



SPECIAL BOARD MEETING
NOTICE AND AGENDA

EAST ORANGE COUNTY WATER DISTRICT
(EOCWD)

Wednesday, August 13, 2025
East Orange County Water District
185 North McPherson Road, Orange CA 92869

5:00 p.m.

Members of the public shall be permitted to speak in-person as to both agendized and non-agendized items. Those wishing to speak may verbally indicating their desire to comment at the time the item is called. Additionally, members of the public may, but are not required to, e-mail comments to Sylvia Prado at sprado@eocwd.com up to 30 minutes before the Board meeting, and such comments shall be provided to the Board. Members of the public wishing to attend the meeting that require other reasonable modifications or accommodation to facilitate such attendance should contact Ms. Prado at (714) 538-5815 or the e-mail provided as soon as feasible before the meeting to make such request.

1. **Call Meeting to Order; Pledge of Allegiance – Director Marquez**

2. **Public Communications to the Board:** Opportunity for members of the public to comment on agendized and non-agendized items. Each speaker and comment is limited to three minutes. During this time, e-mailed comments timely submitted to Ms. Prado shall be provided to the Board. Interested speakers who verbally indicate their desire to speak during this item shall be afforded an opportunity to address the Board. At the discretion of the Board President, comments on a particular agendized item may be deferred until that item is heard

MATTERS FOR CONSIDERATION

3. **Advanced Metering Infrastructure (AMI) Project Award**
Recommendation: Approve Award to Keystone Utilities Solutions.

4. **6 MG Reservoir Preliminary Design Report Award**
Recommendation: Approve Award to Carollo.

5. **Sewer System Management Plan (SSMP) Update Adoption**
Recommendation: Approve SSMP Update.

6. **Orange County Local Agency Formation Commission (LAFCO) Municipal Service Review (MSR) Review and Comments**
Recommendation: Informational.



ADJOURNMENT

Adjourning to a Special Meeting scheduled for **September 4, 2025**, at 9:00 a.m., at East Orange County Water District, 185 N. McPherson Orange, CA 92869 or as noticed pursuant to findings of the Board.

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 East Orange County Water District Board of Directors in connection with a matter subject to discussion or consideration at an open meeting of the Board are available for public inspection in the District's office, 185 N. McPherson Road, Orange, California ("District Office"). If such writings are distributed to members of the Board less than 24 hours prior to the meeting, they will be available at the reception desk of the District Office during business hours at the same time as they are distributed to the Board members, except that if such writings are distributed less than one hour prior to, or during, the meeting, they will be available in the meeting room of the District Office.

Disability-related accommodations: The East Orange County Water District Board of Directors meeting room is wheelchair accessible. If you require any special disability-related accommodations (e.g., access to an amplified sound system, etc.) please contact Sylvia Prado in the District Office at (714) 538-5815 during business hours at least twenty-four (24) hours prior to the scheduled meeting. This agenda can be obtained in alternative format upon written request to Sylvia Prado in the District Office, at least twenty-four (24) hours prior to the scheduled meeting.

MEMO

TO: BOARD OF DIRECTORS
FROM: GENERAL MANAGER *gaj*
SUBJECT: ADVANCED METERING INFRASTRUCTURE (AMI) PROJECT AWARD
DATE: AUGUST 13, 2025

Background

Water meter reads are a critical part of the District's function, as they serve to inform customer usage for billing purposes and are used in mass water balances and system water loss calculations. The data from meter reads can be used for decision making from targeted conservation efforts to large scale infrastructure projects, such as reservoir and mainline sizing. The District currently reads meters manually every other month, relying on a technology system of handheld devices that will soon be obsolete with no on-going support.

Staff created a Request for Proposals (RFP) to provide a turnkey solution of a fully integrated Advanced Metering Infrastructure System (AMI). The RFP included requirements for equipment, installation, implementation, integration into the District's billing software, a customer portal, and training. The new system will be capable of remotely reading water meters, via point cellular technology, and transmit the information to a portal which will allow customers to monitor their real time water usage as well as District staff.

Staff sent the RFP for the AMI turnkey solution to several meter manufacturers and installation companies. Six interested parties attended the pre-proposal meeting and staff received five proposals. Staff reviewed the proposals and ranked them on the basis of approach/technology, team, experience, schedule, and cost. With all factors considered, the Keystone Utility Systems-Badger Meter team provided the highest quality proposal and staff recommends award of the project based on their team experience, product approach, schedule to complete the project, and overall excellent value. It should be noted that all the proposals showed a high level of professionalism and provided very informative and thoughtful approaches.

Budget Analysis

The District is receiving funding from the EPA Community Grants program. The grant funding is a cost sharing agreement where the EPA will cover 80% of the project costs and the District is responsible for the remaining 20%. The EPA grant funding has a maximum amount of \$1,000,000. The District's share will come from Retail Reserves.

Environmental Documentation

As part of the grant approval process, EOCWD worked with an environmental consultant to perform required notifications and environmental reviews, including cultural documentation. Based on the results of the environmental findings and per the Consultant's recommendation, Staff filed a NEPA Categorical Exemption and CEQA Notice of Exemption with the appropriate governing bodies.

Recommendation

Staff recommends that the Board award an Agreement to Keystone Utility Systems in the amount of \$804,147 to furnish a turnkey AMI solution.


Attachment(s):

Proposal scoring matrix

VENDOR SELECTION

RANKING / SCORING MATRIX							
Item	Description	Weights	Core & Main (KAMSTRUP)	HydroPro (Master Meter)	ProMeter (Diehl)	Keystone (Badger)	Metron
1	Experience / Team	20%	5	5	4	4	3
2	Work Plan / Approach	20%	3	4	4	4	4
3	Schedule / Timeline	20%	4	4	3	4	4
4	References	10%	5	5	5	5	3
5	Cost of Services	30%	3	3	4	4	5
<u>Weighted Score (Total)</u>			3.8	4.0	3.9	4.1	4.0

MEMO

TO: BOARD OF DIRECTORS
FROM: GENERAL MANAGER 
SUBJECT: 6 MG RESERVOIR PRELIMINARY DESIGN REPORT AWARD
DATE: AUGUST 13, 2025

Background

The existing Filtration Plant Reservoir has a capacity of six million gallons (6 MG) and was designed and constructed in 1963 as part of the Wholesale System. The reservoir is located south of the intersection of Jamboree Road and Handy Creek Road and access to the site is by a private access road. The site is located at the end of Handy Creek Road, on the hill immediately east of State Route 261 (SR-261). It is a rectangular concrete reservoir, which is partially buried and surrounded by an ascending slope on the east and descending slopes on the other three sides. The reservoir is approximately 280 feet by 170 feet and has a high-water elevation of 790 feet. The original roof of the reservoir was a wood roof that lasted about 10 years and was replaced with a metal roof in 1973. The asphalt planks in the reservoir are original construction and a Hypalon liner was installed in the 1980's. A section of the roof that was damaged due to high winds was replaced in 1999.

The Filtration Plant and Reservoir site was identified in the 2020 Local Hazard Mitigation Plan as being prone to seismic and wildfire risk. The site location has high seismic probability that is projected to experience events with peak ground acceleration values of 40%g. Additionally, the site lies in a "very high" wildfire susceptibility zone, which represents the highest level of wildfire risk.

Therefore, staff submitted a grant application for consideration of funding under the Hazard Mitigation Grant Program in 2021. The scope of the project covered replacement of the facility. Although there was no official approval of the grant, staff continued to pursue solutions to mitigate the issue but was in a holding pattern. The Filtration Building was demolished in early 2023 and the site continued to be used for materials and equipment storage. In late 2024, staff received the official award of a grant for seismic reconstruction project, Phase 1, covering Preliminary Design Report (PDR) efforts.

Phase 1, or the Preliminary Design Report, will include: topographic mapping of the project site; geotechnical investigation including report with seismic parameters; establish a high-water elevation for the reservoir; evaluate if the facility shall be buried or partially buried; evaluate operations and maintenance considerations; determine environmental documentation recommendation; prepare construction cost estimates and schedule; and a report to be used as the basis for final design. This work will include coordination with our member agencies to determine the final recommendation for the site.

A Request for Proposals (RFP) to prepare a PDR for the 6 MG Reservoir was sent to six qualified consultants with previous experience preparing such documents. All six firms, AECOM, Black & Veatch, Carollo, MKN, Tetra Tech, and West Yost attended the pre-proposal meeting but only one submitted a proposal. The majority of firms declined citing insufficient resources due to timing and lack of staff availability. While only one firm submitted, staff believes Carollo would produce a high quality report. Staff reviewed the proposal, finds Carollo's proposal to be consistent with the level of effort, and recommends award of the project to Carollo based on their team, approach, in-depth local knowledge and overall excellent value.

Budget Analysis

Funding for the PDR effort will be provided in part by FEMA Hazard Mitigation Grant funds. The award requires a 25% local funds cost share, which will come from Wholesale Reserves.

Environmental Documentation

The nature of this work falls under the category of report/study and although it may lead to construction, has no direct environmental impact at this time. As stated in the terms of the grant award, Phase 1 of the project has been determined to be Categorical Excluded from the need to prepare either an Environmental Impact Statement or Environmental Assessment.

Recommendation

Staff recommends that the Board award a Professional Services Agreement in the amount of \$348,726 to Carollo Engineers, Inc. to complete the 6 MG Reservoir Preliminary Design Report.

Attachment(s)

Carollo Proposal

PROPOSAL PREPARED FOR
EAST ORANGE COUNTY
WATER DISTRICT

Wholesale System 6 MG
Reservoir Seismic
Reconstruction Project –
**Phase 1: Preliminary
Design Report**

JULY 2025



Statement of Understanding



July 24, 2025

Mr. Bobby Young, P.E., Engineering Manager
 East Orange County Water District
 185 N. McPherson Road
 Orange, CA 92869

Subject: Wholesale System 6.0 MG Reservoir Seismic Reconstruction – Proposal for Phase 1 Preliminary Design Report

Dear Mr. Young:

The East Orange County Water District (EOCWD/District) 6.0 MG Peters Canyon Reservoir is a key component of the District's Wholesale Zone (WZ) water system, used to supply your Retail Zone as well as other surrounding cities and agencies with imported water. Now the reservoir is more than 60 years old and has undergone several inspections and specific improvements including a seismic retrofit in 2000. As part of the District's 2015-2019 Master Plan Project, Carollo Engineers, Inc. (Carollo) carried out a condition assessment of the reservoir along with a seismic evaluation and developed some alternatives for replacing the reservoir. Our team offers the following benefits to EOCWD:

- **A team that is well up the learning curve:** Carollo team members who worked on the District's 2015-2019 Master Plan Project and the Peters Canyon Reservoir condition assessment and evaluation, including our lead structural engineer James Doering, are part of our current team and are well-versed in the challenges associated with reservoirs.
- **Unmatched technical expertise:** Carollo's team specializes exclusively in water reservoirs, having designed and overseen the construction of over 150 storage facilities across California. Most recently, the team, led by Miko Aivazian as project manager and Matthew Huckaby as project engineer, completed the design of a Recycled Water Reservoir and Pump Station for the City of Redlands. We bring extensive experience with all types of reservoirs - welded steel, pre-stressed, and cast-in-place - as well as associated pump stations and pipelines - allowing us to evaluate options objectively and recommend the optimal solution for the District.
- **An approach to optimize your reservoir size:** As part of the Master Plan Project we developed hydraulic models for both the Wholesale and Retail zones. These models will be updated to the latest modeling software version, and then used to evaluate the required scenarios requested in the RFP and also to optimize the future reservoir sizing needs for the District.

We appreciate the opportunity to continue to provide engineering services to EOCWD. We acknowledge receipt of Addendum No. 1 dated June 23, 2025 and the release of the Q&A on July 14, 2025. Please contact the undersigned if you have any questions about our proposal or need any additional information.

Sincerely,

CAROLLO ENGINEERS, INC.

Graham Juby, PhD, PE / Principal-in-Charge
 714-376-7231 / gjgjury@carollo.com

Miko Aivazian, PE / Project Manager
 626-379-2370 / maivazian@carollo.com

ADDENDUM NO. 1
TO REQUEST FOR PROPOSALS
FOR

WZ 6MG RESERVOIR SEISMIC RECONSTRUCTION PROJECT - PHASE 1 PDR

The proposer is directed to make the following corrections, deletions, and/or additions to the contract documents heretofore dispensed to proposer for the above project; and to note proposer's receipt of this addendum by number on the addenda acknowledgment form, which shall be submitted with the proposal:

To REQUEST FOR PROPOSALS:

1. In section VI. SCHEDULE, DELETE and REPLACE the Schedule Item as follows:

ITEM

TARGET DATE

Questions Due:

Thu, July 10, 2025, 4:00 pm

Receive Proposals from Consultants:

Thu, July 24, 2025, 4:00 pm

Committee Approval:

August 2025

First Draft (Outline):

October 2025

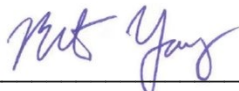
PRE-PROPOSAL MEETING:

1. Question: Is temporary water storage needed during the project?
Answer: Yes, consultant should include a temporary water storage facility to serve the existing system during construction of the new facility.
2. Question: Does environmental documentation need to be included as part of the PDR efforts?
Answer: No, Phase 1 activities have previously been determined to be Categorically Excluded under Catex Category Code A7.

END OF ADDENDUM No. 1

Addendum approved for issuance:

By:



Date: 06/23/2025

Bobby Young, Engineering Manager

From: [Courtney Malone](#)
To: [Courtney Malone](#)
Subject: FW: Wholesale System 6.0 MG Reservoir Seismic Reconstruction - DPR
Date: Wednesday, July 16, 2025 10:40:46 AM
Attachments: [image001.png](#)
[image002.png](#)
[image004.png](#)
[EOCWD_Sample_Professional_Services_Agreement.pdf](#)
[6 MG Condition Assessment \(2019\) reduced.pdf](#)
[6 MG Condition Assessment Appendices \(2019\) reduced.pdf](#)

From: Bobby Young <byoung@eocwd.com>
Sent: Monday, July 14, 2025 10:56 AM
To: Graham Juby <GJGJuby@carollo.com>
Cc: Miko Aivazian <maivazian@carollo.com>
Subject: RE: Wholesale System 6.0 MG Reservoir Seismic Reconstruction - DPR

CAUTION: This email originated from outside Carollo Engineers. Do not open attachments or click links unless you recognize the sender.

Hi Graham,

Sorry for the confusion but we will not be issuing Addendum 2. Instead, please find the attachments and answers below:

1. **Professional Services Agreement** – we did not see this included with the RFP. Can you please provide the PSA together with the other appendices mentioned in the RFP? [See attached.](#)
2. **Proposal Delivery** - please confirm how you would like to receive the proposal and separately submitted Estimated Hours. Is submittal via email for both files acceptable? [Email submittal of separate PDF files is preferred.](#)
3. **11 x 17 pages** – would it be acceptable to use 11 x 17 pages for some graphics and still count them as one page each? [Yes.](#)
4. **Cover** – can we assume that the proposal cover does not count towards the 15-page limit? [Correct, the cover does not count.](#)

Thanks,



eocwd.com

Bobby Young, P.E. Engineering Manager
185 N. McPherson Rd. Orange, Ca 92869
P: 714-538-5815 F: 714-538-0334

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From: Graham Juby <GJGJuby@carollo.com>
Sent: Monday, July 14, 2025 10:32 AM
To: Bobby Young <byoung@eocwd.com>
Cc: Miko Aivazian <maivazian@carollo.com>
Subject: RE: Wholesale System 6.0 MG Reservoir Seismic Reconstruction - DPR

Warning: This email originated from outside EOCWD. Do not click links or open attachments unless you recognize the sender and are expecting the message.

Thanks very much Bobby.

Graham.

From: Bobby Young <byoung@eocwd.com>
Sent: Monday, July 14, 2025 10:26 AM
To: Graham Juby <GJGJuby@carollo.com>
Cc: Miko Aivazian <maivazian@carollo.com>
Subject: RE: Wholesale System 6.0 MG Reservoir Seismic Reconstruction - DPR

CAUTION: This email originated from outside Carollo Engineers. Do not open attachments or click links unless you recognize the sender.

Hi Graham,

Thanks for following up. I am in the process of issuing Addendum 2, which will include the appendices/attachments and hope to send that out later today.

Thanks,



eocwd.com

Bobby Young, P.E. Engineering Manager
185 N. McPherson Rd. Orange, Ca 92869
P: 714-538-5815 F: 714-538-0334

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Project Background, Understanding, and Approach

Our technical approach for this project is based on information provided by the District in the RFP and Carollo's knowledge of the reservoir and water system.

Background

EOCWD is seeking an Engineering Consultant (Engineer) to prepare a Preliminary Design Report (PDR) for the District's WZ 6.0 MG Reservoir. The PDR will include a seismic parameters report, evaluation of construction materials (reservoir types), topographic survey and mapping, alternative construction methods analysis, along with 30% conceptual design plans of the selected alternative.

Project Approach

Based on our previous experience on similar projects and review of available information, the main objectives of this project will be to:

- Provide the District a reservoir that is seismically resilient as well as resilient to wildfires. Properly size the reservoir to demonstrate its ability to meet current and future demands.
- Create redundancy in the system so that water supply can be maintained during reservoir downtime for maintenance.
- Maintain service during construction through provision of an appropriately sized temporary tank.
- Select the most feasible reservoir type.
- Meet the District's schedule for funding.

With this in mind, the first major task of this project will be to perform hydraulic modeling and analyze several scenarios within the water system network to properly determine how much demand is needed and what size the proposed reservoir(s) should be. Once this task is performed the District will be assured that the Peters Canyon Reservoir can meet the current and future demands as well as the fire-flow water needs of the system.

The existing reservoir is a hopper bottom, concrete-lined 6.0 MG rectangular reservoir with a timber roof and is in need of replacement.

Assuming hydraulic modeling confirms that 6 MG is still the correct size, our initial assessment is based on three (3) possible alternatives:

1. One 6.0 MG Pre-stressed Circular Reservoir.
2. Two 3.0 MG Pre-stressed Reservoirs.
3. One 6.0 MG Rectangular Cast-in-Place Reservoir (two cell each 3.0 MG).

If the District desires, Carollo can also evaluate Alternatives 1 and 2 for welded steel tank(s). All three alternatives will require a temporary tank be installed to maintain service during construction. Our proposed hydraulic modeling effort will confirm the capacity of the temporary tank.

Alternative 1 – One 6.0 MG Circular Pre-stressed Concrete Reservoir (Partially Buried)

For this alternative, a circular 165-ft inside diameter reservoir will be evaluated. For a 6.0 MG storage capacity, a reservoir of this size will require a 37-ft water depth (from bottom floor to high water level). This will be slightly above the existing hydraulic grade line. A site layout of this alternative is shown on **page 4** in **Figure 1, Alternative 1**.

Preliminary design criteria is presented in the following table.

Criteria	Value
Tank Inside Diameter	165-ft
High Water Level Elevation	802-ft
Top of Foundation Elevation	765-ft
Height of Water Column	37-ft
Tank Height at Perimeter	43-ft (5-ft freeboard)

One of the biggest advantages of the pre-stressed reservoirs is in material and labor savings during construction. This alternative will be evaluated in more detail during the PDR phase and Carollo will provide construction cost estimates to allow the District to compare alternatives and select the most feasible one. The main disadvantage of a single reservoir alternative is that it does not provide redundancy in the system.

The economics of pre-stressed concrete tanks versus cast-in-place concrete tanks depends on several important factors. Pre-stressed concrete reservoirs require less wall thickness and reinforcing steel for a given height. This is due to the introduction of precompression through wrapping and stressing cable strands around the perimeter of the tank.

The pre-stressed concrete reservoirs are more economical when the wall heights are in the range of 30-ft and higher. Shallower reservoirs are more cost effective with cast-in-place concrete design.

Alternative 2 – Two 3.0 MG Circular Pre-stressed Concrete Reservoirs (Partially Buried)

Carollo understands that the District prefers to have redundancy in the system. This alternative with two smaller reservoirs provides redundancy when one reservoir needs to be taken out of service for maintenance and cleaning allowing the second reservoir to maintain service without any interruptions to water supply. This alternative also assumes a water depth of 37-ft (from reservoir floor to high water level). This will be slightly above the existing hydraulic grade line. A site layout of this alternative is shown on **page 4** in **Figure 1, Alternative 2**.

Preliminary design criteria is presented in the following table.

Criteria	Value
Tank Inside Diameter (Each)	115-ft
High Water Level Elevation	802-ft
Top of Foundation Elevation	765-ft
Height of Water Column	37-ft
Tank Height at Perimeter	43-ft (5-ft freeboard)

The main advantage of this alternative is that it provides operational redundancy at a higher initial investment/construction cost.

For both Alternatives 1 and 2, a flat roof with interior columns or a domed roof may be considered. Domed roof designs typically cost less than flat roof designs. Carollo has received some preliminary cost estimates from DN Tanks for both alternatives and these will be provided to the District during the PDR phase with a detailed overall construction cost estimate for each alternative.

Alternative 3 – One 6.0 MG Cast-In-Place Rectangular Reservoir (2 cell, each 3.0 MG)

For this alternative, we have assumed a rectangular reservoir footprint approximately the same size as the existing reservoir so it will fit within the existing reservoir footprint and within the site. This option can be constructed partially buried similar to Alternative 1 except the water level may be reduced. For this option, a two-cell reservoir is being proposed. The first cell will be constructed and placed in service. The second cell can be constructed next by extending the tank. This option will have the following geometry and preliminary design criteria.

Criteria	Value
Tank Length	260-ft (130-ft each cell)
Tank Width	160-ft
High Water Level Elevation	790-ft
Top of Foundation Elevation	765-ft
Height of Water Column	25-ft
Tank Height at Perimeter	30-ft (5-ft freeboard)

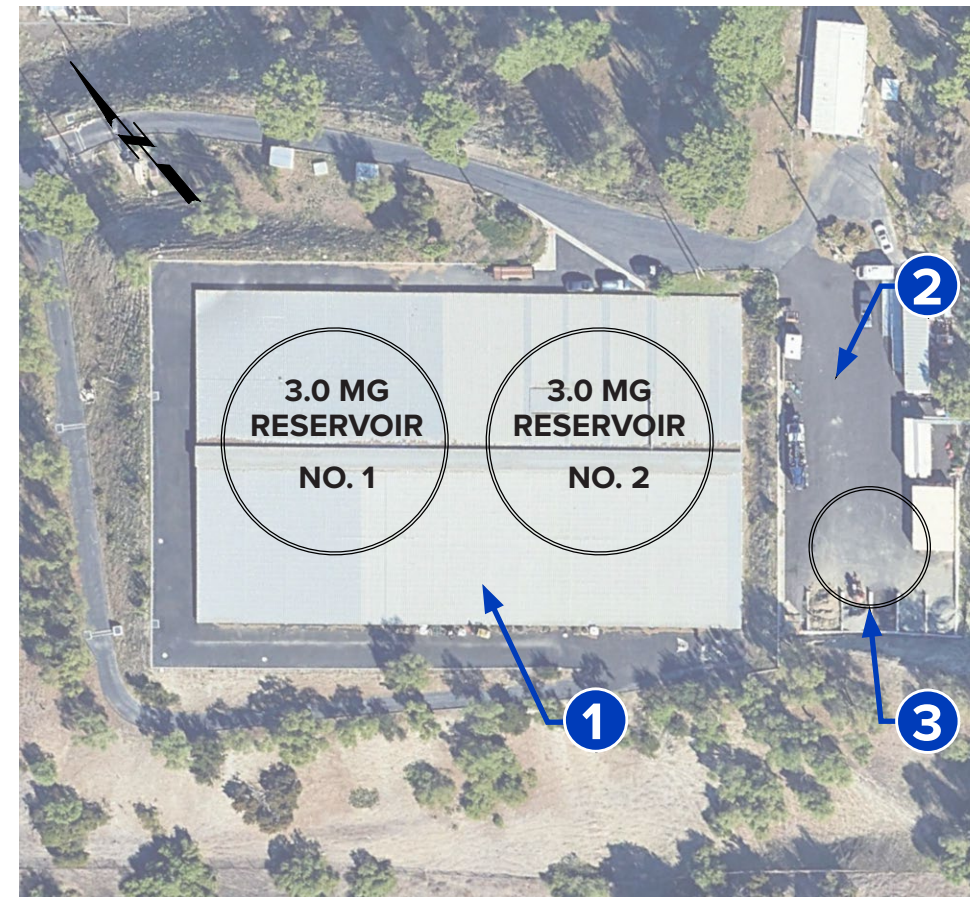
A preliminary site layout for this Alternative 3 is presented as shown on **page 4** in **Figure 1, Alternative 3**.

The advantages of concrete reservoirs (both cast-in-place and pre-stressed) are as follows:

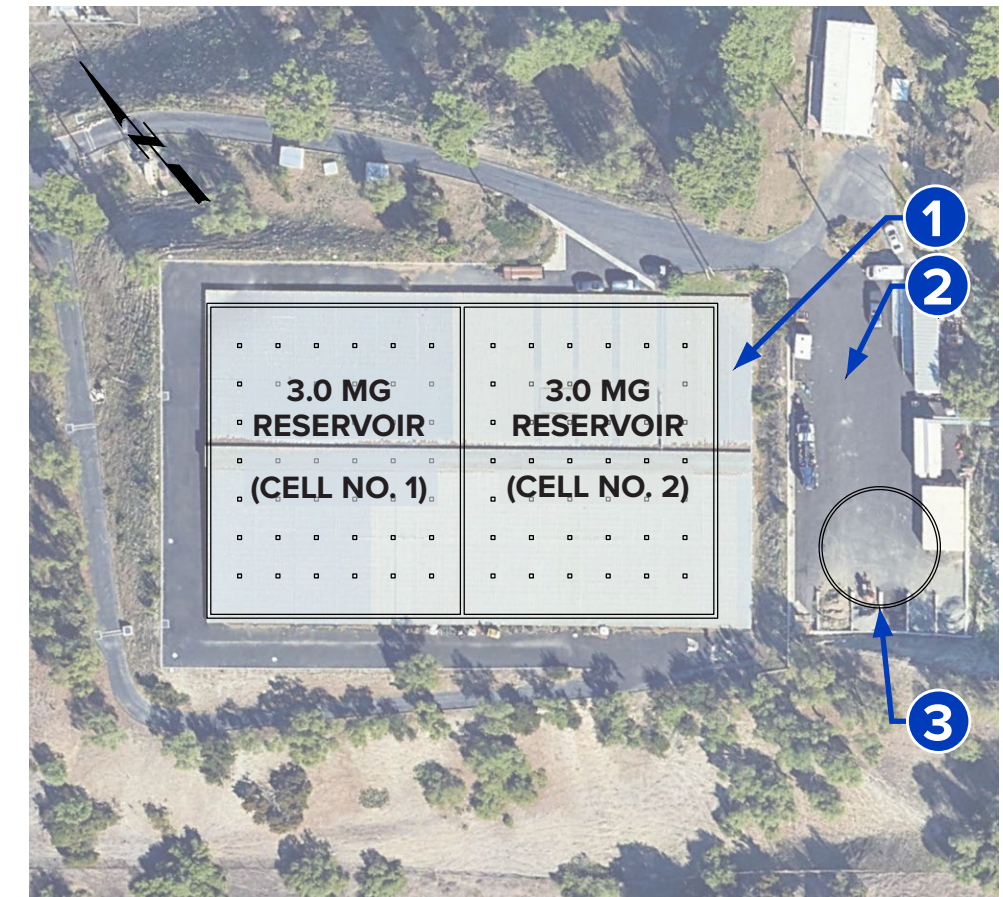
- Durability and longevity of service life with less maintenance compared to steel tanks.
- Corrosion resistance; do not require repeated coating and painting or cathodic protection.
- Ability to bury structure (partially or fully buried) for better concealment and ease of access to reservoir roof.



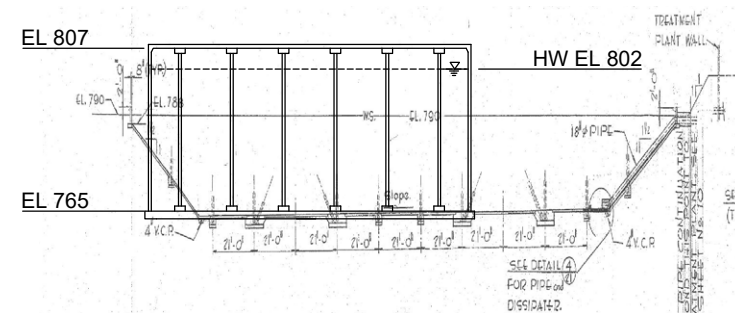
Alternative No. 1 - Plan



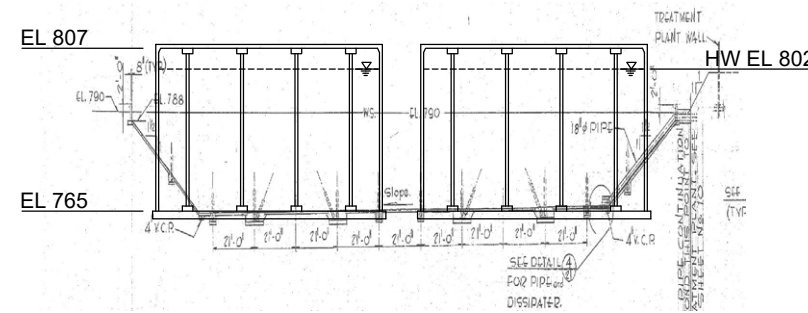
Alternative No. 2 - Plan



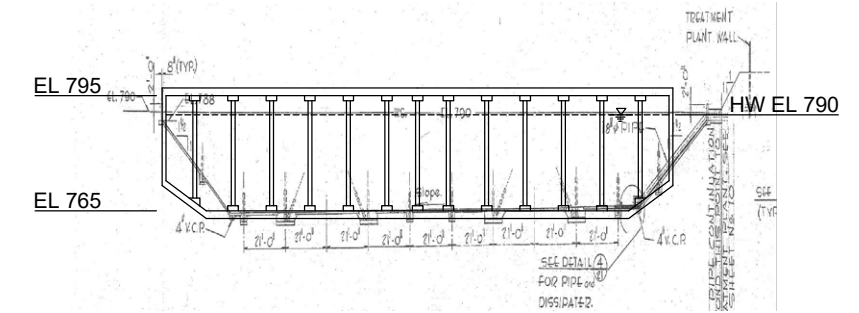
Alternative No. 3 - Plan



Alternative No. 1 - Section



Alternative No. 2 - Section



Alternative No. 3 - Section

KEY NOTES:

1. EXISTING 6MG RESERVOIR
2. POSSIBLE CONTRACTOR STAGING AREA
3. POSSIBLE TEMPORARY TANK LOCATION TO MAINTAIN SERVICE DURING CONSTRUCTION (TO BE CONFIRMED)

FIGURE 1

Based on our understanding of the project from our previous work on the District's Master Plan and the Peters Canyon Condition Assessment carried out in 2015, our initial assessment is that Alternative 2 or 3 may be the best solution for the District because they provide the following benefits:

1. Provide redundancy in the system. Having two tanks ensures one tank can remain in service during maintenance and down times.
2. Provide flexibility for operations.
3. Maximize storage capacity within site limits.

This assessment will of course need to be confirmed as part of a more detailed technical evaluation and the hydraulic modeling to confirm the required reservoir capacity.

Scope of Work and Schedule

The following provides a summary of our proposed Scope of Work.

Scope of Work

This Scope of Work is to complete the preliminary design for the District's WZ 6.0 MG Reservoir Seismic Reconstruction Project. The project and includes the following tasks:

Task 1 – Project Oversight/ Management and QA/QC

1.1 – Project Kick-Off and Progress Meetings

Prior to beginning work, Carollo will coordinate and participate in a project kick-off meeting with the District to discuss the finalized scope of work, the schedule, the roles and responsibilities, communication protocol, coordination activities between District staff, and other related items.

Carollo will attend biweekly progress meetings with the District staff during the development of the Preliminary Design Report (PDR) and evaluations of the reservoir concepts. Carollo will submit plans, layouts, and other documents for review and comments prior to meetings and will make revisions as requested by District staff. We anticipate attending a total of six (6) coordination review and progress meetings via MS Teams calls during the preliminary design phase of this project. This also includes the kick-off meeting.

1.2 – PDR Review Meeting

Carollo will also attend one (1) in-person meeting to review the PDR.

Carollo will prepare and distribute meeting agendas

prior to each meeting. Carollo will also prepare and distribute meeting minutes within two (2) days after each meeting.

1.3 – Project Management

This task addresses the management responsibilities associated with proper scheduling, budget control, invoice preparation and coordination with the District. Carollo's principal-in-charge and project manager will review the status of budget, schedule and discuss relevant project issues together on a weekly basis. Our project manager, Miko Aivazian, will provide project status updates via email to District's designated project manager on a weekly basis. These weekly status updates will be used to confirm work progress, identify critical information needs, and where appropriate alert the District to any potential issues which may impact the project scope, schedule or budget. These weekly project status updates will be supplemented with monthly project status reports that will be prepared and distributed along with Carollo's invoices.

1.4 – Technical Review and QA/QC

Carollo will provide quality assurance and quality control (QA/QC) reviews throughout the course of the project consistent with District's policies. Our QA/QC and quality management procedures establish and maintain a structure for providing reviews of all work products and adherence to industry design standards.

