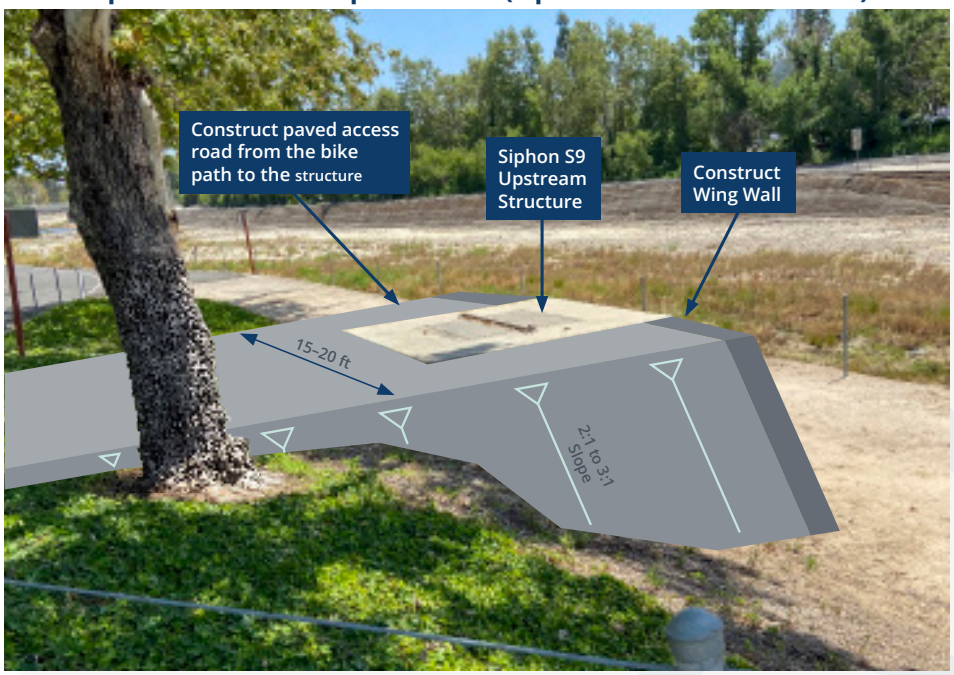
1. To address any potential for odor issues near the structures and corrosion of the metallic access hatch, we recommend removing the top slab of the structure and replacing it with a new precast concrete slab outfitted with IRWD's standard airtight composite manhole covers. Precast polymer concrete will be evaluated as a material option for the replacement top slabs for their corrosion resistance benefits.
2. If solutions to the odor issues at the downstream structure are needed beyond replacing the top slab with airtight composite manhole covers, we will evaluate adding a chemical dosing system immediately upstream of the siphon, in the area east of the bike path.

Recommended Improvements to Access

Siphon S9's upstream structure is located within Orange County Flood Control District right-of-way within a 20-foot wide IRWD sewer easement. The vault is raised approximately 2 to 6 feet above grade, complicating access into the vault. Two approaches to be investigated at this location to provide vehicle and personnel access into the vault would include the following two options.

1. Grading the adjacent property and ramp to be level with the top of the access; or
2. Lowering the access and installing a wingwall to retain the adjacent grades. The option to raise the surface is illustrated on the following figure.

Siphon S9 Access Improvement (Option to Raise to Surface)



Access road and would be constructed south of the existing tree Access road and would be constructed south of the existing tree

For the other six siphons, refer to the following table which summarizes some of the issues and concerns as well as a potential approach. These approaches and others developed as part of the preliminary design will be discussed in a workshop setting which will give opportunity for IRWD O&M and design staff to provide crucial feedback.

SIPHON ISSUES AND POTENTIAL SOLUTIONS

Siphon	Potential Approach
Siphon S1 - San Diego Creek / University Barrels: 10", 15", & 18" ACP Air Jumper: None PDWF = 6.33 mgd	1. Evaluate access improvements to the inlet structure. Options include constructing an all-weather access road, lowering the height of the structure to be flush with grade, constructing a retaining wall, and **allowing the access road to be wider and flatter.** 2. Evaluate access improvements to the outlet structure. Options include constructing an all-weather access road and lowering the height of the structure to be flush with grade. Another option is to construct a new manhole in the south end of the Bethel Church parking lot. A combination unit could be positioned at this new manhole while a maintenance worker walks to outlet structure to direct the hydroflushing hose to the proper barrel. 3. Both the inlet and outlet structures were not constructed as shown on the record drawings. The narrow benches and flow channel walls will create challenges to construct stop gate/log frames. A potential configuration is shown in our proposal. Detailed field measurements and LiDAR 3D scanning will be performed during the man-entry structure inspections to capture accurate as-built conditions. 4. To address odor issues at the inlet structure, the top slab could be replaced with a new precast slab equipped with airtight composite manhole covers that effectively eliminate odors. We will evaluate precast polymer concrete (corrosion proof) for the top slab as an alternative material option. 5. **A grit trap could be located approx. 300 feet south of the siphon inlet structure** next to the parking lot for the Mariposa Villa Apartments to allow for better access for combination units for cleaning. An air vent (with carbon canister) could also be installed on the grit trap at this location. 6. **An air jumper could be constructed across the creek via open cut under the bike path.** This will be evaluated during the design phase.
Siphon S3 - Michelson / Riparian Barrels: 24" & 36" VCP Air Jumper: 21" RPMP PDWF = 41.01 mgd	1. Both the inlet and outlet structures have 48"x48" access shafts (aka "chimneys") from the ground surface to the vaults. This configuration partially blocks visual inspection from the surface. Evaluate removing these shafts and extending the walls up to the ground surface with the top slab at the ground surface. 2. The top slab of the structures will be replaced with precast slabs equipped with airtight composite manhole covers to eliminate odor issues. We will evaluate precast polymer concrete (corrosion proof) for the top slab as an alternative material option. 3. The reported odor issues at the inlet structure are surprising since the existing 21" air jumper should be conveying air downstream. We will inspect the existing 21" air jumper and analyze air flow through the jumper as part of the condition assessment to determine if it is adequately sized or plugged. An airtight lid is the first strategy to eliminate odors at this location. We may also recommend an air vent with carbon canister located 200 feet west in the landscaped area next to a parking lot. A vent may also be recommended at the outlet structure. 4. The configuration of the existing baffles/gates will be confirmed during the man-entry structure inspections. The existing redwood baffles will be removed, and we will evaluate replacement flow control devices. 5. **If a grit trap is constructed, it could be located on the 51" RCP interceptor approx. 700 feet upstream of the siphon as the sewer extends north within a 20' wide sewer easement along a dirt access road between Harvard Ave. and San Joaquin Channel** to allow for better access for combination units for cleaning. An air vent (with carbon canister) could also be installed at this location.
Siphon S5 - Jamboree / Main Barrels: 8" & 8" VCP Air Jumper: To be confirmed PDWF = 3.74 mgd	1. Both of these structures are located in the #2 lane of the heavily trafficked Jamboree Road. 2. We will evaluate the advantages and disadvantages of moving the siphon 30 feet west so that the structures could be accessed without significant traffic control. 3. **The man-entry structure inspections will determine if the air jumper was constructed.** If present, the air jumper will be inspected via CCTV. 4. There is no good location for a grit trap upstream of this siphon before the 15" sewer bifurcates at the Kelvin Ave and Jamboree Rd intersection. Therefore a grit trap would also be located in Lane #2 on Jamboree Rd. The advantages and disadvantages of a grit trap in this location will be evaluated. Installing a Smart Cover at this location will also be evaluated as this location is difficult to visually inspect. 5. Lanes 1, 2, and 3 will likely be closed during construction work at the manholes. If three lanes are closed, the temporary traffic control measures would impact access to the 405 FWY and trigger Caltrans' involvement. Limiting closure to two lanes may avoid impacting the 405 off-ramp and Caltrans involvement. We will evaluate limiting construction work area to lanes 1 and 2 only. Nighttime work will likely be required.
Siphon S8 - Jeffrey / Alton Barrels: 15" & 21" VCP Air Jumper: 15" PVC PDWF = 12.14 mgd	1. The existing corroded sluice gates will be removed. Since the gates appear to be open, it may be possible to dewater and CCTV the siphon barrels during either the design phase or the construction phase. 2. The top slab of the structures will be replaced with precast slabs equipped with airtight composite manhole covers to eliminate odor issues. We will evaluate precast polymer concrete (corrosion proof) for the top slab as an alternative material option. 3. As an additive odor protection measure, an air vent (with carbon canister) could be added at the upstream and downstream structures. 4. The downstream structure has a vertical curb at the edge of the parking lot which keeps the combination unit from being positioned properly over the structure. **We will design site access improvements to allow the proper positioning of cleaning equipment.** 5. We will inspect the 15" air jumper to determine the condition of the air jumper and analyze the air flow to determine if it is adequately sized. 6. A grit trap could be constructed on the existing 33-inch VCP inlet sewer approximately 10 to 30 feet upstream of east of the siphon inlet structure within the 25' wide sewer easement.
Siphon S9 - Sand Canyon / Barranca Barrels: 8" & 12" VCP Air Jumper: None PDWF = 2.37 mgd	1. The existing corroded sluice gates will be removed and we will evaluate replacement flow control devices. 2. The top slab of the structures will be replaced with precast slabs equipped with airtight composite manhole covers to eliminate odor issues. We will evaluate precast polymer concrete (corrosion proof) for the top slab as an alternative material option. 3. Since there have not been any reported odor issues on the upstream side of the siphon, installing an air jumper (by attaching it to the outside of the bridge) is not recommended. 4. There have been odor issues on the downstream side of the siphon. An air vent (with carbon canister) could be added at this location and located adjacent to the landscaping. 5. The upstream structure is raised several feet above the sloped grade which prevents proper access to the structure. Site access improvements to the upstream structure will be recommended. **One option is to construct an access road turnout from the bike path and wingwalls to retain the adjacent grades. A conceptual sketch is provided in this proposal.** 6. The downstream structure has a vertical curb at the edge of the parking lot which keeps the combination unit from being positioned properly over the structure. We will design site access improvements to allow the proper positioning of cleaning equipment. 7. **If a solution for downstream odor issues is needed, there appears to be adequate room for a chemical dosing system in the area east of the inlet structure near the bike path.** 8. On the upstream side, a grit trap could be installed within 20 feet of the inlet structure on the bike path.

