MesaWater DISTRICT

Dedicated to Satisfying our Community's Water Needs

AGENDA
MESA WATER DISTRICT
BOARD OF DIRECTORS
Tuesday, September 17, 2019
1965 Placentia Avenue, Costa Mesa, CA 92627
3:30 p.m. Special Board Meeting

ENGINEERING AND OPERATIONS COMMITTEE MEETING
Tuesday, September 17, 2019 at 3:30 p.m.

CALL TO ORDER

PLEDGE OF ALLEGIANCE

PUBLIC COMMENTS

Items Not on the Agenda: Members of the public are invited to address the Board on items which are not on the agenda. Each speaker is limited to three minutes. The Board will set aside 30 minutes for public comments.

Items on the Agenda: Members of the public may comment on agenda items before action is taken, or after the Board has discussed the item. Each speaker is limited to three minutes. The Board will set aside 60 minutes for public comments.

CONSENT CALENDAR ITEMS:
Approve all matters under the Consent Calendar by one motion unless a Board member, staff, or a member of the public requests a separate action.

1. Developer Project Status Report
2. Mesa Water and Other Agency Projects Status Report
3. Water Quality Call Report
4. Committee Policy & Resolution Review
5. Water Operations Status Report

ACTION ITEMS:
Items recommended for approval at this meeting may be agendized for approval at a future Board meeting.

6. Geographic Information System Support Services
7. Replacement of Assets Including Pipeline and Well Rehabilitation

PRESENTATION AND DISCUSSION ITEMS:

None

REPORTS:

8. Report of the General Manager

9. Directors' Reports and Comments

INFORMATION ITEMS:

10. Unregulated Contaminants Requiring Monitoring

In compliance with California law and the Americans with Disabilities Act, if you need disability-related modifications or accommodations, including auxiliary aids or services in order to participate in the meeting, or if you need the agenda provided in an alternative format, please contact the District Secretary at (949) 631-1206. Notification 48 hours prior to the meeting will enable Mesa Water District (Mesa Water) to make reasonable arrangements to accommodate your requests.

Members of the public desiring to make verbal comments utilizing a translator to present their comments into English shall be provided reasonable time accommodations that are consistent with California law.

Agenda materials that are public records, which have been distributed to a majority of the Mesa Water Board of Directors (Board), will be available for public inspection at the District Boardroom, 1965 Placentia Avenue, Costa Mesa, CA and on Mesa Water's website at ***www.MesaWater.org****. If materials are distributed to the Board less than 72 hours prior or during the meeting, the materials will be available at the time of the meeting.*

ADJOURNMENT

DEVELOPER PROJECT STATUS REPORT

PROJECT STATUS - DEVELOPER PROJECTS			
FILE NO.	PROJECT ADDRESS	PROJECT DESCRIPTION	PROJECT NOTES/STATUS
MC 2235	671 W 17th Street	177 Condos	Plans received and plan check fees paid on 1/21/16. Hydraulic model initiated 2/24/16. Second plan check submitted on 3/24/16 and picked up 4/17/16. Mylar drawings and fee payment received on 7/5/16. Permit issued on 7/11/16. Demolition of existing services on 8/16/16. Mainline installation on 12/6/16. Service laterals installed on 1/9/17. Pressure test on 2/6/17. Bac-t test on 2/15/17. Bedding and service line placement on 4/3/17. Meter box placement on 5/8/17. Follow-up site visit on 5/17/17. Service abandonment on 8/30/17. Valve cans raised on 9/22/17. Meter box placement on 10/19/17. Gravel base on 12/5/17. Meter box placement on 2/14/18. Meters installed and locked off on 6/1/18, 7/17/18, on 8/1/18, and again on 9/7/18. Backflow tested on 9/11/18. Meters installed and locked off on 9/18/18, 9/25/18, and again on 10/5/18. Backflow tested on 10/9/18 and again on 2/27/19. Meters installed and locked off on 11/27/18, 12/5/18, 12/18/18, 1/10/19, 2/8/19, 2/21/19, 3/4/19, 3/12/19, again on 4/26/19. Phase 2 construction still on-going.
C0056-18-01	2033 Republic Avenue	Single Family Home Service & Meter Upgrade	Plans received and plan check fees paid on 6/19/18. Comments returned for second plan check review on 6/28/18. Second plan check submitted 7/26/18, and redlines picked up on 8/20/18. Third plan check submitted on 12/13/18, and redlines picked up on 1/15/19. Fourth and final plan check submitted on 1/24/19, and redlines picked up on 1/29/19. Final approval by District Engineer on 4/18/19. Final permit fees paid on 4/18/19. Permit issued on 4/30/19. Revised drawings issued 7/1/19 and returned 7/1/19. Precon to be scheduled in early September.
C0058-19-01	585 & 595 Anton Boulevard (P2)	Apartment Complex	Plans received and plan check fees paid on 2/5/19. Customer picked up redlines on 2/8/19. Second plan check submitted 3/11/19, and redlines picked up on 3/25/19. Hydraulic Analysis received on 4/5/19. Received Water Service Agreement on 4/30; Final permit fees paid on 5/8/19. Permit issued on 5/8/19. Precon meeting held on 5/16/19. Waiting for revised Easements and Quit Claims regarding legal entities. Services installed 6/28/19. Pressure tests done on 7/2/19, Bac-T tests done on 7/8/19.
C0062-19-01	1591 & 1593 Riverside	Two Single Family Homes	Plans received and plan check fees paid on 12/14/18. Final fees paid on 2/6/19. Permit issued on 2/13/19. Precon held on 2/28/19. Services installed on 3/4/19. Waiting for meter installation and flowthru testing to be scheduled.

DEVELOPER PROJECT STATUS REPORT

PROJECT STATUS - DEVELOPER PROJECTS			
FILE NO.	PROJECT ADDRESS	PROJECT DESCRIPTION	PROJECT NOTES/STATUS
C0063-19-01	1375 Sunflower	Commercial Building	Plans received and plan check fees paid on 12/14/18. Customer picked up redlines on 12/31/18. Second plan check submitted on 1/11/19, and redlines picked up on 1/29/19. Third plan check submitted on 1/31/19. Final permit fees paid on 6/20/19 and permit issued on 6/25/19.
C0071-19-01	2277 Harbor Boulevard	Commercial Building	Plans received and plan check fees paid on 1/7/19. Customer picked up redlines on 1/25/19. Second plan check submitted on 1/28/19, and redlines picked up on 1/31/19. Final permit fees paid on 5/28/19. Permit issued on 5/30/19.
C0072-19-01	168 & 170 Cabrillo	Two Single Family Homes	Plans received and plan check fees paid on 1/14/19.Customer picked up redlines on 1/24/19. Customer submitted second plan check on 5/9/19. Second plan check submitted on 5/13/19 and redlines picked up on 5/20/19. Final permit fees paid on 5/30/19 and permit issued on 6/3/19.
C0073-19-02	55 Fair Drive	Vanguard University East Annex Science Modular	Plans received and meter replacement fees paid on 3/14/19. First plan check completed on 5/9/19 and redlines mailed on 5/14/19. Second plan check submitted 7/3/19. Precon held on 7/3/19. Servies installed on 8/8/19, Backflow prevention devices tested on 8/20/19.
C0074-19-01	2538 Oxford Lane	Single Family Home	Plans received and plan check fees paid on 11/14/18. Customer picked up redlines on 1/31/19. Second plan check submitted on 2/1/19, and redlines picked up on 2/5/19. Waiting for 3rd plan check submittal. Received fire department approval on 5/31/19.
C0077-19-01	1922 Pomona	Commercial Building	Plans received and plan check fees paid on 1/28/19. Customer picked up redlines on 2/1/19. Second plan check submitted on 2/5/19, and redlines picked up again on 2/12/19. Final fees paid on 2/27/19. Permit issued on 3/11/19. Precon meeting held on 3/19/19. Meter installed 3/28/19.
C0079-19-01	1957 Newport Boulevard	Meter Upgrade	Plans received and plan check fees paid on 2/5/19. Customer picked up redlines on 2/27/19. Meeting on 3/5/19 with customer to discuss easement. Second plan check was submitted on 4/23/19 and redlines to be picked up on 5/6/19. Third plan check submitted on 5/16/19. Permit approved on 8/23/19. Precon held on 9/3/19.

DEVELOPER PROJECT STATUS REPORT

PROJECT STATUS - DEVELOPER PROJECTS			
FILE NO.	PROJECT ADDRESS	PROJECT DESCRIPTION	PROJECT NOTES/STATUS
C0081-19-01	2060 Maple Avenue	Single Family Home	Plans received and plan check fees paid on 11/22/18. Owner put plans on hold and resubmitted on 2/5/19. Customer picked up redlines on 2/12/19. Second plan check was submitted on 2/21/19, and redlines picked up on 2/28/19. Third plan check submitted on 2/28/19, and redlines picked up on 3/5/19. Fourth (and final) plan check submitted on 3/26/19 and returned on 4/2/19. Final permit fees paid on 4/2/19 and approved by the District Engineer on 4/18/19. Precon held on 4/25/19. Final permit fees paid on 4/2/19. Permit issued on 4/18/19. Precon held on 4/25/19. Services and pipeline installed on 6/20/19. Shutdown for Abandonments performed on 6/26/19. Meters installed 7/1/19.
C0082-19-01	3323 Hyland Avenue	Pipeline relocation	Plans received and plan check fees paid on 2/20/19. Customer picked up redlines on 3/4/19. Second plan check submitted 3/26/19, and redlines picked up on 4/2/19. Second plan check submitted 6/11/19, and redlines picked up on 6/18/19. Final permit fees paid on 7/23/19 and permit issued on 8/6/19. Waiting for owner to pick up permit.
C0084-19-01	410 E 17th Street	Commercial Business	Plans received and plan check fees paid on 2/20/19. Customer picked up redlines on 3/4/19. Second plan check submitted on 9/4/19 and redlines picked up on 9/10/19.
C0085-19-01	3030 Airway Avenue, Suite B	Commercial Business	Plans received and plan check fees paid on 3/5/19. Customer picked up redlines on 3/12/19. Second plan check submitted 04/1/19, and redlines picked up on 4/8/19. Final permit fees paid on 5/2/19 and permit issued on 6/6/19. Precon held on 6/20/19. Backflow device tested 7/27/19.
C0086-19-01	285 22nd Street	Residential Care Facility	Plans received and plan check fees paid on 3/11/19. Customer picked up redlines on 3/19/19. Second plan check submitted on 5/9/19. Customer to pick up Second plan check redlines on 5/6/19. Third plan check submitted on 5/14/19 and picked up on 5/30/19. Precon held on 8/30/19. Service connection on 9/3/19. Abandonments completed on 9/6/19.
C0089-19-01	3160 Airport Way	John Wayne Airport Taxilot	Plans received and plan check fees paid on 4/8/19. 1st Plan Check submitted on 4/9/19. Second plan check submitted 04/19/19 and redlines picked up on 4/25/19. Final permit fees paid on 6/18/19.