All work product deliverables, including detailed checking of work by in-house staff will be reviewed prior to submittal to the

District. Technical reviews will include reviews for code compliance, safety, operability, constructability, errors/omissions and clarity.

Task 2 – Baseline Research

2.1 – Data Review and Site Visit

Carollo will review the available data including any reports, plans, and other related information provided by the District. Carollo will also attend a site visit and will meet with the District to confirm the information and approach.

Carollo will also review previous plans, studies, and reports for pertinent data to obtain past methodology and review past recommendations.

Task 3 – Prepare Material Analysis and Seismic Parameters Study

3.1 – Technical Memorandum

Carollo will prepare a Technical Memorandum (TM) that as a minimum will include the following information:

- Seismic Parameters of the site.
- Tank Material alternatives analysis including life cycle cost, maintenance requirements, ease of conducting maintenance, and any other relevant parameters.
- Alternatives for maintaining water service to District service area during periods when the reservoir is out of service for routine maintenance.
- Alternatives for maintaining water service to existing system while the new tank is being constructed.
- SCADA connectivity.

3.2 – Second Technical Memorandum (if Needed)

This task is listed as an optional task under Task 6.1 below.

Task 4 – Topographic Mapping, Survey and Geotechnical Studies

4.1 – Topographic and Field Survey

Carollo's subconsultant, CalVada Surveying, will conduct a topographic survey of the site and provide a base map to the extent required for the design of the new reservoir and interconnections with the

existing yard piping. Mapping will include 1-foot contours and will reference NAD83 for control. All surface features will be shown and identified, including trees, fencing, and structures. Where vaults or valve cans can be accessed, the survey will include depths of existing underground utilities.

4.2 – Geotechnical Investigations and Report

To perform the seismic parameters study requested under Task 2, Carollo will need to update the site class as the definitions are changing in the 2025 California Building Code (CBC). Carollo will use the services of Converse Consultants, who provided the previous geotechnical work as our subconsultant in 2019, to provide this additional service. They will also provide recommendations regarding the location(s) of the temporary water storage tank.

Task 5 – Prepare PDR

5.1 – Prepare PDR

After review of the materials analysis and parameters by the District, Carollo will prepare a PDR that will finalize the project design concepts and criteria. The PDR will include key findings from the previous tasks and research performed, recommended site improvements, and an opinion of probable construction cost for the improvements. The TMs developed as part of earlier tasks will become part of the PDR.

The PDR at a minimum will include:

District's existing system planning and design criteria for reservoir sizing and system redundancy will be reviewed and compared with industry standards. Any changes to the criteria will be summarized in a table and provided to District staff for review prior to refining the criteria. Carollo will coordinate with jurisdictional fire agencies for applicable fire flow criteria. Regulatory requirements affecting planning criteria will also be reviewed under this task. The update to the criteria at minimum will include an update to the existing storage criteria to include fire storage. As part of the 2015 Master Plan, Carollo developed hydraulic models for both the WZ and the RZ in H₂O MAP Water. The Master Plan work did not include an evaluation of the required capacity of the Peters Canyon Reservoir. It is assumed that the District will provide the latest calibrated model, updated existing and future demands, and inform Carollo staff about any updates made to the model. Carollo will update the WZ hydraulic model to the latest InfoWater Pro software version. If demand

updates are needed, we have provided scope and effort as an optional task. Carollo will update the model with new demands and operational changes to the system. Carollo will assess the existing diurnal patterns in the model and if necessary, update diurnal patterns as necessary to represent changed to the hourly demand fluctuations. Per the District's RFP, it is currently anticipated that the WZ retail agencies will utilize more groundwater. Carollo will update the model to reflect the supply changes. Updates to model scenarios will include up to three (3) scenarios. Carollo will use the new criteria and the updated hydraulic model to determine the size of the reservoir. Using the updated criteria and demands served by the reservoir, Carollo will determine the volume of the reservoir. Carollo will use the hydraulic model perform the following demand and supply analyses, to determine the dimensions of the reservoir (the height will set the HGL required to serve the demands and meet the updated system criteria):

Scenario 1: 100-percent imported water

Scenario 2: 100-percent groundwater

Scenario 3: Combination of imported and groundwater. Discussions will be held with the District to determine the appropriate mixture of supply. Based on the results of the analyses, Carollo will determine the size of the reservoir. Carollo will also use the model to determine the minimum reservoir capacity that will be needed during the construction phase.

Replacement Reservoir Layout: Carollo will prepare a site layout for the proposed reservoir location showing the connecting pipelines, power and SCADA, and any other aboveground facilities. Layout shall consider access for operation and maintenance, and avoid high traffic areas. The layout shall consider all existing constraints located on the property such as site conditions, easements, other utilities, etc.

Construction Cost Estimate and Schedule: Carollo will prepare an opinion of probable construction cost estimate broken down by major items of work. The costs will be inflated to the mid-point of expected construction. Carollo will also prepare a construction schedule showing at a minimum, completion of final design, bidding, award, construction, and start-up. The schedule will identify key construction constraints and sequencing to keep existing customers in service during construction.

At a minimum, the PDR will include the following Sections:

Section 1: Introduction / Project Overview.

Section 2: Field Investigations / Utility Research.

Section 3: Design Criteria.

Section 4: Civil Site Layouts.

Section 5: Reservoir Sizing, Layouts, and Piping.

Section 6: Reservoir Geotechnical and Structural Criteria.

Section 7: Environmental Permitting.

Section 8: Construction Cost Estimates.

Section 9: Design and Construction Schedules.

Section 10: Conclusions and Recommendations.

5.2 – Prepare 30% Conceptual Design Drawings

The PDR will also include a set of drawings that will present a conceptual (30%) level of the design for the reservoir site. The conceptual drawings will include:

- Overall Site Plan.
- Paving Plan.
- Yard Piping Plan.
- Reservoir Structural Top and Bottom plans.
- Reservoir Sections.
- Reservoir Piping connections.
- SCADA Single Line Diagrams.

Below is a list of preliminary drawings/figures that will be a part of the PDR.

Figure 1: Existing Facility Site Plan.

Figure 2: Existing Facility Yard Piping Plan.

Figure 3: Hydraulic Profile.

Figure 4: Alternative 1 Site Layout – Pre-stressed Concrete Reservoir Option (1-6.0 MG).

Figure 5: Alternative 2 Site Layout – Pre-stressed Concrete Reservoir Option (2-3.0 MG).

Figure 6: Alternative 3 Site Layout – Cast-in-Place Concrete Reservoir Option (6.0 MG).

Figure 7: Site Sections – 1.

Figure 8: Site Sections – 2.

Figure 9: Alternative 1 - Structural Reservoir Plan and Section.

Figure 10: Alternative 2 - Structural Reservoir Plan and Section.

Figure 11: Alternative 3 - Structural Reservoir Plan and Section.

Figure 12: Reservoir Inlet/Outlet and Drain System Connections.

Figure 13: Reservoir Overflow System Connection.

Figure 14: Reservoir Access Plan and Sections.

Figure 15: SCADA and Single Line Diagrams.

of the site and a discussion of critical issues to be considered during design. Carollo will evaluate two to three alternatives in the study if needed. A recommended site layout will be provided.

6.2 – Prepare Field Investigation and Geotechnical Report

It has been assumed that the existing field investigations and Geotechnical report prepared by Carollo in 2015 will be sufficient for the preliminary design phase. As an optional task if needed, Carollo will retain Converse Consultants to provide updated site investigations and a geotechnical report for the reservoir site.

6.3 – Demand Projections

If updated existing and future demands are not available, Carollo will obtain billing records and planning information to update the demands. Existing demands will be updated using historical billing data. To obtain future demand projections, the District will need to obtain each member agency future water demand projections through the planning horizon. We will help coordinate this effort.

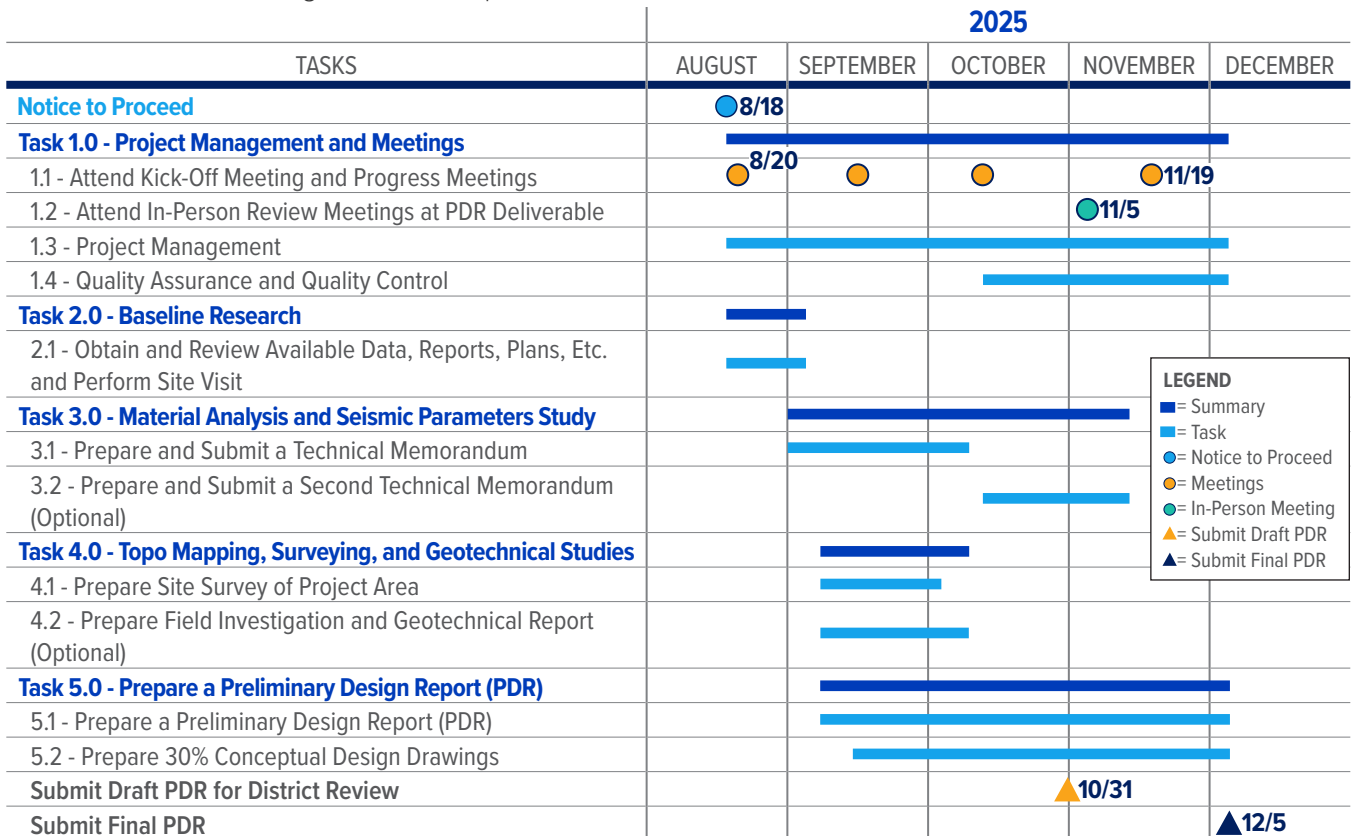
Task 6 – Optional Tasks

6.1 – Prepare and Submit a Second Technical Memorandum

As an optional task, a second TM may be prepared and submitted for review showing the results of the materials analysis and seismic parameters together to be shown together with proposed plan layouts

Schedule

We expect to be able to complete the preliminary design within three and a half months of receiving the notice to proceed, as shown below.



EOCWD / WHOLESALE SYSTEM 6 MG RESERVOIR SEISMIC RECONSTRUCTION PROJECT - PHASE 1: PRELIMINARY DESIGN REPORT

Project Team

Critical to the success of the project is the team of individuals selected to perform the work. Carollo is ready to partner with you every step of the way!

Firm Information

Carollo is a full-service, environmental engineering firm that has been exclusively delivering water management solutions across the U.S. for 92 years. Our clients have counted on us to help them meet public expectations and navigate the increasingly complex challenges of protecting water resources and delivering water services that meet regulatory requirements with innovative technologies and tailored solutions.

Carollo has more than 1,600 employees, including more than 600 registered engineers located throughout the U.S. In California, a staff of more than 450 professionals is available to support our proposed local project manager and project engineer to successfully complete your reservoir seismic reconstruction project.

Why Carollo is the Right Team

Carollo is a recognized leader in designing and building water storage and conveyance facilities in Southern California. A key prerequisite to making great things happen on a project is to bring on personnel who have not only the engineering experience, but also the technical understanding and the know-how to deliver sound engineering practices. Carollo's role is to deliver your projects to meet the District's goals and objectives. We do this by selecting the right team, with a project manager who has the personality and ability to build a trusted relationship with your staff. No team knows more about reservoirs and can show experience with all the similar components of the Reservoir Seismic Reconstruction project. The District can be confident that our experienced team will apply the options that are best suited for your project.

Your Project Manager



LOCATION
Los Angeles, CA

Miko Aivazian, PE / Project Manager

★ WHY MIKO: Miko has more than 35 years of experience in planning, design, condition assessment, and construction of facilities for environmental, industrial, and commercial projects. He has been involved as a Senior Project/Client Manager and engineer for numerous water/wastewater projects, including planning, study, design and construction management of pumping stations, reservoirs, conveyance pipelines, and water and wastewater treatment plants. Reservoirs, pumping stations, and pipelines are in line with Miko's past experience. Miko has managed the design and construction of more than two dozen reservoir projects ranging from 1.0 MG to 55.0 MG.

Miko has served as project manager on the following five most relevant projects:



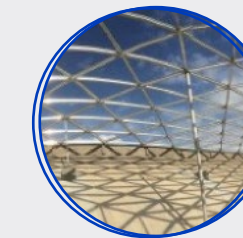
City of Pasadena, California
Sunset Reservoir Replacement Project – Preliminary Design Report



San Diego International Airport, California
Cistern C and Force Main



City of Redlands, California
WWTP Recycled Water Reservoir and Pump Station Project



City of Riverside, California
16 MG Evans Reservoir Replacement Project, 16 MG Linden Reservoir Rehabilitation Project



City of South Pasadena, California
Graves Reservoir Replacement and Wellhead Water Treatment Grand Reservoir Replacement Project

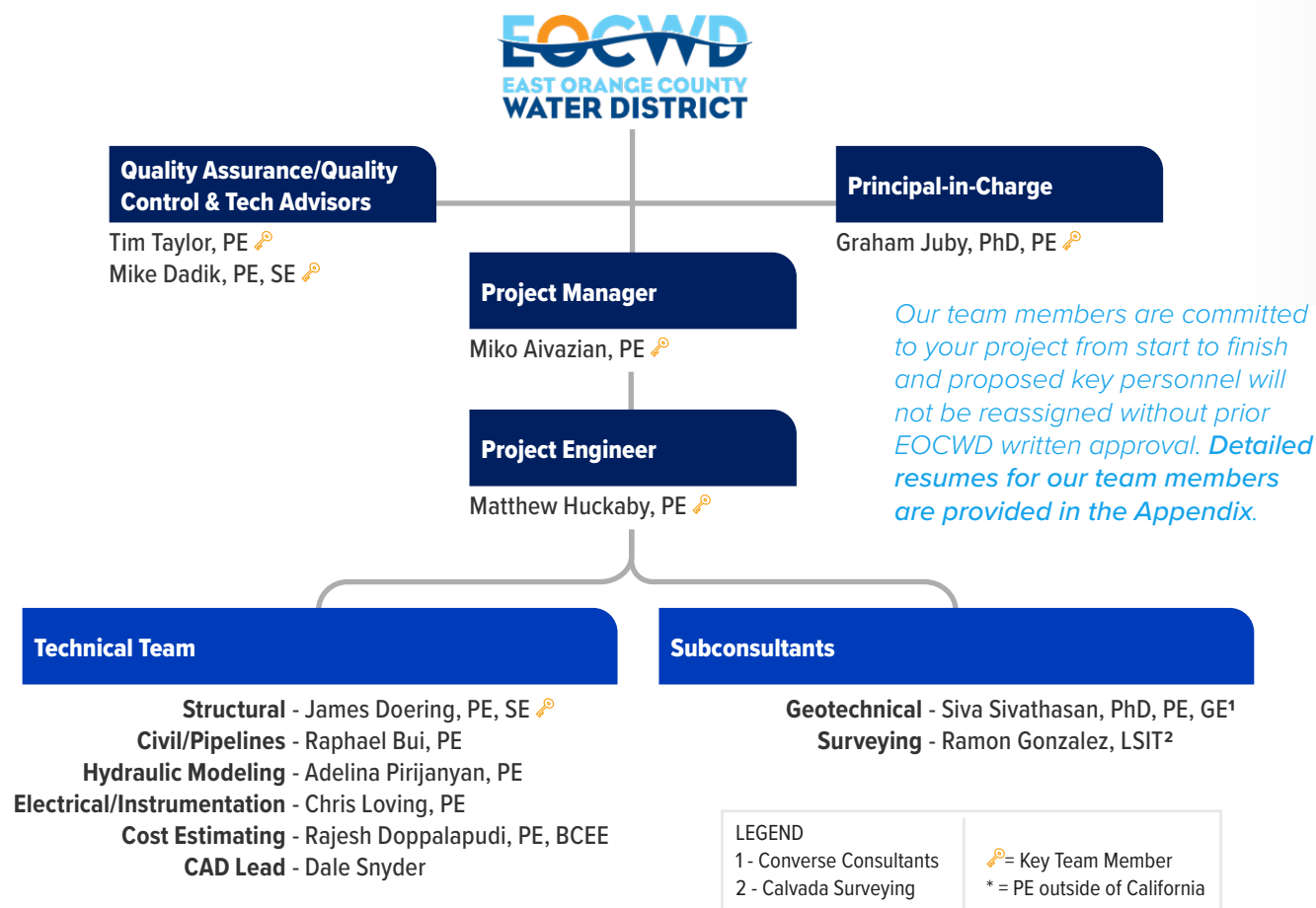
Proposed Key Team Members



LOCATION
Los Angeles, CA

Matthew Huckaby, PE / Project Engineer

★ WHY MATTHEW: Matthew has 20 years of experience in design of water and wastewater infrastructure projects, with particular emphasis on structural and seismic design, hydrologic and hydraulic design, and site layout/horizontal control with a hands-on approach to managing design plans, specifications, calculations, reports, schedules, and cost estimates. His experience includes design and engineering services during construction for reservoirs (precast concrete, cast-in-place concrete, and steel), pump stations, water and wastewater treatment plants, pipelines, channels, spreading basins and detention ponds, encompassing wastewater, recycled water, stormwater, and potable water.



Our team members are committed to your project from start to finish and proposed key personnel will not be reassigned without prior EOCWD written approval. Detailed resumes for our team members are provided in the Appendix.

Proposed Key Team Members *(Continued)*



LOCATION
Costa Mesa, CA

Graham Juby, PhD, PE / Principal-in-Charge

★ WHY GRAHAM: Graham brings 42 years of proven experience in planning and designing water and wastewater treatment facilities. He has worked in Orange County for more than 25 years and has served as the principal-in-charge or project manager on multiple projects to provide cost-effective and environmentally conscious solutions to various water quality issues. Graham was the Project Manager for EOCWD's 2015-2019 Peters Canyon Water Treatment Plant Feasibility Study and Master Plans Update Project, which later also included the condition assessment of the 6.0 MG Peters Canyon Reservoir. As such, he has a good understanding of the District's water system.



LOCATION
Sacramento, CA

Tim Taylor, PE / QA/QC / Technical Advisor

★ WHY TIM: Tim is Carollo's Director of Infrastructure Practice, has served as project manager for numerous water and wastewater infrastructure and treatment projects. With more than 35 years of experience in engineering design, construction, and project management for water distribution systems, gravity sewer collection systems, pump stations, water and wastewater treatment facilities, geographic information system (GIS), and modeling projects, Tim is proficient in all aspects of management, technical engineering, modeling, GIS, and design software. He has designed pipelines ranging from 12 inches up to 148 inches in diameter, as well as pump stations ranging in size from a few hundred gpm up to over 100 mgd.



LOCATION
Walnut Creek, CA

Mike Dadik, PE, SE / QA/QC / Technical Advisor

★ WHY MIKE: Mike has 32 years of experience in structural design of water, wastewater, and civil engineering projects, including rehabilitation and seismic vulnerability assessments. He has overseen the structural design of numerous projects ranging from large WWTP upgrades and expansions to pump station seismic retrofits.



LOCATION
Costa Mesa, CA

James Doering, PE, SE / Structural Lead

★ WHY JAMES: James serves as Carollo's Chief Structural Engineer and has more than 30 years of structural design experience, including structural analysis and design, seismic evaluation and retrofit, rehabilitation, review, and assessment for water and wastewater treatment facilities, pump stations and reservoirs. James was the lead structural engineer for the condition assessment of the 6.0 MG Peters Canyon Reservoir for EOCWD.

Just Ask Our Clients!

We encourage you to contact these references to verify our responsiveness, technical expertise, and quality of service on similar projects. The table below provides reference information for clients with whom our team members have previously worked on directly relevant projects.

	Client/Agency	Contact	Project Name	Team Members
1	City of Pasadena, CA	Gary Cho, Engineer Ph: 626-375-3340 E: gcho@mwdh2o.com	Sunset Reservoir Replacement Project – Preliminary Design Report	Miko Aivazian (Project Manager); Matthew Huckaby (Project Engineer); Graham Juby (Principal-in-Charge); Tim Taylor (Quality Manager); Raphael Bui (Civil Site and Pipelines); James Doering (Structural Lead); Dale Snyder (CAD Lead)
2	City of Riverside, CA	John Farley, Principal Engineer Ph: 951-826-5705 E: jfarley@riversideca.gov	16 MG Evans Reservoir Replacement Project 16 MG Linden Reservoir Rehabilitation Project	Miko Aivazian (Project Manager); Matthew Huckaby (Project Engineer); Raphael Bui (Civil Lead); Dale Snyder (CAD Lead)
3	City of Redlands, CA	Fernando Mata, Wastewater Utility Manager Ph: 909-841-3142 E: fmata@cityofredlands.org John Harris, Director of Municipal Utilities & Engineering Ph: 909-798-7658 E: jharris@cityofredlands.org	WWTP Recycled Water Reservoir and Pump Station Project	Miko Aivazian (Project Manager); Graham Juby (Principal-in-Charge); Tim Taylor (Quality Manager); Raphael Bui (Civil Engineer Lead); Matthew Huckaby (Project Engineer); James Doering (Structural Lead); Dale Snyder (CAD Lead)
4	San Diego International Airport, CA	Brad Kirsch, Project Manager (Sundt) Ph: 619-572-2711 E: bschurch@sundt.com	Cistern C and Force Main Building	Miko Aivazian (Project Manager); Matthew Huckaby (Project Engineer); Tim Taylor (Quality Manager); James Doering (Structural Lead); Dale Snyder (CAD Lead)
5	City of South Pasadena, CA	Anteneh Testaye, Water Operations Supervisor Ph: 626-441-4024 E: atesfaye@southpasadenaca.gov	Graves Reservoir Replacement and Wellhead Water Treatment Grand Reservoir Replacement Project	Miko Aivazian (Project Manager); Matthew Huckaby (Project Engineer); Raphael Bui (Civil Lead)

Recent Storage Reservoir Experience

The table below presents a sampling of our recent water storage reservoir design projects in California.

Client/Project	Volume (MG)	Type	Project Elements				
			Rehab	Preliminary Design	New Design	Seismic	ESDC
City of Redlands - WWTP Recycled Water Tank and Pump Station	2.75	Pre-stressed		●	●	●	
San Diego International Airport - Cistern C and Force Main	3.0	Cast-in-Place		●	●	●	●
City of Pasadena - Sunset Reservoir Replacement	5.6	Concrete	●	●		●	
City of Riverside - Linden Reservoir Rehabilitation	16.0	Cast-in-Place	●	●		●	●
City of Riverside Public Utilities Department - Evans Reservoir	16.0	Cast-in-Place				●	●
City of Glendale GWP - Chevy Chase 968 Reservoir	15.0	Cast-in-Place		●	●	●	●
City of Vallejo - Skyline Reservoir Replacement	6.0	Pre-stressed		●	●	●	
Alameda County Water District - Appian Tank Seismic Upgrade	0.8	Steel	●	●		●	
City of Modesto - Industrial Tank 13	4.0	Pre-stressed		●	●	●	●
City of West Sacramento - Bridge District Water Storage Facility	3.3	Steel		●	●	●	

On the pages that follow we present five detailed project descriptions that highlight our team's experience.

Sunset Reservoir Replacement Project – Preliminary Design Report

City of Pasadena, CA



The Sunset Reservoir site in Pasadena, located near Sunset Avenue and Mountain Street, is a city-owned property dedicated to municipal services. The site features two reservoirs, SR1 and SR2, with storage capacities of 5.6 MG and 9.9 MG, respectively, totaling 15.4 MG. Additional facilities include Sunset Well No. 20, Bangham Well, the Glorieta Booster Station with three 3,900 gpm booster pumps, a maintenance facility, a chlorine building, and a parking lot for city employees. Water is supplied to both reservoirs from the “A-Basin,” where imported water from the Metropolitan Water District and groundwater from Pasadena Water and Power’s wells are blended. The reservoirs are hydraulically connected and designed to operate together at a high water elevation of about 945 feet above sea level.

Carollo evaluated four alternatives and recommended the best value option for replacement of SR1. Analysis of construction costs and construction duration for each alternatives was used to determine the best value option. Carollo provided several conceptual drawings for the four proposed alternatives to be used for cost comparisons between these options. Carollo submitted a comprehensive detailed Preliminary Design Report to the City for review and approval.

REFERENCE:

Gary Cho, Engineer
 700 N. Alameda Street
 Los Angeles, CA 90012
 626-375-3340
 gcho@mwdh2o.com

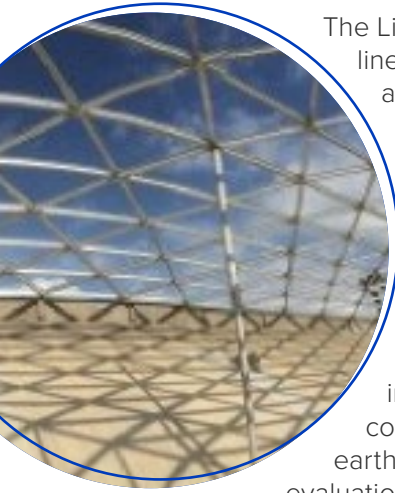
TEAM INVOLVEMENT:

M. Aivazian, Project Manager
 M. Huckaby, Project Engineer
 T. Taylor, QA/QC
 R. Bui, Civil Site and Pipelines
 J. Doering, Structural Lead
 D. Snyder, CAD

EOCWD / WHOLESAL SYSTEM 6 MG RESERVOIR SEISMIC RECONSTRUCTION PROJECT – PHASE 1: PRELIMINARY DESIGN REPORT

16 MG Linden Reservoir Rehabilitation Project

City of Riverside, CA



The Linden Reservoir, originally built in 1927 as a 12 MG concrete-lined, steel-roofed structure, was upgraded in the 1980s with a perimeter concrete wall to expand its capacity to 16 MG.

In 2012, the city commissioned a preliminary investigation and seismic study to assess rehabilitation options for seismic support and a new roof system. **Team members Miko Aivazian and Matt Huckaby led project tasks delivering repairs and a new roof on time and within budget, which is expected to extend the reservoir's service life by 60 years.**

Tasks included: A physical inspection of the reservoir interior and exterior including all structural and piping components; prepared a seismic evaluation; prepared an earthquake retrofit strategy for the existing reservoir structure; evaluation of 11 alternatives for the roof replacement; prepared

life cycle analysis for all repair alternatives complete with construction cost estimates, life expectancy and ranking of alternatives; prepared a Final Report for recommendations for rehabilitation of the tank structure and replacement of the existing roof; final design and engineering services for the reservoir upgrades and the new recommended roof design replacement; and engineering and inspection services during construction of the upgrades and roof replacement.

REFERENCE:

John Farley, Principal Engineer
3750 University Avenue, 3rd Floor
Riverside, CA 92501
951-826-5705
jfarley@riversideca.gov

TEAM INVOLVEMENT:

M. Aivazian, Project Manager
M. Huckaby, Project Engineer
R. Bui, Civil Site and Pipelines
D. Snyder, CAD Lead

WWTP Recycled Water Tank and Pump Station

City of Redlands, CA



Carollo provided engineering services to the City of Redlands for a 2.75 MG circular pre-stressed concrete recycled water reservoir and a 10 MG per day pump station at the Redlands Wastewater Treatment Facility. The reservoir, partially buried with a 125-foot diameter and 30-foot water depth, required Federal Aviation Administration review due to its proximity to San Bernardino International Airport.

The pump station features a 3+1 vertical turbine pump configuration at grade, located adjacent to the reservoir. Carollo prepared a Reservoir Alternatives Technical Memorandum, evaluating several options, including welded steel, cast-in-place, and pre-stressed concrete reservoirs, ultimately selecting the single circular pre-stressed concrete reservoir. Two pump station alternatives were considered, with the preferred solution being a new 10-mgd pump station and conversion of existing pumps to low head.

A Hydraulic Model Analysis Project Memorandum was developed to assess system configurations and impacts on Southern California Edison and Zone 1350 users, supporting the evaluation and final design.

REFERENCE:

John Harris
35 Cajon Street, Suite 15A
Redlands, CA 92373
909-798-7658
jharris@cityofredlands.org

TEAM INVOLVEMENT:

M. Aivazian, Project Manager
M. Huckaby, Project Engineer
G. Juby, Principal-in-Charge
T. Taylor, QA/QC
R. Bui, Civil Site and Pipelines
J. Doering, Structural Lead
D. Snyder, CAD

3.0 MG Cistern C and Force Main

San Diego International Airport, CA



Carollo was engaged by Sundt Construction, Inc. to provide design and engineering services during construction of Cistern “C,” a stormwater storage tank at San Diego International Airport, as outlined in the 2018 Stormwater Master Plan. The project, developed for the San Diego Airport Authority, aimed to capture and reuse stormwater runoff from 77.9 acres, achieving an 85% capture rate as validated by Carollo’s hydrology model. Runoff is conveyed to Cistern “C” through 24- to 54-inch diameter reinforced concrete pipe storm drains. The cistern, with a 3.0-million-gallon storage capacity, features an inlet pipe, overflow system, and two submersible pumps with a combined average pumping capacity of 130 gallons per minute, discharging to existing bio-swales near the Rental Car Center.

Carollo’s responsibilities included the structural design of the cast-in-place, 160-foot diameter circular tank, which incorporates 32 interior columns and a top deck engineered for traffic loading, as the cistern is located beneath a parking area. Additionally, Carollo designed a 20-by-20-foot masonry forcemain building adjacent to the cistern, housing valving, flowmeter, electrical panels, and a sodium hypochlorite chemical feed system. Carollo provided construction administration services for the project.

This project was published in the January/February 2021 edition of AirportImprovements.com magazine. Scan the QR Code or click the image to the right to be directed to the website article.



REFERENCE:

Brad Kirsch, Project Manager
(Sundt)
1660 Hotel Circle N, Suite 400
San Diego, CA 92108
619-572-2711
bskirsch@sundt.com

TEAM INVOLVEMENT:

M. Aivazian, Project Manager
M. Huckaby, Project Engineer
T. Taylor, QA/QC
R. Bui, Civil Site and Pipelines
J. Doering, Structural Lead

1.2 MG Graves Reservoir

City of South Pasadena, CA



The existing site consisted of a 1.0 MG reservoir with two submersible pumps, a chlorination system, concrete sandbox, electrical control room, and groundwater Well No. 2. The reservoir and associated facilities, except for the Well No. 2, were demolished and replaced with a new 1.2 MG cast-in-place concrete reservoir with a sound-attenuated pump house, electrical room, onsite sodium hypochlorite generation room, wellhead treatment system, landscaping/irrigation, and site improvements. Our team performed site investigation, CEQA permitting, pre-design, and final design services for this project.

Due to site constraints and residential homes surrounding the site on three sides, the facilities were designed to minimize visual and environmental impacts while maximizing storage capacity. Structural requirements accommodated the extreme seismic characteristics of the area. The pumping station uses two 1,400-gpm vertical turbine pumps. The new reservoir is a rectangular cast-in-place concrete, flat-bottom, partially buried reservoir

REFERENCE:

Anteneh Testaye, Water
Operations Supervisor
416 Garfield Avenue
South Pasadena, CA 91030
626-441-4024
atesfaye@southpasadenaca.gov

TEAM INVOLVEMENT:

M. Aivazian, Project Manager
M. Huckaby, Project Engineer
R. Bui, Civil Site and Pipelines

Disclosure of Joint Venture and/or Proposed Subcontract Arrangements

Partnership with a Purpose

We recognize that our individual team members are the critical element for successful project delivery. We have complemented our team with **two key subconsultants that bring the right mix of knowledge, experience, and broaden our bench of experts to hit the ground running.**



Converse Consultants
Geotechnical Engineering & Consulting
Environmental & Groundwater Science
Materials Testing & Inspection Services

Converse Consultants an employee-owned geotechnical and

geological engineering corporation, has been a consistent presence on the annual ENR Top 500 Design Engineering Firms list. Since 1946 the firm has provided professional services in the fields of geotechnical engineering, engineering geology, groundwater sciences, environmental sciences and soils and materials testing and inspection.