SIPHON ISSUES AND POTENTIAL SOLUTIONS

Siphon	Potential Approach
Siphon S16 - University / Milano Barrels: 16" & 16" Air Jumper: None PDWF = 4.2 mgd	1. The cone/ top slab of the siphon manhole structures will be replaced with a new cone/slab with an airtight composite cover to eliminate potential future odor issues. 2. Both the inlet and outlet structures are 72" diameter manholes with short channels for the siphon barrels. There may be inadequate space behind flow control devices to allow for effective use of inspection and cleaning equipment. We will evaluate options that accommodate the minimal space and improve O&M access. 3. Since there have not been any odor issues on the upstream side of the siphon, constructing air jumper (by attaching it to the outside of the bridge) is not recommended. 4. **An all-weather driving surface should be installed around the downstream structure. This would provide improved vehicle assess and also reduce the amount of brush encroaching on the structure.** 5. We will evaluate constructing a grit trap on the existing 30" VCP inlet sewer within Bonita Creek Park.
Siphon S18 - Harvard / University Barrels: 8" & 8" Air Jumper: None PDWF = 1.5 mgd	1. The existing manhole covers and frames will be replaced with composite covers per IRWD standards. 2. Both the inlet and outlet structures are 60" diameter manholes with short channels for the siphon barrels. There may be inadequate space behind flow control devices to allow for effective use of inspection and cleaning equipment. We will evaluate reconfiguring the location of the flow control devices. A larger structure may be constructed around the existing upstream structure. Any reconfiguration must eliminate the ragging situation. Constructing a larger structure at the downstream location may not be recommended due to its location in the middle of the intersection. 3. Since there have not been any odor issues on the upstream side of the siphon, installing an air jumper (via open cut) is not recommended. **4. A grit trap could be installed on the existing 12" PVC inlet sewer upstream of the siphon in the median (relatively minor traffic impacts).**

SCOPE OF WORK

TASK 1. PROJECT MANAGEMENT

Task 1.1 Meetings

Woodard & Curran will prepare for and attend up to six project meetings, including the kickoff meeting two PDR meetings and three design review meetings as outlined in the table below. In addition, Woodard & Curran's mechanical, structural, and other key staff will meet for two on-site visits during preliminary design. The on-site visits may be conducted at the time of the coordination meetings or separately. Woodard & Curran will prepare an agenda and meeting notes for each meeting, which will be distributed to the IRWD Project Manager within 5 working days of meetings.

Meeting/Workshop	Description
Preliminary design kick-off and site visit	One (1) two-hour meeting
Present draft Preliminary Design Report	One (1) two-hour meeting
Present final Preliminary Design Report and discuss responses to IRWD's comments	One (1) two-hour meeting
Present the 60% design	One (1) two-hour meeting
Present the 90% design and discuss responses to IRWD's comments	One (1) two-hour meeting
Present the 100% design and discuss responses to IRWD's comments	One (1) two-hour meeting

Task 1.2 Coordination and Project Status Reports

Woodard & Curran will provide regular project coordination, communication, and updates to IRWD weekly. Woodard & Curran will prepare weekly and monthly status reports. Each weekly status report will be submitted on Monday and shall consist of a brief (one to two paragraphs) e-mail summarizing the activities completed the previous week, the activities planned for the upcoming week, and critical decisions that need to be made. Each monthly status report will be submitted along with the billing invoice for that month. The monthly status reports will include a detailed summary of the work completed for that month, the work planned for the upcoming month, and a review of the work status relative to budget and schedule. Woodard & Curran will maintain and update a log of key action items and decisions, which will include key outstanding decisions as well as a record of key decisions made at meetings or in other forums with IRWD.

A Microsoft Project schedule will be prepared and updated at least monthly. The schedule will include detailed schedules for both design and construction activities. The schedule will include critical factors impacting the project schedule including permitting, design, bid and construction phases and shall reflect IRWD's Notice of Award and Notice to Proceed, contractor shop drawing submittals and Engineer review, manufacturing and delivery times for construction materials, construction activities and construction close out.

Task 1.3 Project Invoicing

Woodard & Curran will track the project scope, budget, and schedule and document progress in monthly progress reports that will be submitted with each invoice. Each monthly progress report will provide detail summarizing the work completed and will review work status relative to budget and schedule. The project schedule will be updated on a monthly basis for inclusion in the monthly progress report.

Task 1.4 Quality Control Plan

Woodard & Curran will implement its quality assurance program for the project, which will include an internal Senior Technical Approach Review (STAR) Workshop at the onset of the project, as well as a senior level technical review (quality control reviews) of project deliverables. Our quality assurance (QA) program includes tracking of all major deliverables, assigning reviewers and documenting reviews in the project files.

Task 1 Deliverables:

- → Data Request List (electronic copy, via email)
- → Meeting Agendas and Minutes (PDF or Microsoft Word files via email)
- → Weekly Progress Reports (electronic email)
- → Monthly Progress Report and Updated Schedule (pdf with invoice via email)

Task 1 Assumptions:

- → Assumes an 11 month design project duration from NTP through 100% final design submittal.

TASK 2. PRELIMINARY DESIGN

Woodard & Curran will perform the following subtasks as part of the preliminary design phase. The primary goal of this task is to establish facility design criteria. The subtasks will be documented and compiled into a Preliminary Design Report.

Task 2.1 Data Collection and Review, Utility Information, and Topographic Survey and Laser/3D Scanning

Woodard & Curran will prepare an initial data request list and submit the list to IRWD ahead of the project kickoff meeting. W&C will review available documents relative to the project, including but not limited to: as built drawings, siphon evaluation reports, atlas maps, IRWD's InfoSWMM hydraulic model, and O&M records. The data request list will be updated and sent to IRWD as needed as information is received, and as new information is requested.

Woodard & Curran will research to confirm utilities in the area that will be potentially impacted by the project. Utility review will be based only on mapping provided by No-dig agencies and records provided by IRWD. Utilities if determined present (e.g., storm drain, electrical, gas, and telephone/communication duct banks) will be avoided if possible.

Woodard & Curran's surveying subconsultant, Cal-Vada, will perform a topographic survey of the inlet and outlet siphon structures at each siphon (14 total), including dipping the invert elevations of the siphon barrels. The survey data will be used for verification of record drawing and model information, and base mapping for preliminary and final design of the recommended improvements. A topographic survey will also be performed at the proposed grit trap locations. It is assumed that grit traps will be constructed upstream of each siphon (7 total).

Survey Features:

- → Survey shots will be taken on 50-foot natural ground grit and 25-foot curb/sidewalk grid on the streets to create 1-foot contour intervals.
- → Location, elevation, size, and type of visible above ground existing utilities within the survey areas.
- → Spot elevations of grade breaks and flow lines of adjacent streets, curbs, or catch basins that terminate or commence offsite flow within the survey areas.
- → Flow line invert elevations and sizes of existing sanitary sewer and storm drain structures and manholes within and adjacent to the survey areas. IRWD will open structures/ manholes as required.
- → Existing driveways and intersections adjacent to survey areas.
- → Location of existing adjacent striping and signing, and traffic control signals within the survey areas.
- → Public fire hydrants within the survey areas. If none are in the survey areas, the nearest two will be provided.
- → Streetlights within the survey areas.
- → Location of trees over 6 feet in height, regardless of caliper, within the survey areas.

The vertical control will be based on the North American Vertical Datum of 1988 (NAVD 88). A local municipal benchmark will be used, if available. The horizontal control will be based on the California State Plane Coordinate System of 1983 (NAD 83).

Property lines of the parcels will be included from record data, along with easements of record.

Woodard & Curran's condition assessment subconsultant, V&A Consulting Engineers, will use Laser/3D scanning inside each existing siphon structure to obtain detailed and accurate measurements of the interior of the structures, inlet and outlet piping, siphon barrels, and any existing equipment inside the structures. The results will be incorporated into the design plans to accurately reflect the existing conditions for the demolition and construction requirements of the proposed improvements.

Task 2.2 Condition Assessment

Woodard & Curran's subconsultant, V&A Consulting Engineers (V&A), will perform a complete condition assessment of all 14 siphon structures (7 inlet and 7 outlet). As the first step of the condition assessment, V&A will review as-built drawings and other related documents to the inverted siphons to support planning and condition assessment work. A Work Plan/ Health and Safety (H&S) Plan will be developed for the condition assessment work that will document the methods and locations of the field work, safety requirements, crew contact information, and schedule. A draft Work Plan/H&S Plan will be submitted to W&C and IRWD for one round of comments. Comments will be incorporated into a final submittal. V&A personnel will have previously completed and received certification for confined space training, fall protection training, and fall protection equipment training. V&A will provide and use its own fall protection equipment.

V&A will make a confined space entry into all 14 siphon structures to complete the condition assessment field testing. Items that will be assessed include the vault, vault hatch, inlet piping entering the vault, outlet piping exiting the vault, sluice gates, stop logs (if present), and lining (if present). Where linings are present, V&A will cut back the liner at one (1) location within

each structure to assess the concrete behind the liner. Once all assessments are complete, V&A will repair the lining where removed. The field testing will include the following:

1. **Visual Assessment:** Visually assess accessible areas of the structures, rate condition of concrete surfaces, existing liners, and metallic components, document observations using digital photographs. A minimum of ten (10) photos will be obtained from each structure.
2. **Reinforced Concrete:**
   a. Assess the concrete condition by "sounding" to listen for shallow subsurface discontinuities such as voids, delamination, and honeycombing within the concrete substrate. Sounding will be performed at various elevations of the walls and on the floor/bench of the structure. Delaminated areas will be marked with chalk for reporting purposes.
   b. Conduct penetration measurements (using a chipping hammer) to find the depth to sound material at various locations within the structures.
   c. Measure the surface pH of the concrete surfaces at the concrete penetration test locations described above. The pH of the concrete can substantiate the extent of degradation.
3. **Metallic:** For any metallic surfaces, perform ultrasonic thickness testing (UT) to determine the remaining wall thickness of the metal. Up to ten (10) UT measurements at each structure will be taken.

V&A will obtain CCTV of the existing air jumper lines. Based on a review of the RFP documents, Siphon S3 has a 21-inch RPMP air jumper and Siphon S8 has a 15-inch PVC air jumper. The tractor mounted CCTV will be inserted into the air jumper line and the vaults and will travel downstream. Tractor CCTV allows for pan, tilt, and zoom of the camera to focus on observations. PACP reports per NASSCO will be provided.

V&A will perform differential pressure monitoring of the 21-inch air jumper line at Siphon S3 and 15-inch air jumper line at Siphon S8. Pressure monitoring will be performed for a period of seven (7) days at the inlet and outlet siphon structures (four monitoring locations total). The data will be used to calculate and analyze air flow through the air jumper piping. The differential pressure monitors will be capable of measuring differential pressure in the range of +/- 2-inches of water column. Instantaneous differential pressure samples will be recorded at each of the monitoring locations immediately prior to and after installation of the monitoring equipment.

Condition Assessment Report

After the field data are collected, V&A will prepare a condition assessment report that describes the field assessment methods, activities, results, conclusions, and recommendations for replacement and rehabilitation of the siphon inlet and outlet structures. The report will include photographs of the existing conditions, data tables, and graphical and illustrative figures, as required, to present the information gathered during this assessment. The locations and severity of defects will be noted, and the current condition of the structure regarding its state of degradation will be described. The draft report will be provided in electrical format (PDF) for one round of comments. Comments will be incorporated into a final report deliverable.

Task 2.3 Hydraulic Analysis

Woodard & Curran will utilize IRWD's sewer hydraulic model (InfoSWMM) to conduct a hydraulic capacity analysis of the siphons as defined in the RFP. InfoSWMM is a stable and accurate hydraulic model for master planning. However, hydraulics associated with inverted siphons, specifically the transition between gravity flow and pressurized flow, can cause numerical inaccuracies. Therefore, we will review the accuracy and stability of IRWD's InfoSWMM model prior to conducting the siphon capacity analysis and if necessary, adjust the headlosses and pipe configurations to improve the model accuracy and capacity predictions. Our modeling approach is summarized below:

- → Evaluate the InfoSWMM model accuracy and adjust the model reflecting the hydraulic characteristics of the siphons, including gravity flow, pressurized flow, flow splits and transitions, and entry and exit losses.
- → Collect dry weather flow data from temporary flow meters installed in manholes immediately upstream or downstream of each siphon. Flow data will be collected for a two (2) week period. Additional scope of work on the field flow monitoring is provided later in this section.
- → Evaluate siphon performance with single and multiple barrel operation for dry and wet weather flow conditions.
- → Evaluate dry weather bypass and diversion flow requirements for use in planning the cleaning and rehabilitation process of the structure and siphon barrels during construction and during future siphon barrel cleaning and inspection maintenance.
- → Evaluate siphon performance with proposed weir boards set at various heights to determine if weir boards can stay installed 12-months per year or if weir boards will need to be adjusted seasonally. This evaluation will be performed assumed two conditions: the siphons are clean (no debris) and the siphons are partially filled with debris.
- → Evaluate the impact debris has on hydraulic capacity. The model will be run at various "levels of debris." The goal is to determine the impact of 1 inch of debris, 3 inches of debris, 6 inches of debris, etc. This is a critical analysis because the critical depth of debris for a peak wet weather event may not significantly impact the performance of the siphon during dry weather.