DEVELOPER PROJECT STATUS REPORT

PROJECT STATUS - DEVELOPER PROJECTS			
FILE NO.	PROJECT ADDRESS	PROJECT DESCRIPTION	PROJECT NOTES/STATUS
C0090-19-01	2831 Bristol Street	Parking Lot	Plans received and plan check fees paid on 4/9/19. 1st Plan Check submitted on 4/11/19. Customer picked up redlines on 4/1619. Second plan check submitted 04/19/19 and redlines picked up on 4/25/19. Final permit fees paid on 5/2/19 and permit issued on 6/6/19. Precon held on 9/5/19.
C0091-19-01	368 Magnolia	Single Family Home	Plans received and meter replacement fees paid on 4/15/19. First plan check submitted on 4/18/19 and redlines picked up on 4/23/19. Final permit fees paid on 5/20/19 and permit issued on 5/20/19. Precon held on 8/8/19. Services laterals installed and approved on 8/27/19.
C0092-19-01	Harbor and Hamilton	29 New Townhomes	Plans received and plan check fees paid on 4/23/19. First plan check submitted 4/23/19 and redlines to be picked up on 5/6/19. Second plan check submitted on 6/11/19 and redlines picked up on 6/18/19.
C0093-19-01	163 Broadway	Single Family Home	Plans received and meter replacement fees paid on 4/24/19. 1st Plan check submitted on 4/24/19 and redlines picked up on 5/6/19. Second plan check submitted on 5/13/19 and redlines picked up on 5/24/19. Final Permit fees paid on 7/3/19 and permit issued on 7/3/19. Precon held on 7/9/19.
C0094-19-01	259 E. 20th Street	Single Family Home	Plans received and plan check fees paid on 4/30/19. 1st Plan check submitted 4/30/19 and redlines to be picked up on 5/9/19. 2nd Plan check submitted on 5/14/19 and returned on 5/20/19. Final Permit fees paid on 5/21/19 and permit issued on 5/21/19. Final permit fees paid on 6/20/19 and permit issued on 6/20/19.
C0095-19-01	272 Esther Street	Single Family Home	Plans received and plan check fees paid on 4/30/19. 1st Plan check submitted 4/30/19 and redlines to be picked up on 5/7/19. Second Plan check submitted 6/4/19 and redlines to be picked up on 6/11/19. Final permit fees paid on 8/27/19.
C0096-19-01	333 E. 17th Street, Suite 22	Commercial	Plans received and plan check fees paid on 4/30/19. 1st Plan check submitted 4/23/19 and redlines picked up on 5/9/19.

DEVELOPER PROJECT STATUS REPORT

PROJECT STATUS - DEVELOPER PROJECTS			
FILE NO.	PROJECT ADDRESS	PROJECT DESCRIPTION	PROJECT NOTES/STATUS
C0097-19-01	3505 Cadillac, Suite L-3	Commercial	Plans received and plan check fees paid on 4/30/19. 1st Plan check submitted 4/30/19 and redlines to be picked up on 5/9/19. Second plan check submitted on 6/4/19 and redlines picked up on 6/11/19. Final permit fees paid on 8/6/19 and permit picked up on 8/6/19. Precon conducted on 8/13/19. Hot-tapping, service line placement and thrustrblock placement completed on 8/29/19. Chlorination flush, pressure test and Bac-T sample on 9/3/19. Bac-T sample and backfill completed on 9/4/19. Backflow placement and test, and fireline charged on 9/5/19. Backflow preventers certified on 9/11/19.
C0099-19-01	3505 Cadillac, Suite E	Commercial	Plans received and plan check fees paid on 6/3/19. 1st Plan check submitted 6/3/19 and redlines picked up on 6/6/19. 2nd Plan check submitted on 6/10/19 and redlines picked up on 6/13/19. Final permit fees and permit picked up on 8/15/19. Precon conducted on 8/22/19, Bac-T samples taken on 8/27/19. Hot-tapping, service line placement and thrustrblock placement completed on 8/23/19. Backflow test and mainline turned on 9/5/19. Backflow preventers certified on 9/11/19.
C0101-19-01	1275 Bristol Avenue	Car Dealership	Plans received and plan check fees paid on 6/11/19. 1st Plan check submitted 6/11/19 and redlines picked up on 6/18/19. 2nd Plan check submited on 8/13/19 and picked up on 8/20/19. 3rd Plan check submited 9/3/19.
C0102-19-01	3560 Cadillac Avenue	Commercial	Plans received and plan check fees paid on 6/18/19. 1st Plan check submitted 6/18/19 and redlines to be picked up on 7/2/19. 2nd Plan check submitted on 7/9/19 and picked up on 7/16/19. Final permit fees paid and permit issued on 8/6/19.
C0103-19-01	150 Paularino	Commercial	Plans received and plan check fees paid on 6/18/19. 1st Plan check submitted 6/18/19 and redlines to be picked up on 7/3/19. 2nd Plan check submitted on 7/19/19 and picked up on 7/23/19. 3rd Plan check submitted on 8/20/19 and picked up on 8/28/19. 4th Plan check submitted on 9/3/19 and returned on 9/3/19.
C0104-19-01	413 E. 20th Street	Single Family Home	Plans received and plan check fees paid on 7/1/19. 1st Plan check submitted 7/1/19 and redlines picked up on 7/1/19.
C0105-20-01	3333 Avenue of the Arts	Commercial	Plans received and plan check fees paid on 7/24/19. 1st Plan check submitted 7/26/19 and redlines to be picked up on 7/26/19. 2nd Plan check submitted on 8/30/19.

DEVELOPER PROJECT STATUS REPORT

PROJECT STATUS - DEVELOPER PROJECTS			
FILE NO.	PROJECT ADDRESS	PROJECT DESCRIPTION	PROJECT NOTES/STATUS
C0106-20-01	224 Flower	Single Family Home	Plans received and plan check fees paid on 7/24/19. 1st Plan check submitted 7/26/19 and redlines picked up on 7/26/19. 2nd Plan check submitted on 8/13/19 and redlines picked up on 8/20/19.
C0107-20-01	1835 Newport Blvd, Suite F	Commercial	Plans received and plan check fees paid on 7/15/19. 1st Plan check submitted 7/26/19 and redlines to be picked up on 7/26/19. 2nd Plan check submitted on 7/30/19 and picked up on 8/6/19. Permit approved and final fees paid on 8/15/19. Precon held on 9/5/19.
C0108-20-01	130 Magnolia Street	Single Family Home	Plans received and plan check fees paid on 7/30/19. 1st Plan check submitted 7/30/19 and redlines picked up on 8/6/19.
C0109-20-01	2131 Tustin Avenue	Commercial	Plans received and plan check fees paid on 7/15/19. 1st Plan check submitted 7/26/19 and redlines to be picked up on 7/26/19. 2nd Plan check submitted on 7/30/19 and picked up on 8/6/19. Precon completed on 8/10/19 and hot tap completed on 8/20/19. Hot-tapping completed on 8/29/19. Thrustblock placement & chlorination flush completed on 9/3. Bac-T samples completed on 9/4/19. Backflow preventers tested on 9/11/19.
C0110-20-01	861 Governor Street	Single Family Home	Plans received and plan check fees paid on 7/15/19. 1st Plan check submitted 7/26/19 and redlines picked up on 7/26/19.
C0112-20-01	1626 Ohms Way	Commercial	Plans received and plan check fees paid on 7/16/19. 1st Plan check submitted 7/29/19 and redlines picked up on 7/29/19. 2nd Plan check submitted 8/7/19 and picked up on 8/20/19. 3rd Plan check submitted on 8/22/19 and picked up on 8/29/19.
C0113-20-01	1588 South Coast Drive (Vans Headquarters)	Commercial	Plans received and plan check fees paid on 8/13/19. 1st Plan check submitted 8/13/19 and redlines picked up on 8/20/19.
C0114-20-01	279 Flower Street	Single Family Home	Plans received and plan check fees paid on 8/20/19. 1st Plan check submitted 8/27/19 and redlines picked up on 8/27/19.
C0115-20-01	2179 Miner Street	Single Family Home	Plans received and plan check fees paid on 8/20/19. 1st Plan check submitted 8/27/19 and redlines picked up on 8/27/19.