Cal Vada Surveying, Inc. has been providing land surveying services such as preparing

easements descriptions, exhibits, right-of-way maps, boundary surveys, topography, construction staking, as-builts, and pothole location data for more than 35 years. Cal Vada's long-standing philosophy has been to utilize the most advanced surveying technology available to produce highly accurate results for their clients, and set the standard for excellence within the surveying industry.

Conflict of Interest

We are familiar with applicable conflict of interest laws and requirements. Neither our firm nor any of our employees or subconsultants involved on this project has any apparent or potential conflict of interest that would preclude working on this project, nor do we expect any future conflicts of interest with the District.

Insurance

Carollo maintains insurance to protect both our client and our firm against the types of claims that may be alleged to result from our services on this project. **Carollo carries the following insurance:**

Coverage	Limits	Carrier
General Liability	\$2,000,000 per occurrence \$4,000,000 aggregate	Zurich American Insurance Company
Workers' Compensation	Statutory	Zurich American Insurance Company
Employers Liability	\$1,000,000	Zurich American Insurance Company
Automobile	\$2,000,000 combined single limit	Zurich American Insurance Company
Professional Liability	In excess of \$5,000,000 each claim	Allied World Surplus Lines Insurance Company
Umbrella	In excess of \$5,000,000 per occurrence	American Guarantee & Liability Insurance Company

Current as of 07/07/2025

Insurance Broker for all insurance policies:

Lockton Companies / 444 W. 47th St., Ste. 900 / Kansas City, MO 64112-1906 / 816-960-9000

Appendix

Resumes



EDUCATION

BS Technology, University of Houston, 1984

MS Environmental Engineering, Loyola Marymount University, 1997

LICENSES

Civil Engineer, California, Nevada

Megerdich "Miko" Aivazian, PE

Miko Aivazian has more than 35 years of experience in marketing, planning, design, and construction of facilities for environmental, industrial, and commercial projects. He has been involved as a senior project/client manager and engineer for several water/wastewater projects for more than 32 years, including planning, study, design and construction management of pumping stations, reservoirs, pipelines, and water and wastewater treatment plants. He has managed the design and construction of many projects for major Southern California clients and has been involved on several design-build projects.

RELEVANT EXPERIENCE

> **Project manager for the City of Pasadena, California, Replacement of the Sunset Reservoir preliminary design project.** The project involved the seismic/structural evaluation of a 5.6-MG elliptical-shaped reservoir with a hopper bottom and wood-framed roof originally constructed in 1888.

Operational strategies, rehabilitation/retrofit, and replacement alternatives were considered. Findings and recommendations were presented in a report with conceptual level cost estimates.

> **Project manager for the City of Redlands, California, Recycled Water Reservoir Storage** to provide design of a 2.7 MG prestressed recycled water reservoir and a new pump station to comply with Title 22 requirements allowing for extended use of the water. Project includes hydraulic analysis to determine necessary modifications and confirm reservoir sizing. In addition, Carollo is evaluating construction alternatives for the reservoirs and conducting water quality analysis to assess the need for additional disinfection to achieve desired residuals in the distribution system.

> **Project manager for the Linden Reservoir Rehabilitation Project for the City of Riverside Public Utilities, California.** This \$5.4 million project consisted of preliminary engineering services to provide structural/seismic

analysis of the existing tank structure and demolition of the existing 16 million gallon reservoir steel roof and replacing it with a new pre-manufactured aluminum roof system. The existing reservoir roof has an area of over 100,000 square feet. This project started with evaluation of eleven different roof options and finally selecting the aluminum roof system as the preferred option. The project was then moved into the final design phase. Miko coordinated the design of the reservoir seismic upgrades and the new aluminum roof system with the roof manufacturer. There were several other improvements that were required prior to installing the new roof system such as the demolition and removal of the existing roof system including interior concrete columns; the removal of four sections of the existing concrete perimeter walls in order to provide upgraded seismic load transfer connections for the new roof system; and improvements to existing reservoir interior including crack repair, joint sealant, piping modifications and improvements. Miko managed this project through construction by providing engineering and inspection services during construction. The reservoir inlet/outlet and overflow were also upgraded as part of the improvements. The project was successfully completed within schedule and budget.

Megerdich "Miko" Aivazian, PE

> **Project manager for the San Diego International Airport/Sundt Stormwater Design-Build Validation Phase for the San Diego International Airport (SDIA); California.** Carollo was hired by Sundt Construction, Inc. to provide design and engineering services during construction for the proposed stormwater storage tank known as Cistern "C". The Cistern C sizing was based on the Strategic Stormwater Master Plan (SSMP) recommendations – Capture and Reuse Project developed for the San Diego Airport Authority. As part of the project, Carollo validated the hydrology model with an 85-percent capture rate. The Cistern C was sized for 3.0 MG storage capacity and included an inlet pipe, overflow system and two submersible pumps with an average 130 gpm serving as the cistern outlet system. Carollo was also responsible for the structural design of the cistern that included a cast-in-place circular tank with a diameter of approximately 160 feet. The cistern also included 32 interior columns and a top deck that was designed for traffic loading due to the cistern location under the existing parking area. Miko coordinated the sizing and design efforts during the schematic design, design development, construction documents phases with the DB team and the Airport Authority and is now working on the construction phase of this project.

> **Project manager, Graves Reservoir and Pump Station Replacement Project, San Marino, California, City of South Pasadena.** Constructed in the early 1900s, the existing reservoir is in need of replacement. The reservoir and associated facilities, except for the Well No. 2, are to be demolished and replaced with a new 1.2 MG cast-in-place concrete reservoir, sound-attenuated pump house, electrical room,

chlorine room with onsite sodium hypochlorite generation system, wellhead treatment system, landscaping/irrigation, and site improvements. The pumping station utilizes two vertical turbine pumps with each pump having a rated capacity of 1,400 gpm. The new reservoir is a rectangular cast-in-place concrete, flat-bottom, partially buried reservoir and is 120-feet long by 120-feet wide with a water depth of 12-feet. Responsibilities included design management; preparation of a preliminary design report, a technical memorandum detailing a visual inspection of the reservoir and recommended improvements, a California Environmental Quality Act (CEQA) Initial Study and Mitigated Negative Declaration; and coordination with the Drinking Water State Revolving Fund (DWSRF) for state funding.

> **Project manager for the 55-MG Elysian Reservoir for the City of Los Angeles Department of Water and Power, California.** This project included design of a 55-million-gallon cast-in-place fully buried concrete reservoir within the footprint of the existing open basin reservoir. The design included a complete package for civil/structural and mechanical disciplines. The proposed reservoir was a hopper bottom type in order to reduce the perimeter wall heights and therefore reducing construction cost. The design also included site grading and drainage design. Miko worked closely with LADWP during the design phase and arranged two workshop meetings with LADWP staff in order to speed up the decision making process for several elements of the reservoir. The 30-percent design package was delivered successfully to LADWP for review in March of 2011.



EDUCATION

BS Civil Engineering,
University of Louisiana,
Lafayette, 2005

LICENSES

Civil Engineer, California

Matthew B. Huckaby, PE

Matt Huckaby has an extensive background in structural and civil design for water and wastewater infrastructure, with particular emphasis on structural and seismic design, hydrologic and hydraulic design, site layout/horizontal control and storm water mitigation with a hands-on approach to preparation of design plans, specifications, calculations, reports, schedules and cost estimates. He has practiced as a senior project engineer and civil/structural task leader for multiple projects. His experience includes design of reservoirs (concrete and steel), pump stations, water and wastewater treatment plants, spreading basins and detention ponds, pipelines, channels and culverts, junction and diversion structures, manholes and catch basins, encompassing stormwater, wastewater, recycled water, and potable water.

RELEVANT EXPERIENCE

> **Project engineer for the City of Pasadena, California, Replacement of the Sunset Reservoir preliminary design project.** The project involved the seismic/structural evaluation of a 5.6-MG elliptical-shaped reservoir with a hopper bottom and wood-framed roof originally constructed in 1888.

Operational strategies, rehabilitation/retrofit, and replacement alternatives were considered. Findings and recommendations were presented in a report with conceptual level cost estimates.

> **Project engineer for the Linden Reservoir Rehabilitation Project for the City of Riverside Public Utilities, California.** This \$5.4 million project consisted of preliminary engineering services to provide structural/seismic analysis of the existing tank structure and demolition of the existing 16 million gallon reservoir steel roof and replacing it with a new pre-manufactured aluminum roof system. The existing reservoir roof has an area of over 100,000 square feet. This project started with evaluation of eleven different roof options and finally selecting the aluminum roof system as the preferred option. The project was then moved into the final design phase. There were several other improvements that were required prior to installing the new roof system such as the demolition and

removal of the existing roof system including interior concrete columns; the removal of four sections of the existing concrete perimeter walls in order to provide upgraded seismic load transfer connections for the new roof system; and improvements to existing reservoir interior including crack repair, joint sealant, piping modifications and improvements. The reservoir inlet/outlet and overflow were also upgraded as part of the improvements. The project was successfully completed within schedule and budget.

> **Project engineer for the City of Redlands, California, Recycled Water Reservoir Storage** to provide design of a 2.7 MG prestressed recycled water reservoir and a new pump station to comply with Title 22 requirements allowing for extended use of the water. Project includes hydraulic analysis to determine necessary modifications and confirm reservoir sizing. In addition, Carollo is evaluating construction alternatives for the reservoirs and conducting water quality analysis to assess need for additional disinfection to achieve desired residuals in the distribution system.

> **Project engineer for the San Diego International Airport/Sundt Stormwater Design-Build Validation Phase for the San Diego International Airport (SDIA); California.** Carollo was

Matthew B. Huckaby, PE

hired by Sundt Construction, Inc. to provide design and engineering services during construction for the proposed stormwater storage tank known as Cistern "C". The Cistern C sizing was based on the Strategic Stormwater Master Plan (SSMP) recommendations – Capture and Reuse Project developed for the San Diego Airport Authority. As part of the project, Carollo validate the hydrology model with an 85% capture rate. The Cistern C was sized for 3.0 MG storage capacity and included an inlet pipe, overflow system and two submersible pumps with an average 130 gpm serving as the cistern outlet system. Carollo was also responsible for the structural design of the cistern that included a cast-in-place circular tank with a diameter of approximately 160-feet. The cistern also included 32 interior columns and a top deck that was designed for traffic loading due to the cistern location under the existing parking area.

> **Supervising project engineer, Graves Reservoir and Pump Station Replacement Project, San Marino, California, City of South Pasadena.** Constructed in the early 1900s, the existing reservoir is in need of replacement. The reservoir and associated facilities, except for the Well No. 2, are to be demolished and replaced with a new 1.2 MG cast-in-place concrete reservoir, sound-attenuated pump house, electrical room, chlorine room with onsite sodium hypochlorite generation system, wellhead treatment system, landscaping/irrigation, and site improvements. The pumping station utilizes two vertical turbine pumps with each pump having a rated capacity of 1,400 gpm. The new reservoir is a rectangular cast-in-place concrete, flat-bottom, partially buried reservoir and is

120-feet long by 120-feet wide with a water depth of 12-feet. Responsibilities included design management; preparation of a preliminary design report, a technical memorandum detailing a visual inspection of the reservoir and recommended improvements, a California Environmental Quality Act (CEQA) Initial Study and Mitigated Negative Declaration; and coordination with the Drinking Water State Revolving Fund (DWSRF) for state funding.

> **Supervising project engineer, Diamond Regional Sewer Lift Station (DRSLS) and Dual Forcemains (DFM) Project, Elsinore Valley Municipal Water District (EVMWD), California.** The proposed DRSLS will be designed to receive raw wastewater and pump it through a new parallel dual 16-inch and 24-inch forcemain system (DFM) and discharge the sewage to an existing junction structure located on Lakeshore Drive near Elm Street that connects to the existing 54-inch gravity sewer pipeline along Lakeshore Drive. The 2016 Master Plan identified the proposed DRSLS to serve as the regional wastewater lift station and have the ultimate capacity of 19.9 million gallons per day (MGD) peak design flow (PDF) or peak hourly wet weather flow (PHWWF) at year 2040 with an anticipated initial average inflow of ADWF (Phase 1) of 3.0 MGD and PWWF of 9.0 MGD. The ultimate goal of the project is to eliminate the following three (3) existing lift stations: Summerly Interim Lift Station; B-2 lift station; and Back Basin Groundwater Treatment Plant Lift Station (BBGWTPLS). Mr. Huckaby is the project engineer for this project.



EDUCATION

PhD Engineering,
University of Pretoria,
South Africa, 1995

BS Eng Hons Water
Utilization Engineering,
University of Pretoria,
South Africa, 1992

BS Hons Biomedical
Engineering, University of
Cape Town, South Africa,
1985

BS Chemical Engineering,
University of Cape Town,
South Africa, 1982

LICENSES

Civil Engineer, California
Professional Engineer,
Texas, South Africa

PROFESSIONAL AFFILIATIONS

American Society of Civil
Engineers

American Water Works
Association

International Water
Association

South African Institute of
Chemical Engineers

Water Environment
Federation

Water Institute of
Southern Africa (Fellow)

Graham J.G. Juby, PhD, PE

Dr. Graham Juby, a vice president with Carollo Engineers, has 42 years of experience in planning, testing, and process design for water and wastewater treatment facilities, with an emphasis on water reuse. He has focused on advanced treatment processes such as low- and high-pressure membrane systems (microfiltration and reverse osmosis), nutrient removal, and the application of ozone, granular activated carbon (GAC), biological filtration, ion exchange, and ultraviolet (UV). His background in these technologies includes both pilot plant and full-scale design experience. His experience also includes many planning projects. He has also been involved with several fast-track and alternative delivery projects.

RELEVANT EXPERIENCE

> **Principal-in-charge for the City of Redlands, California, Recycled Water Reservoir Storage to provide design of a 2.7 MG prestressed recycled water reservoir and a new pump station to comply with Title 22 requirements allowing for extended use of the water.**

Project includes hydraulic analysis to determine necessary modifications and confirm reservoir sizing. In addition, Carollo is evaluating construction alternatives for the reservoirs and conducting water quality analysis to assess need for additional disinfection to achieve desired residuals in the distribution system.

> **Project manager for the 2019 Water System Master Plans for East Orange County Water District, California.** The master planning effort included a 20-year outlook for both the wholesale and retail zones for the District. The project also included the preliminary design of a new replacement water treatment plant for the District, and a condition assessment of two existing reservoirs.

> **Project manager for the Structural Evaluation of Peters Canyon Reservoir for East Orange County Water District in Orange, California.** The project involved the structural evaluation of a 6.0-MG, rectangular hopper-bottom cast-in-place concrete reservoir with a wood-framed roof that was originally constructed circa 1963. Operational

strategies, rehabilitation, and replacement alternatives were considered. Construction drawings were then prepared to address roof framing vulnerabilities and corrosion.

> **Project manager for the 2016 Peters Canyon Water Treatment Plant (PCWTP) Feasibility Project for East Orange County Water District, California.** The project evaluated the technical and financial feasibility of constructing a new PCWTP to treat a blend of Lake Mathews water (which can be a blend of Colorado River Water and State Water Project water) and water off the Baker Pipeline. Nine treatment trains were evaluated including both MF/UF membrane treatment, and ozone followed by direct filtration. Multiple selection criteria were identified, and weighting factors were developed using the paired-wise selection approach and used to select the preferred treatment approach. The conceptual design of a new 6 mgd treatment facility was developed together with capital and O&M costs that were used for the financial analysis.

> **Principal-in-Charge for the Reservoirs Assessment Project for the City of Redlands, California.** The project involved the visual assessment and structural evaluation of four of the City's largest buried and partially buried concrete reservoirs. Finite element analysis was used to help determine the

Graham J.G. Juby, PhD, PE

cause of significant concrete spalling and cracking of the roof structure, which was attributed to thermal expansion and contraction.

> **Principal-in-charge for a reservoir rehabilitation project for the City of Torrance, California.** The project involves hydraulic analysis of the distribution system, design of a reservoir mixing manifold, and structural rehabilitation recommendations for 10-MG and 18-MG reservoirs. A focus of the project is prevention of nitrification in the reservoirs and distribution system.

> **Principal-in-charge for the 2014 and 2024 Water System Master Plans for Mesa Water District, California.** This assignment involves demand projections, water supply analysis, hydraulic model update and calibration, extensive field condition assessment, and development of an optimization model. As part of the field condition assessment, all water system facilities (8 groundwater wells, 1 treatment plant, 2 reservoirs, 2 booster stations, and imported water connections) were visited. In addition, 2 miles of non-destructive pipeline testing was done. The findings of the modeling and condition assessment analysis were combined into a comprehensive CIP and water master plan report.

> **Principal-in-charge for the system-wide IDSE evaluation study for the City of Redlands, California.** The project involved developing a final plan for the Initial Distribution System Evaluation (IDSE) for Compliance with the Stage 2 Disinfectants and Disinfection By-Products Rule (Stage 2 D/DBP). The City obtains its water from the Santa Ana River, Mill Creek, and groundwater. When required, California State Water Project can also be used, and is treated at either one of the plants. The entry points to the distribution system for both plants are

not immediately next the plant, but further away: the main entry point for Hinckley plant is Highland Reservoir, whereas the main entry point for Tate plant is Country Club Reservoir. Sites representing high concentrations of DBPs were selected by considering (a) configuration of the distribution system, (b) different pressure zones, (c) the possibility of using an existing TCR compliance monitoring site, (d) 2001 through 2006 data obtained from additional DBP sampling effort, (e) disinfectant residual data collected at the TCR compliance sampling locations during 2005 and 2006, and (f) distribution system HPC data for 2005 and 2006.

> **Project manager for the Colored Water Project, in the role of the owner's engineer, for the Mesa Consolidated Water District, California.** The project involved the preliminary design (approximately 30 percent design) and design/build/bid documents and specifications for a new treatment facility to remove the natural color from groundwater. The project included pre-qualification of design-build teams as well as pre-qualification of major equipment manufacturers. The project also included a 1.25-million-gallon reservoir and high lift pump station and an evaluation of nanofiltration as an alternative treatment process. Also included was design criteria development for a 15-t/d liquid oxygen (LOX) storage, evaporation, and delivery system. Carollo was retained during the construction phase to confirm the predesign concepts were provided by the design/buildier.



EDUCATION

MS Civil and Environmental Engineering, San Jose State University, 1994

BS Civil and Environmental Engineering, California Polytechnic State University, San Luis Obispo, 1986

LICENSES

Civil Engineer, California, Idaho, Nevada

Professional Engineer, Oregon, Washington, Hawaii, Arizona

PROFESSIONAL AFFILIATIONS

Water Environment Federation

Water Environment Federation Collection Systems Committee (Previous Member)

California Water Environment Association, Sierra Section, Board of Directors (2008 President)

Truckee Donner Public Utility District Board of Directors (2007 and 2008 President)

Tim F. Taylor, PE

Tim Taylor, Carollo's Director of Infrastructure Practice, has served as project manager for numerous water and wastewater infrastructure and treatment projects. With 39 years of experience in engineering design, construction, and project management for water distribution systems, gravity sewer collection systems, pump stations, water and wastewater treatment facilities, geographic information system (GIS), and modeling projects, Tim is proficient in all aspects of management, technical engineering, modeling, GIS, and design software. He has designed pipelines ranging from 12 inches up to 148 inches in diameter, as well as pump stations ranging in capacity from a few hundred gpm up to over 100 mgd.

RELEVANT EXPERIENCE

> **QA/QC for the City of Pasadena, California, Replacement of the Sunset Reservoir preliminary design project.**

The project involved the seismic/structural evaluation of a 5.6-MG elliptical-shaped reservoir with a hopper bottom and wood-framed roof originally constructed in 1888. Operational strategies, rehabilitation/retrofit, and replacement alternatives were considered. Findings and recommendations were presented in a report with conceptual level cost estimates.

> **QA/QC for the City of Redlands, California, Recycled Water Reservoir Storage** to provide design of a 2.7 MG prestressed recycled water reservoir and a new pump station to comply with Title 22 requirements allowing for extended use of the water. Project includes hydraulic analysis to determine necessary modifications and confirm reservoir sizing. In addition, Carollo is evaluating construction alternatives for the reservoirs and conducting water quality analysis to assess need for additional disinfection to achieve desired residuals in the distribution system.

> **QA/QC for the San Diego International Airport/Sundt Stormwater Design-Build Validation Phase for the San Diego International Airport (SDIA); California.** Carollo was hired by Sundt Construction, Inc. to

provide design and engineering services during construction for the proposed stormwater storage tank known as Cistern "C". The Cistern C sizing was based on the Strategic Stormwater Master Plan (SSMP) recommendations – Capture and Reuse Project developed for the San Diego Airport Authority. As part of the project, Carollo validate the hydrology model with an 85% capture rate. The Cistern C was sized for 3.0 MG storage capacity and included an inlet pipe, overflow system and two submersible pumps with an average 130 gpm serving as the cistern outlet system. Carollo was also responsible for the structural design of the cistern that included a cast-in-place circular tank with a diameter of approximately 160-feet. The cistern also included 32 interior columns and a top deck that was designed for traffic loading due to the cistern location under the existing parking area.

> **QA/QC for the City of Turlock, California, Surface Water Distribution System Improvements.** The project included preliminary and final design of a 2.5-MG reservoir, 14-mgd booster pump station, hydraulic modeling, distribution system improvements, overall program management services, and equipment pre-purchase. The purpose of the project is to incorporate 10 mgd (initial) and 30 mgd (ultimate) of a new surface water supply from the Stanislaus Regional Water Authority into

AWARDS

Special District Leadership and Management, Special District and Local Government Institute, 2007

OTHER ACCOMPLISHMENTS

Management Action Program, California Truckee North Tahoe Leadership Training Course, Truckee/North Tahoe Area

Tim F. Taylor, PE

the City's potable water distribution system.

> **Quality manager for the City of Redlands, California, Tate Water Treatment Plant Raw Water Influent Line.** Project includes planning and design for replacement of the existing transmission line at the WTP to provide water supply reliability. Team is evaluating three alternative alignments with considerations for potential permitting impacts and local land owners whose property the line passes through.

> **Technical advisor for the City of Yuba City, California, Sanborn Reservoir and Pump Station.** The project involved design of a new 3.5-MG potable water reservoir and 12-mgd pump station to support an area of the City's water system that was converted to a surface water supply from the City's existing water treatment plant to eliminate the use of groundwater wells. A new 30-inch pipeline was routed from the plant to the reservoir and pump station. The 3.5-MG welded steel reservoir was designed with new flexibility requirements for all piping connections, in accordance with the 2007 California Building Code requirements. Carollo's design provided the needed connection flexibility within the smallest footprint possible.

> **Technical advisor for the City of Turlock, California, T-SW and T-SE Water Reservoirs and Pump Stations.** The project involved design of two new 1.0-MG water tanks and two 7.7-mgd pump stations to enhance system capacity and reliability in meeting fire flow demands and peak hour flows.

> **Technical advisor for the City of Auburn, Washington, Academy and Lakeland Hills Booster Pump Stations.** The project included two new booster

pump stations to meet maximum day and fire flow demands for two of the City's service areas. An extensive preliminary design and alternatives analysis was performed to select the site for each facility and size the pump stations. The Academy pump station includes a 500-gpm domestic pump and a 1,500-gpm fire pump, and the Lakeland pump station includes an 800-gpm domestic pump and a 3,125-gpm fire pump.

> **Technical reviewer for the City of West Sacramento, California, Bridge District Water Storage Facility.** The project involved design of a dual-purpose water storage facility and neighborhood park to provide essential infrastructure for the Ironworks development, future development within the Bridge District, and the north part of the City. The storage tank and booster pump station are required for emergency, operational, fire flow, and domestic potable water storage for the new Bridge District development. The Bridge District Water Storage Facility includes a 3.1-MG steel storage tank and a pump station with a firm capacity of 3,000 gpm (4.32 mgd).

> **Project manager for the Monterey County Resource Management Agency, California, San Jerardo Cooperative Water System Improvements.** The project involved design of a 120-gpm domestic water booster pump station; 475-foot deep, 250-gpm groundwater well; 1,500-gpm diesel engine driven fire pump station; approximately 12,000 feet of 6-inch-diameter water transmission main; and 285,000-gallon storage reservoir. Tasks included coordination of multiple county agencies and subconsultants, as well as technical support to facilitate permits, easements, environmental clearance, and land acquisition.



EDUCATION

BS Civil Engineering,
Arizona State University,
1996

LICENSES

Civil Engineer, California

Structural Engineer,
California, Nevada,
Hawaii, New Mexico

Civil/Structural Engineer,
Washington, Oregon

Professional Engineer,
New York, British
Columbia

PROFESSIONAL AFFILIATIONS

American Society of Civil
Engineers

Chi Epsilon (National Civil
Engineering Honor
Society)

Engineers Without
Borders, Technical
Advisory Committee

Structural Engineers
Association of Northern
California

Tau Beta Pi (National
Engineering Honor
Society)

NACE International
Society for Protective
Coatings, Northern
California Chapter
Steering Committee
Governor's Office of

Michael E. Dadik, PE, SE, P.Eng.

Mike Dadik, a principal structural engineer and vice president with Carollo, has 34 years of experience in structural design of water, wastewater, transportation, and civil engineering projects. Since joining Carollo, he has overseen the structural design of numerous projects ranging from water and wastewater treatment plant construction and expansion to pump station seismic retrofits. Mike has extensive experience in rehabilitation and seismic vulnerability assessments. He also has extensive experience in coating and corrosion control and is Carollo's coating specialist responsible for maintenance of our coatings and finishes specifications.

RELEVANT EXPERIENCE

> **Technical reviewer for the City of Turlock, California, Surface Water Distribution System Improvements, which integrates the surface water into the existing potable water distribution system.** The project includes approximately 9,000 feet of 24- to 42-inch-diameter transmission main, 2.3-MG storage reservoir, 14.3-mgd (expandable to 35 mgd) booster pump station, and associated SCADA and other ancillary facilities. Carollo is providing all mechanical and EI&C design for the project. Project elements will be primarily constructed in a developed urban area. Public outreach, aesthetics of aboveground elements, utility coordination, and traffic control during construction are all key project considerations.

> **Technical advisor for Shea Homes/Western Summit Constructors' Mountain House, California, Tank Design.** The project involved a new 6.2-MG steel tank and conversion of a 4-MG tank to finished water service.

> **Project manager for Mountain House Developers Water Treatment Plant Raw Water Storage Tank Conversion.** Carollo prepared a site planning study for buildout of the Mountain House Water Treatment Plant site. Services included planning for additional finished water storage. Carollo evaluated the feasibility of adding a new 6.2-MG steel water tank

and conversion of an existing raw water tank to potable use to meet growing demands for emergency, operational, and fire flow demands. Carollo was then retained to convert the existing 4.0-MG raw water storage tank into a potable water reservoir that could be operated in series or in parallel with the previously constructed 4.0-MG potable water storage tank. This work included added a roof to the converted tank, strengthening the tank's lower shell plate, and improvements to meet CDPH requirements.

> **Project manager for Alameda County Water District, California, Vineyard Heights Tank Seismic Upgrade.** Following evaluation of retrofit and replacement alternatives, a retrofit was selected for this 0.5-MG steel tank. Construction involved replacing the tank lower shell course and anchoring the tank to a new foundation. The tank is the only water storage in the pressure zone requiring temporary backup power and pumping to maintain reliable service. The aggressive schedule of this \$1 million project was 12 months from preliminary design notice to proceed to end of construction.

> **Project manager for Alameda County Water District, California, Appian Tank Upgrade.** Project elements include replacement of the steel 0.75-MG steel tank and 3500 feet of transmission pipeline, and access road

Michael E. Dadik, PE, SE, P.Eng.

upgrades traversing upland grass habitat. The tank is the only water storage in the pressure zone requiring temporary backup power and pumping to maintain reliable service.

> **Structural engineer for design of a seismic retrofit of the Mallard Reservoir inlet/outlet tower as part of the Raw Water Seismic Improvements for the Contra Costa Water District, Concord, California.** This project involved substantial modifications to the 75-year-old inlet/outlet tower located in the reservoir.

> **Structural engineer for the seismic retrofit of the Contra Costa Water District, California, Treatment Water Facilities Improvement Program.** Work included condition assessment and seismic evaluation of a buried concrete reservoir, an above-ground steel reservoir, two pump stations, and associated electric and equipment buildings. Following the seismic evaluation, recommendations were made for retrofit strategies satisfying the client's budget and performance goals.

> **Structural engineer for the City of West Sacramento, California, Bridge District Pump Station, Reservoir, and Park.** Work included design of a 3-MG water storage tank, 3,000-gpm booster pump station and a municipal park to serve the new Bridge District development. This required coordinating aesthetic treatment of the tank and pump station to compliment the neighboring subdivision.

> **Structural engineer for the Contra Costa Water District, California, Treated Water Facilities Improvements.** Work included seismic evaluation of the Lime Ridge Reservoir, a 4-MG buried cast-in-place concrete reservoir.

> **Structural engineer for the Contra Costa Water District, California, Raw Water Improvements.** Work included seismic evaluation and recommendations, cathodic protection system upgrade, and construction documents for the District's Elderwood Reservoir, a 1.7-MG welded steel reservoir.

> **Structural engineer for the Contra Costa Water District, California, Raw Water Seismic Improvements.** Work involved extensive modifications to the Mallard Reservoir inlet/outlet structure, a new reservoir drain energy dissipater, and Contra Costa Canal turnout structure modifications.

> **Structural engineer for the Sacramento Regional County Sanitation District, California, EchoWater Project Flow Equalization Project (FEQ).** FEQ will provide an additional 110 MG of storage capacity for the facility. Additional features include roller-compacted concrete lined basins, spillways and interconnections structures, 84-inch diameter final effluent distribution pipeline, underdrain pump station, and basin washdown system. The washdown system consists of manual and automated water cannons for efficient washdown of the over 60 acres of basin area.

> **Structural engineer for the California Department of Corrections and Rehabilitation California Men's Colony Water Distribution System Replacement.** This project included design for replacement of more than 112,000 feet of distribution piping, eight pipe bridges ranging from 65 feet to 214 feet long, two booster pump stations, and reservoir modifications. Responsible for development of structural plans, specifications, and cost estimating.



EDUCATION

MS Civil Engineering,
University of California,
Berkeley, 1994

BS Civil Engineering,
University of California,
Irvine, 1993

LICENSES

Structural Engineer,
California, Georgia,
Oregon

Civil Engineer, California

Professional Engineer,
Utah, Colorado,
Tennessee, South Dakota

Civil/Structural Engineer,
Washington

PROFESSIONAL AFFILIATIONS

American Concrete
Institute

American Institute of
Steel Construction

James A. Doering, PE, SE

James Doering, a registered structural and civil engineer, is Carollo's structural lead engineer in Southern California. He manages structural design and evaluations for large and small projects. He has 30 years of experience in structural analysis, design, seismic retrofit, rehabilitation, review, and assessment for a variety of structures, such as wastewater and water treatment facilities, pump stations, reservoirs, tanks, clarifiers, large pipe supports, retaining walls, operations and maintenance facilities, office buildings, parking structures, post tensioned concrete structures, retail shopping centers, and warehouses.

RELEVANT EXPERIENCE

> Structural engineer for the Seismic Evaluation of Sunset Reservoir No. 1 for Pasadena Water and Power, California.

The project involved the seismic/structural evaluation of a 5.6 million gallon, elliptical-shaped reservoir with a hopper bottom and wood-framed roof originally constructed in 1888.

Operational strategies, rehabilitation/retrofit, and replacement alternatives were considered. Findings and recommendations were presented in a report with conceptual level cost estimates.

> Structural engineer for the City of Redlands, WWTP Recycled Water Reservoir Project.

The project involved the preliminary and final design of (2) 2.75 MG recycled water reservoirs. The reservoirs were designed to be 125-ft diameter x 45-ft tall prestressed concrete tanks, partially buried with concrete domes.

> Structural engineer for the 3.1-million-gallon stormwater tank (Cistern C) at the San Diego International Airport (Lindbergh Field).

The design-build project included a circular, buried, cast-in-place concrete tank supported on auger-cast piles with secant pile shoring. Special attention was given to coordinating dewatering with construction progress to prevent buoyant uplift damage due to high groundwater levels.

> Structural engineer for the Structural Evaluation of Peters Canyon Reservoir for East Orange County Water District in Orange, California.

The project involved the structural evaluation of a 6.0-MG, rectangular hopper-bottom cast-in-place concrete reservoir with a wood-framed roof that was originally constructed in 1963. Operational strategies, rehabilitation, and replacement alternatives were considered. Construction drawings were then prepared to address roof framing vulnerabilities and corrosion.

> Structural engineer for the City of Vallejo, Skyline Reservoir Replacement Project.

This project involved the preliminary and final design of a 6.0 MG potable water reservoir. The reservoir was designed to be a 172-ft diameter x 45-ft tall prestressed concrete tank, partially buried with a flat concrete roof.

> Lead structural engineer for the City of San Diego Point Loma Reservoir Seismic Evaluation.