Sanitary Sewer Flow Monitoring

V&A will perform the sewer system flow monitoring at seven (7) locations to collect flow data for a duration of two (2) weeks. V&A will prepare flow monitoring equipment necessary for installing and removing the meters. Flow meters will be area-velocity flow meters capable of collecting flow level and velocity measurements in free-flow and surcharged hydraulic conditions. The V&A field crew with a fully equipped truck/van and necessary confined spaced entry equipment, simple traffic control, and flow monitoring equipment will install, field calibrate, and remove the flow meters.

The proposed flow meters for this scope of work will be equipped with an antenna for remote data monitoring. Malfunction of a flow meter will be documented and reported as soon as it is observed, and V&A will respond within a 48-hour window. After the first week, V&A will perform a site visit to download the data and perform in-situ calibrations. After two (2) weeks, V&A will download the data and remove the meters.

Following the flow monitoring activities and after the flow meters are removed, V&A will download the reduce the data in 15-minute intervals into Microsoft Excel spreadsheets for data analysis, data QA/QC, and report preparation. The report will include the following information:

- → A summary of the flow monitoring equipment used.
- → Location maps with addresses, pipe size, manhole identifier number, flow channel condition, site schematics, and photographs.
- → Flow monitoring data with tabular outputs of depth, velocity, and flow rate and hydrographs of depth, velocity, and flow rates for each flow meter.

Task 2.4 Siphon Operation and Maintenance (O&M) Program

Woodard & Curran will develop a siphon operation and maintenance program for each of the siphons, including recommended configurations based on hydraulic analysis and flow monitoring for various flow conditions (wet and dry weather), and recommendations for maintenance and cleaning procedures of the siphon structures and equipment. The O&M program will help maintain full capacity and redundancy of the siphons, maximize self-cleaning velocities through the primary barrels, and minimize risk for blockages, while minimizing or eliminating the need for operational adjustments during flow fluctuations.

Task 2.5 Recommend Improvements for Final Design

Woodard & Curran will evaluate and recommend the required siphon improvements to be included in final design. The recommended improvements will be made to restore system capacity and redundancy and improve the long-term operation and maintenance of the siphons. The following items will be evaluated:

1. **Addition of Grit Trap Structures:** We will evaluate the feasibility and benefits of adding grit traps upstream of the seven siphons, including long term maintenance of the siphons and costs. We will develop a list of criteria for determining the need for a grit trap at each siphon location. Criteria to be considered may include siphon configuration, flow, maintenance access to the proposed grit trap, and benefits to the operation of the siphon.
2. **Vault Structure and Lining:** We will address deficiencies noted in the condition assess ment and recommend improvements that may benefit the long-term operation of the siphons, such as the repair of degraded concrete and corroded structures, and the repair or replacement of lining. The proposed vault improvements will also consider the potential for significant degradation of structures that is not visible due to the existing lining and will consider the condition and materials of the influent and effluent pipes of each structure.
3. **Vault Access:** We will address deficiencies noted in the condition assessment and pro vide recommendations for hatch replacement or repair considering corrosion resistance and the prevention of escaping odors, precluding the need of applying a silicone sealant "gasket" each time the vault is closed. The proposed improvements will allow access for installation and removal of flow control devices, regular maintenance of the siphon barrels, and installation of flow-through plugs for long-term maintenance of the siphon. It is noted that Phase I replaced the existing hatches with composite manhole lids, which required replacement and reconstruction of the vault slab.
4. **Site Access:** We will provide recommendations for site access improvements, where necessary, to facilitate access of vactor trucks and District's vehicles during maintenance.
5. **Flow Control Equipment:** We will evaluate existing flow control systems and alternatives, e.g., sluice gates and stop logs and provide recommendations for equipment based on durability and reliability in a corrosive environment and minimizing or eliminating

confined space entries and extensive maintenance needs of the equipment. The equipment will also allow the District to adjust to changes in operational flow conditions, i.e., siphon operation program.

The design for the flow control systems will be part of an overall siphon operation plan that (a) maximizes the operation of the siphon to maintain reliability and redundancy through all possible flow conditions, and (b) eliminates the need for constant adjustments in response to daily flow fluctuations or wet weather flow conditions. The design will also allow for future isolation of each barrel for cleaning, dewatering, CCTV, and rehabilitation, if necessary, while minimizing the need for confined space entry.

6. **Air Jumpers:** We will recommend repairs or improvements to the existing air jumpers and other improvements to reduce odors emanating from the siphon structures.

7. **Cleaning, closed circuit television inspection, and rehabilitation of siphon barrels:** We will provide recommendations for cleaning, CCTV, and rehabilitation of the siphon barrels, including development of bypass or diversion requirements and optional rehabilitation methods, such as cured-in-place-pipe (CIPP), spot repairs, grouts, pre-liners, etc., which will be included as unit priced Alternate Bid Items in the Construction Documents to address any defects that are discovered during the construction phase.

   Woodard & Curran will evaluate different bypass options, such as aboveground bypass pumping and flow-through plug and provide recommendations with considerations of the risks and costs associated with each bypass option.

Task 2.6 Preliminary Opinion of Probable Construction Cost

Woodard & Curran will provide a preliminary Opinion of Probable Construction Cost for the Project.

Task 2.7 Preliminary Construction Schedule

Woodard & Curran will provide a preliminary construction schedule that reflects coordination items, date of completed plans, critical path issues, any long lead items, and IRWD review times.

Task 2.8 Preliminary List of Drawings

Woodard & Curran will provide a preliminary list of drawings anticipated in the Final Design. The list of drawings may include site plan, demolition plan and details, site access improvement plan, siphon structure improvement plan and sections including concrete and lining rehabilitation, siphon barrel plan and profile, traffic control plans, bike/pedestrian diversion plans, etc. and will be updated based on the preliminary list identified in Task 3.

Task 2.9 Preliminary Design Report (PDR)

The work described above will be summarized and compiled into a PDR. The PDR will summarize the results of the subtasks identified above along with additional design criteria identified during the preliminary design phase. One PDF file of the draft PDR will be submitted for review. Upon resolution and incorporation of review comments, one PDF file of the final PDR will be submitted.

Task 2 Deliverables:

- → Data Request List
- → Topographic Survey

- → Draft and Final Condition Assessment Report
- → Draft and Final Preliminary Design Report including opinion of probable cost, construction schedule, list of drawings.
- → The hydraulic modeling results, flow monitoring data report, condition assessment report, and CCTV inspection of the Siphon S3 and S8 air jumpers will be included as appendices.

Task 2 Assumptions:

- → IRWD will provide access to all facilities, including opening of siphon inlet and outlet structures, as required given reasonable notice.
- → PDR will include preliminary schematics of siphon improvements.
- → IRWD will provide easement documentation for the existing easements. This documentation will either be a title report for each parcel or will be in AutoCAD format that can be inserted into the survey AutoCAD file.
- → Scope assumes major structural rehabilitation or full structure replacement is not anticipated.
- → Geotechnical explorations/recommendations and potholing is not included.

TASK 3. FINAL DESIGN

Woodard & Curran will prepare the final design Contract Documents in accordance with IRWD requirements outlined below for the project manual and construction plans.

IRWD's construction manual will be referred to in the contract documents.

- → **Project Manual:** Woodard & Curran will prepare a Project Manual in standard IRWD format for the Contract Documents. IRWD's front end documents will be utilized, and Woodard & Curran will assess IRWD's documents to determine any needed supplemental special provisions that should be added to comply with IRWD's general provisions and front-end requirements. The Project Manual will describe the work, the allowable shutdown durations and sequencing associated with any connections and tie-ins to existing IRWD facilities. The Project Manual will also include the IRWD General Technical Specifications, modifications thereto, and any project specific technical specifications. Woodard & Curran will prepare the Project Manual in standard IRWD format using the Project Manual template provided by IRWD in Microsoft Word format. Woodard & Curran will provide a PDF file of the bidding documents in 8-1/2 x 11-inch format.
- → **IRWD Construction Manual:** IRWD has also developed and periodically updates its IRWD Construction Manual, which contains General Technical Specifications and Standard Drawings for use in the preparation of plan and project technical specifications. This manual will be referred to in the Contract Documents.
- → **Construction Plans:** Woodard & Curran will prepare detailed construction drawings in the latest version of AutoCAD using NCS V4.0 layering standards, on 24-inch x 36-inch sheets utilizing IRWD's standard border template. Plans will be prepared in AutoCAD. The improvement plans will include a site plan, sheet index/location map/legend, general notes, index map, plans and profiles of the pipeline improvements, abandonment of existing pipes, notes and details, bypass plan, access improvements and construction sequencing, and all details necessary for the construction of the improvements. The list of sheets anticipated for the project, and included for each submittal is indicated below:

Sheet No.	Title	60%	90%, 100%, Final
1	Title Sheet	X	X
2	Sheet Index and Vicinity Map	X	X
3	Legend, General Notes, Sewer Notes, and Construction Notes	X	X
4	Abbreviations, Symbols, Standard Drawing List, and Legend	X	X
5	Siphon S1 Site and Construction Access Plan	X	X
6	Siphon S1 Site and Access Improvements Plan	X	X
7	Siphon S1 Upstream Structure Demo, Rehabilitation and Flow Control Plan and Sections	X	X
8	Siphon S1 Downstream Structure Demo, Rehabilitation and Flow Control Plans and Sections	X	X
9	Siphon S1 Grit Trap Plan	X	X
10	Siphon S1 Barrel Cleaning and CIPP Lining Plan and Section	X	X
11	Siphon S3 Site and Construction Access Plan	X	X
12	Siphon S3 Site and Access Improvements Plan	X	X
13	Siphon S3 Upstream Structure Demo, Rehabilitation and Flow Control Plan and Sections	X	X
14	Siphon S3 Downstream Structure Demo, Rehabilitation and Flow Control Plans and Sections	X	X
15	Siphon S3 Grit Trap Plan	X	X
16	Siphon S3 Barrel Cleaning and CIPP Lining Plan and Section	X	X
17	Siphon S5 Site and Access Improvements Plan	X	X
18	Siphon S5 Upstream Structure Demo, Rehabilitation and Flow Control Plan and Sections	X	X
19	Siphon S5 Downstream Structure Demo, Rehabilitation and Flow Control Plans and Sections	X	X
20	Siphon S5 Barrel Cleaning and CIPP Lining Plan and Section	X	X
21	Siphon S8 Site and Construction Access Plan	X	X