MESA WATER AND OTHER AGENCY PROJECTS STATUS REPORT
September 2019

Project Title: OC-44 Replacement and Rehabilitation Evaluation and Cathodic Protection Study

File No.: M 2034

Description: Evaluate potential repair and replacement options

Status: The Habitat Mitigation and Monitoring Plan (HMMP) has been updated by Michael Baker (former RBF) to reflect the USACE's process and submitted to Mesa Water for review on 1/8/16. Once the HMMP is revised and approved (1/19/16) it will be forwarded to all agencies, including the Coastal Commission. Draft 1602 Streambed Permit obtained on 12/18/15. Final 1602 Streambed Permit pending CDFW will be issued while HMMP is accepted. U.S. Army Corps of Engineers' 404 permit received on 2/10/16. Revised HMMP sent to CCC for review and approval. Project is pending CCC's approval at an upcoming hearing. On 2/29/16, a meeting with Fletcher Jones Motorcars, City of Newport Beach, MBI (former RBF), and City of Huntington Beach was held to discuss issues associated with proposed construction activities. Traffic Plan prepared and submitted to the City of Newport Beach for approval on 6/29/16. Per request of CCC a dewatering plan was prepared and submitted for approval. Mesa Water staff, MBI and CCC met on 10/6/16 and discussed mitigation conditions. Project approved at CCC Public Hearing on 12/7/16. MBI is working on finalizing the HMMP and construction plans and will submit them to CCC. Staff met with MBI on 5/1/17 and discussed comments after reviewing the draft final HMMP. New proposed mitigation criteria received from CCC on 7/5/17 reducing mitigation requirements from 1.6 acres to 0.66 acres. Coastal Development Permit for Construction is anticipated in December, 2017. The project re-start meeting was held on 9/7/17. On 10/30/17 met with City of Newport Beach and City of HB to discuss permit requirements and project access. Met w/Fletcher Jones, Skender Construction, City of HB, MBI to discuss access to the site and scheduling on November 21, 2017. Reviewing the 100% Design Plans & Specs (received on 11/28/17) along with the Pipeline Design Schedule, Construction Monitoring Treatment Plan (CMTP), and proposal for Natural Resources/Regulatory Services during construction activities. Bid solicitation is scheduled for late January 2018. Project sent out to bid on January 30, 2018. Pre-bid meeting held on 2/15/18. Construction bid solicitation was cancelled due to ongoing coordination issues for the final Coastal Development permit. Project was deferred to FY20. On 8/1/18, Orange County Public Works issued a one-year extension to the previously issued Encroachment Permit. The Caltrans Encroachment Permit extension application is under review as of 8/13/18. The CCC extended the permit a year without hearing. MBI moved forward with the amendment to reduce mitigation. The updated information was forwarded by MBI to CCC in the week of August 6, 2018 and November 2, 2018. Staff held a stakeholder coordination meeting on 1/3/2019. Request for Bids sent out to contractors on February 6, 2019. Six bids received on 3/6/19. E&O Committee recommended award of the contract to lowest bidder (E.J. Meyer Company) on 3/19/19. Kick-off meeting held on 4/25/2019. Staff is working on reviewing submittals. Met with SARWQB on 5/24/19 and discussed water discharge permit requirements w/Susan Beeson. On 5/30/19 met with OCSD and went over requirements for the Special

Purpose Discharge Permit (SPDP). Held Project Progress meeting on 6/6/19 and coordination meeting with Metropolitan Water District on 6/20/19. Held Permit Status Meeting on 7/11/2019, Traffic Coordination Meeting with Fletcher Jones Mercedes Dealership on 7/23/2019 and Project Progress Meeting on 7/23/2019. Submitted Application Package to OCSD for SPDP on 7/31/2019. Received Special Purpose Discharge Permit from OCSD on September 1, 2019. Coordination meeting with Fletcher Jones and Project Progress Meeting are scheduled for 9/11/19. Project in Progress (9/9/19)

Project Title: Pipeline Testing Program

File No.: MC 2141

Description: Implement Resolution No. 1442 Replacement of Assets to annually perform non-destructive testing of 1% of the distribution system, and destructive testing of segments that are shown to have less than 70% of original wall thickness by non-destructive testing.

Status:. Three miles of AC pipe constructed in 1956 were selected for non-destructive wall thickness measurement, which occurred during the week of January 14, 2019. The report was received on February 8, 2019. Five AC pipe samples are planned to be collected and sent for wall thickness measurements as part of routine valve replacements in April 2019. Samples were sent to the testing lab in May 2019, and the wall thickness measurement report was received on June 24, 2019. With more data collected from AC pipe samples, a proposed update the Res. 1442 Replacement of Assets is being drafted for discussion by the E&O Committee in September 2019. (9/9/19)

Project Title: Mesa Water Administration Building Improvements & HVAC Replacement/Operation Building Repair Projects

File No.: MC 2171

Description: Evaluate the existing HVAC system, provide recommendations for improved efficiency and operations of the system, provide design, construction management, and construction.

Status: On 2/11/19 Snyder completed painting, carpeting and concrete floor polishing, installation of interior portion of the HVAC system, ceiling tiles and baseboards, rehabilitation of the upstairs and downstairs restrooms, overall cleaning. Also the furniture in supervisors and water quality office were reassembled. The contractor continued working on the roof of the Ops Building on installation of ducts and preparing for the upcoming rain. Starting from February 15 the contractor worked on the HVAC replacement on the second floor of the Administration building and EOC. The work included demolishing of old ducted HVAC piping, blocking for HVAC units, installation of HVAC units, installation of refrigerant and condensate piping, electrical work, painting, installation of the ceiling and carpet tiles, new water fountains and partial demolition of roofing for HVAC platform installation. The work on the second floor was completed on 4/24/2019 and the contractor started working on the first floor on 4/30/2019. The work included installation of HVAC units, installation of refrigerant and condensate piping,

electrical work, and plumbing. Work on the first floor of the Administration Building including installation of skylight completed on 6/8/19. The contractor continues working on the Boardroom improvements. Project completion is scheduled for 9/20/19. Project in progress. (9/9/19)

Project Title: Chandler & Croddy Wells and Pipeline Project

File No.: M18-113

Description: Design, documentation, and permitting for two new wells located on Chandler Avenue and Croddy Way in the City of Santa Ana and the distribution pipeline connecting the wells to Mesa Water's supply system.

Status: Tetra Tech has been contracted to complete the design, documentation, and permitting for the Chandler and Croddy Wells and Pipeline Project. Initial data request sent to Tetra Tech on September 7, 2017. Met with Division of Drinking Water regarding well locations on September 20, 2017. Preliminary hydrological evaluation received on September 29, 2017. Board approved demolition of existing structures and dedicated well facility with option to evaluate long-term lease potential as market conditions dictate at both sites at November 2017 E&O. Butier Engineering has been contracted to provide Construction Management Services. Preliminary Design Report (PDR) for the distribution pipeline was reviewed and returned on March 6, 2018. Well site layouts were presented to the Board in May. DDW waiver for 50-foot control zone is currently being drafted. The revised PDR for the pipeline and the well sites was received in June 2018. A workshop to discuss review comments was held on August 14, 2018. 50% design for the Croddy Pipeline was received and the design review workshop occurred on November 26, 2018. 50% design for the wells is scheduled for submittal in February 2019. The draft CEQA Mitigated Negative Declaration was received on January 22, 2019, and filed for 30-day public comment on February 20, 2019 and completed on March 22, 2019. Four agencies submitted minor comments. A public meeting to adopt the Mitigated Negative Declaration has been noticed for the April 11, 2019 Board of Directors meeting. The revised Preliminary Design Report for the Chandler and Croddy Wells was received on March 5, 2019. 50% design documents for the existing building demolitions and well drilling were received on April 16, 2019. 50% design documents for well equipping were received on September 9, 2019. 90% design documents are expected in October 2019 (8/12/19).

Project Title: Santa Ana Pressure Reducing Station Refurbishment Project

File No.: M17-002A

Description: The work will involve replacement of three (3) butterfly valves, one (1) existing pressure relief valve, precast concrete discharge structure, reconfiguring four (4) Cla-Val control valves, general refurbishments to the vault interior, and site work.

Status: Mesa Water has contracted with Michael Baker International to perform the design of the project. The design was completed in late January 2018 and the bid package was sent out to bid on February 8, 2018. Pre-bid meetings and site walk were held on 2/20/18 and 3/6/18, respectively. Three bids were received on March 13, 2018. Staff has recommended that the construction contract be awarded to J.R. Filanc, Inc., as the lowest bidder. E&O Committee recommended awarding contract to J.R. Filanc,

Inc. on March 20, 2018 and Board approved it on April 12, 2018. The contract was finalized (5/1/18) and signed on 5/3/18. The kick-off meeting was held on May 21, 2018. Electrical work was completed the week of 10/15/18. Concrete work completed in the week of 11/12/18. Pipeline shutdown took place between 11/26/18 and 12/1/18. Final testing and acceptance completed on February 6, 2019. The contractor is working on providing replacement actuators for the existing plug valves and on refurbishment of the 6“bypass cla-valve. The replacement actuators have been ordered by the contractor. The contractor replaced damaged micro switch on train No. 4 and MOV actuators on trains 1 through 4 on 3/8/19 and 6/25/19, respectively. The contractor finalized painting of walls, ceiling, floor and piping inside the vault on 8/30/19. Project in process of closing. (9/9/19)

Project Title: Meter Technology Evaluation

File No.: MC 2248

Description: The lifespan of a water meter is approximately 15 years. As a meter ages, the accuracy drops off due to wear. In preparation for its annual water meter replacement, staff has been reviewing water meter technology determining what water meter and reading solutions would be the best fit for Mesa Water’s aging register technology. With today’s technology, there are several types of meters and meter reading solutions available. The most common are as follows: Fixed Network, Automatic Meter Reading (AMR) System, Handheld or Touch Technology, and Advanced Metering Analytics - Cellular Endpoint.