This study evaluated the adequacy of the existing roof framing system for the Point Loma Reservoir, a rectangular 10 MG hopper-bottom reservoir originally built in 1942. The study presented findings, mitigation alternatives, and provided a feasibility analysis of previously planned structural modifications to the reservoir.

> Structural engineer for the City of Tulare, California, J Street and Alpine Vista Water Storage Tank Improvements.

The project involved

James A. Doering, PE, SE

James Doering added a tremendous value to the Carollo team and was absolutely a contributing factor to the overall success of these critical projects at the EWPCF."

- James Kearns, Capital Projects Manager, Encina Wastewater Authority, referring to the EWPCF Influent Junction Structure Rehab and Ocean Outfall-Landfall Inspection projects

planning, preliminary and final design, and engineering services during construction of two 2-MG concrete potable water storage tanks and two wells. The storage tanks are designed to supply the flow needed between the peak day and peak hour demand to mitigate low pressure issues.

> **Structural engineer for the Structural Evaluation of Smith Reservoir for Serrano Water District in Villa Park, California.** The project involved the seismic/structural evaluation of a 6.0-MG, rectangular cast-in-place concrete reservoir that was originally constructed in 1970. Operational strategies, rehabilitation, and replacement alternatives were considered. Findings and recommendations were presented in a report with conceptual level cost estimates.

> **Structural engineer for the Fulkerth Tank and Pump Station Project for the City of Turlock, California.** The project involved the design of a pump station and a 1-million-gallon prestressed concrete reservoir. Performance specifications and drawings were prepared for AWWA D110 Type I and Type III prestressed concrete tanks to introduce competition for construction of the tank. Challenges included configuration of the floor and drainage to allow efficient cleaning operations.

> **Structural engineer for the Industrial Tank 13 Project for the City of Modesto, California.** The project involved the design of a pump station and a 4.0-MG prestressed concrete reservoir with a flat roof. Performance specifications and drawings were prepared for AWWA D110 Type I and Type III prestressed concrete tanks.

> **Structural engineer for the Reservoirs Assessment Project for the**

City of Redlands, California. The project involved the visual assessment and structural evaluation of four of the City's largest buried and partially buried concrete reservoirs. Finite element analysis was used to help determine the cause of significant concrete spalling and cracking of the roof structure, which was attributed to thermal expansion and contraction.

> **Structural engineer for the 2015 Seismic and Structural Upgrade Project, City of Martinez, California.** Tasks included performance of an ASCE 41-13, Tier 1 and Tier 2 seismic evaluations for the two filter control buildings, and an ACI 350 evaluation of the finished water reservoir and backwash tank. Mitigation alternatives were developed for each structure. A seismic retrofit package was prepared for construction that included addition of shear walls to one of the control buildings and backfill reduction at the tanks.

> **Structural engineer for the Southern Delivery System Water Treatment Plant Raw Water Tank for the City of Colorado Springs, Colorado.** The project involved the design of a 10-MG circular prestressed concrete tank that will store raw water for processing at the water treatment plant. Performance specifications and drawings were prepared for an AWWA D110 Type III prestressed concrete tank. The 276-foot diameter tank was specified with a free-spanning cast-in-place concrete dome. The City preferred a flat roof for aesthetic reasons. Challenges in design included the development of soil mitigation procedures to reduce the potential for settlement due to the presence of collapsible aeolian soil deposits.



EDUCATION

BS Civil Engineering,
University of California,
2003

LICENSES

Civil Engineer, California

PROFESSIONAL AFFILIATIONS

WaterReuse Association
SoCal Water Coalition

Adelina Pirijanyan, PE

Adelina Pirijanyan has 20 years of experience in water resources planning. Through effective collaboration, timely communication, and efficient project coordination, Adelina has led various master planning efforts, completing tasks on time and budget. She has successfully managed various water/sewer resource planning projects involving multiple disciplines, subconsultants, and clients nationwide. Her strong communication and collaboration skills, coupled with her foresight allows her to successfully plan for and overcome project challenges, communication and budget issues, and schedule conflicts. She is Carollo's Southern California Planning Team Lead.

In addition, Adelina is skilled in hydraulic modeling and environmental data management, including data collection, input, quality assurance/ quality control, verification, validation, and analysis. Her expertise includes applying GIS technologies and hydraulic modeling for potable/non-potable systems.

RELEVANT EXPERIENCE

> **Project engineer and Modeling Lead for the Recycled Water System Model Development Analysis for the Camrosa Water District, Camarillo, California.**

Responsible for the construction, analyses, and model calibration for the Camrosa Water District's recycled water system. The District's existing non-potable system includes distribution of non-potable water to various agriculture and traditional irrigation users. Camrosa maintains several surface storage ponds, closed reservoirs, pump stations, and distribution piping to serve approximately 350 customers throughout seven separate pressure zones.

> **Project manager for the Recycled Water Strategy Update for the Inland Empire Utilities Agency, Chino, California.** Carollo has been performing recycled water hydraulic modeling services for the Inland Empire Utilities Agency (IEUA) since 2016. Adelina serves as the Project Mager for the task order to update their 2015 Recycled Water Strategy Plan. In addition, Adelina supports and leads the planning effort for various other task orders, which include hydraulic evaluations of IEUA's recycled water system to optimize recycled water supply, define

system deficiencies, and provide solutions to questions regarding the recycled water system.

> **Planning lead for the Manhattan Beach 2020 Water Master Plan for the City of Manhattan Beach, California.**

Adelina led the master planning update which focused on near- and long- term water supply demands, delivery of adequate flows and pressures for peak demands and fire protection, redundancy for service reliability with diversified water supply sources, and highest efficiency and lowest cost of operation. The master plan included hydrant flow testing and calibration of the City's hydraulic model in InfoWater.

> **Project engineer for the Water System Master Plan for the City of Orange, California.** Adelina led the hydraulic modeling effort for the water master plan update that included update of the City of Orange's current hydraulic model in InfoWater. The model update included hydrant flow testing and model calibration. Adelina supported the master planning effort, which included analyzing water demand and supply projections, evaluating optimization of supply facility operation, evaluating distribution system maintenance program, and providing a phased CIP with cost estimates. She also

Adelina Pirijanyan, BS, PE

AWARDS

OTHER ACCOMPLISHMENTS

OPEN FOR QUOTE

investigated water quality issues and identified any deficiencies and "bottle necks" in water system.

> **Project engineer and Modeling Lead for the SARP 10 Program Wastewater Collection System Master Plan, for the City of Memphis, Memphis, Tennessee.**

Responsible for the development of wastewater hydraulic model and master plan report as part of the SARP 10 program. The model development utilizing InfoSWMM included data import from GIS databases, dry weather calibration, and wet weather calibration. The master plan utilized future flow projections under a variety of design storm conditions to determine the appropriate conveyance improvements capacities for resolve hydraulic bottlenecks. The objective of this program is to improve the sanitary sewer infrastructure system and help reduce the number of sanitary sewer overflows (SSOs). The City owns, operates, and maintains approximately 2,400 miles of sanitary sewers, 100 lift stations, and 80,000 manholes.

> **Design engineer for the Water and Sewer Master Plan for the City of Banning, Banning California.**

Responsible for the hydraulic and sewer analyses, model calibration, planning and report preparation for the Water and Sewer System Master Plan. The development included commercial and residential acreage encompassing approximately 1,500 acres in project development. The City did not have domestic water zoning for this area, therefore water pressure zones were defined, were sized, the domestic and sewer water network was routed for the development, water and sewer pipes were sized, pressure reducers and valves were required, a pump station and a force main line was necessary for the southwest portion of the project in

order to deliver the sewage to the plant due to elevation restrictions.

> **University Research Parks 12 and 13 Hydraulic Analysis, Irvine Ranch Water District, Irvine, California.**

> **Project engineer for Hydraulic Modeling On-call Services for the Eastern Municipal Water District, Perris, California.**

> **Project modeler for the Development of the Woodbury-Connecticut Hydraulic Model, Woodbury, Connecticut.**

> **Planning lead for the Fullerton 2020 Water Master Plan for the City of Fullerton, California.** The City was updating its Water Master Plan (WMP) and Water Rate Study (WRS) to address water supply, water demands, facilities planning, water quality and regulatory concerns, and a prioritized capital improvement program (CIP). Adelina led the planning effort to complete the water master plan which included one to one model development, fire hydrant testing, model calibration, condition assessment and asset management.

> **Project engineer and Modeling Lead for the 2015 Wastewater Collection System Master Plan for the Eastern Municipal Water District, Perris, California.** Responsible for leading the model evaluation and master plan report development for the master plan update. She is also working with the GIS team in the development and integration of tools for EMWD (District). They provide wastewater collection and treatment services to approximately 555 square miles, owning and operating over 1,700 miles of sewer pipe, 51 active lift stations, and five regional water reclamation facilities.



EDUCATION

BS Civil Engineering,
California State
Polytechnic University,
Pomona, 1994

LICENSES

Professional Engineer,
California, Florida

Raphael V. Bui, PE

Raphael Bui has more than 30 years of experience in civil detail design of pipelines, utilities, storm drainage, stormwater mitigations, open water flow channels, water diversion facilities, wells, wetlands, percolation ponds, water reclamation plants, pump stations, geometric roadways, reservoirs, and water and wastewater treatment plants projects with particular emphasis on site layout design, grading plans, horizontal control plans, and yard piping plans and mechanical piping. He is also experienced with hydrology, hydraulic, and subdivision designs that include public street improvements. In addition to his strong design background, Raphael has performed as Field Project Engineer and Resident Engineer in construction management services at water and wastewater treatment facilities for two years.

RELEVANT EXPERIENCE

> **Civil engineer for the Seismic Evaluation of the Pasadena Water and Power, California, Sunset Reservoir No. 1.**

The project involved the seismic/structural evaluation of a 5.6-MG elliptical-shaped reservoir with a hopper bottom and wood-framed roof originally constructed in 1888. Operational strategies, rehabilitation/retrofit, and replacement alternatives were considered. Findings and recommendations were presented in a report with conceptual level cost estimates.

> **Civil engineer for the Linden Reservoir Rehabilitation Project for the City of Riverside Public Utilities, California.**

This \$5.4 million project consisted of preliminary engineering services to provide structural/seismic analysis of the existing tank structure and demolition of the existing 16 million gallon reservoir steel roof and replacing it with a new pre-manufactured aluminum roof system. The existing reservoir roof has an area of over 100,000 square feet. This project started with evaluation of eleven different roof options and finally selecting the aluminum roof system as the preferred option. The project was then moved into the final design phase. There were several other improvements that were required prior to installing the new roof system such as the demolition and

removal of the existing roof system including interior concrete columns; the removal of four sections of the existing concrete perimeter walls in order to provide upgraded seismic load transfer connections for the new roof system; and improvements to existing reservoir interior including crack repair, joint sealant, piping modifications and improvements. The reservoir inlet/outlet and overflow were also upgraded as part of the improvements. The project was successfully completed within schedule and budget.

> **Civil engineer for the City of Redlands, California, Recycled Water Reservoir Storage** to provide design of a 2.7 MG prestressed recycled water reservoir and a new pump station to comply with Title 22 requirements allowing for extended use of the water. Project includes hydraulic analysis to determine necessary modifications and confirm reservoir sizing. In addition, Carollo is evaluating construction alternatives for the reservoirs and conducting water quality analysis to assess need for additional disinfection to achieve desired residuals in the distribution system.

> **Civil engineer for the San Diego International Airport/Sundt Stormwater Design-Build Validation Phase for the San Diego International Airport (SDIA); California.** Carollo was

Raphael V. Bui, PE

hired by Sundt Construction, Inc. to provide design and engineering services during construction for the proposed stormwater storage tank known as Cistern "C". The Cistern C sizing was based on the Strategic Stormwater Master Plan (SSMP) recommendations – Capture and Reuse Project developed for the San Diego Airport Authority. As part of the project, Carollo validate the hydrology model with an 85% capture rate. The Cistern C was sized for 3.0 MG storage capacity and included an inlet pipe, overflow system and two submersible pumps with an average 130 gpm serving as the cistern outlet system. Carollo was also responsible for the structural design of the cistern that included a cast-in-place circular tank with a diameter of approximately 160-feet. The cistern also included 32 interior columns and a top deck that was designed for traffic loading due to the cistern location under the existing parking area.

> **Senior project engineer for the City of South Pasadena, California, Graves Reservoir Replacement.** This project included replacement of the existing 1.0-MG reservoir and associated facilities, except for the onsite groundwater Well No. 2, with a new 1.2-MG cast-in-place concrete reservoir, sound-attenuated pump house, electrical room, onsite sodium hypochlorite generation room, wellhead treatment system, landscaping/irrigation, and site improvements. The project also included coordination with the Drinking Water State Revolving Fund (DWSRF) for state funding and CEQA-Plus Initial Study and Mitigated Negative Declaration. Raphael's responsibility included being the civil design lead and main coordinator for mechanical and structural disciplines.

> **Civil lead for the Diamond Regional Sewer Lift Station (DRSLS) and Dual Force Mains for the Elsinore Valley Municipal Water District, California.**

Project includes preliminary and final design for the new DRSLS which will be constructed in three phases. The lift station structure will be constructed for the maximum 19.9-mgd peak hourly wet weather flow (PHWWF) required for Phase 3. A dual force main system of 2- to 24-inch diameter pipeline will be constructed from the new DRSLS to an existing diversion structure located north of the intersection of Lakeshore Drive and Elm Street for conveyance to EVMWD's Regional Water Reclamation Facility via the existing 54-inch diameter Lakeshore Trunk Sewer.

> **Civil engineer for the Westward Ho Sewer Crossing Replacement for the Valley Sanitary District, California.**

Project includes engineering services for the preliminary design, final design, permitting assistance, bid phase, and engineering services during construction of this replacement sewer project. Carollo's Preliminary Design Report evaluated two trenchless installation methods (HDD or microtunneling). As part of the evaluation, Carollo developed siphon hydraulic design criteria for Option 1 and lift station design criteria for Option 2. Geotechnical information on the subsurface conditions for trenchless methods of construction were reviewed. Carollo also completed a scour analysis for a better understanding of the minimum depth required for the pipeline to be safe from future scour. Carollo recommended the most feasible method for the project and recently completed the final design phase of the project.



EDUCATION

MS Electrical Engineering,
Colorado School of
Mines, 2011

BS Electrical Engineering,
Colorado School of
Mines, 2007

LICENSES

Professional Engineer,
Colorado, Illinois,
Virginia, Maryland

Electrical Engineer,
Arizona, California,
Nevada

Christopher L. Loving, PE

Chris Loving is a principal electrical engineer and is Carollo's Community of Practice leader for electrical system studies. He has extensive experience in electrical and instrumentation design and construction management for both water and wastewater treatment facilities. He also has in-depth knowledge of short circuit studies, protective device coordination and arc flash studies and can perform electrical system studies in ETAP, SKM, and EasyPower. His projects typically have involved extensive coordination with other disciplines, understanding and incorporating plant operator input, and wide-ranging integration with existing facilities. Many projects have included detailed and complex construction sequencing plans to minimize plant downtime.

RELEVANT EXPERIENCE

> **Electrical and instrumentation design of Panther Creek Wastewater Treatment Plant for North Texas Municipal Water District.** The project

included addition of a primary and secondary clarifier, aeration basins, odor control, sludge pumping, and a UV system. Design included one-lines, motor control center elevations, standby power generation studies, conduit routing, and switchgear.

> **Electrical and instrumentation engineer for the design and construction support of a 1.1-MW cogeneration system for the City of Hayward, California, Wastewater Treatment Facility.** Project consisted of developing construction documents for a 1.1-MW digester gas-fueled reciprocating-engine-based cogeneration system. System included installation of a single engine with space for a second unit, all appurtenant equipment, fuel treatment equipment, emission control equipment, and all electrical interconnection equipment.

> **Electrical and instrumentation engineer for the design and construction support of a 650 kW cogeneration system for the South Orange County Wastewater Authority Latham treatment plant, California.** Project included extensive coordination with two other consultants performing work on the same construction

documents including the service entrance gear being designed by others. Project included utilizing custom standards for the I&C design documents

> **Electrical and instrumentation engineer for the design of an 846 kW cogeneration system for the South Orange County Wastewater Authority Regional treatment plant, California.**

Project includes extensive utility coordination and developing California Rule 21 documentation and assistance with the utility interconnection agreement. The design includes all new switchgear and several other pieces of distribution gear. Extensive integration with the existing electrical distribution system was required and a detailed temporary power plan/construction sequence was developed as a part of this project.

> **Electrical and instrumentation design engineer for the New UV Facility at Floyd Branch for North Texas Municipal Water District.** Project consisted of three UV channels rated at 5 mgd with two banks each. Design of the UV equipment was specifically engineered to be open to multiple manufacturers with horizontal or vertical systems with alternative bids for other types. A 50KW standby generator was designed to supply the UV equipment in case of plant power failure.

> **Lead electrical design engineer for the Hancock County Utility Authority,**

AWARDS

OTHER
ACCOMPLISHMENTS

OPEN FOR QUOTE

Christopher L. Loving, PE

Mississippi, Northern Regional Wastewater Treatment Plant design project. The plant consisted of multiple electrical rooms to support the septage receiving station, influent/effluent pumping stations, closed vessel UV disinfection, in-line post aeration, and solids processing.

> **Electrical engineer for the City of Prescott, Arizona, Airport Water Reclamation Facility Expansion.** Carollo assisted in approximately 65 percent of the design. This Phase 1 was 3.75 mgd capacity, with the phased expansion of the facility planned for an ultimate capacity of 15 mgd. Because this Phase 1 expansion included a process change (from the existing oxidation ditches to activated sludge BNR) this project was essentially designing the first phase of a new treatment facility.

> **Electrical and I&C engineer for the Hi-Desert Water District, Yucca Valley, California, Collection System Phase 1.** Carollo provided design and construction support for the complete collection system of the \$95 million Phase I Wastewater Reclamation Project. Phase 1 included 77 miles of collection system piping ranging from 6 to 24 inches in diameter, three lift stations, ten separate jack-and-bore installations across Caltrans right of way at SR 62 and 247, and replacement of more than 78 miles of roadway.

> **Lead electrical engineer for the City of Las Vegas, Nevada, WPCF Filtration Building Miscellaneous Improvements.** The project involved preparation of design documents to upgrade the Filtration Building at the WPCF facility. Improvements included a ultrasonic level sensors, pump VFDs, filter level transmitters, flowmeters, butterfly valves, pressure switches, flow transmitters, hoists on the propeller

flowmeters, roof modifications, filter control panels, and general filter building paint and window improvements.

> **Lead electrical engineer and project engineer for a series of electrical upgrade project at the City of Simi Valley, California that includes pre-design, design, and engineering services during construction associated with the replacement of 480-volt switchgear and motor control centers that comprise the power distribution system at the City of Simi Valley's Water Quality Control Plant.** Design included a detailed construction sequence plan to minimize disruptions to plant operation as existing electrical equipment was taken out of service and ensures that all plant loads are supported by at least two sources of power derived from the utility service and either the plant standby diesel engine generator or a temporary standby engine generator provided by the contractor. Project involved understanding the Owner's needs and including a variety of process, HVAC, SCADA, fiber, and other upgrades.

> **Performed electrical system studies including short circuit, protective device coordination and arc flash hazard analysis for the Ocotillo Brine Reduction Facility Design/Build Project, California.** The project included 12.47kV switchgear with bus differential relays, 4.16kV MCC with motor protection relays, low voltage switchboards and MCCs, existing low voltage MCC and panelboards and an existing 350kW generator. Tasks included coordinating with the contractor for information for the existing equipment. This information included electrical equipment ratings, protective device settings, motor information and other required data.



EDUCATION

MS Environmental Engineering, University of Cincinnati, 2001

B-Tech Civil Engineering, Indian Institute of Technology, Bombay, 1998

LICENSES

Civil Engineer, California, Washington

CERTIFICATION

Board Certified Environmental Engineer (BCEE), American Academy of Environmental Engineers

Rajesh B. Doppalapudi, PE, BCEE

Rajesh Doppalapudi is a civil engineer specializing in the analysis and design of water and wastewater projects. With 25 years of experience in project management and process engineering, he has contributed to numerous wastewater treatment, solids handling, and disposal projects. Over the past five years, he has managed projects with a total planned construction value exceeding \$5.5 billion. His expertise in constructability and cost estimating contributes to the efficient and effective delivery of projects.

RELEVANT EXPERIENCE

> **Civil engineer providing commissioning and start-up assistance for the Eastern Municipal Water District, California, Moreno Valley Regional Water Reclamation Facility Acid-Phase Anaerobic Digestion project.** His responsibilities included submittal reviews, equipment testing, start up, and training for acid-phase anaerobic digestion process.

> **Civil engineer providing commissioning and start-up assistance for the Eastern Municipal Water District, California, Moreno Valley Regional Water Reclamation Facility Secondary Clarifier and Tertiary Treatment project.** Responsibilities included submittal reviews, equipment testing, start up, and training for tertiary treatment including cloth filters and chlorine contact basins.

> **Construction support and civil engineer for the Eastern Municipal Water District, California, Perris Valley Regional Water Reclamation Facility Dewatering Expansion.** Construction support responsibilities included submittal review, response to Requests for Information, and start-up and training assistance.

> **Construction support and civil engineer for the Eastern Municipal Water District, California, Temecula Valley Regional Water Reclamation Facility 16-mgd Expansion.** Construction support responsibilities included submittal review and response to

contractor Requests for Information. Design responsibilities included design of a sludge storage tank, digester gas holder, and truck scale.

> **Construction support and civil engineer for the Bardenpho Ditch Modifications at the Eastern Municipal Water District, California, Moreno Valley Regional Water Reclamation Facility.** Construction support responsibilities included submittal review and response to Requests for Information. Design responsibilities included developing the hydraulic profile and design of aeration basins.

> **Construction support engineer responsible for submittal review and response to contractor requests for information on the Clark County Water Reclamation District, Nevada, Central Plant Secondary Treatment Facility Modifications.**

> **Project engineer for the Eastern Municipal Water District, California, Year 2025 Regional Water Reclamation Facilities Capital Improvement Plan.** The project included developing 25-year capital requirements for EMWD based on project requirements and flow projection at four regional water reclamation facilities.

> **Civil engineer for the Orange County Water District, California, Dewatering Comparison project.** The project involved comparing various alternatives for the expansion of dewatering capacity. Performed a

Rajesh B. Doppalapudi, PE, BCEE

qualitative and life-cycle cost comparison between belt filter presses and centrifuges.

> **Project engineer for the centrifuge pilot testing prequalification on prepurchase design for three Eastern Municipal Water District, California, water reclamation facilities.**

Responsibilities included developing specifications for the evaluated bid package and shop drawing submittal review during construction.

> **Project engineer responsible for site development and bypass pumping for the Eastern Municipal Water District (EMWD), California, 2020 Warm Springs Lift Station Condition Assessment and Preliminary Design.**

This fast track project involved the condition assessment of a 30-year old active 37-mgd raw wastewater lift station and the two upstream sewers. A drone inspection of the operating lift station was carried out as the most cost-effective approach to observe the internal condition of the buried wet well.

> **Project manager for the ongoing Eastern Municipal Water District, California, Moreno Valley RWRF Plant 2A Rehabilitation project.** The project consists rehabilitation of the Plant 2A aeration basin at MVRWRF that has been in operation for 20-years. In addition, there are other scope items, such as replacement of a portion of the 42-inch stainless steel air header for Plant 2. The project is working towards the 90-percent design deliverable and is expected to go into construction in June 2025.

> **Design manager for the Inland Empire Utilities Agency, California, RP-4 Primary Clarifier and Process Rehabilitation Project.** The project includes preliminary and final design for assessment of the various processes in

the plant and developing construction drawings for the various improvements identified during the assessment.

> **Project engineer for the Eastern Municipal Water District, California, Temecula Valley Regional Water Reclamation Facility Secondary Plant Stress Test.** His responsibilities included developing test plans, working with plant staff to optimize their secondary process, and collecting and analyzing plant data.

> **Project engineer for the Orange County Sanitation District, California, 2017 Facilities Master Plan.** Carollo provided a comprehensive update to the 2009 Facilities Master Plan, including the collection system and the two Plants facilities. The project included identifying CIP projects for the next 20 years based on various end of life assessment drivers. The identified projects were then prioritized to meet OCSD's cash flow requirements. The project also included developing an estimate of the replacement value of all of OCSD's facilities.

> **Project engineer for the City of Riverside, California, Comprehensive Wastewater Master Plan.** Carollo provided an update to the City's 2008 Master Plan, including a visual condition assessment of the collection system and Regional Water Quality Control Plant. The new plan included flow monitoring, flow and process modeling, a Waste Discharge Requirements GAP analysis, development of a CIP for the collection system and treatment plant, and a financial plan.



EDUCATION

BA Political Science,
University of Nevada, Las Vegas, 1986

Dale M. Snyder

Dale Snyder has 39 years of civil design experience, mostly in water resources CADD design work for water resource improvement projects. Many of his projects include reservoir designs and he is the source of information for many of the Southern Nevada Water Authority's (SNWA) design projects, since he was intimately involved in their development. As manager of the CADD design effort, Dale coordinated production of computer-aided design/ drafting assignments; directed procurement for MIS equipment; and assured deliverable products adhered to the clients' standards and specifications. He has considerable experience with design software in the preparation of computer-generated drawings using Civil 3D, as well as Microsoft Office. Dale has experience with multiple platforms, conversions, and integration of computerized files to adhere to client standards and specifications, drawing preparation and production, and quality computations. He has a wealth of knowledge and understanding of pipeline-oriented designs, particularly those involving complete system development.

RELEVANT EXPERIENCE

> **CAD lead for the City of Pasadena, California, Replacement of the Sunset Reservoir preliminary design project.**

The project involved the seismic/structural evaluation of a 5.6-MG elliptical-shaped reservoir with a hopper bottom and wood-framed roof originally constructed in 1888. Operational strategies, rehabilitation/retrofit, and replacement alternatives were considered. Findings and recommendations were presented in a report with conceptual level cost estimates.

> **CAD lead for the City of Redlands, California, Recycled Water Reservoir Storage** to provide design of a 2.7 MG prestressed recycled water reservoir and a new pump station to comply with Title 22 requirements allowing for extended use of the water. Project includes hydraulic analysis to determine necessary modifications and confirm reservoir sizing. In addition, Carollo is evaluating construction alternatives for the reservoirs and conducting water quality analysis to assess need for additional disinfection to achieve desired residuals in the distribution system.

> **Design manager for the Southern Nevada Water Authority, Las Vegas,**

Nevada, Coyote Springs Well and Moapa Transmission System, SNWA 340-A.

This SNWA project included the design of approximately 81,200 feet of 24-inch diameter pipeline, inclusive of a reservoir, pumping station and its equipage, various regulating valves, and pumps. Dale oversaw pipeline design elements, such as: alignment studies, plans and profiles, valve specifications, and associated appurtenances to accommodate submersible pumps, meters, and flow. Dale followed up on SNWA design modifications and red lines to effect timely turnarounds and ensured conformity with specifications.

> **Lead designer for the Southern Nevada Water Authority, Henderson, Nevada, 160-A River Mountains 2530 Pumping Station and 25 MG Clearwell C.** Carollo designed a 175 mgd pumping station that includes a 25 MG underground reservoir, five pumps, each capable of about 34 mgd at approximately 410 feet of head, associated piping, valves, meters, and surge tanks. Dale designed civil plans, plan set organization, and general design and drafting support.

> **Lead designer for the Southern Nevada Water Authority, Nevada, North Valley Lateral, 170-B.** Dale was

Dale Snyder

the lead designer for the design of 6.6 miles of 72-inch diameter MLC steel pipeline serving the SNWA 2345 Decatur Reservoir and CNLV Deer Springs 2430 Zone Pump Station located in the northwest portion of the Las Vegas Valley. The project included accommodation for regional flood control facilities; an impressed current cathodic protection system, four butterfly valves and vaults; air/vacuum and blow-off assemblies, fiber optics conduits and a design that anticipated other future improvements along the corridor.

> **Lead designer for the Southern Nevada Water Authority, Nevada, North Valley Lateral, 140-A.** Dale was the lead designer for the design of 2.6 miles of 84-inch, 2.0 mile of 42-inch, 1.0 miles of 30-inch and 2.0 miles of 24-inch diameter MLC steel pipeline serving the SNWA 2345 Decatur Reservoir and CNLV Deer Springs 2430 Zone Pump Station located in the northwest portion of the Las Vegas Valley. The project included accommodation for future regional flood control facilities and accommodation for the future Beltway crossing at Valley Drive and Centennial Parkway: an impressed current cathodic protection system, four butterfly valves and vaults; air/vacuum and blow-off assemblies, fiber optics conduits and a design that anticipated other future improvements along the corridor.

> **Senior designer, City of Riverside Public Utilities Department, California, San Bernardino Pipeline Condition Assessment.** This project is a condition assessment to determine the condition of a 1927 era concrete pipeline carrying drinking water from San Bernardino to Riverside. The work consists of planning, permit processing and paying the fees for each permit such as Caltrans, City of Colton, City of Riverside, and City of San

Bernardino. Traffic Control Plans for the same cities were also required. The project includes physical man entry inspection as well as close circuit television inspection. URS joined with Spiniello Infrastructure Company to perform the inspection activities. The project also includes the assessment task and recommendations for the pipeline such as repairs, relining and or replacement. Dale was involved with the field inspections, figures, and assessment report preparation.

> **Senior designer for the Inland Empire Utility Authority (IEUA), California, Baseline Recycled Water Pipeline Project.** The project at the northeastern portion of the service area includes an existing 24-inch diameter pipeline located in Baseline Avenue that was extended approximately 8,200 linear feet to Cherry Avenue in the City of Fontana of which 4,500 linear feet was along Baseline Avenue and 3,700 feet along South Heritage Circle. The project supports recycled water for landscape irrigation in medians, park ways, and parks that increased the beneficial reuse of recycled water by approximately 105 AFY. The pipeline extension is located within IEUA's 1630 pressure zone. There is potential to increase recycled water usage in the future with lateral branches from the 24-inch line pipeline to the north and south of Baseline Avenue and further east into the City of Fontana. This project provided water reliability by reducing dependence on imported water and maximizing the beneficial reuse of recycled water.

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COST PROPOSAL PREPARED FOR
EAST ORANGE COUNTY
WATER DISTRICT

Wholesale System 6 MG
Reservoir Seismic
Reconstruction Project –
**Phase 1: Preliminary
Design Report**

JULY 2025





July 24, 2025

Mr. Bobby Young, P.E., Engineering Manager
East Orange County Water District
185 N. McPherson Road
Orange, CA 92869

Subject: Cost Proposal for Wholesale System 6.0 MG Reservoir Seismic Reconstruction – Phase 1 Preliminary Design Report

Dear Mr. Young:

In accordance with the East Orange County Water District (EOCWD/District) Request for Proposal (RFP), we have prepared a cost estimate based on the anticipated level of effort for completion of the individual tasks outlined in the Scope of Work. The individual tasks associated with the Phase 1 Preliminary Design Report, the level of effort and assigned staff categories are shown in the attached Exhibit. The cost proposal also includes the expenses for each subconsultant. At the bottom of the table we have included some Optional tasks that the District may wish to consider.

In preparing the cost estimate we made the following assumptions:

1. The duration of the Phase 1 Preliminary Design Report will be approximately three and a half months as indicated in our proposal.
2. District staff will provide project background information material and direction for specific tasks.
3. It is assumed that the water demands will be provided by the District.
4. Potholing is not included. We have assumed that potholing locations can be identified as part of the Phase 1 work and that any required potholing can be completed in the next phase of the work.
5. Additional geotechnical field investigation is included as an optional task. We have assumed that there is sufficient existing information available to complete the PDR phase.
6. It is assumed that the pump station and reservoir piping and replacement is not part of this PDR.
7. The District will provide a working hydraulic model and information needed for sizing the temporary tank.
8. Environmental documentation is not required.
9. Permitting is not included.
10. Any additional out of scope work will be discussed and negotiated with the District prior to performing the work.

We look forward to the opportunity to deliver responsive client service to the District and collaborate with you on a successful project. Please contact the undersigned if you have any questions about our proposal or need any additional information.

Sincerely,

CAROLLO ENGINEERS, INC.