Sheet No.	Title	60%	90%, 100%, Final
22	Siphon S8 Site and Access Improvements Plan	X	X
23	Siphon S8 Upstream Structure Demo, Rehabilitation and Flow Control Plan and Sections	X	X
24	Siphon S8 Downstream Structure Demo, Rehabilitation and Flow Control Plans and Sections	X	X
25	Siphon S8 Barrel Cleaning and CIPP Lining Plan and Section	X	X
26	Siphon S9 Site and Construction Access Plan	X	X
27	Siphon S9 Site and Access Improvements Plan	X	X
28	Siphon S9 Upstream Structure Demo, Rehabilitation and Flow Control Plan and Sections	X	X
29	Siphon S9 Downstream Structure Demo, Rehabilitation and Flow Control Plans and Sections	X	X
30	Siphon S9 Grit Trap Plan	X	X
31	Siphon S9 Barrel Cleaning and CIPP Lining Plan and Section	X	X
32	Siphon S16 Site and Construction Access Plan	X	X
33	Siphon S16 site and Access Improvements Plan	X	X
34	Siphon S16 Upstream Structure Demo, Rehabilitation and Flow Control Plan and Sections	X	X
35	Siphon S16 Downstream Structure Demo, Rehabilitation and Flow Control Plans and Sections	X	X
36	Siphon S16 Grit Trap Plan	X	X
37	Siphon S16 Barrel Cleaning and CIPP Lining Plan and Section	X	X
38	Siphon S18 Site and Access Improvements Plan	X	X
39	Siphon S18 Upstream Structure Demo, Rehabilitation and Flow Control Plan and Sections	X	X
40	Siphon S18 Downstream Structure Demo, Rehabilitation and Flow Control Plans and Sections	X	X
41	Siphon S18 Grit Trap Plan	X	X
42	Siphon S18 Barrel Cleaning and CIPP Lining Plan and Section	X	X

Sheet No.	Title	60%	90%, 100%, Final
43	Siphon S1 Air Jumper Plan and Profile	X	X
44	General Civil/Rehabilitation Details 1	X	X
45	General Civil/Rehabilitation Details 2	X	X
46	General Civil/Rehabilitation Details 3	X	X
47	General Civil/Rehabilitation Details 4	X	X
48	General Civil/Rehabilitation Details 5		X
49	General Civil/Rehabilitation Details 6		X
50	General Civil/Rehabilitation Details 7		X
51	Structural Notes	X	X
52	Structural Details 1	X	X
53	Structural Details 2	X	X
54	Structural Details 3	X	X
55	Structural Details 4		X
56	Structural Details 5		X
57	Siphon S1 San Diego Creek Trail Bikeway Diversion Plan	X	X
58 - 60	Siphon S3 Traffic Control Plans	X	X
61 - 66	Siphon S5 Traffic Control Plans	X	X
67	Siphon S8 San Diego Creek Trail Bikeway Diversion Plan	X	X
68	Siphon S9 San Diego Creek Trail Bikeway Diversion Plan	X	X
69	Siphon S16 Bonita Creek Bikeway and Pedestrian Diversion Plan	X	X
70 - 77	Siphon S18 Traffic Control Plans	X	X

Task 3.1 Final Design Plans

The final design covers the 60%, 90%, 100% and final design submittals. Throughout final design, Woodard & Curran will continue to regularly meet with IRWD to discuss the project and integrate any responses into the next project milestone. The 90% submittal will be a substantially complete and biddable construction set, pending any unresolved questions or items for IRWD staff discussion. The 100% design submittal will be a biddable, buildable design submittal for final IRWD approval.

Woodard & Curran will preview each plan submittal with IRWD staff in a virtual preview meeting. Improvement plans will be submitted and transmitted via email (PDF file) to IRWD for review at the 60%, 90%, 100% and final design completion levels according to the following guidelines:

- **60% Draft:** Woodard & Curran will provide a searchable PDF file of the plan set and will show right-of-way, easements, construction notes and major details. The design set will include all sheets, plan and profile, and sections/details for major items. Key maps, location maps, station numbers, and general notes will be included in the plans including civil/site, demolition, mechanical, structural, rehabilitation, bypass/diversion, and traffic control plans. It will include basic mechanical equipment, structural layouts, pipeline alignments, preliminary profiles, and existing utilities at a minimum. We will provide a complete table of contents for the Project Manual. The project manual will include all sections including any project specific specifications sections or modifications to the IRWD General Technical Specifications Sections and relevant City standards or specifications. Woodard & Curran will provide a single searchable PDF file of the 60-percent Project Manual. An opinion of probable construction cost will be provided. All deliverables will be QA/QC'd by our internal QA/QC Team.
- **90%:** Woodard & Curran will provide a searchable PDF file of the entire plan set. The plan set will show all design elements including traffic control plans, be QA/QC'd by our internal QA/QC Team, and include revisions per IRWD, City of Irvine, City of Newport Beach and other agencies' comments. Woodard & Curran will provide a single searchable PDF file of the 90-percent Project Manual. An updated opinion of probable construction cost will be provided. All deliverables will be QA/QC'd by our internal QA/QC Team.
- **100% submittal:** Woodard & Curran will provide a searchable PDF file of the entire plan set. Woodard & Curran will provide a single searchable PDF file of the 100-percent Project Manual. An updated opinion of probable construction cost will be provided. All deliverables will be QA/QC'd by our internal QA/QC Team.
- **Final Design Deliverable:** Woodard & Curran will provide one full size, final set of plans in a single PDF with the Engineer's electronic stamp and signature, including IRWD's signatures on the design sheets. Woodard & Curran will provide a single searchable PDF file of the Project Manual including the Engineer's electronic stamp and signature on the signature page. This submittal will be backchecked for inclusion of all previous comments prior to adding the Executive Director's electronic signature on the cover sheets of the plans and Project Manual. Once the submittal is reviewed and signed by IRWD, Woodard & Curran will provide AutoCAD files for the entire plan set and Microsoft Word files used in the preparation of the Project Manual. An updated opinion of probable construction cost will be provided. All deliverables will be QA/QC'd by our internal QA/QC Team.

Task 3.2 Project Manual

Woodard & Curran will prepare the project manual in accordance with IRWD requirements previously outlined. Woodard & Curran will assist in calculating liquidated damages value for the project should the contract time be exceeded. IRWD's standard liquidated damage calculation form will be provided.

Task 3.3 Opinion of Probable Construction Cost

Woodard & Curran will prepare a detailed and itemized opinion of probable construction cost for the proposed facilities for submission with each of the design deliverables. The Opinion of Probable Construction cost will be formatted the same as the Schedule of Work included in the Bid Documents section of the Project Manual.

Task 3.4 Permits

Woodard & Curran will identify required permits and their controlling agencies including the City of Irvine, City of Newport Beach and County of Orange. Woodard & Curran will apply for and secure approval of the required permits. Copies of permit conditions will be inserted in the Project Manual's Appendix. IRWD will pay all permit fees directly to the agency.

Task 3.5 CEQA Documentation Support

Woodard & Curran will provide necessary project information, maps or exhibits to assist IRWD in preparing the CEQA documentation for the project including project description details and construction and operational specifics such as estimates of area affected by construction, equipment used for construction, or estimates of construction vehicle trips.

Task 3 Deliverables:

- → 60% Design Drawings, Project Manual, Engineer's Estimate and Schedule (pdf electronic copies)
- → 90% Design Drawings, Project Manual, Engineer's Estimate and Schedule (pdf electronic copies)
- → 100% Design Drawings, Project Manual, Engineer's Estimate and Schedule (pdf electronic copies)
- → Final Bid Design Drawings, Project Manual, Engineer's Estimate and Schedule (electronic copies in PDF, AutoCAD and Microsoft Word files)

Task 3 Assumptions:

- → IRWD will be responsible for producing and distributing Bid Documents and maintaining a plan holders list
- → Construction phase support is not included; however, we can provide these services at a negotiated scope and fee.
- → A single bid package will be provided.
- → Final design duration is estimated to be approximately 6 months. Delays beyond the reasonable control of Woodard & Curran may result in additional project management costs.
- → CEQA support is limited only to providing engineering and planning exhibits.
- → No public outreach is provided as part of this fee estimate.
- → Excludes electrical and Instrumentation plans. If proposed automatic chemical dosing systems are required, the number of which will be determined in preliminary design and included in separate scope and fee.

→ Permitting fee assumes effort include encroachment permit for City of Irvine, and City of Newport Beach, and Orange County Flood Control District. Fees to be paid by IRWD.

Task 4. ADDENDA PREPARATION and PRE-BID MEETING

During the bidding period, Woodard & Curran will assist with providing information and clarification of bid documents to prospective bidders. This will include the preparation of three addendums for bidding, including revisions to the design plans and specifications and assistance with addressing bidder questions. This includes the following budgeted hours:

1. **Plan Revisions:** Woodard & Curran has budgeted twenty-four (24) hours for plan revisions to the construction drawings.
2. **Specification Revisions:** Woodard & Curran has budgeted twenty-four (24) hours for revisions or additions to the project specifications.
3. **Bidder Questions:** Woodard & Curran has budgeted twenty-four (24) hours to address and respond to bidder questions.
4. **Pre-Bid Meeting:** During the bidding period, Woodard & Curran will attend a two-hour pre-bid meeting. This may include a site visit with potential bidding contractors.

Task 5. Siphon Barrel, Cleaning, Dewatering, and CCTV Inspection (Optional Task)

If approved by IRWD to perform siphon barrel cleaning, dewatering, and CCTV inspection after the completion of the PDR, Woodard & Curran will retain its subconsultant, National Plant Services, to perform cleaning, dewatering, and CCTV inspection of the 15 siphon barrels. National Plant Services is appropriately licensed with the necessary capabilities and experience to perform siphon barrel inspections, including installation of flow-through plugs to isolate individual siphon barrels. Woodard & Curran will coordinate the inspection work and perform quality review of the inspection data deliverables submitted by National Plant prior to demobilizing from a siphon site. Woodard & Curran will use the inspection data collected to assess the condition of the siphon barrels and provide rehabilitation recommendations (CIPP lining or spot repairs). The rehabilitation recommendations would be incorporated into the final design bid items. The inspection data reports would be included as an appendix to the Project Manual.

Task 5 Deliverables:

→ Cleaning Log with volume of debris removed
→ PACP Coded CCTV Videos in MPEG4
→ PACP database
→ PACP Reports in PDF

Task 5 Assumptions:

→ Access points must be accessible, and a minimum of 24" in diameter, with no benches that will prevent installation of flow through plugs.
→ Disposal bin staging site to be provided by IRWD
→ Assumes no discharge permit required to decant wash water
→ Water Source must be in the vicinity of each siphon.