Status: Mesa Water prepared a Technical Memo with information of the existing aging metering technology in comparison with proposed new meter reading solutions. The Technical memo was presented to the April E&O Committee and approved by the Board at the May 2019 Board meeting. Recommendations approved by the Board for early implementation include ensuring competitive pricing from the standardized meter supplier, making cellular endpoint meters available to customers who wish to have access to real-time water use data, and working with the meter reading software vendor to configure a software upgrade. Staff has complied the total installed cost of the cellular endpoint meters and presented an implementation plan to the Engineering and Operations Committee on August 20, 2019. Staff also negotiated a contract with National Meter and Automation for preferred customer pricing and limiting annual price escalation, and presented the contract to the Engineering and Operations Committee on August 20,2019 (9/9/2019)

Project Title: Reservoirs 1 & 2 Chemical Systems Design

File No.: M18-117

Description: Improve disinfection and mixing in both reservoirs to improve water quality and minimize nitrification.

Status: Final Design Contract awarded to Hazen & Sawyer on February 14, 2018. 50% design report received on July 17, 2018. Design review workshop took place in September 2018. A site visit to Laguna Beach County’s El Morro reservoirs occurred on November 8, 2018, to evaluate the Vortex mixing system. Staff met with the designer on December 5, 2018, to incorporate design-for-reliability and design-for-maintainability

principals into the mixing system design. The consultant is working with the mixer supplier to ensure that the reliability and maintainability requirements will be met at both the reservoir sites. The consultant provided a Technical Memo summarizing the options for maintainability and reliability of the mixer system on April 4, 2019. The 90% design deliverable was received on June 4, 2019, and is being reviewed by staff. (9/9/2019)

Water Quality Call Report
August 2019

Date: 8/6/2019
Source: Letter
Address: 2209 Wallace Avenue
Description: Customer wrote to express his dissatisfaction with the chlorine taste of tap water in Costa Mesa.

Outcome: Response letter sent to customer 8/20/19 thanking him for his letter and invited him to call us for a site visit. Staff also sent him a copy of the Consumer Confidence Report.

Date: 8/10/2019
Source: Visit
Address: 655 Baker #V106
Description: Customer concerned about the water smelling like petroleum.

Outcome: Duty operator responded to the Saturday call. He collected water from the front hose bib entering the apartment complex and from a backflow by the meter to the building. Staff did not notice any petroleum odor in either water sample. The customer also brought a sample from inside the house and staff did not smell any petroleum odor. Customer may be noticing change in the source of the water. On Monday, staff spoke to customer who said the odor was no longer present and wants to wait until Wednesday to see if odor returns. On Wednesday, staff followed up with customer and he said the odor is mostly gone and he declined another site visit. He will call if he has any further concerns or the odor returns.

Date: 8/10/2019
Source: Phone
Address: 752 Wesleyan Bay
Description: Customer concerned about water smelling like petroleum. She was following up from her friend's (655 Baker) call of similar concern. Both live less than 1/2 mile away from each other.

Outcome: Duty operator spoke to customer on Saturday and told her that the water at 655 Baker was already checked and no petroleum odor was found. Water quality staff followed up with customer on Monday, at which time the customer said the odor is no longer noticeable. The following day, staff followed up with customer again and the water was reported as fine.

Date: 8/13/2019
Source: E-mail
Address: N/A
Description: Customer says water is very hard and leaves spots/deposits on her countertops and in the dog bowl.

Outcome: Several attempts and voice messages were left for customer. Spoke to customer and let her know that the sources of water do naturally contain hardness. Explained to customer that although hard water can leave deposits, it is not harmful. Customer appreciated the call.

Date: 8/20/2019
Source: Phone
Address: 3270 California Avenue
Description: Owner called saying his tenant has reported dirty brown water.

Outcome: An appointment was set for a site visit but owner canceled it due to lack of cooperation from the tenant. Owner will call back another time to schedule a site visit.

Date: 8/20/2019
Source: Phone
Address: College Park Homes (Carnegie & Bucknell)
Description: Customer called to check if we are operating any differently. He has noticed more chlorine odor in the water.

Outcome: Explained to customer that he may be noticing different sources of water as we are in higher demand season. Customer declined a site visit and will call back if he needs one.

Date: 8/28/2019
Source: Visit
Address: 2281 Fountain Way
Description: Customer has noticed that the water smells.

Outcome: Site visit concluded that the water at the hose bib, kitchen and bath faucet had no smell. Chlorine residual, temperature, and pH were within normal range and water was clear. Explained to customer about odor possibly coming from the drains. Customer will call back if odor returns.

COMMITTEE POLICY & RESOLUTION REVIEW

ENGINEERING and OPERATIONS COMMITTEE

Policy Assignments for 2019

Policy Name	Resolution No.	Date Adopted	Revision Schedule	Last Reviewed
Replacement of Assets Including Pipeline and Well Rehabilitation	1442	03/15/14	Review and update every 3 – 5 years * Scheduled for the 09/17/19 meeting	03/15/14
Rules and Regulations for Water Service	1514	07/12/18	Review and update as needed	07/12/18
Standard Specifications and Standard Drawings		05/03/18	Review and update as needed	05/03/18
Urban Water Management Plan	1477	06/09/16	Review and update as required every 5 years	06/09/16

Water Operations Status Report
July 1, 2019 - August 31, 2019

Operations Department Status Report	Wk Unit	Plan Days	Act Days	Plan Qty	Act Qty	Plan Cost	Actual Cost
01 - HYDRANTS							
WD-0101 - HYDRANT MAINTENANCE	HYDRANTS	30	26	609	498	$12,082	$10,279
WD-0102 - HYDRANT PAINTING	HYDRANTS	3	8	76	239	$902	$3,184
WD-0103 - HYDRANT REPAIR	HYDRANTS	9	12	10	18	$2,910	$8,863
Program 01 TOTAL		42	46			$15,894	$22,326
02 - VALVES							
WD-0201 - DISTRIBUTION VALVE MAINTENANCE	VALVES	22	16	433	340	$9,374	$6,893
WD-0202 - NIGHT VALVE MAINTENANCE	VALVES	0	0	0	0	$0	$0
Program 02 TOTAL		22	16			$9,374	$6,893
03 - METERS							
WD-0305 - ANGLE STOP/BALL VALVE REPLACE	REPLACE	5	1	9	1	$2,964	$366
Program 03 TOTAL		5	1			$2,964	$366
04 - MAIN LINES							
WD-0401 - MAIN LINE REPAIR	REPAIRS	22	13	4	1	$10,883	$6,809
WD-0402 - AIR VAC MAINTENANCE/REPAIR	REPAIRS	5	2	29	2	$1,764	$634
Program 04 TOTAL		27	15			$12,647	$7,443
05 - SERVICE LINES							
WD-0501 - SERVICE LINE REPAIR	REPAIRS	10	22	4	9	$4,310	$9,839
Program 05 TOTAL		10	22			$4,310	$9,839
06 - CAPITAL							
CAP AV - CAPITAL AIR VACUUM REPLACE	AIR VACS	0	5	0	1	$0	$1,808
CAP BI - CAPITAL BYPASS & METER INSTALL	REPLACE	0	0	0	0	$0	$0
CAP FH - CAPITAL HYDRANT UPGRADE	HYDRANTS	43	22	6	2	$33,036	$17,752
CAP MV - CAPITAL MAINLINE VALVE REPLACE	VALVES	35	13	6	1	$23,951	$6,802
CAP SL - CAPITAL SERVICE LINE REPLACE	SERVICES	7	11	2	4	$3,695	$4,861
CAP SS - CAPITAL SAMPLE STATION REPLACE	STATIONS	0	1	0	1	$0	$184
Program 06 TOTAL		85	52			$60,682	$31,407
VACANT POSITIONS	2		103				
TOTAL						$105,871	$78,274

MEMORANDUM

MesaWater DISTRICT®

Dedicated to Satisfying our Community's Water Needs

TO: Engineering and Operations Committee

FROM: Phil Lauri, P.E., Assistant General Manager

DATE: September 17, 2019

SUBJECT: Geographic Information System Support Services

RECOMMENDATION

Recommend that the Board of Directors award a contract to Carollo Engineers, Inc. in the amount of $140,000 per year for five years for an amount not to exceed $700,000 with 2-one year renewal options to provide Geographic Information System and Hydraulic Model Hosting and Maintenance Services.

STRATEGIC PLAN

Goal #2: Practice perpetual infrastructure renewal and improvement.

PRIOR BOARD ACTION/DISCUSSION

At its December 11, 2012 meeting, the Board of Directors (Board) approved a contract with RBF Consulting (a company of Michael Baker International) for $95,500 to provide Geographic Information System Support Services.

At its August 8, 2013 meeting, the Board approved a change order with RBF Consulting (a company of Michael Baker International) in the amount of $157,000 to provide Geographic Information System Support Services.

At its July 10, 2014 meeting, the Board approved a change order with RBF Consulting (a company of Michael Baker International) for an amount not to exceed $133,500 to provide Geographic Information System Support Services.

At its November 12, 2015 meeting, the Board approved Change Order #3 to Michael Baker International (MBI) in the amount of $325,000 for two and a half years.

At its July 16, 2019 meeting, the Engineering and Operations Committee received an information item that staff was preparing a Request for Proposal (RFP) for Geographic Information System (GIS) services.