Graham Juby, PE, Principal-in-Charge
714-376-7231 / gjjuby@carollo.com

Miko Aivazian, PE / Project Manager
626-379-2370 / maivazian@carollo.com

Cost Proposal

East Orange County Water District

Carollo Fee Estimate

Preliminary Design Services for 6.0 MG Wholesale System Reservoir Replacement Project



Task No.	TASK DESCRIPTION	Hourly Billing Rate								TOTAL HOURS	LABOR COST	Project Equipment and Communication Expense [PECE] (\$15.60 per labor hour)	OTHER DIRECT COSTS	Subconsultants	Markup on Subconsultants	TOTAL PROJECT FEE
		\$324	\$324	\$302	\$285	\$250	\$185	\$170	\$150							
		Senior Professional	Project Manager, QA/QC	Lead Professional	Project Professional	Professional	Assistant Professional	CAD Technician	Office Support							
1.0	PROJECT OVERSIGHT/MANAGEMENT AND QA/QC	6	36	30	30	12	0	0	5	119	\$ 34,968	\$ 1,856	\$ 400	\$ -	\$ -	\$ 37,224
1.1	Attend kick-off meeting, biweekly meetings (assume 6 total)	2	8	8	8				2	28	\$ 8,236	\$ 437		\$ -	\$ -	\$ 8,673
1.2	Attend in-person review meeting at PDR deliverable		4	2	2				1	9	\$ 2,620	\$ 140	\$ 400	\$ -	\$ -	\$ 3,160
1.3	Project Management	2	16	12	12	12			1	55	\$ 16,026	\$ 858		\$ -	\$ -	\$ 16,884
1.4	Quality Assurance and Quality Control	2	8	8	8				1	27	\$ 8,086	\$ 421		\$ -	\$ -	\$ 8,507
2.0	BASELINE RESEARCH	0	4	12	12	0	8	8	1	45	\$ 11,330	\$ 702	\$ -	\$ -	\$ -	\$ 12,032
2.1	Obtain and review available data, reports, plans, and perform site visit		4	12	12		8	8	1	45	\$ 11,330	\$ 702		\$ -	\$ -	\$ 12,032
3.0	MATERIAL ANALYSIS AND SEISMIC PARAMETERS STUDY	4	24	60	40	40	0	12	4	184	\$ 51,232	\$ 2,870	\$ 200	\$ -	\$ -	\$ 54,302
3.1	Prepare and submit a Technical Memorandum	4	24	60	40	40		12	4	184	\$ 51,232	\$ 2,870	\$ 200	\$ -	\$ -	\$ 54,302
3.2	Prepare and submit a second Technical Memorandum with layouts (if needed)-See optional task 6.1									0	\$ -	\$ -		\$ -	\$ -	\$ -
4.0	TOPOGRAPHIC MAPPING, SURVEYING AND GEOTECHNICAL STUDIES	0	4	6	8	0	0	8	3	29	\$ 7,198	\$ 452	\$ -	\$ 29,200	\$ 2,920	\$ 39,770
4.1	Prepare site survey of the project area		2	4	4			8	2	20	\$ 4,656	\$ 312		\$ 20,000	\$ 2,000	\$ 26,968
4.2	Geotechnical investigation to update Site Class per 2025 California Building Code		2	2	4				1	9	\$ 2,542	\$ 140		\$ 9,200	\$ 920	\$ 12,802
5.0	PREPARE A PRELIMINARY DESIGN REPORT (PDR)	10	68	128	72	108	64	136	18	604	\$ 149,108	\$ 9,422	\$ 500	\$ -	\$ -	\$ 159,030
5.1	Prepare a Preliminary Design Report (PDR) - Includes hydraulic modeling, construction schedule and cost estimate	6	44	88	32	68	64	16	14	332	\$ 85,556	\$ 5,179		\$ -	\$ -	\$ 90,735
5.2	Prepare 30% conceptual design drawings	4	24	40	40	40		120	4	272	\$ 63,552	\$ 4,243	\$ 500	\$ -	\$ -	\$ 68,295
TOTAL FOR TASKS 1-5		20	136	236	162	160	72	164	31	981	\$ 253,836	\$ 15,304	\$ 1,100	\$ 29,200	\$ 2,920	\$ 302,360
OPTIONAL TASKS																
6.0	ADDITIONAL OPTIONAL TASKS	3	8	14	8	8	40	24	3	108	\$ 24,002	\$ 1,685	\$ -	\$ 18,800	\$ 1,880	\$ 46,367
6.1	Prepare and submit a second Technical Memorandum with layouts (if needed)	2	4	4	8			24	2	44	\$ 9,812	\$ 686		\$ -	\$ -	\$ 10,498
6.2	Additional geotechnical field investigations (if needed)		2	2					1	5	\$ 1,402	\$ 78		\$ 18,800	\$ 1,880	\$ 22,160
6.3	Additional hydraulic modeling	1	2	8		8	40			59	\$ 12,788	\$ 920		\$ -	\$ -	\$ 13,708
TOTAL FOR OPTIONAL TASKS		3	8	14	8	8	40	24	3	108	\$ 24,002	\$ 1,685	\$ -	\$ 18,800	\$ 1,880	\$ 46,367
TOTAL FOR ALL TASKS		23	144	250	170	168	112	188	34	1,089	\$ 277,838	\$ 16,988	\$ 1,100	\$ 48,000	\$ 4,800	\$ 348,726

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MEMO

TO: BOARD OF DIRECTORS
FROM: GENERAL MANAGER *AMJ*
SUBJECT: SEWER SYSTEM MANAGEMENT PLAN (SSMP) APPROVAL
DATE: AUGUST 13, 2025

Background

The development and implementation of the Sewer System Management Plan (SSMP) is a requirement of the State Water Resources Control Board adopted Order No. 2022-0103-DWQ, Statewide General Waste Discharge Requirements (WDR) for Sanitary Sewer Systems, adopted on December 6, 2022. The revised Sanitary Sewer Systems General Order requires public agencies that own or operate sanitary sewer systems to develop and implement sewer system management plans and report all sanitary sewer spills to the State Water Board's online California Integrated Water Quality System (CIWQS) Sanitary Sewer System Database. The revised WDR added additional spill Category 4 to recognize the lowest-threat spills less than or equal to 50 gallons and added adaptive management principles to the SSMP development and implementation approach. Another major element update is that the Spill Emergency Response Plan (SERP) replaces the Overflow Emergency Response Plan, which EOCWD updated in 2023. The WDR include directives for owners and operators of collection systems to demonstrate adequate and efficient management, operation, and maintenance of their collection systems.

The SSMP is not a static document, rather it is meant to be a dynamic document that reflects the actual Operations, Maintenance, Engineering and Administrative functions performed. To add to this dynamism, the State requires that each agency audit the SSMP regularly and incorporate the findings.

The District's most recent update to the SSMP was in 2019, with an audit of the plan in 2024. As previously discussed and approved at prior Board meetings, Dopudja & Wells Consultants (DWC) has been awarded a contract to update the Sewer Master Plan and SSMP.

Staff worked with DWC to identify revisions to the document that were incorporated into Volumes I and II. The SSMP document will be placed on the District's website for public review as well. The submittal of the updated SSMP, and the associated attachments, will fulfill the updating requirement for the next review cycle.

Budget Analysis

This work was budgeted in the FY24/25 CIP and approved at the December 2024 Board meeting

Environmental Documentation

Not applicable.

Recommendation

Staff recommends that the Board approve the Sanitary Sewer Management Plan 2025.

Attachment(s)

SSMP 2025 Volume 1 (Due to size, Volume 2: Appendices will be available on the District's website)



SANITARY SEWER MANAGEMENT PLAN 2025

Volume I

Revised:
AUGUST 2025



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Appendix H – 2025 EOCWD Sewer Master Plan Update

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Appendix K – Public-education outreach materials and program (website, print and social media) promoting proper disposal of FOG

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Appendix M – Handout materials for each Food Service Establishment to educate staff and ensure compliance.

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Appendix O – FOG Control Regulations Applicable to Food Service Establishments (FSE)

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Appendix Q – Local Sanitary Sewer Service Charges

Appendix R – FOG Management Program

Appendix S – FOG Binder containing guidance and resources for FSEs

Appendix T – Agreement for Provision of Environmental Health Services between the County of Orange and Orange County Sanitation District

Appendix U – Materials developed to educate the public about proper FOG and debris disposal

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Element 1: Goals and Introduction

The goal of the Sewer System Management Plan (SSMP) is to provide the plan and schedule to (1) properly manage, operate, and maintain all parts of the sanitary sewer system owned by the East Orange County Water District (District, EOCWD), (2) reduce and prevent spills, and (3) contain and mitigate spills that do occur.

This SSMP has been developed and is implemented with the intent of properly managing, operating, and maintaining all parts of the District's sanitary sewer system. The District has identified specific goals that it believes achievable through the implementation of the contents of this plan. With this regard, the SSMP establishes the following discrete goals:

- 1. Minimize the frequency of spills, and specifically maintain the number of spills at less than 2.1 spills per 100 miles annually*
- 2. Appropriately mitigate the impacts caused by spills by containing all spills within 3 hours of notification, and responding to all spills within 20 minutes of notification during District business hours and 60 minutes during off hours*
- 3. Provide notifications and reports to all required regulatory agencies in a timely manner*
- 4. Effectively manage, operate, maintain, and improve the sewer collection system*
- 5. Provide education and outreach to the general public to increase awareness of the sanitary sewer system, its function, and operation, and to promote the proper disposal of pipe-blocking substances*
- 6. Train collection system operators, employees, contractors, responders, or other agents to address any sewer spill events*
- 7. Work to ensure the District's collection system is properly designed, constructed, and funded to provide sufficient capacity to convey base and peak flows while meeting or exceeding applicable regulations, laws, and generally acceptable practices relative to sanitary sewer system O&M*

1.1 Introduction

This SSMP has been prepared in compliance with the requirements of the State Water Resources Control Board adopted Order No. 2022-0103-DWQ, Statewide General Waste Discharge Requirements (WDRs) for Sanitary Sewer Systems. This element includes a brief overview of the District's sanitary sewer system, a summary of the Order's regulatory context, and the purpose and organization of this SSMP.

1.2 Regulatory Context

Sewage is untreated or partially treated domestic, municipal, commercial and/or industrial waste (including sewage sludge), and any mixture of these wastes with inflow or infiltration of stormwater or groundwater, conveyed in a sanitary sewer system. A spill is a discharge of sewage from any portion of a sanitary sewer system due to a sanitary sewer system spill, operational failure, and/or infrastructure failure. Sewage and its associated wastewater spilled from a sanitary sewer system may threaten public health, beneficial uses of waters of the State, and the environment.

On May 2, 2006, the State Water Resources Control Board adopted Order No. 2006-003 DWQ (Order), the Statewide General Waste Discharge Requirements (WDRs) for Sanitary Sewer Systems, which required owners and operators of wastewater collection systems with more than one mile of pipeline to comply with all elements and provisions of the WDRs.

On August 6, 2013, the State Water Resources Control Board adopted Order No. WQ 2013-0058-EXEC, amending the Monitoring and Reporting Requirements (MRP) included in the original Order. The MRP in the original Order categorized spills as Category 1 and Category 2. The amended MRP implemented a Category 3 spill, facilitating the evaluation of high threat and low threat spills.

On December 6, 2022, and to further provide a consistent, statewide regulatory approach to address sanitary sewer spills, the State Water Board adopted revised Statewide General Waste Discharge Requirements for Sanitary Sewer Systems, Water Quality Order No. 2022-0103-DWQ. The requirements of the revised order became effective on June 3, 2023.

The revised Sanitary Sewer Systems General Order (WDR) requires public agencies that own or operate sanitary sewer systems to develop and implement sewer system management plans and report all sanitary sewer spills to the State Water Board's online California Integrated Water Quality System (CIWQS) Sanitary Sewer System Database. The revised WDR added additional spill Category 4 to recognize the lowest-threat spills less than or equal to 50 gallons and added adaptive management principles to the SSMP development and implementation ethos.

The WDRs include directives for owners and operators of collection systems to demonstrate adequate and efficient management, operation, and maintenance of their collection systems. Generally, the WDRs require that:

- During a spill event all feasible steps are implemented to control the volume released and prevent any untreated wastewater from entering storm drains, waters of the state, and etc.,
- All spill events are reported to the State Water Resources Control Board via the California Integrated Water Quality System (CIWQS),
- An SSMP is prepared and approved by the board governing the owners or operators of a sanitary sewer system, and
- The SSMP is implemented using an adaptive management program. The adaptive management program periodically considers the effectiveness of the plan and the operations and maintenance program in preventing and mitigating spills, and revises it accordingly when deficiencies and/or improvements are identified.

1.3 SSMP Purpose, Organization, and Update Schedule

The purpose of the SSMP is to implement and document the requirements of the WDRs as appropriate to the District's collection system. To fulfill the requirements of the WDRs, this SSMP contains 11 elements which detail the management, operation, and maintenance of all parts of the District's sanitary sewer system. These elements are:

1. *Goals*
2. *Organization*
3. *Legal Authority*
4. *Operations and Maintenance Program*
5. *Design and Performance Provisions*
6. *Spill Emergency Response Plan*
7. *Sewer Pipe Blockage Control Program*
8. *System Evaluation and Capacity Assurance Plan*
9. *Monitoring, Measurement, and Program Modifications*
10. *SSMP Program Audits*
11. *Communication Program*

A summary of each of the elements, as defined in the WDRs, is included at the beginning of each section to inform readers of the section’s content and the basis of their inclusion in the SSMP. Following this introduction, each section contains the policies, practices, descriptions, and references used to address the element’s requirements.

The SSMP update and audit schedule is summarized below in Table 1. It should be noted that this SSMP Update incorporates the results of the audit completed in December 2024, covering the three-year audit period from August 2021 to August 2024.

Table 1 – SSMP Update and Audit Schedule

Action	Due Date	Notes
SSMP Update and Re-Certification	Aug 2025	Six-year recertification by District Board
SSMP Internal Audit Report	Dec 2027	Period Aug 2024 to Aug 2027
SSMP Internal Audit Report	Dec 2030	Period Aug 2037 to Aug 2030
SSMP Update and Re-Certification	Aug 2031	Six-year recertification by District Board
Adaptive management updates to SSMP	As Needed	SSMP to be updated as necessary based on monitoring and performance evaluations conducted throughout the SSMP implementation period.

1.4 Sewer System Asset Overview

This section describes the District’s existing wastewater collection, including the service area, population trends, and an overview of the collection system facilities.

Study Area

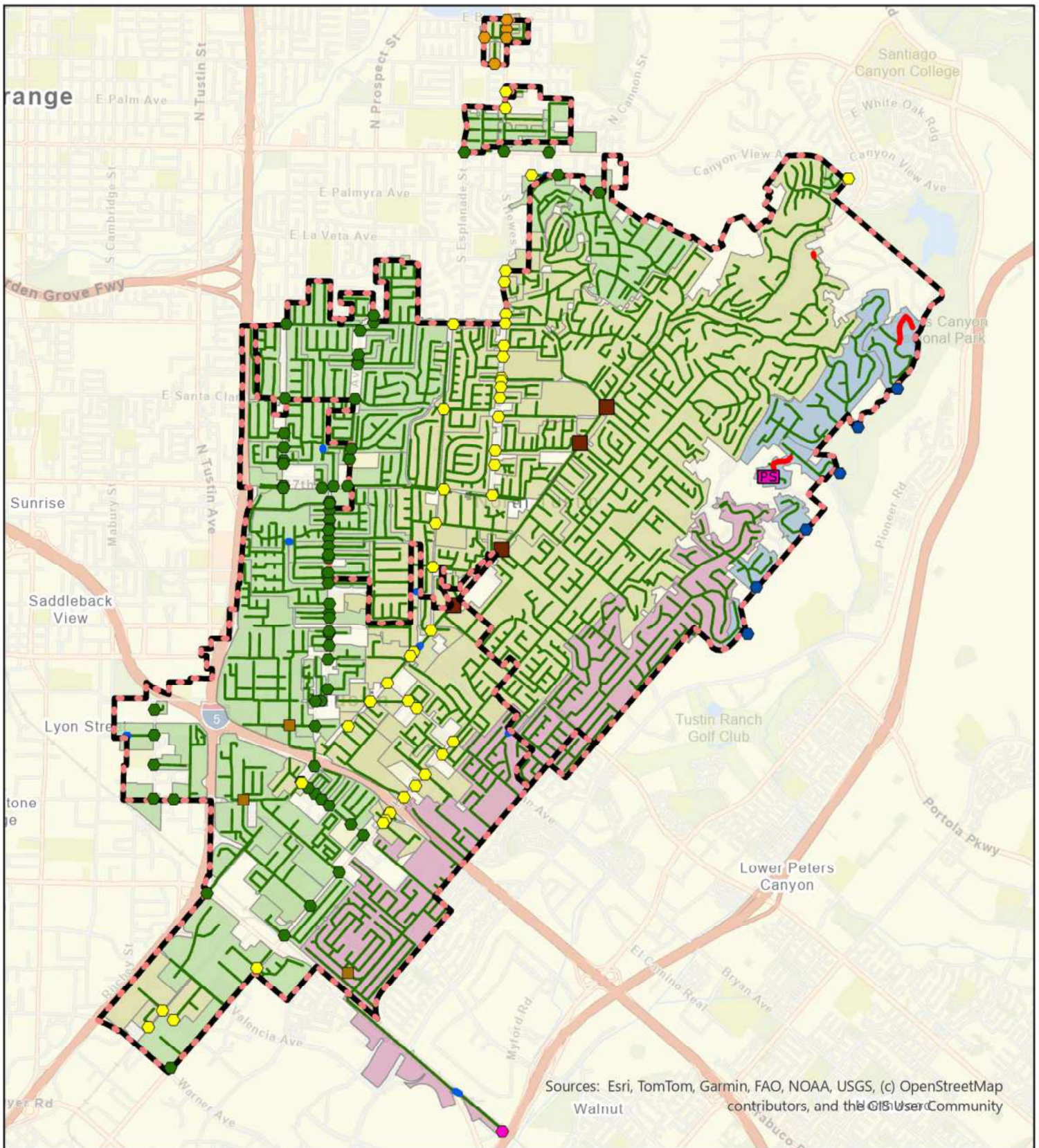
EOCWD is located in central Orange County, just north of the City of Irvine. The District's service area is described below.

Service Area Description

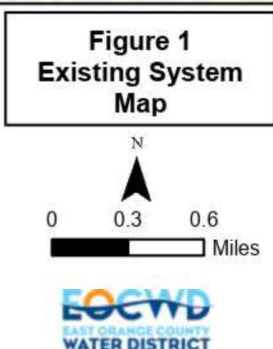
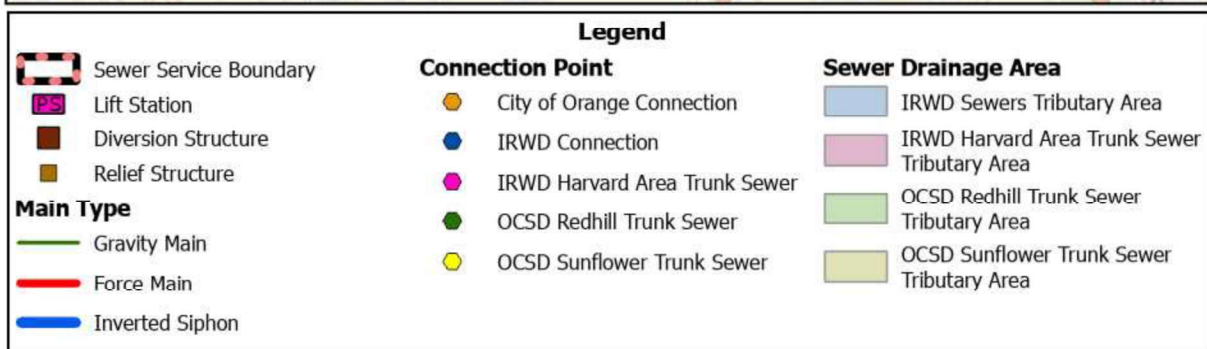
EOCWD wastewater collection is located in central Orange County and serves portions of the Cities of Tustin and Orange, as well as adjacent unincorporated areas of Orange County. The District covers approximately 7,800 acres (12.15 square miles) and serves a predominantly urbanized region.

The District's boundaries are approximately defined by the 55 Freeway to the northwest, Warner Avenue to the southwest, and generally lie between Red Hill Avenue and Tustin Ranch Road to the southeast. To the northeast, the boundary extends roughly a few miles southwest of Chapman Avenue. Major transportation corridors within the District include the I-5 Freeway and Irvine Boulevard, which traverse the area in a northwest-to-southeast direction, along with Newport Avenue, a primary cross street that runs perpendicular to the I-5 and Irvine Boulevard.

EOCWD's wastewater collection service area is largely made up of low density single-family residential neighborhoods, with additional commercial, light industrial, and agricultural land uses. The District also contains parks, open space, and public rights-of-way, which generally produce little to no wastewater flow. The EOCWD sewer service area is illustrated on Figure 1.



Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GISUserCommunity



Population Trends

The population within the District’s sewer service area was 79,035 as of 2023. Table 2 summarizes the historical population trends within the area. As would be expected in a maturely developed area near buildout conditions, the compounded annual population growth rate is less than one percent annually between 2010 and 2023.

Table 2 – EOCWD Sewer Service Area Population Estimates

Year	Population ^{1,2}	Percent Change
2023	79,035	0.4%
2022	78,694	-1.1%
2021	79,561	-0.3%
2020	79,792	6.0%
2019	75,275	-1.0%
2018	76,024	0.4%
2017	75,687	-1.2%
2015	76,604	4.8%
2010	73,117	

1. Data obtained from Census.gov
2. Population estimates are based on percent area of census tract within EOCWD sewer service area

Topography and Climate

EOCWD, located near Tustin, CA, experiences a Mediterranean climate, characterized by hot, dry summers and cooler, cloudier winters. Foggy conditions can persist for several days during the colder months. Rainfall is generally sparse, with nearly 80% of annual precipitation occurring between October and March, typically totaling less than 10 inches per year.

Topographically, the EOCWD service area includes a mix of flatlands, rolling hills, and foothill terrain, influenced by its proximity to the Santa Ana Mountains. The elevation changes within the district impact stormwater drainage patterns and groundwater recharge zones, playing a crucial role in local water management strategies.

Overview of Collection System Facilities

The following section summarizes the District’s existing collection system. The EOCWD existing sewer system consists of approximately 173 miles of pipeline and 3,700 manholes serving about 16,500 customers. The District does not own or operate any wastewater treatment facilities; instead, wastewater generated within its service area is conveyed through one of the 137 connection points to sewer systems owned by the City of Orange, Orange County Sanitation District (OCSan), and Irvine Ranch Water District (IRWD). These connection points and upstream infrastructure are organized into twelve drainage basins, which are further grouped into four primary sewershed areas: IRWD’s Harvard Area Trunk Sewer (HATS), OCSan’s Redhill

Trunk Sewer, OCSan's Sunflower Trunk Sewer, and IRWD's North Tustin Area. Wastewater from the Orange and OCSan tributary areas is directed to OCSan's Reclamation Plant No. 1. Flows that connect to IRWD's system are conveyed to the Michelson Water Recycling Plant (MWRP).

EOCWD's existing collection system consists of approximately 173 miles of gravity mains, ranging in diameter from 6-inches to 27-inches. The most common pipe diameter is 8-inches, accounting for nearly 91-percent of the total length. The gravity mains in EOCWD's collection system were installed between 1955 and 2003. The bulk of the system – approximately 670,000 feet or 127 miles – was constructed between 1960 and 1969, representing about 73% of the total gravity mains. The majority of EOCWD's infrastructure is now over 50 years old, which may have implications for system maintenance, rehabilitation planning, and long-term capital improvement strategies. EOCWD utilizes six (4) different material types for gravity mains:

- Acrylonitrile-Butadiene-Styrene (ABS) (Not a currently approved material)
- Cast Iron, Ductile Iron
- Polyvinyl Chloride (PVC)
- Vitrified Clay Pipe (VCP)

The most common gravity main material in the EOCWD collection system is VCP, which makes up approximately 98-percent of the total gravity main length in the system.

EOCWD's service area contains one publicly owned lift station - the Lemon Heights Lift Station. Other lift stations within the District's boundaries are privately owned and are neither operated nor maintained by the District. In conjunction with the single lift station, the existing collection system includes approximately 2,074 ft, or 0.37 miles, of 4-inch diameter force main. There is also a privately owned 2-inch force main within the District's service area.

The District's existing collection system includes nine inverted siphons, each constructed to pass beneath major flood control channels or utilities. The system also contains four active diversion structures, all located along Newport Boulevard. In addition, the collection system encompasses three active relief structures. The diversion structures are designed with channels that currently direct 100% of the flow eastward, away from Newport Boulevard. If the flow exceeds a certain threshold, the diversion structures are configured to allow excess flow to spill over and be redirected westward toward Newport Boulevard. The relief structures are intended to provide relief prior to spilling if high flows surcharge gravity mains up into the system's manholes.

The District does not own any portion of the sewer laterals that connect individual customers to the gravity mains throughout the collection system. Also, the District does not have any diversion structures dedicated to diverting stormwater into the collection system. The District's collection system facilities are summarized in Table 3.

Table 3 – EOCWD Collection System Facilities Summary

Description	Value
Total Length – Gravity Mains (miles)	173
Total Length – Force Mains (miles)	0.4
Total Length – Laterals (miles)	0
Number of Lift Stations	1
Number of Siphons	9
Number of Diversion Structures	4
Number of Relief Structures	3
Number of Stormwater Diversion Structures	0

The above collection system information is maintained in a comprehensive Geographical Information System (GIS) that also forms the basis of a Computerized Maintenance Management System (CMMS) in the ESRI Enterprise Information System platform. Both the GIS and the CMMS are regularly and routinely updated based upon construction data and field data. An updated system map created from the GIS is provided in **Appendix A**. The GIS/CMMS and updating protocols are described in more detail in Element 4.

1.5 Collection System Connection Data

There are approximately 16,374 connections to the District’s collection system. The distribution of these connections among residential, commercial, and industrial customers, as well as within either the City of Tustin or Orange County, is shown in Table 4. As described in the Collection System Challenges section that follows, the number of connections is considered approximate because of complications in determining the number of septic tanks in the service area.

Table 4 – EOCWD Sewer Service Area Connection Data

Description	Within City of Tustin	Within Unincorporated Orange County	Total
Residential Connections	5,943	9,775	15,718
Commercial Connections	545	51	596
Industrial Connections	60	-	60
Total	6,548	9,826	16,374

1.6 Collection System Challenges

EOCWD staff have identified the following general challenges in operating and maintaining the District's collection system:

- 1. The fact that the District does not own nor operate any trunk sewer within its service area results in the District's collection system comprising a high number of unconnected basins with small diameter gravity mains that require focused maintenance attention.*
- 2. Because the District recently took over ownership and operation of the collection system (August 2016), historical information including record drawings is more limited than typically seen. District staff are still in the process of understanding system connectivity and configuration in some parts of the system.*
- 3. The District's challenging service topography in the foothill portions of the service area have resulted in a large number of Onsite Wastewater Treatment Systems (OWTS), more commonly called septic tanks, being put in use in the service area. The location and operation of the septic tanks has been poorly documented in the past. As part of the ongoing Sewer Master Plan Update, the District is documenting the location of septic tanks and developing a plan for ongoing operation in these challenging areas.*
- 4. The District has a number of private collection systems serving multi-family residential and shopping center areas that discharge flow into the District's collection system. These small private systems can have maintenance issues that impact the District's system, and the District wishes to have a more systematic method for communication with the operators of these systems.*
- 5. Root intrusion appears to be the greatest challenge for collection system integrity as identified both by spill records and by interviews with staff. The District is actively implementing root intrusion control activities.*

1.7 Roles and Responsibilities

Because this element includes a high-level overview of collection system activities, the EOCWD Board of Directors, General Manager, Operations Manager, Engineering Manager, GIS Manager, and Operations Supervisor have responsibilities in maintaining this element.

1.8 Effectiveness, Improvement, and Key Performance Indicators

To monitor the effectiveness of this element of the SSMP, the following Key Performance Indicators (KPIs) are being monitored by EOCWD:

- Have the goals of the SSMP been reviewed at a Quarterly SSMP Review Meeting?

Element 2: Organization

The SSMP must identify:

- 1. The name of the Legally Responsible Official as required in section 5.1 of Order No. 2022-0103-DWQ – Statewide General WDR For Wastewater Collection Agencies.**
- 2. The position titles, telephone numbers, and email addresses for management, administrative, and maintenance positions responsible for implementing specific SSMP elements.**
- 3. Organizational lines of authority; and**
- 4. The chain of communication for reporting spills from receipt of a complaint or other information, including the person responsible for reporting spills to the State and Regional Water Board and other agencies if applicable (such as County Health Officer, County Environmental Health Agency, Regional Water Board, and/or State Office of Emergency Services (OES)).**

2.1 Introduction

The administration and implementation of the SSMP is directed through executive staff, engineering staff, and operations & maintenance staff of EOCWD. The offices of these staff are located at:

Administrative Office
185 N. McPherson Road,
Orange, CA 92869-3720
Phone: 714-538-5815
Fax: 714-538-0334

2.2 Legally Responsible Official

Legally Responsible Official: David Youngblood, P.E., General Manager

2.3 Authorized Representatives

The District has authorized certain individuals to serve as Authorized Representatives for all sanitary sewer related issues in the District. These representatives are authorized to submit all reports required by the WDRs and other information required by the State or Regional Water Board. The titles of these individuals are:

- Jerry Mendzer, Operations Manager
- Justin Davis, Operations Supervisor

The contact information for these individuals can be found in the tables that follow in this chapter.

2.4 Administrative and Maintenance Personnel

The District employs five individuals, comprising the Operations Supervisor and four (4) collection system staff, dedicated to managing, operating, maintaining, and improving the collection system. The Operations Supervisor reports to the Operations Manager, who reports directly to the General Manager. The four individuals who report to the Operations Supervisor are certified using California Water Environment Association (CWEA) standards.

Tables 5 and Table 6 below give the names and phone numbers of positions responsible for implementing the SSMP and the entire range of positions/departments having some responsibility for implementing specific elements of the SSMP, respectively. These tables are key components to the proper implementation of the SSMP and its effectiveness. A complete organizational chart identifying lines of authority for all District employees including those responsible for SSMP implementation can be found in **Appendix B**.