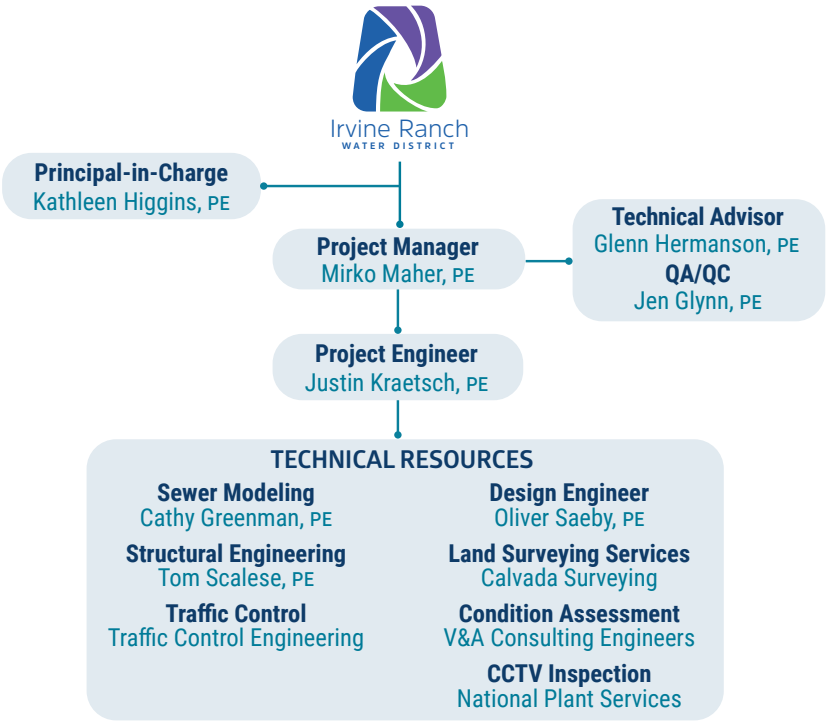


B. Team

B | Team

Our staff are specialists in their fields, offering in-depth understanding of cutting-edge technology, astute problem solving, multidisciplinary engineering, and expert regulatory guidance. Woodard & Curran has over 1160 highly-qualified professionals from 27 office locations across the United States, including seven offices in California. We have successfully assisted many southern California cities and agencies in implementing sewer design projects.

The team members shown in the organizational chart below have provided design of sewer improvements for IRWD and other agencies, including Orange County Sanitation District, City of Anaheim, City of Malibu, Padre Dam Municipal Water District, City of Santa Clara, City of San Jose and many more. Our team members' have a thorough understanding of the unique challenges associated with the Sewer Siphon Improvement Projects having completed the Phase I project which will make this project a long-term success for IRWD.




10% of time on Project

Mirko Maher, PE | Project Manager (Laguna Hills, CA)

Mirko has 24 years of experience in planning, design, and construction management of water and wastewater pipelines and pump stations. Mirko has managed planning design teams from preliminary and planning through bid package work products, resulting in successful construction with minimal change orders. He takes pride in finding solutions to provide best methods of pipeline construction and rehabilitation to provide cost and construction efficiencies while reducing owner risks. Mirko is familiar with IRWD requirements and is currently project manager for the IRWD Sewer Relocation in SD Creek near SR133, was QA/QC reviewer for the IRWD Woods sewer Access Improvements Study and is project manager for the Anaheim Broadway Sewer Siphon Improvement project.



2% of time on Project

Kathleen Higgins, PE | Principal-in-Charge (Laguna Hills, CA)
Kathleen has over 30 years of experience leading a variety of water projects including sewer and water design and management, BMP analysis and design, and preparation of final design plans for water and sewer systems. She has served as principal-in-charge and project manager on a variety of projects throughout Southern California including IRWD's Sewer Siphon Improvements Project Phase I and The Woods Sewer Study. Kathleen will be responsible to ensure that the right staff are committed to the project and that IRWD's needs are met. She will also assist in resolving any issues on the project, should they arise.



5% of time on Project

Glenn Hermanson, PE | Technical Advisor (Sacramento, CA)
Glenn's 32 years of experience with infrastructure engineering have provided him with significant expertise in trenchless technologies and genuine enthusiasm working on sewer projects, pipeline condition assessment, rehabilitation, and design. His experience includes projects that minimize disturbance to residents and businesses, reduce risk, and save costs. Glenn's experience has focused on sewer facilities evaluation, hydraulic analysis, pipeline rehabilitation, condition assessment, and design and construction of sewer improvements. He has completed more than 13 sewer condition assessment projects, including over 43 miles of pipeline and evaluation of over 30 sewer siphons. Glenn's work includes analysis and design of the IRWD Sewer Siphon Improvements project and the Anaheim Broadway Sewer Siphon Improvement project.



30% of time on Project

Justin Kraetsch, PE | Project Engineer (Laguna Hills, CA)
Justin's 7 years of experience in sewer infrastructure design and construction management includes predesign, final design, and trenchless feasibility studies of pipeline projects. Justin has served as the Project Engineer on several pipeline design projects and is experienced in construction plan preparation using AutoCAD, development of technical specifications, and construction cost estimates. He was the project engineer responsible for the preparation of final design construction plans, specifications, and cost estimates for the IRWD Sewer Siphon Improvements project and is the project engineer for the Anaheim Broadway Sewer Siphon Improvement project.



3% of time on Project

Jen Glynn, PE | QA/QC (Sacramento, CA)
Jennifer has 27 years of experience specializing in pipeline condition assessment, alternatives analysis, and rehabilitation design in both congested urban areas; and highly sensitive environmentally impacted locations involving various lining methods, as well as pipe bursting and conventional open-cut replacement techniques. She has assessed and designed more than 100 miles of pipeline ranging in size from 2-inches to 96-inches in diameter. Jennifer successfully manages projects from conception to completion, many of which required special attention to sensitive issues, including endangered species habitat preservation. Jennifer is a recognized expert in the

field of trenchless technology and focuses on using the most advanced technologies in the field. Jen provided QA/QC of the IRWD Sewer Siphon Improvements Project.



30% of time on Project

Oliver Saeby, PE | Design Engineer (Laguna Hills, CA)
Oliver's water-related project experience includes sewer infrastructure design and facility site layout, wastewater operations analysis, and cost estimating. He was the design engineer for IRWD's sewer Siphon Improvement Project and has focused on sewer infrastructure planning for the Town of Somers, NY, and Coachella Valley Water District, and planning and execution support services for Encina Wastewater Authority.



5% of time on Project

Cathy Greenman, PE | Modeling (Home Office, CA)
Cathy specializes in wastewater collection system planning and hydraulic modeling projects. She has over 20 years' experience with numerous hydraulic modeling software, including InfoSWMM, InfoWorks, MIKE URBAN, H2OMap, and EPA SWMM 5, and is skilled in data analysis and report writing. Cathy has worked on modeling projects for OC SAN, City of Santa Ana, City of San Diego, City of Escondido, City of Pomona and many others.



5% of time on Project

Tom Scalese, PE | Structural Engineer (Montana)
Tom is a Professional Engineer with over 12 years of experience in structural engineering. His experience includes municipal wastewater design, industrial steel and concrete design, cast in place concrete tankage and temporary shoring. Tom is experienced with both new construction, structural evaluation, and reinforcing existing structures. His design proficiencies consist of classical approximations, computer aided analysis, and 3D modeling. His project experience includes both small and large projects for municipal, state, and private clients throughout the country. He was the structural engineer for the IRWD Sewer Siphon Improvements Project.

Subconsultants

V&A Consulting Engineers

V&A Consulting Engineers, Inc. (V&A) provides water, wastewater and transit agencies with specialized engineering solutions to combat the effects of aging infrastructure. They have been supporting our clients since 1979 with corrosion engineering services, field-based condition assessments, coating systems management, collection system flow monitoring and odor control solutions. Corrosion Engineering has earned V&A a national reputation as a company providing comprehensive and specialized services to assist owners in assessing and maintaining infrastructure assets.

National Plant Services

National Plant Services (NPS) has been active in the sewer maintenance business for 40 years and have an experienced and dedicated staff that will make this project a success. They have significant experience in all aspects of siphon and sewer system inspection,

maintenance, and rehabilitation, which has made them true Sewer Experts. The NPS team is experienced in working on dozens of large and complex projects each year, and have developed a seamless way to plan, schedule, inspect, and analyze all work in scope.

Calvada Surveying

Calvada Surveying was established in 1989 by Armando DuPont, PLS and maintains a company headquarters in Corona, California. The firm's long-standing philosophy has been to utilize the most advanced surveying technology available to produce highly accurate results for our clients and set the standard for excellence within the surveying industry. Because of this, they have developed an outstanding reputation for providing timely, high-quality service to cities and agencies throughout California.

Traffic Control Engineering

Traffic Control Engineering, Inc. was organized on January 25, 1989 and specializes in preparing traffic control plans and detour plans for construction work in or about public streets, conducting traffic impact studies and alternative alignment evaluation for construction of various underground utility lines, and preparing traffic control plans for special events. Mr. David Kuan, PE, principal of the firm, has extensive working experience with both public and private sectors. Since its inception, the Firm has prepared traffic control plans for thousands of different projects, ranging from street improvements, storm drains, sewer lines, water/reclaimed water pipelines, drilling excavations, raised median landscaping, bus bays, oil pipelines, soundwalls, freeway widening, utility pipelines, fiber optic conduits, bike ride design and special event planning.



C. Experience

Engineering Design Services for the Sewer Siphon Improvements Phase II

C | Experience

Woodard & Curran's engineers are experts in the analysis and design of sewer infrastructure projects and are nationally recognized in the water/wastewater industry. We prepare high-quality and cost-effective designs that result in facilities that are easy-to-operate and maintain. In achieving a successful project, our design engineers identify key issues early on and work with our client's engineers and operations staff to identify their preferences and design standards. Woodard & Curran is familiar with IRWD preferences and design standards having worked on recent IRWD projects including the Sewer Siphon Improvements Phase I project and the Woods Sewer Improvements Study.

Representative Projects

The following table lists representative projects completed by our firm highlighting key requirements similar to this project. Following the table are selected detailed project descriptions and references.

Client/Project	SS Hydraulic Assessment	Sewer Condition Assessment	Sewer Infrastructure Rehab	SS Prelim/Final Design	SS Cleaning/CCTV
IRWD Sewer Siphon Improvements Phase 1	✓	✓	✓	✓	✓
Anaheim/Broadway Sewer Siphon Rehabilitation Design	✓		✓	✓	
Santa Rosa Master Plan and Condition Assessment	✓	✓			✓
Padre Dam Inverted Siphon Assessment	✓	✓			✓
Santa Clara Guadalupe Siphon Rehabilitation	✓		✓	✓	
Santa Clara Trimble Road Rehabilitation	✓	✓	✓	✓	
Santa Clara Walsh Trunk Sewer	✓	✓	✓	✓	✓
San Jose Sanitary Sewer Master Plan and Siphon Analysis	✓	✓	✓	✓	✓
Eastern MWD Flow Monitoring & Model Calibration	✓	✓	✓		
EBMUD Data Assessment and Modeling Project	✓	✓	✓		
OCSD Newhope-Placentia Trunk Replacement	✓	✓	✓		✓
OCSD Western Region Rehabilitation Study	✓	✓			
OCSD Collection System Capacity Study	✓	✓	✓	✓	
San Jose Sanitary Sewer Master Plan and Siphon Analysis	✓	✓	✓		
Santa Ana Sewer and Condition Assessment Master Plan	✓	✓			
SAWPA Inland Empire Brine Line	✓	✓	✓		
Stockton Tuxedo Avenue Sewer	✓	✓	✓	✓	



Irvine Ranch Sewer Siphon Improvements Phase 1 | Irvine Ranch Water District

Reference: Malcolm Cortez, Principal Engineer, Irvine Ranch Water District; 949.453.5854, cortez@irwd.com

Completion Date: 2019 (Design Completion); 2022 (Construction Completion)

Design Fee: $629,000 **Construction Cost:** $8.5M

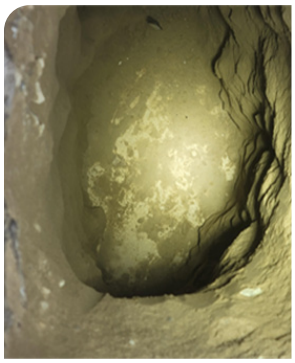
Team Members Involved: Kathleen Higgins, Glenn Hermanson, Jennifer Glynn, Justin Kraetsch, Oliver Saeby

Provided condition assessment, analysis, and rehabilitation design of the four most critical sewer siphons within IRWD's system.