BACKGROUND

Mesa Water District (Mesa Water®) has developed a versatile GIS that is central to managing its infrastructure assets. GIS is used to provide as-needed maps of Mesa Water's assets. GIS also functions as the backbone for the hydraulic model, record drawings database, pipeline breaks database, pipeline integrity testing database, and demographic and parcel information database. The GIS and hydraulic model are maintained by a consultant under the GIS Support Services contract, and Hydraulic Modelling Services contract. The contract term with the current GIS Support Services consultant expires in October 2019. Staff developed an RFP for GIS and Hydraulic Model Hosting and Maintenance Services for Fiscal Years 2020-2025, with the option for 2-one year renewals.

Key tasks in the RFP include the following:

- Hosting of GIS on secure servers
- Maintenance of GIS software licenses
- Staff access to GIS viewer via WebGIS portal
- Maintenance and upkeep of asset database
- Hydraulic modeling to evaluate water supply, system pressure, water velocity with pipelines, etc.
- Update of Potable Water and Recycled Water Atlas
- Development of specialized maps as needed

DISCUSSION

Mesa Water solicited proposals from 13 qualified firms to provide GIS and Hydraulic Model Hosting and Maintenance Services. 11 of the 13 firms attended the pre-proposal meeting. From the 11 firms, eight proposals were received. The proposals were reviewed by a Selection Panel comprised of Mesa Water and City of Newport Beach staff. The top three firms were invited to participate in interviews. Each firm was evaluated based on qualifications, experience, staff availability, project understanding, scope of work approach, and proposal quality. The results are as follows:

Rank	Firm	Final Score	Billing Rate Range for Professional Staff ($/hour)
1	Carollo Engineers, Inc.	4.91	$139 - $255
2	HDR, Inc.	3.97	$ 85 - $325
3	Michael Baker International LLC	3.32	$ 97 - $229

While all of the firms presented excellent approaches and highly qualified staff, Carollo Engineers, Inc. (Carollo) was unanimously ranked as the most qualified due to their experience of helping clients similar to Mesa Water create user-friendly GIS and Hydraulic Model applications and maps that support day-to-day operations. Their understanding of how Mesa Water staff uses GIS and the Hydraulic Model demonstrated in their proposal and their recommendations for helping Mesa Water take the next steps in integrating GIS with other systems were the most logical and the most implementable of all of the proposers. Carollo's proposal is included as Attachment A. Other proposals are available upon request.

Professional Services costs were evaluated and the proposed fees presented by Carollo were in alignment with industry standard rates for GIS and Hydraulic Modeling services.

Staff recommends that the Board consider awarding a contract to Carollo in the amount of $140,000 per year for five years for an amount not to exceed $700,000 with 2-one year renewal options to provide GIS and Hydraulic Model Hosting and Maintenance Services.

FINANCIAL IMPACT

In Fiscal Year 2020, $302,000 is budgeted for Support Services; no funds have been spent to date.

ATTACHMENTS

Attachment A: Carollo Engineers, Inc.'s GIS and Hydraulic Model Hosting and Maintenance Services Proposal

MesaWater DISTRICT

Geographical Information Systems and Hydraulic Model Hosting and MAINTENANCE SERVICES

PROPOSAL | August 2019

carollo

Engineers...Working Wonders With Water®

Engineers...Working Wonders With Water®

3150 Bristol Street, Suite 500, Costa Mesa, California 92626
P. 714.593.5100 F. 714.593.5101

August 22, 2019

Ms. Karyn Igar, PE, Senior Civil Engineer
Mesa Water District
1965 Placentia Avenue
Costa Mesa, CA 92627

Subject: Proposal – Geographical Information Systems and Hydraulic Model Hosting and Maintenance Services

Dear Ms. Igar:

The GIS and Hydraulic Model Hosting and Maintenance Services is the foundation for Mesa Water's GIS system. Mesa Water® is seeking a professional engineering consultant to develop an ESRI-based web application as a common access point for staff to access Mesa Water's GIS data. Carollo Engineers' project team is exceptionally qualified to provide these services for several reasons:

Proven project leadership leads to project success. Tim Loper (project manager), Jackie Silber (GIS lead), and Matt Huang (modeling lead) are GIS specialists, system integration experts, and hydraulic modeling engineers who bring their expertise to work alongside Mesa Water's staff to help develop an easy-to-use, customizable, non-proprietary GIS system that easily integrates with Mesa Water's model and other asset management systems. They have helped clients just like Mesa Water® develop and implement robust modeling and GIS programs, and that experience has proven to lead to project success.

A deep bench of GIS and modeling resources provides efficient and timely project delivery. The ability to meet Mesa Water's needs throughout the five-year contract period is driven by our ability to deliver efficiently. Carollo will serve as the extension of Mesa Water's staff by updating the GIS and linking the digital assets to Mesa Water's asset management systems and other outside digital resources via a customized approach. We will also provide a qualified hydraulic modeling team to provide as-needed hydraulic modeling services on an annual basis.

No learning curve with Carollo's extensive knowledge and understanding of Mesa Water's entire water system. There will be no learning curve because we have gained knowledge of your water system through past work on projects such as the Nitrification Modeling Study, Chlorine Conversion Study, and 2014 Water System Master Plan.

We are pleased to offer this highly knowledgeable and experienced team to work with you and your staff to develop an accurate and updated model that meets the needs of the community for many years to come. If you have any questions, please contact our proposed project manager, Tim Loper, at 559-313-4802 or tloper@carollo.com.

Sincerely,

CAROLLO ENGINEERS, INC.

Graham J.G. Juby, PhD, PE
Vice President/Principal-in-Charge

Tim Loper, PE
Vice President/Project Manager

Proposal Cover Page

Name of Business: Carollo Engineers, Inc.

Business Address: 3150 Bristol Street, Suite 500, Costa Mesa, California 92626

Phone: 714-593-5100

Email: GJGJuby@carollo.com

Website: www.carollo.com

Federal Tax ID: 86-0899222

Type of Business: S Corporation

Years in Business: 86

Point of Contact: Graham Juby, PhD, PE, Vice President

Phone: 714-593-5134

Signatory Contact: Graham Juby, PhD, PE, Vice President

Phone: 714-593-5134

Certificate of Insurance: Included on the next page

Signature

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 8/2/2019

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

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

PRODUCER Risk Strategies Company 2040 Main Street, Suite 450 Irvine, CA 92614 www.risk-strategies.com CA DOI License No. 0F06675	**CONTACT NAME:** Risk Strategies Company **PHONE (A/C, No, Ext):** 949-242-9240 **FAX (A/C, No):** **E-MAIL ADDRESS:** syoung@risk-strategies.com
INSURED Carollo Engineers, Inc. 2700 Ygnacio Valley Road, #300 Walnut Creek CA 94598	**INSURER(S) AFFORDING COVERAGE** — **NAIC #** **INSURER A :** **INSURER B :** **INSURER C :** **INSURER D :** Continental Casualty Company — 20443 **INSURER E :** **INSURER F :**

COVERAGES **CERTIFICATE NUMBER:** 50399570 **REVISION NUMBER:**

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

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
	COMMERCIAL GENERAL LIABILITY						EACH OCCURRENCE	$
	☐ CLAIMS-MADE ☐ OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	$
							MED EXP (Any one person)	$
							PERSONAL & ADV INJURY	$
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	$
	☐ POLICY ☐ PRO-JECT ☐ LOC						PRODUCTS - COMP/OP AGG	$
	OTHER:							$
	AUTOMOBILE LIABILITY						COMBINED SINGLE LIMIT (Ea accident)	$
	☐ ANY AUTO						BODILY INJURY (Per person)	$
	☐ OWNED AUTOS ONLY ☐ SCHEDULED AUTOS						BODILY INJURY (Per accident)	$
	☐ HIRED AUTOS ONLY ☐ NON-OWNED AUTOS ONLY						PROPERTY DAMAGE (Per accident)	$
								$
	UMBRELLA LIAB ☐ OCCUR						EACH OCCURRENCE	$
	EXCESS LIAB ☐ CLAIMS-MADE						AGGREGATE	$
	☐ DED ☐ RETENTION $							$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y / N	N / A					☐ PER STATUTE ☐ OTH-ER	
	ANYPROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? ☐ **(Mandatory in NH)**						E.L. EACH ACCIDENT	$
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE	$
							E.L. DISEASE - POLICY LIMIT	$
D	Professional Liability Unlimited Prior Acts			AEH288354410	7/4/2019	7/4/2020	Each Claim: Aggregate: Deductible:	$1,000,000 $1,000,000 $400,000

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

Projects as on file with the insured including but not limited to: Geographical Information System (GIS) and Hydraulic Model Hosting and Maintenance Services - RFP

CERTIFICATE HOLDER

Mesa Water District
1965 Placentia
Costa Mesa CA 92627

CANCELLATION

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

AUTHORIZED REPRESENTATIVE

Michael Christian

Table of Contents

SECTION 1

Firm Qualifications and Experience

Carollo Engineers is a full-service, environmental engineering firm that has been exclusively providing water and wastewater services for 86 years across the U.S. **Water is our focus, our business, and our passion.**

Firm Introduction

Founded in 1933, Carollo Engineers has 45 offices in 18 states throughout the U.S., with employees numbering more than 1,100 including more than 500 registered engineers.