Table 5 – District Roles, Responsibilities, and Contact Information

Role	Responsibility	Contact Information
Board of Directors	Establishes policy.	Sprado@eocwd.com 714-538-5815
General Manager	Plans, organizes and directs the overall administrative activities and operations of the District. Advises and assists the Board, represents the District's interest with other governmental agencies, business interests, and the community. Certifies spill reports in CIWQS after a spill.	Dyoungblood@eocwd.com 714-538-5815
General Counsel/Board Secretary	Provides legal guidance and support for District Board of Directors, management and operation; also provides District Secretary services.	Sprado@eocwd.com 714-538-5815
Operations Manager	Provides direct oversight of the utility operations to ensure compliance with local, state and federal laws and regulations. Contacts regulatory agencies in the event of a spill. Can submit spill reports in CIWQS after a spill.	Jmendzer@eocwd.com 714-501-5596
Engineering Manager	Plans, coordinates, supervises, and participates in the performance of professional engineering activities of a complex nature involving engineering planning and design, construction project	Byoung@eocwd.com 714-538-5815
Finance Director/Treasurer	Plans, organizes and directs all financial aspects of District operations. Prepares operating and capital budgets, including financing plans for capital projects and monthly financial statements.	Sprado@eocwd.com 714-538-5815
Administrative Assistants	Perform general and technical office work in support of District administrative, engineering and operations divisions; oversees records management system.	Sprado@eocwd.com 714-538-5815
Bookkeeper	Assists Finance Director in day-to-day accounting tasks for District. Assists with purchasing and contract management tasks.	Sprado@eocwd.com 714-538-5815

Role	Responsibility	Contact Information
<p>Operations Supervisor</p>	<p>Manages, plans, directs, coordinates, and evaluates all aspects of the operation, maintenance, and construction of the Wastewater Division; coordinates assigned activities with other divisions and departments. Provides training to staff. Coordinates assigned activities including CCTV inspection work and reviewing PACP reports. Submits spill reports in CIWQS after a spill.</p>	<p>Jdavis@eocwd.com 714-497-8073</p>
<p>GIS Manager</p>	<p>Manages and maintains the District's GIS/CMMS system in Esri Enterprise Information System format. Manages collection system workorders and produces collection system reports tracking maintenance and cleaning. Reviews DigAlert ticket response and performance through Esri.</p>	<p>Rgallegos@eocwd.com 714-538-5815</p>
<p>Collection System Maintenance Field Crew</p>	<p>Performs semi-skilled and skilled labor in the construction, maintenance, repair, and inspections of wastewater collection systems. Cleans, unplugs, and repairs wastewater lines. Operates power equipment including hydraulic cleaning truck, sewer rodder, and closed circuit television system.</p>	<p>Jdavis@eocwd.com 714-497-8073</p>
<p>Water Distribution Operators/Stand-by Field Crew</p>	<p>Performs semi-skilled and skilled labor in the construction, maintenance, repair, and inspections of water utility systems. Responds to service requests outside of department normal work week hours. Secures site in the event of an overflow, and performs initial mitigation as needed. Operates power equipment including hydraulic cleaning truck, sewer rodder, backhoe, and other heavy equipment.</p>	<p>Jmendzer@eocwd.com 714-501-5596</p>
<p>Contract Cleaning Crew (If required)</p>	<p>If determined to be required by the Operations Manager or Operations Supervisor, performs semi-skilled and skilled labor in the maintenance, repair, and inspections of wastewater collection systems. Cleans, unplugs, and repairs wastewater lines. Operates power equipment including hydraulic cleaning truck, sewer rodder, and closed-circuit television system. Responds to service requests outside of departmental normal work hours and assists with sewer overflows if needed.</p>	<p>Obtained When Needed</p>

Table 6 – EOCWD Responsible Staff for SSMP Elements

Element	Responsible Staff
<p>I. Goals</p>	<ul style="list-style-type: none"> • Board of Directors • General Manager • Operations Manager • Engineering Manager • GIS Manager • Operations Supervisor
<p>II. Organization</p> <p>a. Name of the Responsible or authorized representative(s)</p> <p>b. Names and telephone numbers of management, administrative, and maintenance positions</p> <p>c. Chain of communication for reporting spills</p>	<ul style="list-style-type: none"> • General Manager • Operations Manager • Engineering Manager • Operations Supervisor
<p>III. Legal Authority</p> <p>a. Prevent illicit discharges to the collection system</p> <p>b. Require that sewers and laterals be properly designed and constructed</p> <p>c. Ensure access to the collection system</p> <p>d. Limit discharge of FOG and other debris that may cause blockages</p> <p>e. Enforcement of Ordinance</p>	<ul style="list-style-type: none"> • Board of Directors • General Manager • Operations Manager • Engineering Manager • Operations Supervisor • General Counsel/Board Secretary
<p>IV. Operation and Maintenance Program</p> <p>a. Maintain current map of collection system and storm drain system</p> <p>b. Describe routine and preventative operation and maintenance of collection system</p> <p>c. Develop a rehabilitation and replacement plan.</p> <p>d. Develop and implement a training program</p> <p>e. Provide equipment and training parts inventories</p>	<ul style="list-style-type: none"> • Operations Manager • Engineering Manager • Operations Supervisor • GIS Manager

Element	Responsible Staff
<p>V. Design and Performance Provisions</p> <ul style="list-style-type: none"> a. Design, construction and specification standards for installation and rehabilitation of new and existing sewers b. Procedures and standards for the inspection of new or rehabilitated sewers and appurtenances. 	<ul style="list-style-type: none"> • General Manager • Operations Manager • Engineering Manager
<p>VI. Spill Emergency Response Plan</p> <ul style="list-style-type: none"> a. Notification procedures for regulatory agencies b. Response and mitigation procedures c. Staff and contractor training d. Emergency operations e. Containment and monitoring plans 	<ul style="list-style-type: none"> • Operations Manager • Engineering Manager • Operations Supervisor
<p>VII. Sewer Pipe Blockage Control Program</p> <ul style="list-style-type: none"> a. Identification of "hot spot" areas of collection system b. Identification of food service businesses in "hot spot" areas of collection system c. Administrative controls (permits) for potential grease dischargers d. Requirement to install grease removal equipment e. Encouragement to use BMPs to reduce grease discharges f. Periodic inspections g. Enforcement actions h. Public Education 	<ul style="list-style-type: none"> • Operations Manager • Engineering Manager • GIS Manager • Operations Supervisor
<p>VIII. System Evaluation, Capacity Assurance, and Capital Improvements</p> <ul style="list-style-type: none"> a. Capacity evaluation b. Identification of capacity needs c. Project schedule 	<ul style="list-style-type: none"> • Operations Manager • Engineering Manager

Element	Responsible Staff
<p>IX. Monitoring, Measurement, and Program Modifications</p> <ul style="list-style-type: none"> a. Maintain records and data b. Monitor implementation of SSMP c. Assess the success of preventive maintenance program d. Update program elements e. Identify and track spill trends 	<ul style="list-style-type: none"> • General Manager • Operations Manager • Engineering Manager • Operations Supervisor • GIS Manager
<p>X. Internal Audits</p> <ul style="list-style-type: none"> a. Person responsible for the Audit b. Scope of the Audit c. Audit work product d. Schedule for the Audit, minimum every three years 	<ul style="list-style-type: none"> • Operations Manager • Engineering Manager • Operations Supervisor
<p>XI. Communication Program</p> <ul style="list-style-type: none"> a. Notification that an SSMP is being prepared. Website use is suggested 	<ul style="list-style-type: none"> • Operations Manager • Engineering Manager • Administrative Assistants

2.5 Reporting Chain of Communication

The District utilizes a systematic approach to spill response and notification from receipt of a complaint or observation to cleanup of a verified spill. Various positions are responsible for ensuring that proper procedures are followed in the event of a spill. A complete description of spill response is found in the Spill Emergency Response Plan (SERP) maintained by the District, and included as **Appendix C** of this document. In summary, during regular business hours, spill communication begins with a call to the District’s main office staff who document the call and obtain critical information. That information is forwarded to Operations Supervisor or Operations Manager, who coordinates the response by selecting the nearest operator to the spill location. After hours calls are answered directly by the on-call operator. Upon arrival, the operator will relay information back to the Operations Supervisor or Operations Manager, who then determines the need for additional support. Required notifications to various other agencies are made by the Operations Supervisor or Operations Manager as required depending on the nature of the spill. One of the Authorized Operators may perform other notifications for Category 1 spills. A graphic depiction of spill response and notification as outlined in the SERP is provided below on Figure 2, taken from the District’s SERP.

2.6 Effectiveness, Improvement, and Key Performance Indicators

To monitor the effectiveness of this element of the SSMP, the following Key Performance Indicators (KPIs) are being monitored by EOCWD:

- Have the organization of the utility and the application of that organization to the SSMP been reviewed at a Quarterly SSMP Review Meeting?

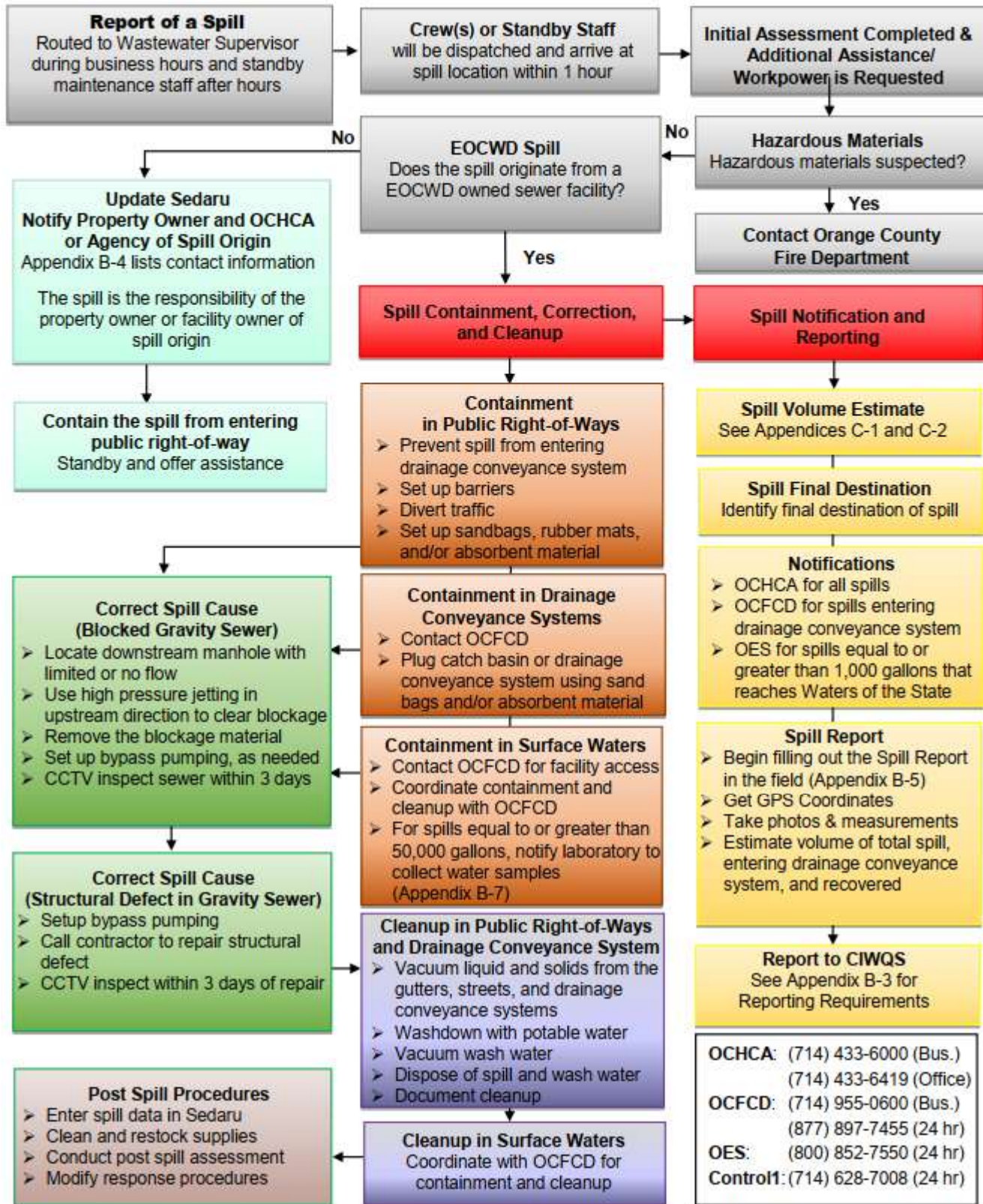


Figure 2 – EOCWD Spill Response Plan

Element 3: Legal Authority

Each Enrollee must demonstrate, through sanitary sewer system use ordinances, service agreements, or other legally binding procedures, that it possesses the necessary legal authority to:

1. *Prevent illicit discharges into its sanitary sewer system (examples may include I/I, stormwater, chemical dumping, unauthorized debris and cutroots, etc.);*
2. *Collaborate with storm sewer agencies to coordinate emergency spill responses, ensure access to storm sewer systems during spill events, and prevent unintentional cross connections of sanitary sewer infrastructure to storm infrastructure*
3. *Require that sewer system components and connections be properly designed and constructed*
4. *Ensure access for maintenance, inspection, and/or repairs for portions of the lateral owned or maintained by the Enrollee;*
5. *Enforce any violation of its sewer ordinances, service agreements, or other legally binding procedures; and*
6. *Obtain easement accessibility agreements for locations requiring sewer system operations and maintenance, as applicable.*

3.1 Introduction

The District’s legal authority is comprised of several documents, codes, and ordinances that enable EOCWD to protect its sewer system from harmful discharges and activities. The following sections summarize the District’s legal authority with respect to the collection system. Many of the elements in these documents implement source control prohibitions required by OCSan.

3.2 Compliance Summary

The District maintains legal authority with respect to the collection system under the following enacted ordinances/resolutions or agency policies:

- **Water Code Section 31016**, granting a county water district the general power to enforce its ordinances, including entry (by consent or warrant) onto private property where necessary for investigation of violations.
- **Government Code Sections 54739 and 54740**, which provide industrial waste pretreatment ordinance authority for local agencies with treatment works or collection systems.
- **EOCWD Ordinance No. 2016-1 “Establishing Wastewater Discharge Regulations” effective September 15, 2016**. This has general prohibitions, limits and requirements for discharge which apply to all users of the sewer system.
- **EOCWD Ordinance No. 2016-02 “Adopting Fats, Oils, and Grease (FOG) Control Regulations applicable to Food Service Establishments”, effective Date, 2016**. This ordinance provides EOCWD with the legal authorities necessary to limit FOG and debris entering into the sewer system.
- **Standard Specifications and Drawings for Sanitary Sewers (September 2022)** These specifications and drawings require that sewers, connections, and appurtenances be properly designed and constructed in EOCWD.

3.3 Compliance Documents

The following subsections describe how the District’s documents meet the WDR requirements in the specific requirement categories.

Illicit Discharges

Illicit discharges are regulated by Ordinance No. 2016-1 (Article 2, Section 201, Prohibited Discharges) and Ordinance No. 2016-2 (Article 2, Section 2.2, Prohibitions). Ordinance No. 2016-1 is included with this document as **Appendix D**. Ordinance No. 2016-2 is included with this document as **Appendix E**.

Ordinance No. 2016-01, Article 2, Section 201 states that *“These prohibitions apply to all Users of EOCWD’s Sewerage Facilities whether or not they are subjected to Federal Categorical Pretreatment Standards or any other national state, or local Pretreatment Standards or requirements.”*

Ordinance No. 2016-01, Article 2, Section 201 lists general prohibitions, limits, and requirements for discharges, as well as specific prohibitions for substances that will adversely impact the collection system.

Ordinance No. 2016-02, Article 2, Section 2.1/Section 2.2 places limits on the discharges that may take place from Food Service Establishments (FSEs), including limitations on Fats, Oil, and Grease (FOG) discharge.

Collaboration with Storm Sewer Agencies

Collaboration with storm sewer agencies is most required when spills from the EOCWD collection system end up in the storm sewer system. The EOCWD Spill Emergency Response Plan was developed utilizing collaboration with the Orange County Flood Control District (OCFCD) so that collaboration with OCFCD is embedded in the Spill Emergency Response Plan. As stated in the plan, EOCWD personnel responding to a spill will utilize the OCFCD “Water Pollution” service request website for online reporting, found at this link:

<https://myoceservices.ocgov.com/ServiceRequest>

In addition to the online request, the EOCWD Operations Supervisor will contact OCFCD by phone if immediate assistance is needed (i.e. access to locked OCFCD facilities, additional guidance for response to large spills, etc.).

The District is a member agency of the Water Emergency Response Organization of Orange County (WEROC). In the event of a sanitary sewer spill, WEROC member agencies and other nearby agencies can be contacted for additional equipment and support.

Design Standards

EOCWD has legal authority to require the sewers and sewer laterals to be properly designed through the Standard Specifications and Drawings for Sanitary Sewers (dated September 2022). This document is included as **Appendix F**.

Access to Facilities

The District does not own any portion of the laterals within the collection system, and therefore requires no access to such.

Ordinance No. 2016-01, Article 5, Section 501.3 provides legal authority for EOCWD's Right of Entry to obtain "*reasonable access to all parts of the Wastewater generating and disposal facilities for the purposes of inspection and sampling.*"

Enforcement of Legal Authority

Ordinance No. 2016-1, Article 6 provides the legal authority for enforcement of the ordinance. The enforcement section of the ordinance discusses violations of the ordinance, enforcement procedures and fees, probation order, permit suspension, permit revocation, public notices, termination of service, civic penalties, and criminal penalties.

Water Code Section 31016 paragraph b provides the District the ability to enter any public property within the District's jurisdiction in regards to investigating possible violations of an ordinance of the District. Investigation into the violation on private property will be made with the consent of the owner or tenant of the property, otherwise a warrant can be issued under probable cause pursuant to the procedures set within Title 13 of Part 3 of the Code of Civil Procedure.

Easement Accessibility Agreements

Easement accessibility is specified in Section 1.2.6 of the Standard Specifications and Drawings for Sanitary Sewers (dated September 2022).

3.4 Roles and Responsibilities

Maintaining appropriate legal authority for a collection system requires that ordinances and other legal documents be updated and maintained. Therefore, in addition to the General Manager, Operations Manager, Engineering Manager, and Operations Supervisor, the EOCWD Board of Directors and General Counsel have a role in maintaining this element.

3.5 Effectiveness, Improvement, and Key Performance Indicators

To monitor the effectiveness of this element of the SSMP, the following Key Performance Indicators (KPIs) are being monitored by EOCWD:

- Have the documents associated with collection system legal authority been reviewed at a Quarterly SSMP Review Meeting?

In the preparation of this SSMP, EOCWD has identified the following improvements to legal authority documentation that will improve the effectiveness of the SSMP:

- Update Ordinance No. 2016-01 to specifically prohibit septic tank sludge, rainwater, stormwater, street drainage, and other contaminated water from the collection system – *Complete by the next internal audit in December 2027*

- Update Ordinance No. 2016-01 to provide explicit authority for EOCWD access to all facilities for maintenance, inspection and repairs– *Complete by the next internal audit in December 2027*

Element 4: Operation and Maintenance Program

The SSMP must include those elements listed below that are appropriate and applicable to the Enrollee’s system:

1. ***Maintain an up-to-date map(s) of the sanitary sewer system, and procedures for maintaining and providing State and Regional Water Board staff access to the map(s). The map(s) must show all gravity line segments and manholes, pumping facilities, pressure pipes and valves, and applicable stormwater conveyance facilities within the sewer system service area boundary***
2. ***Describe routine preventive operation and maintenance activities by staff and contractors, including a scheduling system and a data collection system for preventative operation and maintenance activities. The scheduling system is to include inspection and maintenance activities, higher-frequency inspections and maintenance of known problem areas, including areas with tree-root problems, and regular CCTV inspections of manholes and sewer pipes. The data collection system is to include data from system inspection and maintenance activities, including system areas/components prone to root-intrusion potentially resulting in system backup and/or failure***
3. ***Provide in-house and external training on a regular basis for staff in sanitary sewer system operations, maintenance, and contractors. The training is to include the requirements of General Order 2022-0103-DWQ, the Enrollee’s Spill Emergency Response Plan procedures and practice drills, skilled estimation of spill volume for field operators, and electronic CIWQS reporting procedures for all staff submitting data.***
4. ***Provide an inventory of sanitary sewer equipment, including identification of critical replacement and spare parts.***

4.1 Map of the Collection System

EOCWD utilizes the Esri Enterprise information management system to maintain the Sewer Geographical Information System (GIS) and an up-to-date map of the sewer system. EOCWD owns one lift station (Lemon Heights Lift Station) as described in Element 2. The storm water conveyance facilities are currently viewed online through the County of Orange web map services.

EOCWD keeps an up-to-date GIS database of its sewer facilities which includes the following:

- Manholes with ID numbers, diameter, material type (concrete, brick, composite), cover type, liner type, rim elevation, invert elevation, depth, link to as-built plan, smart cover install date (if any), link to smart cover reporting data, and pictures
- Manhole maintenance related information: date last inspected, rehabilitation date, and roach spraying
- Pipes with ID numbers, size, slope, reach length, material, liner material, link to as-built plan, CCTV inspections, pipe type (gravity or siphon)
- Pipe maintenance related information: cleaning frequency, cleaning group number, date of last cleaning, access notes, cleaning notes (observations made during cleaning – light roots, grit, grease), root foaming date, date of last closed circuit television (CCTV) inspection, link to CCTV video, date lined, and cleaning nozzle required

- Food service establishments (FSEs) with kitchen inventory, operation information, grease removal equipment status, facility pictures, and fats, oils, and grease (FOG) inspection data including FOG Program permitting and compliance information
- Historical spill locations, dates, causes, volume, recovered volume, time of initial notification, time of arrival, containment time, cleanup, link to CIWQS report, and whether it reached surface waters or storm drains

EOCWD's updated Spill Emergency Response Plan (SERP), June 2023 includes a map of the sewer system facilities, as well as local drainage conveyance system facilities and open channels/surface waters. The map included as Appendix A-1 of the 2023 SERP report .

4.2 Preventative Operations and Maintenance

The District has developed a robust and adaptive preventative operations and maintenance program for its collection system. The central organizing tool for the preventative operations and maintenance program is the District's Esri Enterprise Information Management System (Esri Enterprise System), which the District leverages as both a Geographical Information System (GIS) and a Computerized Maintenance Management System (CMMS).

The Esri Enterprise System is managed by the District's GIS Manager. This system is used to open and close work orders which guide the Operations Supervisor and four (4) collections system staff in their daily, weekly, monthly, quarterly, and yearly activities. The Operations Supervisor and collection system staff are equipped with electronic field access to the Esri Enterprise System, and therefore can record completed work and close work orders from the field, as well as identify necessary updates to the GIS data as observed in the field.

The use of the Esri Enterprise System and the collaboration between the GIS Manager, the Operations Supervisor, and other members of the EOCWD staff are detailed in the sections below.

Gravity Main Maintenance

Historically, the District's goal for routine gravity main maintenance was to clean every gravity main once per year , and to clean those mains that require more maintenance ("hotspots") at a frequency appropriate to prevent overflows from these gravity mains. This cleaning goal was effective in maintaining low spill rates in the collection system.

With Esri Enterprise System integrated into the preventative maintenance program, the District now has the ability to make more data-driven decisions, which will allow the District to better target its valuable resources. The District is currently in the process of transitioning to using CCTV results to decide on cleaning schedules for each gravity main. The goal of this transition to maintain the District's historically low spill rate while focusing resources on the facilities that need them, ideally freeing other resources to be used extending asset lives across the collection system. To facilitate the use of CCTV data during cleaning schedules, workorders are opened at the beginning of each month to identify that month's cleaning goals. The workorders integrate:

- The last time a gravity main was cleaned

- The results of the last CCTV inspection on that gravity main
- Hotspots that need to be completed that month to maintain the hotspot schedule

The workorders are generally grouped geographically to optimize crew time in the field. As the cleaning is completed, collection systems staff can close the workorders electronically while in the field. On a weekly basis, the GIS manager summarizes completed work and distributes a report to the Operations Manager, Engineering Manager and Operations Supervisor to monitor work progress and key performance indicators and to re-prioritize resources as required. An example of this report is shown as Figure 3.

Sewer Gravity Main Work										
Workflow	Monthly Target	Footage Completed	Workflows Completed							
CCTV Inspection	10,720	15,243	57							
Main Cleaning	80,000	88,886	357	<table border="1"> <tr> <td>% of Monthly Target Cleaned</td> <td>111%</td> </tr> <tr> <td>% of Year-to-month Annual Target Cleaned</td> <td>111%</td> </tr> <tr> <td>% of Annual Target Cleaned</td> <td>9%</td> </tr> </table>	% of Monthly Target Cleaned	111%	% of Year-to-month Annual Target Cleaned	111%	% of Annual Target Cleaned	9%
% of Monthly Target Cleaned	111%									
% of Year-to-month Annual Target Cleaned	111%									
% of Annual Target Cleaned	9%									
Main Lining	As Needed	0	0							
Main Repair	As Needed	0	0							
Main Replace	As Needed	0	0							
Managers Form	As Needed	0	0							
Pipe Layer Edit	As Needed	0	0							
Root Foaming	As Needed	0	0							
Total			414							

Figure 3 – Sample Gravity Main Maintenance Weekly Report

For each gravity main that is inspected, District collection systems staff record the grease condition, root condition, and grit/gravel condition of the gravity main to inform future activities. EOCWD staff holds regular meetings to review gravity main cleaning and inspection progress and adjust resources and priorities as necessary. It is a goal to have a more formal review of gravity main cleaning and inspection progress at each Quarterly SSMP Review Meeting (detailed in Element 9).

A particular challenge for gravity main preventative maintenance in the collection system is root intrusion into the gravity mains. Roots both block flow themselves and push pipe liners into the flow, thereby blocking flow. The challenge of root intrusion is confirmed both by the presence of roots as a cause of several historical spills from the collection system, and by collection system staff reports. To combat the challenge of root intrusion, the District has established a chemical root treatment budget that is expended each year. The success of the chemical root treatment program is demonstrated by the recent decline in spill attributed to root intrusion in the collection system.

Manhole Inspection/Maintenance Activities

The District’s goal is to inspect/maintain the proximate manholes as each gravity main section is cleaned. Manhole inspection/maintenance is tracked in the Esri Enterprise System, and weekly reports are sent on monthly progress as shown on Figure 4. Pictures of the manholes are captured during inspection and linked to the manhole in the Esri Enterprise System. The District’s goal is to be more consistent in recording manhole inspection results. At times, positive results that do not require District action are not fully noted.

Manhole Work		
Workflow	Monthly Target	Workflows Completed
Manhole Inspection	333	320
Manhole Layer Edit	As Needed	0
Manhole Rehab	As Needed	0
Manhole Repair	As Needed	0
Roach Spray	As Needed	1,607
SSO Report	As Needed	0
Total		1,927

Figure 4 – Sample Manhole Maintenance Weekly Report

CCTV Inspection Program and Condition Assessment

The goal of the District's CCTV inspection program is to inspect the entire gravity main inventory every seven years. This equates to inspecting approximately 14% (roughly 24 miles) of the gravity main inventory per year. To accomplish these inspections, EOCWD owns and operates its own CCTV inspection van. Inspections are performed by NAASCO-trained EOCWD staff to be compliant with PACP standards.

Each gravity main is evaluated for both structural issues and maintenance issues. Structural and maintenance scores are recorded in the Esri Enterprise System, and pictures and videos are also linked to the assets in the system to facilitate future detailed review. The numerical results and the pictures/videos are reviewed as necessary in a collaborative effort among the Operations Supervisor, the Operations Manager, and the Engineering Manager to determine where rehabilitation, repair, or replacement is required for any gravity main. This effort is outlined as follows:

1. Defect discovered by inspection or cleaning activities
2. Record in Esri Enterprise System
3. Develop action plan
4. Create repair, replacement, or rehabilitation work orders in Esri Enterprise System
5. Complete and record workorders
 - a. Esri Enterprise work orders are closed
 - b. Work history captured and reported in Esri Enterprise System

It is the District's goal to have a more formal review of these actions, and of the hotspot cleaning list, at the Quarterly SSMP Review Meetings. A further goal is to add the footage of CCTV inspections performed to the monthly reports distributed to District Board of Directors.

4.3 Rehabilitation and Replacement Plan for System Assets

The District developed a comprehensive rehabilitation and replacement plan as part of the 2018 Sewer Master Plan. The majority of the improvements identified as part of this plan have been completed by the District, as detailed in Figure 5.

No.	Year	Project Description	Contract Price	Contractor	Status
1	2017	REMOVE AND REPLACE 98 FEET OF 8" VCP DUE TO EITHER OFFSETS, SAGS, FRACTURES AND BREAKS AT WHITNEY DRIVE, FAIRHAVEN EXT, MANNING DRIVE. REMOVE AND REPLACE 110 FEET OF 10" VCP DUE TO SAGS, FRACTURES, AND BREAKS ALONG BROWNING AVE.	\$393,000	BEADOR CONSTRUCTION COMPANY, INC.	COMPLETED
2	2018	REMOVE AND REPLACE 50 FEET OF 8" VCP DUE TO SAG. REMOVE AND REPLACE 26 FEET OF ACP IN CONFLICT WITH SEWER.	\$182,800	WA RASIC CONSTRUCTION	COMPLETED
3	2018	CIPP WORK	\$100,000	SANCON	COMPLETED
4	2020	SEPTIC TO SEWER PROJECT - CAROL WAY / VISTA DEL LAGO SEWER EXTENSION PROJECT - 1000 FEET OF 8" VCP	\$439,416.70 PAID FOR BY RESIDENTS	DIRTONU	COMPLETED
5	2020	CIPP WORK	\$198,756	SANCON	COMPLETED
6	2021	CIPP WORK	\$137,374	SANCON	COMPLETED
7	2021	REMOVE AND REPLACE 150 FEET OF 4 INCH CAST IRON SEWER PIPE WITH 8 INCH PVC PIPE ON HOLIDAY LANE	\$46,488	WA RASIC CONSTRUCTION	COMPLETED
8	2021	REPLACED AND UPSIZED HOLIDAY LANE	\$50,000	WA RASIC CONSTRUCTION	COMPLETED
9	2022	CIPP WORK	\$205,199	SANCON	COMPLETED
10	2022	REPLACED AND UPSIZED 1,370 LF FROM 10" TO 15" FROM BENT TWIG TO BRYAN AND 2,242 LF FROM 12" TO 18" FROM BRYAN TO SIERRA VISTA	\$5,000,000	TE ROBERTS	COMPLETED
11	2023	REMOVED AND REPLACE 605 FEET OF 8 INCH VCP WITH 12 INCH SDR35 ON CRAWFORD CANYON RD. FROM BRAE GLEN TO STOLLER LANE	\$7,000,000	TE ROBERTS	COMPLETED
12	2023	CONSTRUCTED 774 FEET OF NEW 12 INCH SDR35 PIPE ON 6TH STREET.		TE ROBERTS	COMPLETED
13	2023	REMOVE AND REPLACE 1,000 FEET OF 12 INCH VCP WITH 18 INCH SDR35 ON BROWNING AVE FROM NISSON RD. TO MITCHELL AVE.		TE ROBERTS	COMPLETED
14	2023	CONSTRUCT 388 FEET OF NEW 18 INCH PVC PIPE INSIDE 36 INCH STEEL CASING ON BROWNING AVE FROM SIERRA VISTA TO NISSON RD.		TE ROBERTS	COMPLETED
15	2023	CONSTRUCT 341 FEET OF NEW 20 INCH SDR 35 PIPE INSIDE 36 INCH STEEL CASING FROM FALLEN LEAF TO ENDINGER AVE.		TE ROBERTS	NOT COMPLETED, PROJECT TO BE REPLACED
16	2023	CIPP WORK	\$74,964	SANCON	COMPLETED
17	2024	TOOK OWNERSHIP OF SHARON LANE LIFT STATION	N/A	N/A	COMPLETED

Figure 5 – Existing Collection System Rehabilitation and Repair Plan

The District is currently completing the EOCWD 2025 Sewer Master Plan Update, which will produce an updated Capital Improvement Plan that integrates capacity and condition improvements into a prioritized and funded rehabilitation and repair action plan.

4.4 Training

Staff training is conducted on the following elements:

- Federal and State wastewater laws
- California General Collection System Permit
- Standard Specifications and Design Standards for EOCWD sewers
- Safety training included confined space entry and rescue, personal protective equipment, traffic control, chemical storage and handling, fall protection

- Laboratory/Sampling procedures
- Collection systems management (asset management, O&M)
- Collection systems operations
- Collection systems math
- Asset management software and data collection
- SERP training including spill estimating and spill response
- Conferences, seminars and classes that provide training on SSMP, SSOs, FOG, sewer cleaning, pretreatment issues or related subjects

The District has developed standard operations and maintenance procedures for hydro cleaning, combination cleaning truck and manhole inspections. These procedures are included as **Appendix G** of this SSMP. The District wishes to add spill response and spill estimation training to the regular training schedule.

4.5 Equipment and Parts Inventory

The District’s current equipment inventory is detailed on Table 7.

Table 7 – Existing Equipment Inventory

Year	Make	Model	Description
Vehicles			
2017	Ford	F-250 1st Responder	Sewer Vehicle
2021	Ford	F-250 – Reg Cab with Tommylift (tandem)	Sewer Vehicle
2019	FRHT	VACCON Titan (Tandem)	Sewer Vehicle
2021	FRHT	Combo 2100i (Single rear)	Sewer Vehicle
2018	FRHT	Vactor Combo – Jetter (Single rear)	Sewer Vehicle
2022	Dodge	CCTV Van	Sewer Vehicle
2023	Chevrolet	Silverado 1500 with lift gate	Sewer Vehicle

Year	Make	Model	Description
Equipment			
2020	Doosan		Air compressor
2021	Ditch Witch		Ditch Witch
2016	Superior		Diesel Trailer
2021	Big Tex		Trailer
2020	Wanco		Arrow board
2020	Wanco		Arrow board
2020	Wanco		Arrow board
-	M.Mover		Bypass Trailer
2021	Hyster		Fork Lift
2014	J. Deere	310 SK	Backhoe
2022	Multi Quip		Trash Pump (600 ft discharge lay flat hose, 25 ft suction)

4.6 Roles and Responsibilities

The Operations Manager, Engineering Manager, Operations Supervisor, and GIS Manager collaborate to maintain and implement this element of the SSMP.

4.7 Effectiveness, Improvement, and Key Performance Indicators

To monitor the effectiveness of this element of the SSMP, the following Key Performance Indicators (KPIs) are being monitored by EOCWD:

- Has the Operations and Maintenance Program been reviewed at every Quarterly SSMP Review Meeting?
- Are spills occurring at a rate less than 2.1 per 100 miles of gravity main/year?
- Are the following tools being utilized at the appropriate frequency for operations and maintenance/asset management:

Table 8 - Key Performance Indicators

Dashboards/Reports	Purpose	Used By	Use Frequency
FOG Program FSE Inspection Dashboard	Monitor FOG inspection progress and non-compliance issues	GIS Manager, Admin Assistant	Bi-weekly
Sewer Condition Assessment Dashboard	Monitor manhole and sewer main work for identified issues	GIS Manager, Operations Supervisor, Collections Crew	Monthly
Sewer Hotspot Status Dashboard	Monitor hotspot cleaning progress	Operations Supervisor, Collections Crew	Weekly
Sewer Main Cleaning Dashboard	Monitor monthly and daily cleaning	Operations Supervisor, Collections Crew	Daily
Manhole Inspection Older Than 1 Year	Identifies manholes past due for inspection	Collections Crew	Daily
Main Cleaning Older Than 1 Year	Identifies sewer mains past due for cleaning	Collections Crew	Daily
Sewer Main Hotspots Need Cleaning	Identifies sewer main hotspots past due for cleaning	Collections Crew	Daily
Food Service Establishments, non-Compliance	Identifies FSEs not in compliance with FOG Program requirements	FOG Inspector	As needed
FSE inventory review	Ensure EOCWD's FSE inventory is up to date	GIS Manager	Quarterly
CCTV inspection data review	Ensure CCTV inspection program is capturing mains that need to be inspected and ensure the inspection was successful and properly documented	GIS Manager	Bi-annually (Semi-annually)
Sewer main cleaning postponement review	Monitor all sewer mains that have been inspected and deemed clean and can forego next scheduled cleaning	GIS Manager, Operations Supervisor	Monthly
Sewer main cleaning averages and targets	Compares cleaning footage month by month and year by year to compare current progress against historical performance. Also determines each month's cleaning target based on historical monthly cleaning average and month's available working days	GIS Manager	Monthly

Dashboards/Reports	Purpose	Used By	Use Frequency
Weekly Work Target Reports	Provide supervisors summary of field work completed and whether work targets are being met	Engineering Manager, Operations Manager, Operations Supervisor, Collections Crew	Weekly
Monthly Work Reports	Provide summary of field work completed in a month for Board meeting report	EOCWD Board	Monthly
Monthly Sewer Main Cleaning	Graph that compares year to year monthly cleaning	Operations Supervisor	Monthly

In the preparation of this SSMP, EOCWD has identified the following improvements to the operations and maintenance program that will improve the effectiveness of the SSMP:

- Develop detailed root control program to lower the impact of root intrusion on the collection system – *Complete by the next internal audit in December 2027*

Element 5: Design and Performance Provisions

The SSMP must include the following items as appropriate and applicable to the Enrollee's system:

1. *Updated design criteria and construction standards and specifications for the construction, installation, repair, and rehabilitation of existing and proposed system infrastructure components, including but not limited to pipelines, pump stations and, other appurtenances*
2. *Procedures and standards for inspecting and testing the installation of newly constructed system pipelines, pumps, and other equipment and appurtenances.*

5.1 Compliance Summary and Activities

EOCWD has developed a Standard Specification and Drawings for Sanitary Sewers document that can be accessed on EOCWD's website at:

https://www.eocwd.com/files/ugd/5317eb_8c21c735eedb41ecac606d9e7cd6d346.pdf

The Table of Contents of the latest version of this document (September 2022) can be found in **Appendix F**.