IRWD completed a preliminary assessment of 19 inverted sewer siphons. Woodard & Curran was retained to design improvements to four of the siphons. The purpose of the Project was to design and construct improvements to increase the reliability and operability. The siphons are located near high traffic residential and commercial properties which require a high level of consideration during design to minimize interruption to the property occupants during construction. The Project also required easement and permitting coordination with the City of Irvine, County of Orange, Southern California Regional Rail Authority, the City of Tustin and various utility agencies. Traffic control plans were developed for work in accordance with local jurisdictional requirements as part of the permit approval process.

Project Highlights:

- → Four critical sewer siphons, aging and blocked with debris
- → Hydraulic/capacity evaluation
- → Inlet/outlet structures condition assessment
- → IRWD design and specifications
- → Agency permits and coordination
- → Cleaning, CCTV, and cured-in-place pipe (CIPP) lining specifications



Magnolia & Broadway Sanitary Sewer Improvements | City of Anaheim

Reference: Lori Ishigo, Associate Engineer, City of Anaheim; 714.765.5268; lishigo@anaheim.net

Completion Date: 2022 (Design Completion); 2023 (Construction Completion)

Design Fee: $153,000 **Construction Cost:** $600,000

Team Members Involved: Kathleen Higgins, Mirko Maher, Glenn Hermanson, Jennifer Glynn, Justin Kraetsch

Woodard & Curran provided design services for a broken siphon in the City's system.

Woodard & Curran was selected to provide design services for a high-priority sewer improvement project that addresses a broken 8-inch diameter inverted sewer siphon crossing underneath a 93-inch diameter concrete storm drain in the City of Anaheim's Broadway

collection system. Woodard & Curran evaluated improvement alternatives consisting of repairing the broken siphon, construction of a new siphon, and constructing a new gravity sewer line to replace the siphon. The preliminary design report and final design plans, specifications, and cost estimates were developed for the recommended improvements. The critical components of the design include construction of a new 8-inch VCP sewer underneath the large 93-inch storm, minimizing sewer service interruptions, traffic control, and utility coordination. The final design is scheduled to be completed in August 2022 and construction in January 2023.

Project Highlights:

- → Challenging clearances between pipes at utility crossings
- → Fast track schedule
- → Rehabilitating a broken siphon



Master Plan and Condition Assessment of Siphons | City of Santa Rosa

Reference: Jason Roberts, Supervising Engineer, City of Santa Rosa; 707.543.3857

Completion Date: 2022

Fee: $2.5M

Team Members Involved: Jen Glynn, Glenn Hermanson, Justin Kraetsch

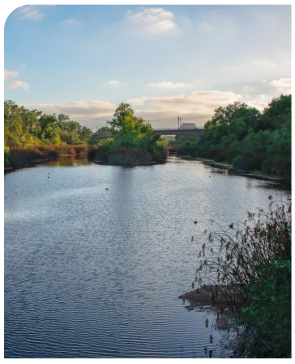
Woodard & Curran provided inspection for 32 siphons in the City's system.

The large diameter trunk sewer network and siphons are some of the most critical components of the City of Santa Rosa's sanitary sewer system. As part of this overall master planning project, Woodard & Curran was selected to provide inspection planning, inspection, condition assessment, remaining useful life predications, and project prioritization for 13 miles of trunk sewer ranging in sizes from 33 - 66" in diameter. In addition, we provided inspection for 32 siphons in the City's system. Inspections of the trunk sewer and siphons were conducted using a combination of CCTV and sonar.

Inspection challenges included high peak daily water levels, depth of sediment, flow velocities, and location and access for inspection equipment as a majority of the trunk sewers are located in easements outside of the public right-of-way. In addition, we conducted man-entry inspections and physical testing at nine large structures along the trunk sewer system. Once the condition of the assets was determined, we then determined remaining useful life projections, and projects were identified and prioritized. A cost estimate for each identified project was provided. We leveraged our experience and industry knowledge to select appropriate rehabilitation solutions that balanced correctly addressing pipe condition, assuring constructability, minimizing permitting, and maximizing the use of the City's available budget. The City used these recommendations to develop a CIP for future maintenance and repairs of their trunk sewer system.

Project Highlights:

- → Condition assessment and inspection of 32 siphons
- → Rehabilitation solutions identified
- → Operations and maintenance considerations for long term success



Inverted Siphon Capacity and Condition Assessment | Padre Dam Municipal Water District (PDMWD)

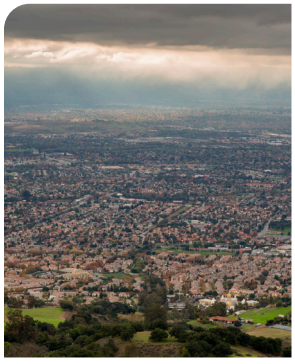
Reference: Seval Sen, Engineer, Padre Dam Municipal Water District; 619.258.4631
Completion Date: 2018
Fee: $148,000
Team Members Involved: Jen Glynn, Glenn Hermanson

Woodard & Curran conducted capacity and condition assessment for this trunk pipeline, a double barrel inverted siphon that crosses under the San Diego River. The inverted siphons are 16-inch and 14-inch DIP.

Woodard & Curran provided condition and capacity assessment of an inverted siphon (built in 1975) under the San Diego River. Approximately 1,800 lineal feet of asbestos cement pipe with ductile iron pipe transitions, inspection, cleaning and maintenance of the siphon was challenging due to the system's characteristics; moreover, PDMWD wanted a firm understanding of the condition and capacity of the infrastructure for upcoming projects. Services included flow monitoring, hydraulic modeling, and preparation of a Condition Assessment Work Plan to assess the overall condition and remaining useful life of the siphon system. Work included installation of flow monitoring equipment on the siphons and obtained flow monitoring data on each siphon for a two-week period per siphon.

Project Highlights:

- → Condition assessment and inspection of two inverted siphons
- → Hydraulic modeling
- → Operations and maintenance considerations for long term success



Guadalupe Siphon Rehabilitation | City of Santa Clara

Reference: Falguni Amin, Principal Engineer, City of Santa Clara; 408.615.3015
Completion Date:2013
Design Fee: $44,000
Team Members Involved: Glenn Hermanson, Jen Glynn, Cathy Greenman

Design was completed on a 14-day fast-track schedule.

Woodard & Curran designed the rehabilitation improvements to two siphons under the Guadalupe River. The design included CIPP rehabilitation of two parallel 24-inch siphon pipes and two parallel 15-inch diameter siphon pipes. Prior to finalizing the siphon designs, we performed a hydraulic analysis on the operations of the siphons which determined the elevation of the weir boards that were then placed in front of two pipelines. The dry weather

flow was conveyed in two barrels which reduced odors and sediment deposition and then during a wet weather event the higher flows would overtop the weirs and be conveyed in all four barrels. The calculated surcharge had minor impacts upstream. Woodard & Curran overcame the challenges of accessing private property for critical construction activities by anticipating and applying for an encroachment permit since Guadalupe River and its levees are within SCVWD's right-of-way.

Project Highlights:

- → Design and rehabilitation of two siphons
- → Hydraulic modeling
- → Fast-track schedule



Trimble Road Sanitary Sewer Rehabilitation | City of Santa Clara

Reference: Falguni Amin, Principal Engineer, City of Santa Clara; 408.615.3015

Completion Date: 2013 (Design Completion); 2016 (Construction Completion)

Design Fee: $479,000 **Construction Cost:** 8.6M

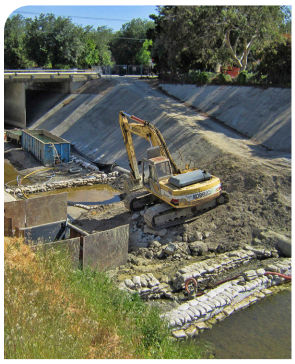
Team Members Involved: Glenn Hermanson, Cathy Greenman

Design included the rehabilitation of two inverted siphon, one air jumper, and one grit trap.

After performing an alternatives analysis, Woodard & Curran provided design for rehabilitation of existing 33-inch and 48-inch sections of a gravity sanitary sewer trunk for Santa Clara. The project had two siphons. One siphon crossed under Highway 101 and the second siphon crossed under a lager storm drain culvert. Both siphons were rehabbed using cured-in-place pipe. The air jumper on the second siphon was inspected during the predesign phase and rehabbed using cured-in-place pipe. Woodard & Curran designed a grit trap upstream of these siphons to decrease the amount of sediment that will be trapped in the siphons. The grit trap has been on-line for 4 years and the City's maintenance crews are very happy with its performance. One of the major components of the project was 4,440 feet of 48-inch CIPP and the bypass pumping plans necessary to support this work.

Project Highlights:

- → Design and rehabilitation of two inverted siphons
- → Bypass pumping and CIPP lining
- → Operations and maintenance considerations for long term success included installation of a Grit trap.



Walsh Avenue Trunk Sewer | City of Santa Clara

Reference: Falguni Amin, Principal Engineer, City of Santa Clara; 408.615.3015
Completion Date: 2012
Design Fee: $1.3M **Construction Cost:** $8.2M
Team Members Involved: Glenn Hermanson, Jennifer Glynn

Design included a new inverted siphon across San Tomas Aquino Creek.

The Walsh Avenue Trunk Sewer Improvements Project consisted of a feasibility study/ preliminary design, final design, and construction support services for new 30-inch sanitary sewer improvements along Walsh Avenue. The critical crossing for this project was the inverted siphon under San Tomas Aquino Creek. Our design was a two barrel design (18-inches each) with a 28-inch air jumper. The pipe material selected for the siphon and air jumper was HDPE to eliminate the potential for future corrosion. A grit trap was constructed upstream of the siphon to capture large grit particles. The siphon has been on-line since 2012. Maintenance crews empty the grit trap every 6-months. Tasks for the project included mapping and surveying, permitting, feasibility study, preliminary design, 65% design, 95% design, preparation of bid documents, bid phase services, construction phase services, and project close-out.

Project Highlights:

- → Preliminary design and final design of new inverted siphon
- → Permitting and agency coordination
- → Operations and maintenance considerations for long term success included installation of a Grit trap.