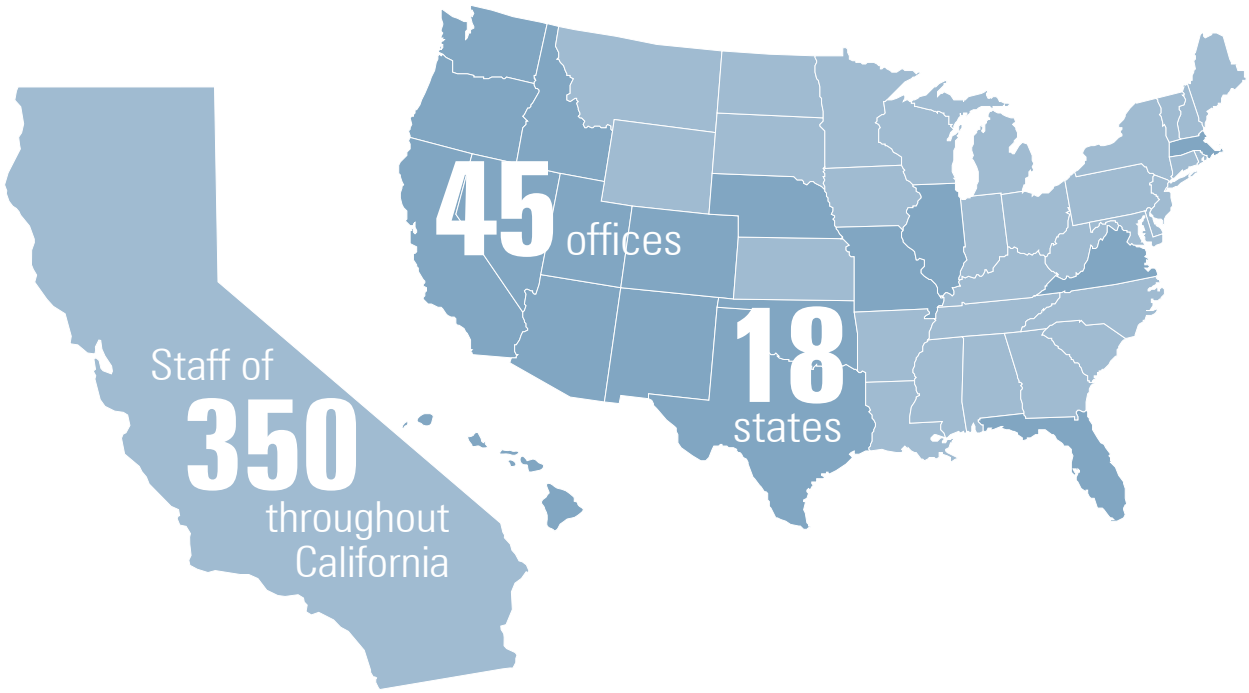
Unlike the majority of our competitors, we solely provide water and wastewater services, and that's where we focus our resources and energy every day of every year. As a result, we are known in the industry for our innovative solutions.

Strength and Stability

During our 86-year history, Carollo has successfully completed more than 25,000 projects. We are currently ranked within *Engineering News Record's* (*ENR*) top 500 design firms. More importantly, *ENR's* annual Source Book ranks Carollo among the top 10 firms for water and sewer/wastewater. We are the largest firm in the country that is 100 percent focused on water engineering solutions. With a reputation based on client service, you can expect from us a commitment to quality.

We recruit nationwide and hire technical staff with extensive background and training specific to this field. For that reason, the quality and professional standing of our core group of professionals equals or exceeds that provided by some of the largest engineering firms in the country.

Our staff includes civil, sanitary, environmental, electrical, mechanical, chemical, structural, control system, and corrosion control engineers, as well as architects, planners, and specialists in other areas. Consultants are retained as needed in specialized fields depending on a project's specific needs.



GIS and Modeling Capabilities

Carollo is a leader in helping agencies develop technological tools to support operation, maintenance, and existing business practices. We are experienced in creating workable, user-friendly GIS, computer models, and integration systems to support day-to-day data access. We are experts in the development and use of complex water system models that are integrated with GIS and asset management systems.

Our experience also includes the development of GIS web applications and hydraulic models. We bring expertise in performing geospatial analyses utilizing a variety of ArcGIS tools and geoprocesses to create and visualize GIS data. They create map documents, analyze GIS data, and link non-spatial data to GIS.

Office Location

The work for your project will be performed and managed through our Costa Mesa office located at 3150 Bristol Street, Suite 500, Costa Mesa, California 92626. This office, together with our total firm resources, has the capability and capacity to provide the range of services needed to complete your project.

Why Carollo?

There are two important reasons that make the Carollo team the best choice for your Geographical Information Systems and Hydraulic Model Hosting and Maintenance Services project:

1. Our extensive knowledge and understanding of Mesa Water's entire water system.
2. Our recent experience with very similar projects.

These two key reasons to select Carollo for your project are spelled out in our proposal.

Relevant Experience

Just Ask Our Clients... Carollo is known for the large number of clients with whom we have maintained long-term relationships. Our experience shows that open communication, collaboration, and proven solutions build trust, minimize conflict, and eliminate surprises. On the following pages we have provided three project profiles with references who will attest to our level of service and responsiveness.

As requested in the RFP, brief descriptions of additional projects are included in the table below.

Additional Experience

Client/Project	Description
Mesa Water®, CA Chlorine Conversion Study	Performed a water source trace using a hydraulic model to determine which supply sources serve which customers.
City of Pasadena, CA Hydraulic Model Development	Created a new hydraulic model in InfoWater by Innovyze®. Conducted technical review of the model network and enhanced the model topology and added water system controls.
City of Morro Bay, CA OneWater Water and Wastewater Master Plan	Provided GIS analysis for project involving the addition of important invert elevation data in areas with data gaps so a model could be generated.
City of Lemoore, CA Water, Sewer, and Wastewater Treatment Plant Master Plans	Provided GIS analysis to help the City fill gaps in its wastewater network pertaining to elevation data and determine flow monitoring locations. Located and entered important elevation data and created cartographic figures for verification of flow monitoring locations.
City of Garden Grove, CA Water Master Plan	Developed a complete water system GIS; created a hydraulic model, demand projections, system analysis, CIP development, and prepared a master plan.
City of Shasta Lake, CA 2016-2026 Water Master Plan	Developed a new water system hydraulic model based on the City's most recent GIS database of the water distribution system.

Accelerated Water Meter and Line Replacement Program

City of Sacramento Department of Utilities, CA

Point of Contact

Michelle Carrey, Engineering Supervisor, Water
1395 35th Avenue, Sacramento, CA 95822
916-808-1438 | mcarrey@cityofsacramento.org

Project Description

Carollo is providing program management and design services for the City of Sacramento's $250M Accelerated Water Meter Program that consists of installing more than 41,000 water meters, and replacement of approximately 60 miles of water mains and service lines.

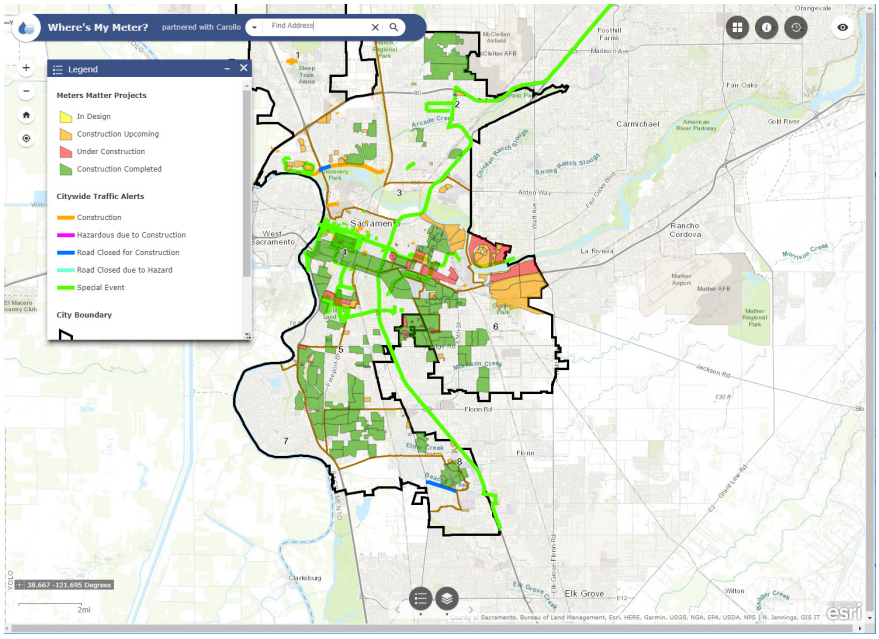
The program involves condensing the water service meter installation effort from eight years to four years. Using a web and mobile GIS application, our team developed a multifaceted outreach effort to build support for the program and communicate program activities relevant to the residents and businesses being affected by the work.

Using ArcGIS Online, a web application was developed to alert residents of meter installation status and traffic alerts related to meter installation areas. The web application provides residents a way to search for their address, parcel APN, or project name. Updates to the web app required a full-time GIS analyst to support the City's meter installation timeline.

Carollo developed documented workflows and customized scripts to automate GIS database updates based on construction updates. The same GIS staff that developed this app for the City of Sacramento will assist Mesa Water®.

Relevance to Mesa Water®

- Data collection and management to interface with City's business systems and GIS.
- Website and mobile application based on GIS to inform public and stakeholders of program status and useful information.
- Developed workflows and procedures for quickly updating the GIS and uploading to the web application.