Hydraulic capacity performance criteria developed to ensure that collection system components are designed with sufficient dry weather and wet weather capacity will be established in the 2025 EOCWD Sewer Master Plan Update. The development of this master plan update is ongoing. Appendix H of this SSMP document is reserved for the 2025 EOCWD Sewer Master Plan Update when it is complete and adopted.

5.2 Compliance Documents

Design and Construction Standards and Specifications

Standards for design, construction and repair of sewer facilities are included in EOCWD's Design, Construction and Repair Standards for Sanitary Sewer document. Design and construction topics covered in this document include, but are not limited to the following:

- Criteria for Average and Peak Flow
- Design Calculations
- Minimum Velocity
- Minimum Pipe Size
- Maximum Slope
- Pipe Depth to Diameter Ratio
- Manhole Criteria
- Siphon Criteria
- Radius of Curvature
- Water Main Separation Requirements
- Trench Backfill
- Jacked Casing or Open Trench Casing

- House Lateral Criteria
- Cured-in-Place Pipe and Manholes
- Pipe and Manhole Materials
- Testing of Gravity Sewers and Manholes
- Safety Operations

EOCWD's standard plans for design and construction of sewer facilities are listed in Figure 6.

Drawing Number	Description
S-1	PIPE INSTALLATION AND PAVEMENT REPLACEMENT
S-2	CONCRETE ENCASEMENT OF PIPE
S-3	VALVE BOX, SURVEY MONUMENT, OR SEWER CLEAN OUT COVER AND FRAME INSTALLATION
S-4	NOT USED
S-5	NOT USED
S-6	SEWER HOUSE LATERAL AT UTILITY INTERSECTIONS
S-7	ANCHOR BLOCK DETAIL
S-8	PIPE INSTALLATION IN CASING
S-9	FIELD CLOSURE FOR VCP PIPES
S-10	POLYMER CONCRETE MANHOLE AND CONCRETE BASE
S-11	COMPOSITE MANHOLE FRAME AND COVER (36" CLEAR OPENING)
S-12	NEW UN-LINED MANHOLE FOR SEWERS
S-13	NEW LINED MANHOLE OVER EXISTING SEWER
S-14	NEW LINED MANHOLE FOR NEW SEWERS
S-15	DROP MANHOLE CONNECTION TO STANDARD MANHOLE
S-16	48" MANHOLE FRAME AND COVER WITH CONCENTRIC 24" COVER
S-17	STANDARD MANHOLE FRAME AND COVER
S-18	BOLTED MANHOLE FRAME AND COVER
S-19	MANHOLE ADJUSTMENT TO GRADE
S-20	GAS FLAP INSTALLATION FOR LINED OR UNLINED MANHOLES
S-21	CORE DRILLED STUB AT EXISTING MANHOLE DETAIL
S-22	DIVERSION STRUCTURE WITH STOP GATE
S-23	REHABILITATION OF PVC LINED MANHOLES
S-24	CUT IN WYE CONNECTIONS
S-25	HOUSE LATERAL CONNECTION TYPICAL
S-26	EXISTING MANHOLE ABANDONMENT

Figure 6 – Standard Drawings

The 2025 EOCWD Sewer Master Plan Update currently under development will provide detailed sanitary sewer flow factors for use in accurately projecting future flows in the collection system.

These factors comprise both dry weather factors and wet weather factors that account for Rainfall Dependent Inflow & Infiltration (RDII) in the collection system.

The master plan will also provide detailed performance criteria for gravity mains, force mains, lift stations, and siphons. The 2025 EOCWD Sewer Master Plan Update will be in alignment with and support the Design, Construction and Repair Standards for Sanitary Sewers, providing technical detail for support of infrastructure design.

Inspection and Testing

Standards for inspection and testing of gravity sewers and manholes are included in Section 1.6.1 and Section 1.6.2 of the Standard Specification and Drawings for Sanitary Sewers document, respectively. This document is supplemented with the American Public Works Association Standard Specification and Drawings for Public Works Construction (“The Greenbook”) most current edition and American Society of Testing and Materials Specifications (ASTM).

5.3 Roles and Responsibilities

The General Manager, Operations Manager, and Engineering Manager are responsible for implementing and maintaining this element of the SSMP

5.4 Effectiveness, Improvement, and Key Performance Indicators

To monitor the effectiveness of this element of the SSMP, the following Key Performance Indicators (KPIs) are being monitored by EOCWD:

- Have the Design and Performance Provisions been reviewed at a Quarterly SSMP Review Meeting?

In the preparation of this SSMP, EOCWD has identified the following improvements to the design and performance provisions that will improve the effectiveness of the SSMP:

- Update standard plans to include details such as bedding, cleanouts, and grease interceptors. Update standards to include abandonment of assets. – *Complete by the next internal audit in December 2027*
- Develop standards and guidelines for the connection of private systems to the EOCWD collection system– *Complete by the next internal audit in December 2027*

Element 6: Spill Emergency Response Plan

Each Enrollee shall develop and implement an up-to-date spill emergency response plan to ensure prompt detection and response to spills to reduce spill volumes and collect information for prevention for future spills. At a minimum, this plan must include procedures to:

- 1. Notify primary responders, appropriate local officials, and appropriate regulatory agencies of a spill in a timely manner**
- 2. Notify other potentially affected entities (e.g. health agencies, water suppliers, etc.) of spills that potentially affect public health or reach waters of the State**
- 3. Comply with the notification, monitoring and reporting requirements of the General Order 2022-0103-DWQ, State law and regulations, and applicable Regional Water Board Orders**
- 4. Ensure that appropriate staff and contractors implement the Spill Emergency Response Plan and are appropriately trained**
- 5. Address emergency system operations, traffic control and other necessary response activities**
- 6. Contain a spill and prevent/minimize discharge to waters of the State or any drainage conveyance system**
- 7. Minimize and remediate public health impacts and adverse impacts on beneficial uses of waters of the State**
- 8. Remove sewage from the drainage conveyance system**
- 9. Clean the spill area and drainage conveyance system in a manner that does not inadvertently impact beneficial uses in the receiving waters**
- 10. Implement technologies, practices, equipment, and interagency coordination to expedite spill containment and recovery**
- 11. Implement pre-planned coordination and collaboration with storm drain agencies and other utility agencies/departments prior, during, and after a spill event**
- 12. Conduct post-spill assessments of spill response activities**
- 13. Document and report spill events as required by General Order 2022-0103-DWQ**
- 14. And annually review and assess the effectiveness of the Spill Emergency Response Plan, and update as needed.**

6.1 Compliance Summary and Activities

Section 5.12 of Order 2022-0103-DWQ required all agencies to update and implement their Spill Emergency Response Plan (SERP) within six months after the adoption of the General Order. The Order was adopted December 5, 2022, so the SERP had to be updated by June 5, 2023.

EOCWD staff updated the former Sewer System Overflow Response Plan to create the SERP and comply with the new requirements of Order 2022-0103-DWQ, including the SSMP requirements (Attachment D) and the Notification, Monitoring, Reporting, and Recordkeeping Requirements (Attachment E1 and E2).

6.2 Compliance Documents

The District's SERP is included with this SSMP as **Appendix C**. The SERP is organized as follows:

- Section 1 Authority
- Section 2 Overview
- Section 3 Initial Response Procedures
- Section 4 Notifications Procedures
- Section 5 Spill Response Procedures
- Section 6 Monitoring and Reporting Procedures
- Section 7 Training and Evaluation

The fourteen items listed in Section 5.12 of Order 2022-0103-DWQ were addressed in the updated SERP document. The following list notes where each item is addressed in the SERP document:

1. Notify primary responders, appropriate local officials, and appropriate regulatory agencies of a spill in a timely manner;
 - a. Section 3 Initial Response Procedures, Section 4 Notification Procedures, Appendix B-1 Spill Emergency Response Flowchart
2. Notify other potentially affected entities (for example, health agencies, water suppliers, etc.) of spills that potentially affect public health or reach waters of the State
 - a. Section 4 Notification Procedures, Appendix B-3 Spill Notification and Reporting Requirements, Appendix B-4 Resource Phone List
3. Comply with the notification, monitoring and reporting requirements of this General Order, State law and regulations, and applicable Regional Water Board Orders
 - a. Section 4 Notification Procedures, Section 6 Monitoring and Reporting Procedures, Appendix B-3 Spill Notification and Reporting Requirements, Appendix B-4 Resource Phone List, Appendix B-5 Spill Report, Appendix B-6 Monitoring and Reporting Data by Spill Category Summary, Appendix B-7 Water Sampling Requirements
4. Ensure that appropriate staff and contractors implement the Spill Emergency Response Plan and are appropriately trained
 - a. Section 7 Training and Evaluation
5. Address emergency system operations, traffic control and other necessary response activities
 - a. Section 5 Spill Response Procedures
6. Contain a spill and prevent/minimize discharge to waters of the State or any drainage conveyance system
 - a. Section 5-4 Containment Procedures
7. Minimize and remediate public health impacts and adverse impacts on beneficial uses of waters of the State
 - a. Section 5-5 Correction Procedures
8. Remove sewage from the drainage conveyance system
 - a. Section 5-5 Correction Procedures

9. Clean the spill area and drainage conveyance system in a manner that does not inadvertently impact beneficial uses in the receiving waters
 - a. Section 5-6 Cleanup Procedures
10. Implement technologies, practices, equipment, and interagency coordination to expedite spill containment and recovery;
11. Implement pre-planned coordination and collaboration with storm drain agencies and other utility agencies/departments prior, during, and after a spill event
 - a. Section 2-6 Coordination and Collaborations, Appendix D Agency Coordination Documents
12. Conduct post-spill assessments of spill response activities
 - a. Section 7-3.2 Spill Event Response Evaluation, Appendix F-1 Spill Response Evaluation
13. Document and report spill events as required in this General Order;
14. Annually, review and assess effectiveness of the Spill Emergency Response Plan, and update the Plan as needed.
 - a. Section 7-3.3 Annual Spill Emergency Response Plan Document Evaluation; Appendix F-2 Annual Spill Response Evaluation

6.3 Roles and Responsibilities

The Operations Manager, Engineering Manager, and Operations Supervisor are responsible for maintaining and implementing this portion of the SSMP.

6.4 Notification and Response Procedures

Notification and response procedures are summarized in the EOCWD Spill Response Plan shown in Figure 4. Details are provided in Section 3, Section 4, and Section 5 of the SERP.

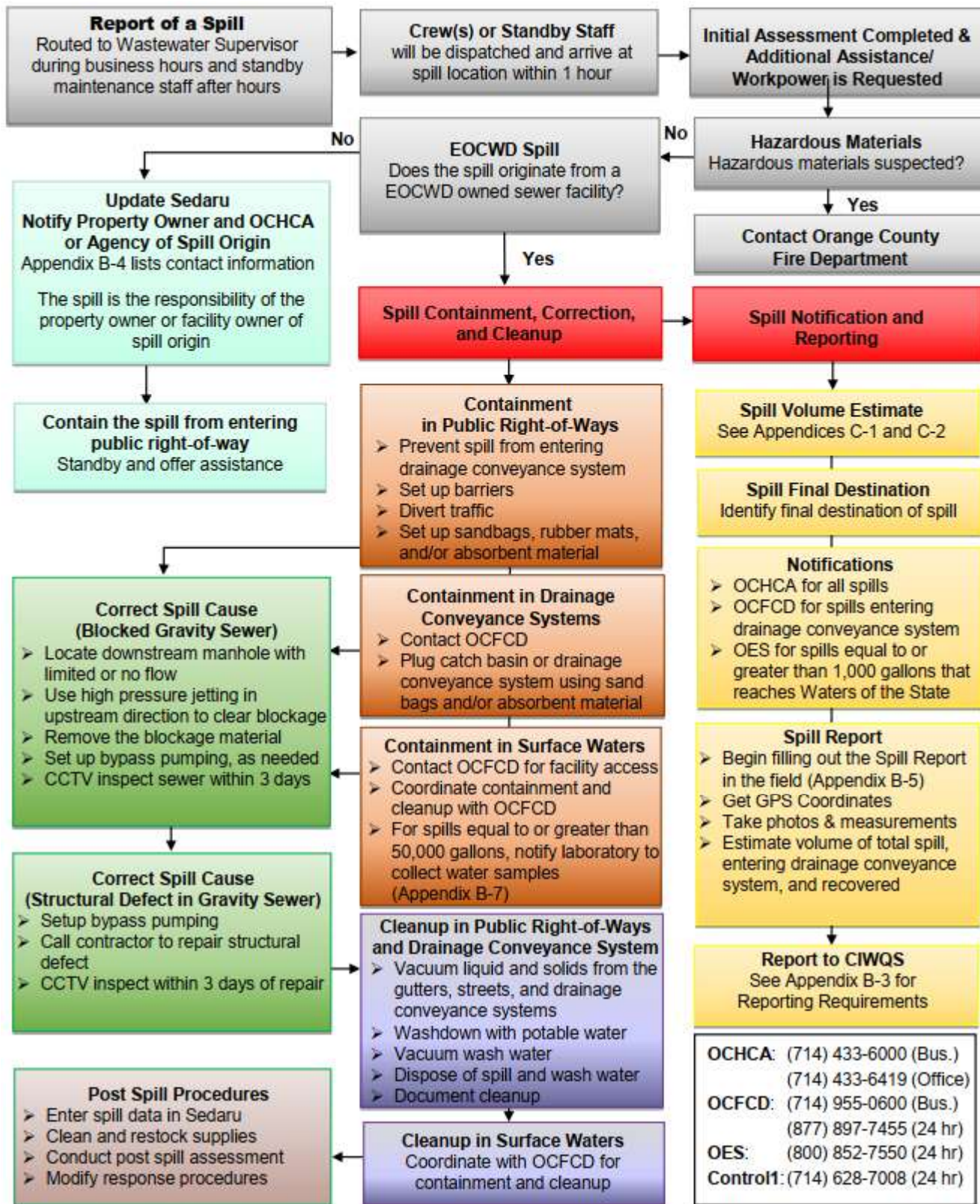


Figure 7 – EOCWD Spill Response Plan

6.5 Training

The maintenance staff receives training through the California Water Environment Association's (CWEA) Training Program, which is the current industry standard for training and certifying sewer collection system maintenance staff. In addition, annual spill emergency response training occurs in the office and in the field. In general, the Operations Manager is responsible for scheduling and documenting training sessions for EOCWD staff. The Operations Supervisor is responsible for conducting training sessions.

Office Training

Initial Spill Receipt training is conducted by the Operations Manager. Training includes review of the correct procedures for receiving calls, recording the information on the Sanitary Sewer Overflow Initial Receipt Form (Appendix B-2), and notification of the maintenance staff.

Office training of maintenance staff is conducted by the Operations Supervisor. This involves complete review of the following documents and/or procedures:

1. The SERP plan document review
2. The SERP flowchart (SERP Appendix B-1)
3. Regulatory agency notification and reporting requirements (SERP Appendix B-3)
4. Filling out the Spill Report (SERP Appendix B-5)
5. Recording spill data and information into Esri Enterprise System
6. Sewers, Drainage Conveyance Systems, and Surface Waters Map (SERP Appendix A-1)
7. Spill volume calculation methodologies (SERP Appendix C-1 and C-2)
Post-Spill Response evaluation procedures

Office training is completed monthly.

Field Training

Field training of the maintenance staff is conducted by the Operations Supervisor. The following training topics are reviewed in the field once per year, at a minimum:

1. Safety Procedures
2. Operation of EOCWD's combination trucks
3. Field spill volume estimation, with training simulations
4. Review of all available equipment on the combination truck
5. Review of all spare parts available at EOCWD yard
6. Containment and clean up procedures
7. Gravity sewer correction procedures
8. Bypass pumping procedures

Any new staff that have not participated in the annual training will be separately trained by the Operations Supervisor during their first week of employment.

Other Training Opportunities

EOCWD will look for and participate in other training opportunities made available from nearby agencies including but not limited to:

- Orange County Sanitation District (OCSan)
- SoCal Waste Discharge Requirements Group
- California Water Environment Association (CWEA)
- Water Emergency Response Organization of Orange County (WEROC)

Training Logs

The Operations Manager keeps records of all SERP-related training. Sign-in sheets include the training topic, date, time, and list of all attendees. All sign-in sheets, agendas, handout material, quizzes, etc will be maintained electronically.

6.6 Effectiveness, Improvement, and Key Performance Indicators

To monitor the effectiveness of this element of the SSMP, the following Key Performance Indicators (KPIs) are being monitored by EOCWD:

- Has the SERP been reviewed at a Quarterly SSMP Review Meeting?
- Is SERP training taking place at a quarterly basis?
- Are training records and resources being maintained electronically?

Element 7: Sewer Pipe Blockage Control Program

The SSMP must include procedures for the evaluation of the Enrollee’s service area to determine whether a sewer pipe blockage control program is needed to control fats, oils, grease, rags, and debris. If an Enrollee determines that a program is not needed, the Enrollee must provide justification for why it is not needed. The procedures must include, at minimum:

- 1. An implementation plan and schedule for a public education outreach program that promotes proper disposal of pipe-blocking substances;**
- 2. A plan and schedule for the disposal of pipe-blocking substances generated within the sanitary sewer system service area. This may include a list of acceptable disposal facilities and/or additional facilities needed to adequately dispose of substances generated within a sanitary sewer system service area;**
- 3. The legal authority to prohibit discharges to the system and identify measures to prevent spills and blockages;**
- 4. Requirements to install grease removal devices (such as traps or interceptors), design standards for the removal devices, maintenance requirements, BMP requirements, record keeping and reporting requirements;**
- 5. Authority to inspect grease producing facilities, enforcement authorities, and whether the Enrollee has sufficient staff to inspect and enforce the fats, oils, and grease (FOG) ordinance;**
- 6. An identification of sanitary sewer system sections subject to FOG blockages and establishment of a cleaning maintenance schedule for each section;**
- 7. Implementation of source control measures for all sources of FOG reaching the sanitary sewer system for each section identified in each section above.**

7.1 Compliance Summary and Activities

In order to limit the discharge of FOG, rags, and other debris that causes increased maintenance and pipe blockages that can cause SSOs, EOCWD has prepared and is implementing the following elements into our FOG Control Program effort:

- EOCWD’s Sewer Use Ordinance 16-01 was adopted on September 15, 2016 containing the necessary Legal Authority to prohibit discharges to the system and identify measures to prevent SSOs and blockages caused by FOG (**Appendix I**);
- Adopted the FOG Ordinance 16-02 providing the authority to inspect FOG producing facilities 1, and providing enforcement powers to ensure compliance as needed (**Appendix J**);
- Developed and implemented a FOG training and FSE inspection program for Collection Systems staff through contractor EEC Environmental;
- Developed materials and began implementation of a public education outreach program, also using our website and print/social media to promote proper disposal of FOG (**Appendix K**);

- For FSEs, requirements to install Grease Control Devices (GCD's) in facilities (such as traps or interceptors) design standards for the GCDs, maintenance requirements to be performed by the facility owner, BMP requirements, record keeping and reporting requirements (**Appendix L**);
- Developed and implemented source control measures, for all sources of FOG discharged to the sanitary sewer system, for each section identified above;
- Reviewed hot spot sewer cleaning maintenance schedules for line segments including inverted siphons that are subject to FOG;
- Developed handout materials for each FSE to help educate and ensure compliance. (**Appendix M**)
- Developed a process of corrective measures needed by FSE's and residential facilities if a FOG related SSO does occur (**Appendix N**);
- Developed FOG Reduction Program training for EOCWD staff charged with Program implementation;
- Implemented a risk based FSE and GCD inspection program;
- Developed a process for residential outreach which will target parcels upstream of trouble-spots associated with FOG and debris (wipes) where upstream FSE's may not be present.

To address the WDR Order, EOCWD adopted FOG Control Regulations Applicable to Food Service Establishments (FSE) to also establish the legal authority to prohibit FSEs from discharging FOG to the sewer system. The Ordinance Establishing Wastewater Discharge Regulations provides the uniform requirements for users of EOCWD's facilities which are tributary to OCSan's regional treatment and reuse facilities. FOG Program fees were adopted under Resolution 799 at the June 15, 2017 Board Meeting. These fees have since been removed in favor of a charge added to the property taxes levied by the District.

7.2 Compliance Documents

EOCWD relies on the following documents for compliance:

- FOG Control Regulations Applicable to Food Service Establishments (FSE) (**Appendix O**)
- Ordinance Establishing Wastewater Discharge Regulations (**Appendix P**)
- EOCWD's Local Sanitary Sewer Service Charges (**Appendix Q**)
- FOG Management Program (**Appendix R**)
- FOG Binder with information for FSEs (**Appendix S**)
- Agreement for Provision of Environmental Health Services Between County of Orange and Orange County Sanitation District. Includes EOCWD as a subscribing agency (**Appendix T**)
- Materials developed to educate the public about FOG and debris disposal (**Appendix U**)

7.3 Roles and Responsibilities

EOCWD's Operations Manager, working with and through consultant EEC Environmental and EOCWD's Collections System staff, has a program to identify sections of the collection system subject to blockages, and a schedule for trouble-spot cleaning as part of the preventive maintenance program. The review of existing FOG trouble-spot conditions is a continuous process conducted as part of the cleaning program. New trouble-spots that can be attributed to FOG that are discovered by staff or contractors, are reported to Operations Manager for investigation and mitigation. Based on the as-found conditions at the scheduled time of cleaning, a recommended change in the maintenance frequency of an existing site will be reviewed and discussed and made if warranted.

EOCWD's Operations Manager is responsible for reviewing and recommending updates to the FOG Program for the General Manager's review and approval before a Program change affecting this SSMP can be made. An SSMP Chapter or Appendix revision will then be made.

7.4 Public Education and Outreach Program

EOCWD has developed materials and is implementing a public education outreach program using websites and print/social media to promote proper disposal of FOG. Public education on FOG control can be found here:

<https://www.eocwd.com/fog-control-program>

7.5 FOG Disposal Facilities

EOCWD maintains a list of FOG hauling and disposal services for customers within the EOCWD service area. This list can be found under Districts Fog Control Program website, and at the following direct link:

https://www.eocwd.com/files/ugd/5317eb_ob83c0432ec24b45892920e1d802a41d.pdf

7.6 FOG Program Requirements and Design Standards

FOG Program requirements can be found in the FOG Management Program. Design Standards for FOG control and mitigation in the collection system are found in the design standards described in Element 5 of this SSMP.

7.7 FOG Inspections and Enforcement

FOG inspections and enforcement for FSEs within the EOCWD service area are required by the FOG Control Regulations Applicable to Food Service Establishments (FSE) and are conducted by EOCWD staff and contractor EEC Environmental. EOCWD has developed requirements to install Grease Control Devices (GCD's) in facilities (such as traps or interceptors) design standards for the GCDs, maintenance requirements to be performed by the facility owner, BMP requirements, record keeping and reporting requirements.

7.8 FOG Preventative Maintenance

Preventative maintenance for FOG and debris within the collection system is integrated into the preventative maintenance program described in Element 4 of this SSMP.

7.9 Source Control Measures

Source control activities with regard to the collection system are carried out by the County of Orange and OCSan under agreement. This agreement, Agreement for Provision of Environmental Health Services Between County of Orange and Orange County Sanitation District, includes EOCWD as a subscribing agency.

7.10 Effectiveness, Improvement, and Key Performance Indicators

To monitor the effectiveness of this element of the SSMP, the following Key Performance Indicators (KPIs) are being monitored by EOCWD:

- Has the Pipe Blockage Control Program been reviewed at a Quarterly SSMP Review Meeting?
- Are monthly FSE inspection targets being met?
- Are FSE, FOG Program violations being followed up on and corrected?
- Are the sewer mains cleaning and inspection targets being met?

Element 8: System Evaluation, Capacity Assurance and Capital Improvements

The SSMP must include procedures for the evaluation of capacity and condition of the Enrollee's collection system. At a minimum:

- 1. The SSMP must include procedures and activities for routine evaluation and assessment of system conditions, capacity assessment and design criteria, prioritization of corrective actions, and a capital improvement plan (CIP).**
- 2. System Evaluation and Condition Assessment (SECAP):**
 - a. Evaluate the sanitary sewer system assets utilizing the best practices and technologies available.**
 - b. Identify and justify the amount of its system for its condition to be assessed each year.**
 - c. Prioritize the condition assessment of system areas that hold a high level of environmental consequences if vulnerable to collapse, failure, blockage, or other system deficiencies, are located within the vicinity of surface waters, steep terrain, high groundwater elevations, and environmentally sensitive areas, and are within the vicinity of a receiving water with a bacterial-related impairment on the most current Clean Water Act section 303(d) List.**
 - d. Assess the system conditions using visual observations, video surveillance and/or other comparable system inspection methods. Utilize observations/evidence of system conditions that may contribute to exiting of sewage from the system which can reasonably be expected to discharge into a Water of the State.**
 - e. Maintain documents and recordkeeping of system evaluation and condition assessment inspections and activities, and identify system assets vulnerable to direct and indirect impacts of climate change, including but not limited to flooding and/or erosion due to increased storm volumes, frequency, intensity, wildfires, power disruptions, etc.**
- 3. Capacity Assessment and Design Criteria:**
 - a. The SSMP must include procedures to identify system components that are experiencing or contributing to spills caused by hydraulic deficiency and/or limited capacity, including procedures to identify the appropriate hydraulic capacity of key system elements for: dry-weather peak flow conditions that cause or contribute to spill events, the appropriate design storm(s) or wet weather events that causes or contributes to spill events, the capacity of key system components, and the identification of major sources that contribute to the peak flows associated with sewer spills.**
 - b. The capacity assessment must consider: data from existing system condition assessments, system inspections, system audits, spill history, and other available information, capacity of flood-prone systems subject to increased infiltration and inflow, under normal local and regional storm conditions, capacity of systems subject to increased infiltration and inflow due to larger and/or higher-intensity storm events as a result of climate change, increases in erosive forces in canyons and streams near underground and above-ground system components due to larger and/or**

higher-intensity storm events, capacity of major system elements to accommodate dry-weather peak flow conditions and updated design storm and wet weather events, and necessary redundancy in pumping and storage capacities

- 4. Prioritization of Corrective Action: The findings of the condition assessments and capacity assessments must be used to prioritize corrective actions. Prioritization must consider the severity of the consequences of potential spills***
- 5. Capital Improvement Plan: The CIP must include project schedules including the completion dates for all portions of the CIP, internal and external project funding sources for each project, and joint coordination between operation and maintenance staff, and engineering staff/consultants during planning, design, and construction of capital improvement projects, and interagency coordination with other impacted utility agencies.***

8.1 Compliance Summary and Activities

The District is in the process of completing the 2025 EOCWD Sewer Master Plan Update. This document will be a comprehensive evaluation of collection system capacity and condition, and it will provide a risk-based prioritization of collection system improvements with a detailed schedule. Appendix I of this SSMP document is reserved for the 2025 EOCWD Sewer Master Plan Update when it is complete and adopted.

8.2 Compliance Documents

EOCWD relies on the following documents for compliance:

- EOCWD 2025 Sewer Master Plan Update (Under ongoing development) (**Appendix I when completed and adopted.**)

8.3 Roles and Responsibilities

EOCWD's Engineering Manager is responsible for maintaining, updating, and implementing the CIP and recommendations from the 2025 Sewer Master Plan Update. The Engineering Manager works with the Operations Manager to make sure that the condition of the collection system is updated and integrated into the CIP recommendations and projects.

8.4 System Evaluation and Condition Assessment

For the 2025 Sewer Master Plan Update, a comprehensive capacity evaluation will be performed, using Aquanuity's AquaTwin Sewer hydraulic modeling platform. The following flow conditions will be evaluated:

- Peak Dry Weather Flow (PDWF)
- Peak Wet Weather Flow (PWWF) using adopted design storm criteria to simulate Rainfall Dependent Inflow and Infiltration (RDII) in the collection system.

The following service area scenarios will be included in the evaluation:

- Existing conditions
- Near-term development conditions
- Future build-out conditions
- Sensitivity Analysis: Septic Tank Conversion
- Sensitivity Analysis: Accessory Dwelling Unit (ADU) development
- Sensitivity Analysis: Climate change impacts on RDII in the collection system

Inspection records for collection system assets will be integrated into the hydraulic evaluation.

8.5 Capacity Assessment and Design Criteria

Design and performance criteria for the collection system have been developed and will be integrated into the 2025 Sewer Master Plan Update. Performance criteria will include:

- Depth to diameter ratio and velocity criteria for gravity mains
- Velocity criteria for force mains
- Velocity and surcharge criteria for hydraulic siphons
- Firm pump capacity for lift stations

8.6 Capital Improvement Plan

A Capital Improvement Plan (CIP) will be included in the 2025 Sewer Master Plan Update. The CIP will include improvement projects, anticipated project timing, project triggers to facilitate timing updates in the future, and projected conceptual costs of the improvements. The CIP will include improvements required for both capacity enhancement and condition improvement. For each improvement, funding sources and inter-agency coordination required for completion of the improvement are identified.

8.7 Prioritization of Corrective Actions

The CIP provided in the 2025 Sewer Master Plan Update will be prioritized based upon estimated risk identified for each improvement. Risk scores will be calculated based upon both Likelihood of Failure (LoF) and Consequence of Failure (CoF) criteria. CoF criteria will include environmental criteria such as proximity to Waters of the State.

8.8 Effectiveness, Improvement, and Key Performance Indicators

To monitor the effectiveness of this element of the SSMP, the following Key Performance Indicators (KPIs) are being monitored by EOCWD:

- Has the 2025 Sewer Master Plan Update been completed?
- Has the CIP been reviewed at a Quarterly SSMP Review Meeting?
- Has the CIP schedule been updated to account for new priorities

Element 9: Monitoring, Measurement, and Program Modifications

The SSMP must include an Adaptive Management section that addresses its implementation effectiveness and the steps necessary for SSMP improvement:

- 1. Maintain relevant information, including audit findings, that can be used to establish and prioritize appropriate SSMP activities;*
- 2. Monitor the implementation and, where appropriate, measure the effectiveness of each element of the SSMP*
- 3. Assess the success of the preventative operation and maintenance activities*
- 4. Update SSMP procedures and activities, as appropriate, based on monitoring or performance evaluations; and*
- 5. Identify and illustrate spill trends, including: frequency, location, and estimated volumes.*

9.1 Compliance Summary and Activities

This SSMP and the programs described herein has been developed to be continually reviewed to monitor and measure the performance of the sewer collection system. As related for each element above, Key Performance Indicators have been developed for each element to facilitate evaluation of the element's effectiveness in the collection system. This ongoing review, in conjunction with the SSMP Program Audits element, is used to identify the strengths and weaknesses of current programs and modify them as deemed necessary.

9.2 Compliance Documents

The compliance document for this element is the SSMP quarterly meeting log included as **Appendix V** of this SSMP.

9.3 Roles and Responsibilities

The General Manager has the responsibility for hiring a third-party environmental auditor to conduct the audits. Deficiencies identified as a result of the audit are brought to the attention of each responsible EOCWD stakeholder. Deficiencies and suggested corrective actions are identified, verified, and documented by the third-party auditor using EOCWD's Audit Finding Form. The General Manager is responsible for following up with EOCWD stakeholders to close-out the findings and document for Board and public awareness.

9.4 Maintain Information

To monitor and measure the SSMP's effectiveness, the District manages and maintains detailed records of the sewer system's condition, capacity, and operation and maintenance activities. The Sewer Division utilizes an Esri Enterprise work and asset management system as its computerized maintenance management system (CMMS). The CMMS database serves as the comprehensive repository for collection system assets and enables maintenance work to be requested, planned, prioritized and recorded. The Sewer Division utilizes the Esri Enterprise to track and visualize asset, facility, completion of work, spills, hot spot, repair, and spill locations. Records of line cleaning, televising, spills, and other pertinent information provide the necessary data required to identify areas of concern. Among the data tracked are:

- Miles of sewer line cleaned
- Miles of sewer line inspected
- Number of service requests completed
- Number of spills
- Causes of spills
- Locations of spills
- Quantity spilled
- Repair replacement of sewer lines
- Public education events/activities

Detailed information relevant to specific sewer lines, manholes, or other assets is also maintained. Databases enable quick access to detailed information, including CCTV videos, spill details, and dates of specific line cleanings.