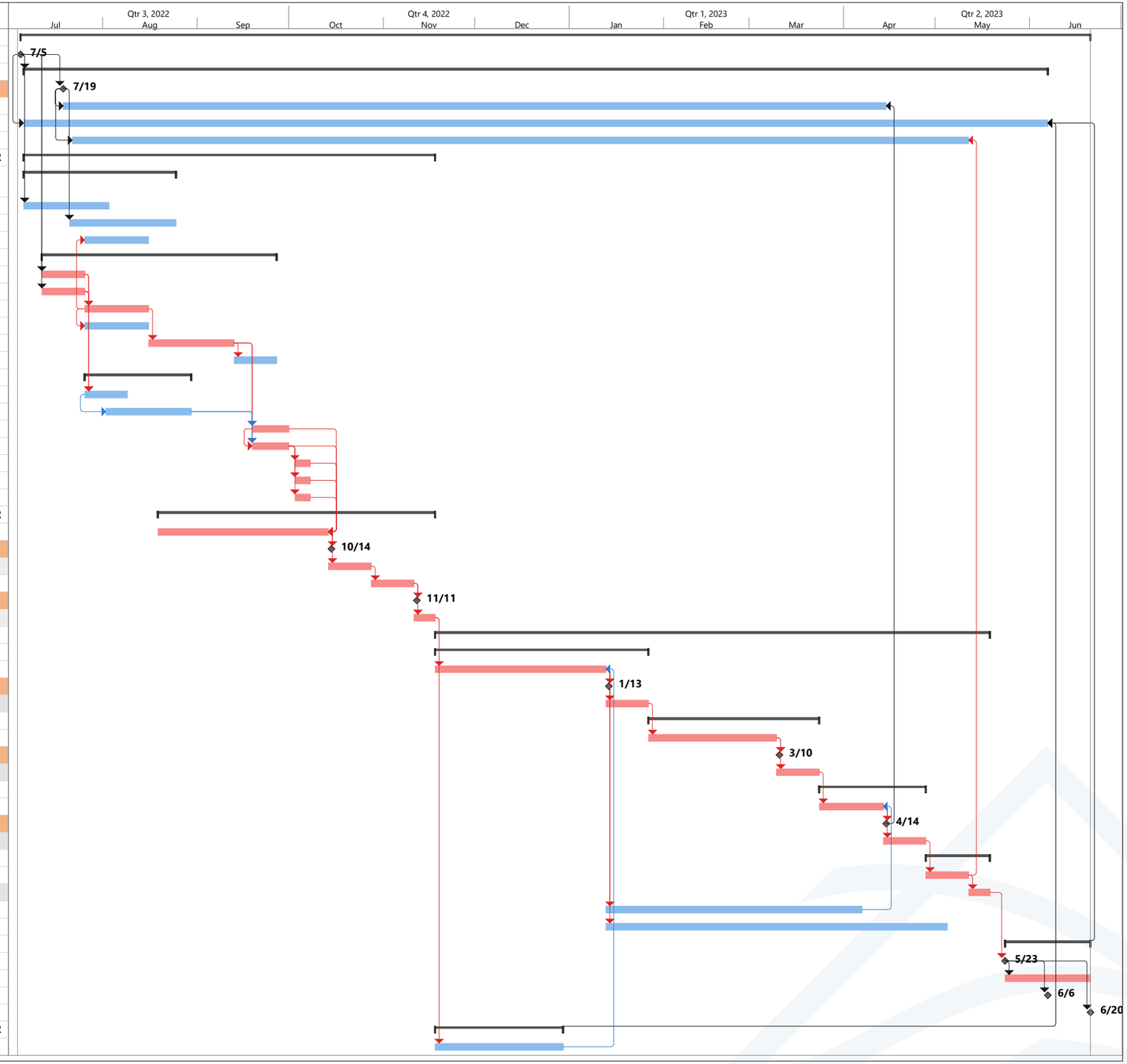


D. Schedule

D | Schedule

Presented on the following page is Woodard & Curran's schedule for the project. The scope of work, provided in Section 1 of our proposal, was applied to the development of this detailed project schedule. The major tasks and subtasks from the scope of work, including IRWD review time after submittals, are included herein.

ID	Task Name	Duration	Start	Finish
1	**Sewer Siphon Improvements Phase II**	**50.2 wks**	**Tue 7/5/22**	**Tue 6/20/23**
2	Notice to Proceed	0 days	Tue 7/5/22	Tue 7/5/22
3	**TASK 1: PROJECT MANAGEMENT**	**48 wks**	**Wed 7/6/22**	**Tue 6/6/23**
4	Kickoff Meeting/Site Meeting	0 days	Tue 7/19/22	Tue 7/19/22
5	1.1 Meetings (Kickoff and Design Workshops)	9.7 mons	Tue 7/19/22	Fri 4/14/23
6	1.2 - 1.3 Coordination & Invoicing	12 mons	Wed 7/6/22	Tue 6/6/23
7	1.4 QA/QC Plan	10.5 mons	Fri 7/22/22	Thu 5/11/23
8	**TASK 2: PRELIMINARY DESIGN**	**19.4 wks**	**Wed 7/6/22**	**Thu 11/17/22**
9	**2.1 Data Collection and Review, Utility Info, Topographic Survey & LiDAR**	**7.2 wks**	**Wed 7/6/22**	**Wed 8/24/22**
10	Data & Utility Requests and Review	4 wks	Wed 7/6/22	Tue 8/2/22
11	Topographic Survey - Field Survey & Mapping	5 wks	Thu 7/21/22	Wed 8/24/22
12	LiDAR / 3D Scanning	3 wks	Tue 7/26/22	Mon 8/15/22
13	**2.2 Condition Assessment**	**11 wks**	**Tue 7/12/22**	**Mon 9/26/22**
14	Encroach. Permits - Testing & Flow Meters	2 wks	Tue 7/12/22	Mon 7/25/22
15	Work Plan Development and Review	2 wks	Tue 7/12/22	Mon 7/25/22
16	Condition Assessment Field Testing	3 wks	Tue 7/26/22	Mon 8/15/22
17	Air Jumper Air Flow Monitoring & CCTV	3 wks	Tue 7/26/22	Mon 8/15/22
18	Prepare and Submit Draft Report	4 wks	Tue 8/16/22	Mon 9/12/22
19	Prepare and Submit Final Report	2 wks	Tue 9/13/22	Mon 9/26/22
20	**2.3 Hydraulic Analysis**	**5 wks**	**Tue 7/26/22**	**Mon 8/29/22**
21	Flow Monitoring Data Collection	2 wks	Tue 7/26/22	Mon 8/8/22
22	Modeling	4 wks	Tue 8/2/22	Mon 8/29/22
23	**2.4 Siphon O&M Program**	**2 wks**	**Mon 9/19/22**	**Fri 9/30/22**
24	**2.5 Develop Recommendations for Final Design**	**2 wks**	**Mon 9/19/22**	**Fri 9/30/22**
25	**2.6 Preliminary Construction Cost**	**1 wk**	**Mon 10/3/22**	**Fri 10/7/22**
26	**2.7 Preliminary Construction Schedule**	**1 wk**	**Mon 10/3/22**	**Fri 10/7/22**
27	**2.8 Preliminary List of Drawings**	**1 wk**	**Mon 10/3/22**	**Fri 10/7/22**
28	**2.9 Preliminary Design Report (PDR)**	**13 wks**	**Fri 8/19/22**	**Thu 11/17/22**
29	Prepare and Submit Draft PDR	8 wks	Fri 8/19/22	Thu 10/13/22
30	Draft PDR Workshop	0 days	Fri 10/14/22	Fri 10/14/22
31	IRWD Review of Draft PDR	2 wks	Fri 10/14/22	Thu 10/27/22
32	Prepare and Submit Final PDR	2 wks	Fri 10/28/22	Thu 11/10/22
33	Final PDR Workshop	0 wks	Fri 11/11/22	Fri 11/11/22
34	IRWD Review of Final PDR	1 wk	Fri 11/11/22	Thu 11/17/22
35	**TASK 3: FINAL DESIGN**	**26 wks**	**Fri 11/18/22**	**Thu 5/18/23**
36	**3.1 - 3.3 60% Design PS&E**	**10 wks**	**Fri 11/18/22**	**Thu 1/26/23**
37	Prepare and Submit 60% Design PS&E	8 wks	Fri 11/18/22	Thu 1/12/23
38	60% Design Preview Workshop	0 days	Fri 1/13/23	Fri 1/13/23
39	IRWD Review of 60% Submittal	2 wks	Fri 1/13/23	Thu 1/26/23
40	**3.1 - 3.3 90% Design PS&E**	**8 wks**	**Fri 1/27/23**	**Thu 3/23/23**
41	Prepare and Submit 90% Design PS&E	6 wks	Fri 1/27/23	Thu 3/9/23
42	90% Design Preview Workshop	0 days	Fri 3/10/23	Fri 3/10/23
43	IRWD Review of 90% Submittal	2 wks	Fri 3/10/23	Thu 3/23/23
44	**3.1 - 3.3 100% Design PS&E**	**5 wks**	**Fri 3/24/23**	**Thu 4/27/23**
45	Prepare and Submit 100% Design PS&E	3 wks	Fri 3/24/23	Thu 4/13/23
46	100% Design Preview Workshop	0 days	Fri 4/14/23	Fri 4/14/23
47	IRWD Review of 100% Submittal	2 wks	Fri 4/14/23	Thu 4/27/23
48	**3.1 - 3.3 Final Design Deliverable**	**3 wks**	**Fri 4/28/23**	**Thu 5/18/23**
49	Prepare and Submit Final Deliverable	2 wks	Fri 4/28/23	Thu 5/11/23
50	IRWD Backcheck	1 wk	Fri 5/12/23	Thu 5/18/23
51	**3.4 Permitting**	**12 wks**	**Fri 1/13/23**	**Thu 4/6/23**
52	**3.5 CEQA Documentation Support**	**16 wks**	**Fri 1/13/23**	**Thu 5/4/23**
53	**TASK 4: ADDENDA PREP. & PRE-BID MEETING**	**4 wks**	**Tue 5/23/23**	**Tue 6/20/23**
54	Bid Advertisement	0 days	Tue 5/23/23	Tue 5/23/23
55	Prepare Addenda	4 wks	Wed 5/24/23	Tue 6/20/23
56	Pre-Bid Meeting	0 days	Tue 6/6/23	Tue 6/6/23
57	Bid Opening	0 days	Tue 6/20/23	Tue 6/20/23
58	**TASK 5: OPTIONAL TASKS**	**6 wks**	**Fri 11/18/22**	**Thu 12/29/22**
59	5.1 Siphon Barrel Cleaning, Dewatering, & CCTV	6 wks	Fri 11/18/22	Thu 12/29/22





Sections F - J

Engineering Design Services for the Sewer Siphon Improvements Phase II

F | Joint Venture

For this project, Woodard & Curran proposes to utilize **V&A Consulting Engineers, National Plant Services, Calvada Surveying,** and **Traffic Control Engineering** as subconsultants.

V&A Consulting Engineers

V&A Consulting Engineers, Inc. (V&A) provides water, wastewater and transit agencies with specialized engineering solutions to combat the effects of aging infrastructure. They have been supporting our clients since 1979 with corrosion engineering services, field-based condition assessments, coating systems management, collection system flow monitoring and odor control solutions. Corrosion Engineering has earned V&A a national reputation as a company providing comprehensive and specialized services to assist owners in assessing and maintaining infrastructure assets.

National Plant Services

National Plant Services (NPS) has been active in the sewer maintenance business for 40 years and have an experienced and dedicated staff that will make this project a success. They have significant experience in all aspects of siphon and sewer system inspection, maintenance, and rehabilitation, which has made them true Sewer Experts. The NPS team is experienced in working on dozens of large and complex projects each year, and have developed a seamless way to plan, schedule, inspect, and analyze all work in scope.

Calvada Surveying

Calvada Surveying was established in 1989 by Armando DuPont, PLS and maintains a company headquarters in Corona, California. The firm's long-standing philosophy has been to utilize the most advanced surveying technology available to produce highly accurate results for our clients and set the standard for excellence within the surveying industry. Because of this, they have developed an outstanding reputation for providing timely, high-quality service to cities and agencies throughout California.