Link to web application: https://sacmeterprogram.github.io/

Northwest Model Expansion and Capacity Analysis

City of Reno, NV

Point of Contact

Dustin Waters, Associate Civil Engineer
1 East First Street, Reno, NV 89501
775-321-8352 | watersd@reno.gov

Project Description

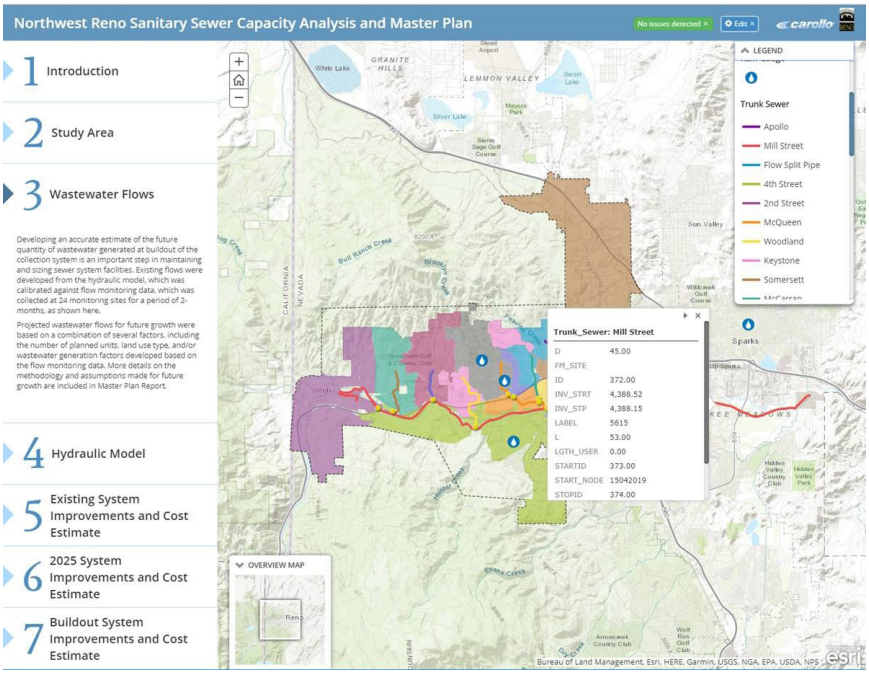
The City of Reno retained Carollo to conduct a sanitary sewer capacity analysis and develop a master plan for the City's Northwest area. Carollo collected and reviewed existing GIS data, conducted site visits to gather additional information on the City's collection system, and interviewed staff to develop a better understanding of suspected operations and maintenance issues, flow diversions, and other collection system hydraulic information.

Beyond the typical master planning tasks such as development of a temporary flow monitoring program, and reviewing the City's existing model to expand the existing wastewater collection system hydraulic computer model, Carollo developed a web based GIS application to share GIS data with internal City staff and the public through ESRI's ArcGIS Online.

The web application provided critical background related to project understanding, background information, project phasing, costs, and project specifics such as improvement specifications, justification, existing and future user cost allocations, and total project costs.

Relevance to Mesa Water®

- Reviewed existing Sewer GEMS model.
- Developed temporary flow monitoring program using a GIS database.
- Developed a Story Map of CIP projects using ArcGIS Online.
- Projects displayed in the Story Map are linked to CIP project description PDFs.



Link to web application: https://carollo.maps.arcgis.com/apps/MapSeries/index.html?appid=984476d1348d4736aaedced77cf9c760

Northeast Water Purification Plant Project
City of Houston, TX

Point of Contact

Ravi Kaleyatodi, Senior Assistant Director
12630 Waterworks Way, Humble, TX 77396
713-346-0899 | ravi.kaleyatodi@houstontx.gov

Project Description

Carollo has been tasked with providing oversite on the day-to-day construction of the Northeast Water Purification Plant (NEWPP) expansion project. Carollo developed a new approach to construction management through the development of an ArcGIS Online web application.

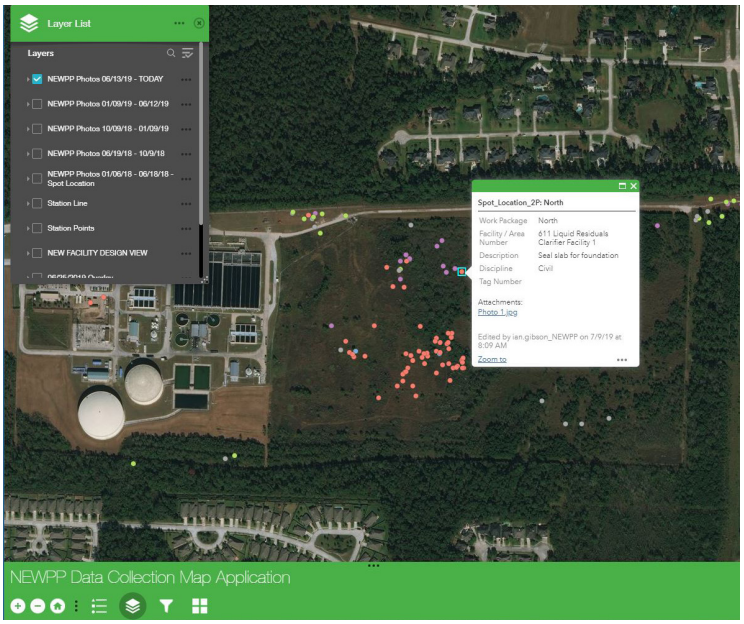
Carollo is considered the Project Management Team (PMT) for the expansion, which in layman's terms means we will be providing quality assurance to the stakeholders. One of the tasks of the PMT is to thoroughly report daily construction activities with pictures and descriptions. To do so, Carollo hired four inspectors that managed the quality of work being done by contractors on site. These inspectors went out every day to take pictures and notes on the various construction activities happening around the work area. At the end of each day, they rewrote their notes in a Word document, attached the photos, and uploaded the reports to a SharePoint server. Carollo found that this reporting method would not be scalable when the project expanded to 20 inspectors.

Relevance to Mesa Water®

- ArcGIS Online Web Application.
- Hosting large datasets.
- Data Collection Map– Used to show location of photo collection locations for pipeline assessment.

To simplify the reporting process, a web map was created using ArcGIS Online which contained a variety of fields for the inspectors to fill in. These fields consisted of dropdowns, auto-filled dates, and text areas that the inspectors found useful in making their job easier. Once created, the inspectors utilized the Collector for ArcGIS application on their mobile devices to capture the information. They were now able to take their phone or iPad into the field and document the work each day. There was no longer a need for the inspectors to rewrite the information into a Word document.

Additionally, each photo was geolocated to a place on the map that was important in the review process from each area manager. Being that the project area was so large, understanding the exact location of each activity was useful in providing assurance to the clients that each concrete pour, pipe lay, rebar instillation, etc. was up to standard.



SECTION 2

Staff Experience and Availability

Nothing is more important to the success of your project than the qualifications and experience of your engineering team. Simple, one-size fits all solutions will not meet your expectations for a thorough third-party GIS team to host and maintain Mesa Water's GIS and hydraulic model systems.
You need a team of specialists.

THE RIGHT TEAM FOR MESA WATER®

The key to the success of Mesa Water's GIS and Hydraulic Model Hosting and Maintenance Services project will be the experience and abilities of the project team. A successful project team must demonstrate practical and relevant experience in all of the technical aspects of a project, a well-conceived project approach, and a commitment to the project goals.

Team Organization

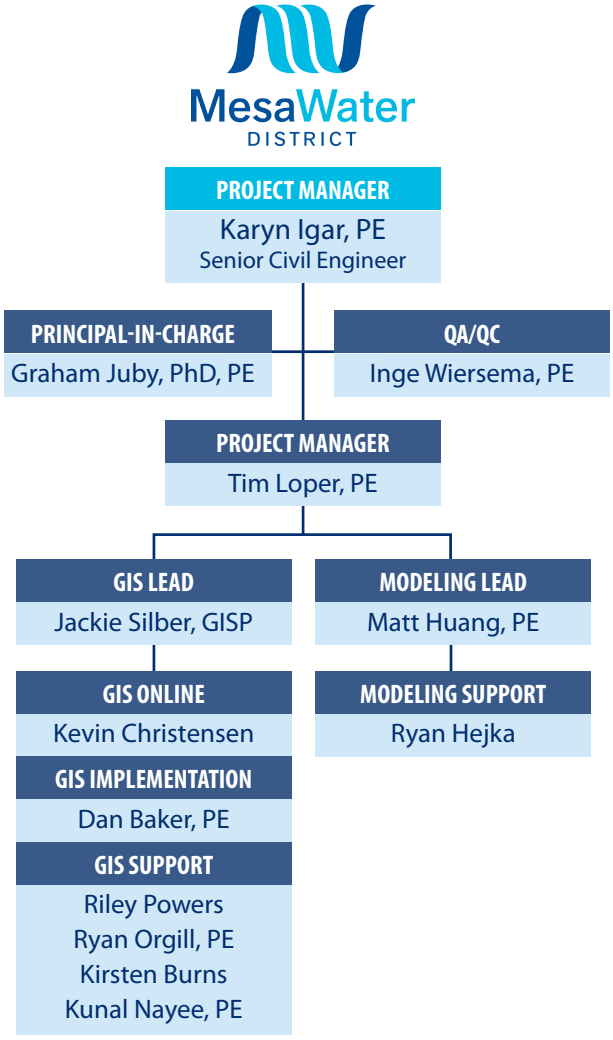
We have a team of responsive GIS specialists, system integration experts, and hydraulic modeling engineers to work alongside Mesa Water's staff to help you locate and manage digital assets at an affordable cost. Our team members will take a proactive role in providing services by identifying challenges before they become costly issues and developing proactive solutions for optimal results.

Resources

With a staff of more than 350 located throughout California, Carollo has the resources and systems in place to meet any of your project staffing needs. We have the ability to mobilize and respond quickly to your requests, both large and small.

Following are brief profiles showcasing the background and qualifications of our key team members. Resumes are provided in Attachment A. All of our team members are available and committed throughout the duration of this project.

Our team shows a deep bench of GIS resources. This allows us the ability to meet Mesa Water's needs throughout the five-year contract period.



LEADERSHIP TEAM

Tim Loper, PE

Project Manager

Availability: 50%

Tim is Carollo's Chief of Infrastructure Planning Services and has 18 years of experience in all aspects of water and wastewater engineering. Tim focuses on providing the right team to develop the right solutions for water-related challenges. With extensive experience in planning and design, his knowledge of available analytical methods, and robust evaluations provides the foundation for justifiable findings and results that support each agency's goals and needs.