9.5 Monitoring Implementation and Effectiveness of SSMP

The District's robust GIS database is used as the primary tool by which each element of the SSMP is measured for its effectiveness in fulfilling the goals of the SSMP. Four meetings are held by EOCWD stakeholders each year (Quarterly SSMP Review Meeting #1, Quarterly SSMP Review Meeting #2, Quarterly SSMP Review Meeting #3, and Quarterly SSMP Review Meeting #4). The Operations Manager is responsible for scheduling and documenting the Quarterly SSMP meetings.

The Quarterly SSMP Review Meetings are held in conjunction with the formal audit which covers a period of three years. During these audits, the District reviews the SSMP's elements as well as various other key statistics related to its collection system to monitor and assess the effectiveness of the implementation of its SSMP and management of its collection system.

Table 9 summarizes the performance indicators the District utilizes to assess the effectiveness of each of its SSMP elements, the quarterly meeting schedule for each element, and the identified improvement actions that have been identified for each element.

Table 9 – EOCWD Responsible Staff for SSMP Elements

Element	KPIs	Quarterly Meeting Schedule	Identified Improvement Actions as of SSMP Adoption
<p>I. Goals</p>	<p>1. Have the goals of the SSMP been reviewed at a Quarterly SSMP Review Meeting?</p>	<p>1st Quarter</p>	
<p>II. Organization</p> <p>a. Name of the Responsible or authorized representative(s)</p> <p>b. Names and telephone numbers of management, administrative, and maintenance positions</p> <p>c. Chain of communication for reporting spills</p>	<p>1. Have the organization of the utility and the application of that organization to the SSMP been reviewed at a Quarterly SSMP Review Meeting?</p>	<p>1st Quarter</p>	
<p>III. Legal Authority</p> <p>a. Prevent illicit discharges to the collection system</p> <p>b. Require that sewers and laterals be properly designed and constructed</p> <p>c. Ensure access to the collection system</p> <p>d. Limit discharge of FOG and other debris that may cause blockages</p> <p>e. Enforcement of Ordinance</p>	<p>1. Have the documents associated with collection system legal authority been reviewed at a Quarterly SSMP Review Meeting?</p>	<p>1st Quarter</p>	<p>1. Update Ordinance No. 2016-01 to specifically prohibit septic tank sludge, rainwater, stormwater, street drainage, and other contaminated water from the collection system – <i>Complete by the next internal audit in December 2027</i></p> <p>2. Update Ordinance No. 2016-01 to provide explicit authority for EOCWD access to all facilities for maintenance, inspection and repairs– <i>Complete by the next internal audit in December 2027</i></p>

Element	KPIs	Quarterly Meeting Schedule	Identified Improvement Actions as of SSMP Adoption
<p>IV. Operation and Maintenance Program</p> <ul style="list-style-type: none"> a. Maintain current map of collection system and storm drain system b. Describe routine and preventative operation and maintenance of collection system c. Develop a rehabilitation and replacement plan. d. Develop and implement a training program e. Provide equipment and training parts inventories 	<ul style="list-style-type: none"> 1. Has the Operations and Maintenance Program been reviewed at every Quarterly SSMP Review Meeting? 2. Are spills occurring at a rate less than 2.1 per 100 miles of gravity main/year? 3. Are the ESRI Enterprise tools being utilized at the appropriate frequency for operations and maintenance/asset management? 	<p>1st Quarter 2nd Quarter 3rd Quarter 4th Quarter</p>	
<p>V. Design and Performance Provisions</p> <ul style="list-style-type: none"> a. Design, construction and specification standards for installation and rehabilitation of new and existing sewers b. Procedures and standards for the inspection of new or rehabilitated sewers and appurtenances. 	<ul style="list-style-type: none"> 1. Have the Design and Performance Provisions been reviewed at a Quarterly SSMP Review Meeting? 	<p>2nd Quarter</p>	<ul style="list-style-type: none"> 1. Update standard plans to include details such as bedding, cleanouts, and grease interceptors. Update standards to include abandonment of assets. – <i>Complete by the next internal audit in December 2027</i> 2. Develop standards and guidelines for the connection of private systems to the EOCWD collection system– <i>Complete by the next internal audit in December 2027</i>

Element	KPIs	Quarterly Meeting Schedule	Identified Improvement Actions as of SSMP Adoption
<p>VI. Spill Emergency Response Plan</p> <ul style="list-style-type: none"> a. Notification procedures for regulatory agencies b. Response and mitigation procedures c. Staff and contractor training d. Emergency operations e. Containment and monitoring plans 	<ul style="list-style-type: none"> 1. Has the SERP been reviewed at a Quarterly SSMP Review Meeting? 2. Is SERP training taking place at a quarterly basis? 3. Are training records and resources being maintained electronically? 	<p>2nd Quarter</p>	
<p>VII. Sewer Pipe Blockage Control Program</p> <ul style="list-style-type: none"> a. Identification of "hot spot" areas of collection system b. Identification of food service businesses in "hot spot" areas of collection system c. Administrative controls (permits) for potential grease dischargers d. Requirement to install grease removal equipment e. Encouragement to use BMPs to reduce grease discharges f. Periodic inspections g. Enforcement actions h. Public Education 	<ul style="list-style-type: none"> 1. Has the Pipe Blockage Control Program been reviewed at a Quarterly SSMP Review Meeting? 2. Are monthly FSE inspection targets being met? 3. Are FSE, FOG Program violations being followed up on and corrected? 4. Are the sewer mains cleaning and inspection targets being met? 	<p>3rd Quarter</p>	

Element	KPIs	Quarterly Meeting Schedule	Identified Improvement Actions as of SSMP Adoption
<p>VIII. System Evaluation, Capacity Assurance, and Capital Improvements</p> <ul style="list-style-type: none"> a. Capacity evaluation b. Identification of capacity needs c. Project schedule 	<ul style="list-style-type: none"> 1. Has the 2025 Sewer Master Plan Update been completed? 2. Has the CIP been reviewed at a Quarterly SSMP Review Meeting? 3. Has the CIP schedule been updated to account for new priorities? 	<p>3rd Quarter</p>	
<p>IX. Monitoring, Measurement, and Program Modifications</p> <ul style="list-style-type: none"> a. Maintain records and data b. Monitor implementation of SSMP c. Assess the success of preventive maintenance program d. Update program elements e. Identify and track spill trends 	<ul style="list-style-type: none"> 1. Are the Quarterly SSMP Review Meetings being held on schedule? 2. Are records of these meetings being maintained? 3. Are corrections identified in the meetings being recorded and implemented in the field? 	<p>4th Quarter</p>	
<p>X. Internal Audits</p> <ul style="list-style-type: none"> a. Person responsible for the Audit b. Scope of the Audit c. Audit work product d. Schedule for the Audit, minimum every three years 	<ul style="list-style-type: none"> 1. Are the audits being completed and recorded on a timely basis? 	<p>4th Quarter</p>	

Element	KPIs	Quarterly Meeting Schedule	Identified Improvement Actions as of SSMP Adoption
<p>XI. Communication Program</p> <p>a. Notification that an SSMP is being prepared. Website use is suggested</p>	<ol style="list-style-type: none"> 1. Have public communications been reviewed at a Quarterly SSMP Review Meeting? 2. Have private systems communications been reviewed at a Quarterly SSMP Review Meeting? 	<p>4th Quarter</p>	<ol style="list-style-type: none"> 1. Develop a regular schedule for communication with all private systems that discharge into the EOCWD collection system – <i>Complete by the next internal audit in December 2027</i>

9.6 Assessment of Preventative Maintenance Program

EOCWD prioritizes the assessment of the Preventative Maintenance Program so that the District’s resources are continually deployed in the most effective manner. The assessment of the preventative maintenance program takes place four times per year at a minimum, at each quarterly meeting. Impromptu meetings and assessments are performed when results from the field require such.

9.7 Spill Trends

The District uses the CIWQS database in conjunction with records captured in its own GIS to track and illustrate spill trends and to compare these trends to state and regionwide spill trends. The District’s database includes detailed information about spills including their location, volume, cause, response time, notifications, etc. Through analysis of the database as well as analysis using GIS mapping software, spill trends can be identified that can uncover unknown issues with the sewer system. Much of this analysis is described and detailed in the Program Audits Element. When trends are found, changes in practices including revisions to the operations and maintenance schedule can be made to reduce future spills.

As indicated by the Audit Report for the last audit period, the District has maintained the number of spills at less than 2.1 spills per 100 miles/year for the years 2022, 2023, and 2024. This value is below state and regional values.

9.8 Effectiveness, Improvement, and Key Performance Indicators

To monitor the effectiveness of this element of the SSMP, the following Key Performance Indicators (KPIs) are being monitored by EOCWD:

- Are the Quarterly SSMP Review Meetings being held on schedule?
- Are records of these meetings being maintained?
- Are corrections identified in the meetings being recorded and implemented in the field?

Element 10: SSMP Program Audits

As part of the SSMP, the Enrollee shall conduct periodic internal audits, appropriate to the size of the system and the number of spills. At a minimum, these audits must occur every three years and a report must be prepared and kept on file. This audit shall focus on evaluating the effectiveness of the SSMP and the Enrollee’s compliance with the SSMP requirements identified in the General Order 2022-0103-DWQ Attachment D, including identification of any deficiencies in the SSMP and steps to correct them.

10.1 Compliance Summary and Activities

In accordance with the WDRs, the District conducts all internal audits of its SSMP every three years. The purpose of the audits is to assess the performance of the SSMP and determine if any improvements or changes must be made. The District uses the data gathered as part of the KPIs for each element to: 1) evaluate the effectiveness of the City’s SSMP; 2) ensure compliance with the WDRs; 3) identify any SSMP deficiencies; and 4) correct any SSMP deficiencies identified by implementing the necessary modifications.

The final work product derived from the audit process is a summary of organization changes, operations and maintenance activities, sewer pipe blockage inspections, CIP projects, public education events, and other pertinent activities and systematic changes that the District will implement. This summary consists of narrative, graphical, and cartographic descriptions and information as well as recommendations on further progress.

10.2 Compliance Documents

The audit document for the latest audit period is included in **Appendix W**.

10.3 Roles and Responsibilities

The District’s Operations Manager is responsible for engaging the appropriate collection system stakeholders to perform the audit at the end of each three year period.

10.4 SSMP Audits and Updates Schedule

The SSMP audit and update schedule is shown in Table 10.

Table 10 – SSMP Update and Audit Schedule

Action	Due Date	Notes
SSMP Update and Re-Certification	Aug 2025	Six-year recertification by District Board
SSMP Internal Audit Report	Dec 2027	Period Aug 2024 to Aug 2027
SSMP Internal Audit Report	Dec 2030	Period Aug 2037 to Aug 2030

Action	Due Date	Notes
SSMP Update and Re-Certification	Aug 2031	Six-year recertification by District Board
Adaptive management updates to SSMP	As Needed	SSMP to be updated as necessary based on monitoring and performance evaluations conducted throughout the SSMP implementation period.

10.5 Roles and Responsibilities

The Operations Manager, Engineering Manager, and Operations Supervisor are responsible for maintaining and implementing this element.

10.6 Effectiveness, Improvement, and Key Performance Indicators

To monitor the effectiveness of this element of the SSMP, the following Key Performance Indicators (KPIs) are being monitored by EOCWD:

- Are the audits being completed and recorded on a timely basis?

Element 11: Communication Program

The Enrollee shall communicate on a regular basis with:

- 1. The public: for spills and discharges resulting in closures of public areas, or that enter a source of drinking water and on the development, implementation, and performance of its SSMP. The communication system shall provide the public the opportunity to provide input to the Enrollee as the program is developed and implemented.***
- 2. Owners/operators of systems that connect into the Enrollee's system, including satellite systems, for: system operation, maintenance, and capital improvement-related activities.***

11.1 Compliance Summary and Activities

The District uses a mixture of communication through its website and social media, communication through printed materials that are distributed, and communication through meetings and workshops to communicate with both the public and with owners/operators of connecting collection systems. This communication is provided in more detail below.

11.2 Roles and Responsibilities

The General Manager, Operations Manager, and Engineering Engineer share responsibility for communication of the SSMP

11.3 Procedures to Communicate with Public for Spills and Discharges

East Orange County Water District (EOCWD) complies with the Communication requirements through the following procedures:

1. EOCWD uses the following documents and tools:
 - Posting the Sewer System Management Plan (SSMP) on the EOCWD website
 - Hard copy of SSMP is available in EOCWD office for public review
 - FOG Program outreach
 - Public and Education Outreach
 - District newsletters
 - Spill Emergency Response Plan
 - District Board Meetings (public comment periods, agenda items and meetings)
 - Social Media
2. EOCWD also has a public comment period before the initial adoption of an SSMP and for significant updates that require the Board's approval.
3. EOCWD keeps the Board of Directors informed of the SSMP progress through the monthly General Manager's Report as well as semi-annual briefings provided through the Strategic Plan reporting process.
4. EOCWD staff reviews the SSMP program on a semi-annual basis through a dedicated meeting with the General Manager, Operations Manager, and Engineering Manager.

5. EOCWD has an outreach consultant, Communications LAB, to perform specific sewer outreach tasks including the development of educational website content, and print/social media marketing content.
6. Per EOCWD's Spill Emergency Response Plan (SERP) document, EOCWD will provide any signage and/or other public notification to educate the public of a spill, as required by the Office of Emergency Services (OES) or the Orange County Health Care Agency (OCHCA).
7. The OCHCA in coordination with EOCWD staff, will determine if and when the media will be informed of a spill incident.
8. In the event of a large spill, EOCWD has a contract with Communications Lab and they will assist with the communication of the spill to the public.

11.4 Procedures for Communication with Owners/Operators

EOCWD communicates with private entities as well as adjacent agencies by conducting the following activities:

1. EOCWD has a communications consultant (Communications Lab) and uses its website and doorhangers to communicate with customers on a large scale.
2. EOCWD uses the direct contact information of the Home Owners Associations' (HOAs') representatives and apartment managers to communicate with satellite systems that tie into EOCWD's sewer system.
 - a. Apartment complexes have been prone to onsite spills due to lack of maintenance to their sewer system and so EOCWD regularly coordinates with the apartment managers for cleaning and inspection work.
3. EOCWD communicates to outside agencies such as the Cities of Tustin and Orange, Orange County Sanitation District (OCSan), and County of Orange by either email or telephone.
 - a. EOCWD occasionally works with the Tustin code enforcement to deal with private spills.
 - b. EOCWD is in regular contact with OCSan for cleaning and inspection work.
 - c. The City of Orange is an agency that is physically connected to EOCWD and has its own local sewer system. Cooperation with the City of Orange is on an as needed basis.
4. EOCWD attends OCSan-hosted meetings and events with its other satellite dischargers.
5. EOCWD works directly with OCSan as needed on WDR/SSMP items affecting both agencies.

11.5 Effectiveness, Improvement, and Key Performance Indicators

To monitor the effectiveness of this element of the SSMP, the following Key Performance Indicators (KPIs) are being monitored by EOCWD:

- Have public communications been reviewed at a Quarterly SSMP Review Meeting?
- Have private systems communications been reviewed at a Quarterly SSMP Review Meeting?

In the preparation of this SSMP, EOCWD has identified the following improvements to SSMP communication provisions that will improve the effectiveness of the SSMP:

- Develop a regular schedule for communication with all private systems that discharge into the EOCWD collection system – *Complete by the next internal audit in December 2027*

MEMO

TO: BOARD OF DIRECTORS
FROM: GENERAL MANAGER *AM*
SUBJECT: MUNICIPAL SERVICE REVIEW COMMENTS
DATE: AUGUST 13, 2025

Background

A Municipal Service Review (MSR) is a legislative mandate that requires the Local Agency Formation Commission of Orange County (OC LAFCO) to conduct an analysis of the municipal services delivered by cities, special districts and other service providers to Orange County's residents. In accordance with State law and local policy, OC LAFCO prepares MSRs on a five year cycle. The EOCWD service area falls in the Central MSR region of OC LAFCO along with 9 other agencies. The public comment period is now underway for the draft MSR and comments are due by August 18, 2025.

The report was based on publicly available documents found on each city or agency website and covers topics such as population, growth, disadvantaged communities, capacity of services, overall finances, governance/accountability, and opportunities for shared services.

Staff have reviewed the draft report and have developed a number of comments in order to clarify some of the information in the report. In particular, there is some discrepancy on population served as well as District reserves. Overall, the report did not identify potential opportunities for additional shared services. Staff will review the comments with the Board.

Recommendation

Informational.

Attachment(s)

Draft MSR Excerpts

East Orange County Water District

Incorporated 1961

District Information

Address	185 N. McPherson Road, Orange CA 92869
Primary Contact	David Youngblood, General Manager
Contact Information	714-573-3101
Website	www.eocwd.com
Governance	5-Member Board of Directors, Elected By-District
Total Agency Staff	14 Full-Time, 1 Part-Time Employee

Service Area Information

Incorporated Area (Sq. Mi.)	14.95
Communities Served	Tustin, Orange; North Tustin
Population in Boundary	75,402 (Wastewater Boundary) 74,379 (Wholesale Boundary) 3,443 (Retail Boundary)

Water Infrastructure Totals

Wells	2 domestic wells
Water Connections	1,204 connections
Miles of Infrastructure	24 miles
Estimated Age of Infrastructure	~50 years old

Wastewater Infrastructure Totals

Manholes	3,700
Miles of Infrastructure	171 miles
Estimated Age of Infrastructure	~60 years old

Financial Summary

East Orange County Water District

Financial Summary ¹	2018-19	2019-20	2020-21	2021-22	2022-23
Revenue	\$ 13,723,921	\$ 12,990,858	\$ 14,666,591	\$ 17,753,825	\$ 16,818,695
Expenditures	8,849,131	8,427,001	13,623,686	16,279,464	14,191,550
Net	\$ 4,874,790	\$ 4,563,857	\$ 1,042,905	\$ 1,474,361	\$ 2,627,145
Reserves	\$ 13,929,861	\$ 14,868,399	\$ 15,413,441	\$ 19,968,549	\$ 35,461,882

¹"Reserves" shown are based on Unassigned Fund Balance or Unrestricted Net Position.

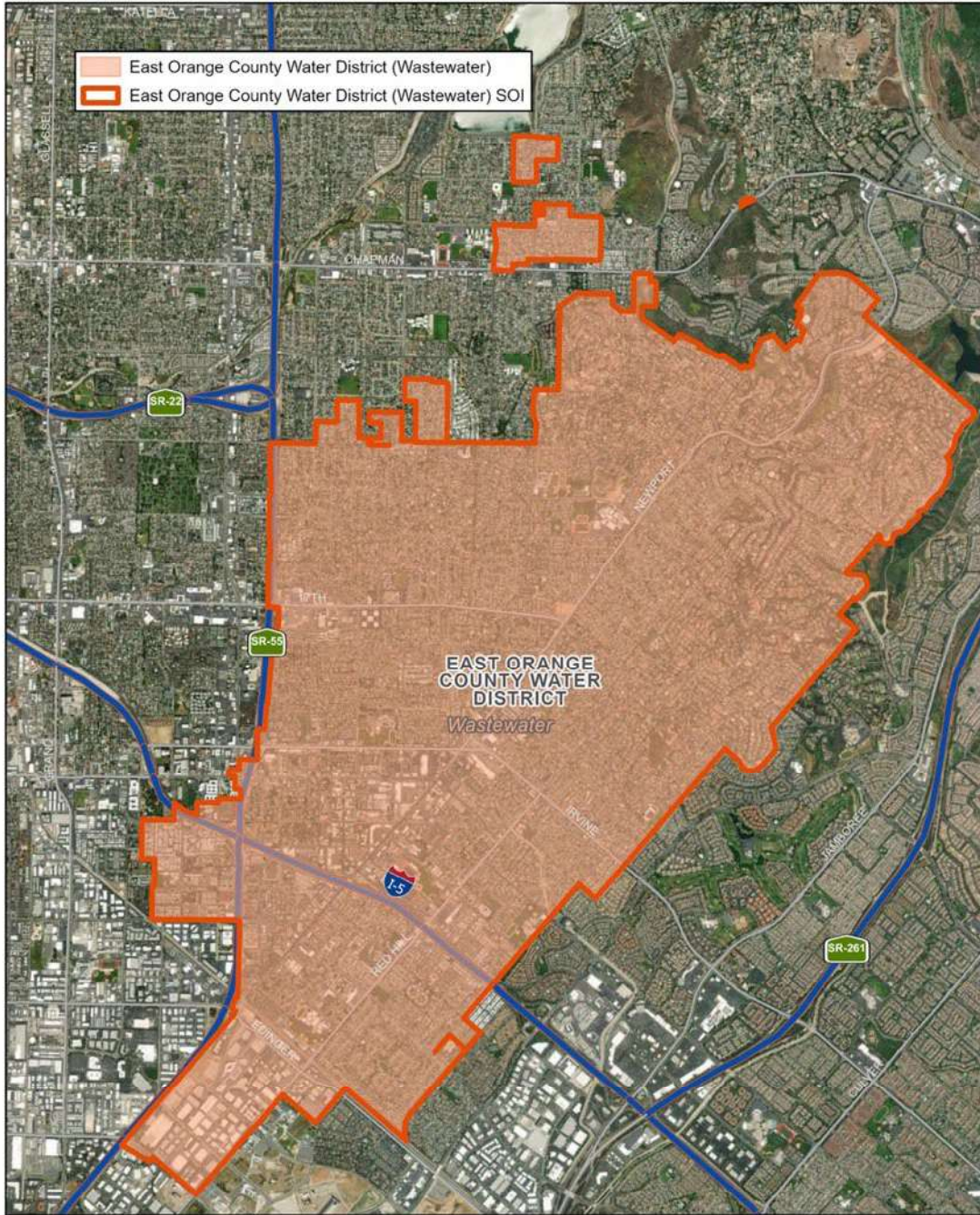
Source: OC LAFCO Fiscal Indicators, Berkson & Associates

Demographic Summary (East Orange Wastewater Boundary)

East Orange County Water District (Wastewater)			
Population & Density	Agency		County
2020 Population	75,296		3,187,189
2023 Population	75,402		3,140,475
2028 Population ¹	75,109		3,179,293
2023-2028 Projected Annual Growth Rate (%)	-0.1%	<	0.2%
Daytime Population	66,232		3,298,545
Unincorporated SOI Population	-		-
Households	24,747		1,089,171
Household Size	3.05	>	2.92
Area (Square Miles)	12.16		948.00
Density (Persons per Square Mile)	6,199	>	3,313
Housing			
Housing Units	25,670		1,150,154
Owner Occupied (%)	57%	>	54%
Renter Occupied (%)	39%	<	41%
Vacant (%)	4%	<	5%
Median Home Value	\$ 936,425	>	\$ 895,768
Employment & Poverty			
Businesses	4,221		172,355
Employees	30,221		1,635,323
Median Household Income	\$ 104,894	<	\$ 105,332
Public Transportation Commuters (%)	1.1%	<	1.5%
Commute Longer than 60 Minutes (%)	7.2%	<	9.0%
Poverty Rate	8.4%	<	9.9%

¹2028 Population estimate is a projection only.

Source: US Census Bureau, DOF Population and Housing Estimates (Cities), ESRI Business Analyst

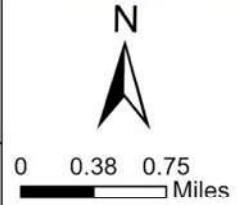


East Orange County Water District (Wastewater)
 East Orange County Water District (Wastewater) SOI



**East Orange
County Water District
(Wastewater)**

Source: RSG Inc., ESRI, OC LAFCO

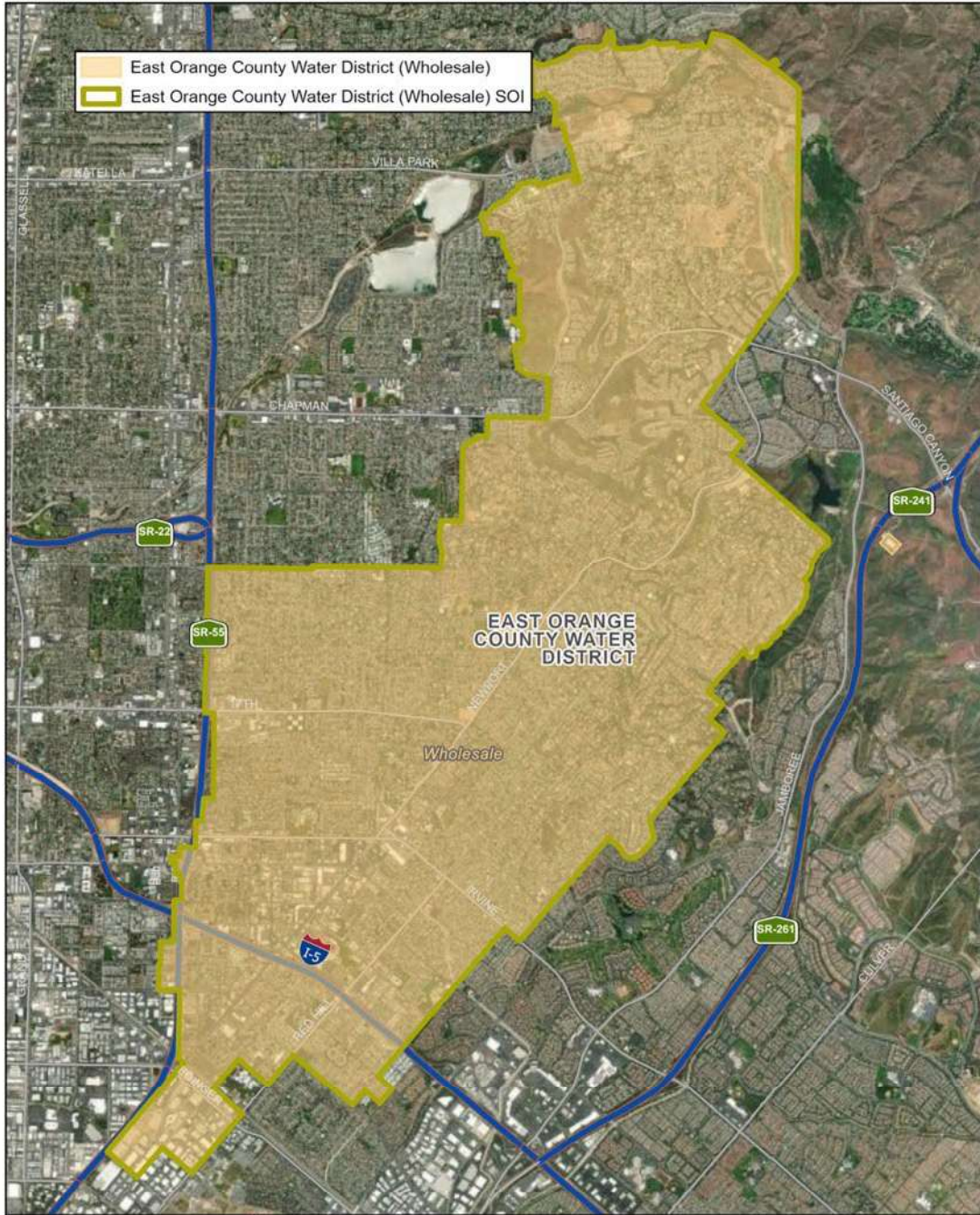


Demographic Summary (East Orange Wholesale Boundary)

East Orange County Water District (Wholesale)		
Population & Density	Agency	County
2020 Population	74,308	3,187,189
2023 Population	74,379	3,140,475
2028 Population ¹	74,124	3,179,293
2023-2028 Projected Annual Growth Rate (%)	-0.1% <	0.2%
Daytime Population	63,000	3,298,545
Unincorporated SOI Population	-	-
Households	25,086	1,089,171
Household Size	2.96 >	2.92
Area (Square Miles)	14.95	948.00
Density (Persons per Square Mile)	4,976 >	3,313
Housing		
Housing Units	26,006	1,150,154
Owner Occupied (%)	64% >	54%
Renter Occupied (%)	33% <	41%
Vacant (%)	4% <	5%
Median Home Value	\$ 977,786 >	\$ 895,768
Employment & Poverty		
Businesses	3,933	172,355
Employees	27,016	1,635,323
Median Household Income	\$ 116,509 >	\$ 105,332
Public Transportation Commuters (%)	0.9% <	1.5%
Commute Longer than 60 Minutes (%)	7.0% <	9.0%
Poverty Rate	7.4% <	9.9%

¹2028 Population estimate is a projection only.

Source: US Census Bureau, DOF Population and Housing Estimates (Cities), ESRI Business Analyst

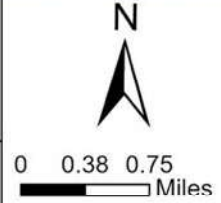


East Orange County Water District (Wholesale)
 East Orange County Water District (Wholesale) SOI



**East Orange
County Water District
(Wholesale)**

Source: RSG Inc., ESRI, OC LAFCO



Demographic Summary (East Orange Retail Boundary)

East Orange County Water District (Retail)			
Population & Density	Agency		County
2020 Population	3,487		3,187,189
2023 Population	3,443		3,140,475
2028 Population ¹	3,478		3,179,293
2023-2028 Projected Annual Growth Rate (%)	0.2%	<	0.2%
Daytime Population	2,022		3,298,545
Unincorporated SOI Population	-		-
Households	1,162		1,089,171
Household Size	2.96	>	2.92
Area (Square Miles)	0.92		948.00
Density (Persons per Square Mile)	3,742	>	3,313
Housing			
Housing Units	1,197		1,150,154
Owner Occupied (%)	83%	>	54%
Renter Occupied (%)	14%	<	41%
Vacant (%)	3%	<	5%
Median Home Value	\$ 1,161,881	>	\$ 895,768
Employment & Poverty			
Businesses	84		172,355
Employees	371		1,635,323
Median Household Income	\$ 176,863	>	\$ 105,332
Public Transportation Commuters (%)	1.2%	<	1.5%
Commute Longer than 60 Minutes (%)	9.9%	>	9.0%
Poverty Rate	4.2%	<	9.9%

¹2028 Population estimate is a projection only.

Source: US Census Bureau, DOF Population and Housing Estimates (Cities), ESRI Business Analyst



	<p>East Orange County Water District (Retail)</p>	<p>N</p>  <p>0 500 1,000 Feet</p> 
	<p><i>Source: RSG Inc., ESRI, OC LAFCO</i></p>	

EAST ORANGE COUNTY WATER DISTRICT

East Orange County Water District had moderate revenue growth and high expenditure growth between FY 18-19 and FY 22-23. The District had a high unrestricted net position in FY 22-23.

General Fund Cash Flow Detail FY 18-19 through FY 22-23

Operating Revenues					
	FY 2018-19	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23
Water Use Sales	\$5,413,349	\$4,437,961	\$7,887,798	\$10,202,597	\$8,657,574
Meter and Standby Service Charges	606,512	611,386	637,245	1,994,631	2,071,857
Capacity and Connection Fees	880,651	810,367	815,122	-	-
Sewer Use Fees	3,007,647	3,000,161	3,101,177	3,093,772	3,079,234
Other Connection Fees	51,616	111,514	148,526	33,405	113,742
Other Service Charges	27,546	58,659	39,675	51,611	65,617
Total Revenues	\$9,987,321	\$9,030,048	\$12,629,543	\$15,376,016	\$13,988,024
Operating Expenses					
	FY 2018-19	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23
Source of Supply	\$4,904,003	\$4,005,563	\$7,300,958	\$10,054,006	\$8,754,851
Pumping	90,563	18,080	23,327	25,447	23,447
Transmission and Distribution	1,137,465	1,193,919	1,610,839	466,081	534,343
Sewer System Maintenance	512,616	145,447	264,243	201,442	203,152
General and Administrative	1,468,539	2,095,013	1,663,194	972,362	1,238,672
Salaries and Benefits	-	-	-	1,061,144	3,437,085
Total Operating Expenses	\$8,113,186	\$7,458,022	\$10,862,561	\$12,780,482	\$14,191,550
Net Operating Income (Loss)					
	FY 2018-19	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23
Net Operating Income (Loss)	\$1,874,135	\$1,572,026	\$1,766,982	\$2,595,534	\$(203,526)
Depreciation	(691,866)	(972,239)	(1,096,590)	(1,067,048)	(1,290,617)

Total Net Operating Income (Loss)	\$1,182,269	\$599,787	\$670,392	\$1,528,486	\$(1,494,143)
Non-Operating Revenues (Expenses)					
	FY 2018-19	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23
Property Taxes	\$1,681,051	\$1,748,584	\$1,832,792	\$1,905,287	\$2,074,715
Rental Income	121,927	131,848	131,492	173,090	143,834
Investment Earnings	1,850,253	2,065,454	27,206	(1,793,085)	540,648
Other Revenues	83,369	14,924	42,132	299,432	38,924
Other Expenses	(1,903)	(3,511)	(1,424,151)	(184,299)	-
Gain (loss) on Sale of Assets	(42,176)	6,771	3,426	(1,764)	32,550
Interest Expense	-	-	(240,384)	(452,786)	(433,409)
Total Net Non-Operating Revenues	\$3,692,521	\$3,964,070	\$372,513	\$(54,125)	\$2,397,262
Change in Net Position After Capital Contributions					
	FY 2018-19	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23
Change in Net Position	\$4,896,525	\$5,127,467	\$1,305,362	\$1,556,355	\$2,326,563
Unrestricted Net Position/Reserves (End of Year)					
	FY 2018-19	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23
Unrestricted Net Position "Reserves"	\$13,929,861	\$14,868,399	\$15,413,441	\$19,968,549	\$35,461,882