Traffic Control Engineering

Traffic Control Engineering, Inc. was organized on January 25, 1989 and specializes in preparing traffic control plans and detour plans for construction work in or about public streets, conducting traffic impact studies and alternative alignment evaluation for construction of various underground utility lines, and preparing traffic control plans for special events. Mr. David Kuan, PE, principal of the firm, has extensive working experience with both public and private sectors. Since its inception, the Firm has prepared traffic control plans for thousands of different projects, ranging from street improvements, storm drains, sewer lines, water/reclaimed water pipelines, drilling excavations, raised median landscaping, bus bays, oil pipelines, soundwalls, freeway widening, utility pipelines, fiber optic conduits, bike ride design and special event planning.

G | Conflict of Interest

Woodard & Curran does not have any actual, apparent or potential conflicts of interest that may result from the performance of any of the services under this contract.

H | Contract

Woodard and Curran does not have any exceptions to IRWD's Professional Services Agreement.

Insurance

Woodard & Curran Insurance Coverage:

Insurance Required	Limit	Policy Number	Company
Commercial General Liability	$1 million per occurrence	6014561812	Continental Casualty Company
Personal & Adv Injury	$1 million per occurrence	6014561812	Continental Casualty Company
General Aggregate	$2 million per project/ location	6014561812	Continental Casualty Company
Products – COMP/OP AGG	$2 million per project/ location	6014561812	Continental Casualty Company
Automotive Liability	$1 million per accident	6014561843	National Fire Insurance Company of Hartford
Workers Compensation	$1 million per occurrence	6017075447	Transportation Insurance Company
Professional Liability	$1 million per claim/$2 million aggregate	114135520	Continental Casualty Company

Note: Woodard & Curran's current insurance policy is effective 02/23/2022 to 02/23/2023. A submittal from our insurance carrier can be provided to IRWD upon request.

J | Public Work Requirement

Woodard & Curran - California Department of Industrial Relations (DIR): 1000046744, expires 6/30/2022.

V&A Consulting Engineers - California Department of Industrial Relations (DIR): 1000007205, expires 6/30/2025

National Plant Services - California Department of Industrial Relations (DIR): 1000002703 expires 6/30/2022

Calvada Surveying - California Department of Industrial Relations (DIR): 1000002703 expires 6/30/2022

24422 Avenida de la Carlota
Suite 180
Laguna Hills, CA 92653

949.420.5300

woodardcurran.com

Woodard & Curran

Irvine Ranch WATER DISTRICT





24422 Avenida de la Carlota
Suite 180
Laguna Hills, CA 92653
www.woodardcurran.com

T 800.426.4262
T 949.420.5300

June 13, 2022

Mr. Michael Lu
Irvine Ranch Water District
Michelson Water Recycling Plant
3512 Michelson Drive
Irvine, CA 92612

Re: **Updated Fee Proposal for Engineering Design Services for the Sewer Siphon Improvements Phase II**

Dear Mr. Lu:

Irvine Ranch Water District (IRWD) is seeking engineering services for the Engineering Design Services for the Sewer Siphon Improvements Phase II. Woodard & Curran has a full understanding of IRWD's project and unmatched qualifications for sewer siphon design. Based on our review of the request for proposal and discussions and meetings with IRWD staff, we have developed the attached fee proposal that corresponds to the scope of work in our proposal.

Included in the attached fee proposal are costs for labor, subconsultants, reproduction, and other direct costs for the Preliminary Design Report and Final Design. Also included is our standard rate table of hourly rates.

We are committed to working with IRWD to make this important project a success. If you have any questions about our fee proposal, please contact me at Khiggins@woodardcurran.com or (949) 420-5313 or Mirko Maher at Mmaher@woodardcurran.com or (925) 212-3757.

Sincerely,

WOODARD & CURRAN, INC.

Kathleen Higgins

Kathleen Higgins, PE
Principal-in-Charge

Woodard & Curran

Irvine Ranch Water District
Sewer Siphon Improvements Phase II

Fee Estimate
6/13/2022

Tasks	Labor											Outside Services						ODCs		Total
	Kathleen Higgins	Mirko Maher	Justin Kraetsch	Glen Hermanson/ Jen Glynn	Tom Scalese	Oliver Saeby	Cathy Greenman	Drafter	Admin.	Total Hours	Total Labor Costs (1)	V & A	National Plant	Calvada	TCE	Subtotal	Sub Consultant Total Cost (2)	ODCs	Total ODCs (3)	Total Fee
	PIC	PM	PE	Tech Advisor/ QA/QC	Structural Engineering	Design Engineer	Modeling	CAD	Admin.			Condition Assessment	CCTV	Survey	Traffic Control					
	$330	$315	$245	$330	$260	$205	$295	$170	$120											
Task 1: Project Management																				
1.1 Meetings	2	24	24		24					74	$20,340								$0	$20,340
1.2 Coordination and Project Status Reports		48	48			48				144	$36,720								$0	$36,720
1.3 Project Invoicing		12	24						12	48	$11,100								$0	$11,100
1.4 QA/QC Plan	1	4	8	62	48	1	1			125	$36,990								$0	$36,990
Subtotal Task 1:	3	88	104	62	72	49	1	0	12	391	$105,150	$0	$0	$0	$0	$0	$0	$0	$0	$105,150
Task 2: Preliminary Design																				
2.1 Data Collection and Review, Utility Information & Topographic Survey and Laser 3D Scanning		4	16	2		48				70	$15,680	$16,855		$41,072		$57,927	$60,823		$0	$76,503
2.2 Condition Assessment		2	12	8		16				38	$9,490	$128,887				$128,887	$135,331		$0	$144,821
2.3 Hydraulic Analysis			8	4		24	42			78	$20,590	$29,729				$29,729	$31,215		$0	$51,805
2.4 Siphon Operation and Maintenance (O&M) Program		4	16	4		24				48	$11,420					$0	$0		$0	$11,420
2.5 Recommend Improvements for Final Design		4	32	2		24				62	$14,680					$0	$0		$0	$14,680
2.6 Preliminary Opinion of Probable Construction Cost			8	2		24				34	$7,540					$0	$0		$0	$7,540
2.7 Preliminary Construction Schedule		2	16	4						22	$5,870					$0	$0		$0	$5,870
2.8 Preliminary List of Drawings		2	8			8				18	$4,230					$0	$0		$0	$4,230
2.9 Preliminary Design Report (PDR)	2	24	40	8	48	80		54	4	260	$59,200					$0	$0		$0	$59,200
Subtotal Task 2:	2	42	156	34	48	248	42	54	4	630	$148,700	$175,471	$0	$41,072	$0	$216,543	$227,369	$0	$0	$376,069
Task 3: Final Design																				
3.1.1 60% Final Design Plans		16	96	4	40	160		460		776	$151,280				$20,000	$20,000	$21,000	$200	$220	$172,500
3.1.2 90% Final Design Plans	2	24	100	4	40	120		400		690	$137,040				$8,000	$8,000	$8,400	$100	$110	$145,550
3.1.3 100% Final Design Plans		8	32	2	20	80		160		302	$59,820				$4,000	$4,000	$4,200	$100	$110	$64,130
3.1.4 Final Design Plans		8	16	1	12	24		60		121	$25,010				$2,000	$2,000	$2,100	$50	$55	$27,165
3.2 Project Manual			72	8	40	40				160	$38,880					$0	$0		$0	$38,880
3.3 Opinion of Probable Construction Cost		4	8	4	24	24				64	$15,700					$0	$0		$0	$15,700
3.4 Permits		8	48	8		60				124	$29,220					$0	$0		$0	$29,220
3.5 CEQA Documentation Support		8	8			8				24	$6,120					$0	$0		$0	$6,120
Subtotal Task 3:	2	76	380	31	176	516	0	1080	0	2261	$463,070	$0	$0	$0	$34,000	$34,000	$35,700	$450	$495	$499,265
Task 4: Addenda Preparation and Pre-Bid Meeting																				
4.1 Addenda Preparation and Pre-bid Meeting		6	27		12	12		22		79	$17,825					$0	$0	$50	$55	$17,880
Subtotal Task 4:	0	6	27	0	12	12	0	22	0	79	$17,825	$0	$0	$0	$0	$0	$0	$50	$55	$17,880
TOTAL	**7**	**212**	**667**	**127**	**308**	**825**	**43**	**1156**	**16**	**3361**	**$734,745**	**$175,471**	**$0**	**$41,072**	**$34,000**	**$250,543**	**$263,069**	**$500**	**$550**	**$998,364**
Task 5: Optional Tasks																				
5.1 Siphon Barrel Cleaning, Dewatering, and CCTV Inspection		8	24	8		16				56	$14,320		$260,000			$260,000	$273,000		$0	$287,320
Optional Tasks Subtotal:	0	8	24	8	0	16	0	0	0	56	$14,320	$0	$260,000	$0	$0	$260,000	$273,000	$0	$0	$287,320
TOTAL with Optional Tasks	**7**	**220**	**691**	**135**	**308**	**841**	**43**	**1156**	**16**	**3417**	**$749,065**	**$175,471**	**$260,000**	**$41,072**	**$34,000**	**$510,543**	**$536,069**	**$500**	**$550**	**$1,285,684**

1. The individual hourly rates include salary, overhead and profit.
2. Subconsultants will be billed at actual cost plus 5%.
3. Other direct costs (ODCs) such as reproduction, delivery, mileage (rates will be those allowed by current IRS guidelines), and travel expenses, will be billed at actual cost plus 10%.
4. Additional Woodard & Curran staff may perform work on the project, based on our standard billing rate schedule attached.
5. Although the Scope of Services is broken down into tasks and subtasks, the fee for each task is not an exact estimate. Woodard & Curran reserves the ability to adjust the budgets within and amongst tasks to balance the overall level of effort. Woodard & Curran will not exceed the total contracted budget without authorization from the District.

Woodard & Curran

Rate Schedule

Municipal Standard 2022

STAFF TYPE	HOURLY RATE
Project Assistant	$120
Billing Manager	$140
Designer 1	$140
Graphic Artist	$140
Graphics Manager	$140
Marketing Assistant	$140
Marketing Manager	$140
Senior Accountant	$140
Senior Project Assistant	$140
Software Engineer 1	$165
Designer 2	$170
Designer 3	$175
Senior Software Developer	$175
Engineer 1	$180
Geologist 1	$180
Planner 1	$180
Scientist 1	$180
Senior Designer	$180
Technical Specialist 1	$180
Software Engineer 2	$185
Software Engineer 3	$200
Engineer 2	$205
Geologist 2	$205
Planner 2	$205
Scientist 2	$205
Technical Specialist 2	$205
Engineer 3	$235
Geologist 3	$235
Planner 3	$235
Scientist 3	$235
Technical Specialist 3	$235
Project Engineer 1	$245
Project Geologist 1	$245
Project Planner 1	$245
Project Scientist 1	$245
Project Specialist 1	$245
Project Technical Specialist 1	$245
Project Engineer 2	$260
Project Geologist 2	$260
Project Planner 2	$260
Project Scientist 2	$260
Project Specialist 2	$260
Project Technical Specialist 2	$260
Project Manager 1	$280
Technical Manager 1	$280
Project Manager 2	$295
Technical Manager 2	$295
Senior Project Manager	$315
Senior Technical Manager	$315
National Practice Leader	$330
Senior Technical Practice Leader	$330

EXPENSES

Travel	$0.585 / mile
Other Direct Costs	At Cost Plus 10%
Subconsultants/Subcontractors	At Cost Plus 5%

NOTES

Mileage rate will change as the federal allowable rate is modified.

This rate schedule is confidential and for customer internal use only.

Note: This page is intentionally left blank.