As project manager, Tim will be the prime contact throughout the project. He will develop the budget and schedule, assign responsibilities, secure adequate staffing, monitor the technical approach, and represent the team at all meetings.

Relevant Experience

- Principal-in-charge for the City of Reno, NV, Northwest Reno Sewer Capacity Analysis and Master Plan.
- Principal for the Truckee Sanitary District, CA, Ongoing Hydraulic Modeling Assistance.
- Project manager for the City of Tulare, CA, Water Model Update and Calibration.
- Project manager for the City of Millbrae, CA, Water System Master Plan.

Jackie Silber, GISP

GIS Lead

Availability: 50%

Jackie is a GIS lead with 18 years of professional experience in GIS and technical training. Her experience includes geospatial GIS analysis for water resource planning, environmental remediation sampling, and demographic forecasting projects. Her GIS skills focus on geodatabase design and optimization, setting cartographic standards, scripting the automation of repetitive analysis using Python, and administering the Carollo's ArcGIS Online account.

Relevant Experience

- ArcGIS online administrator/technical advisor for the City of Houston, TX, Northeast Water Purification Plant.
- GIS lead for Mesa Water®, CA, Free Chlorine Conversion Study.
- ArcGIS online administrator for the City of Reno, NV, Northwest Model Expansion and Capacity Analysis and Master Plan Story Map project.

Matt Huang, PE

Modeling Lead

Availability: 30%

Matt brings 18 years of experience and expertise in water and recycled water hydraulic modeling and master planning, with more than 100 hydraulic models, and serves as Carollo's National Distribution System Modeling Lead. He also has a broad base of experience working in water quality, water and wastewater treatment, water and sewer infrastructure, water resources, and wastewater system modeling and master planning, with experience in planning, design, and construction. His project management background includes many large planning and design projects, with projects in ten states and seven foreign countries.

In addition, Matt has experience with a number of specialized computer programs, including InfoWater, H2OMAP, H2ONET, InfoSewer, InfoSWMM, InfoWorks WS, WaterGEMS, GoldSim, WEAP, and ArcGIS Desktop, as well as a number of database, programming, scheduling, and spreadsheet programs. He currently serves on AWWA's Engineering Modeling Applications Committee.

Relevant Experience

- Project engineer for Mesa Water's Nitrification Modeling Study and Chlorine Conversion Study.
- Project manager for Elsinore Valley Municipal Water District, CA, On-Call Hydraulic Modeling project.
- Task Leader for Inland Empire Utilities Agency, CA, On-Call Hydraulic Modeling Contract.

Graham Juby, PhD, PE

Principal-in-Charge

Availability: 20%

Graham has 36 years of experience in the planning and implementation of water and wastewater treatment projects.

During the last 20 years, he has served in management or advisory roles for numerous projects for Mesa Water®. His experience allows him to anticipate challenges that arise during the course of any project. He encourages an open line of communication between the client and project manager to create innovative solutions to challenges. Graham will have overall responsibility for the project, including quality control, staffing, and contractual matters. He will be available throughout the project to perform the stated responsibilities.

Relevant Experience

- Principal-in-charge for the 2014 Water System Master Plan for Mesa Water®, CA.
- Project manager for the 2016 Nitrification Control Study for Mesa Water®, CA.
- Principal-in-charge for the preliminary and final design for the Colored Water Treatment Facility Technology Replacement and Expansion project for Mesa Water®, CA.

Inge Wiersema, PE

QA/QC Technical Advisor

Availability: 20%

Inge is Carollo's Southern California Regional Planning Manager and is an expert in developing comprehensive water master plans for public utilities. She has dedicated her 24-year career to hydraulic modeling and master planning, and has been involved in more than 150 master plans and modeling projects.

Inge will utilize her past work and lessons learned on previous successful modeling projects to provide quality management and technical oversight to Mesa Water®.

Relevant Experience

- Project manager for Mesa Water®, CA, Nitrification Prevention Modeling project.
- Project manager for the Metropolitan Water District of Southern California, CA, System-Wide Hydraulic Modeling Development.
- Project manager/engineer for the Los Angeles Department of Water and Power, CA, Hydraulic Model Planning project.

SUPPORT STAFF

Kevin Christensen

GIS Online

Availability: 20%

Kevin has six years of experience preparing map documents using GIS data of varying levels of complexity. He has performed geospatial analyses utilizing a variety of ArcGIS tools and geoprocesses to create and visualize GIS data.

Relevant Experience

- GIS analyst for the City of Oxnard, CA, Public Works Integrated Master Plan.
- GIS analyst for the City of West Sacramento, CA, Water Master Plan Update.
- GIS analyst for the Bella Vista Water District, CA, Urban Water Management Plan.

Dan Baker, PE

GIS Implementation

Availability: 20%

Dan has 27 years of experience in business management consulting for water utilities throughout the United States. He is Carollo's lead for program management controls and business integration with diverse expertise in organizational assessments, information technology, asset management, CIP development, and strategic planning.

Relevant Experience

- Program controls lead for the City of Sacramento, CA, Accelerated Water Meter Program.

- Program controls lead for the City of Houston, TX, Northeast Water Purification Plant Program Owner's Engineer/Agent project.
- Principal consultant for the Central Contra Costa Sanitary District, CA, Asset Management Implementation Plan, including integration of data into the GIS and maintenance management systems.

Riley Powers

GIS Support

Availability: 20%

Riley is a GIS analyst with prior work experience in water and wastewater infrastructure mapping with the City of Marquette, Michigan. He joined Carollo's team in Reno in 2017. Riley's skills focus on the collection and manipulation of data, creation and maintenance of geodatabases, conversion between program interfaces and data types for map creation, spatial analysis, and creation of cartographic figures.

Relevant Experience

- GIS analyst for the City of Reno, NV, Northwest Reno Sewer Capacity Analysis and Master Plan.
- GIS analyst for the City of Morro Bay, CA, OneWater Water and Wastewater Master Plan.
- GIS analyst for the City of Tumwater, OR, Comprehensive Water System Plan Update.

Ryan Orgill, PE

GIS Support

Availability: 20%

Ryan brings 15 years of experience dedicated specifically to infrastructure master planning projects. His expertise includes hydraulic modeling (water, sewer, and recycled water) in various software platforms, master planning, and GIS. Ryan specializes in creating and calibrating hydraulic models, development of analysis criteria, evaluation of existing water systems, and the development of improvement projects to mitigate existing deficiencies and to serve future growth.

He has conducted more than 50 hydraulic model updates and evaluations He has worked on infrastructure master planning and hydraulic modeling projects for clients throughout the western United States, including California, Oregon, Washington, Nevada, Arizona, and Texas.

In addition, Ryan has worked with Tim Loper on more than 20 master planning projects, including recent projects for the cities of Morro Bay, Porterville, Fresno, Hanford, and Turlock.

Relevant Experience

- Project manager for the City of Reno, NV, Northwest Reno Sewer System Capacity Analysis and Master Plan.
- Project engineer for the City of Santa Barbara, CA, Water Model Update.
- Project engineer for the City of Shasta Lake, CA, 2016 - 2026 Water Master Plan.

Kirsten Burns

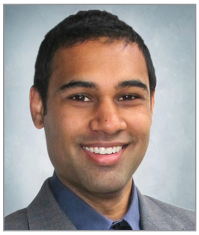
GIS Support

Availability: 20%

Kirsten has four years of experience in infrastructure design, modeling, and planning. Her primary focus includes hydraulic model development, integrated with GIS, where she has developed new or updated existing hydraulic models, including providing system calibration and model training.

Relevant Experience

- Intern engineer for the Orange County, FL, Stormwater Inventory Project. Responsible for consolidation of stormwater inventory information in GIS including pump station and drainwell information for Orange County.
- Intern engineer for the Orange County, FL, Pond Mowing Study. Responsible for consolidation of pond information for Orange County contracted and non-contracted ponds with intent of producing mowing limits in GIS for maintenance of ponds.



Kunal Nayee, PE

GIS Support

Availability: 20%

Kunal has six years of experience ranges from GIS, permit writing, potable design, gravity design and data acquisition. His projects include hydraulic modeling for city- and county-level systems, asset management studies, and potable water system designs. Experience includes playing a central role in hydraulic water and wastewater models for a city-level system, asset management plan using GIS techniques for criticality modeling for a county-level forcemain system, and a potable water system replacement design for a city CIP.

Relevant Experience

- Project engineer for the Indian River County Wastewater Hydraulic Model Update, Indian River County, FL. Converted existing GIS information from the County into WaterCAD for use in a hydraulic model.
- Project engineer for the City of Coconut Creek Water/Wastewater/Stormwater Utilities Master Plan, Coconut Creek, FL. An existing asset management system created in house by Kunal and the Water Infrastructure Group customized to the City's GIS system and run to determine areas of the distribution system that require maintenance.
- Project engineer for the Mims Water System Pipeline Replacement, Brevard County, FL. Supported GIS data creation from existing CAD layers, partial clearance permitting, and other design support roles.

Ryan Hejka

Modeling Support

Availability: 20%

Ryan is a civil engineer with six years of professional experience specializing in water and recycled water system hydraulic modeling and master planning. He is skilled in the use of a wide variety of hydraulic modeling packages including InfoWater, H2OMAP, Mike Urban, and WaterGEMS.

Ryan also has extensive experience with ArcGIS and is proficient in multiple programming languages that he has utilized to build several customized water optimization models and tools for various water agencies.

Relevant Experience

- Staff engineer for the Nitrification Study for Mesa Water®, CA.
- Staff engineer/water system planner for the 2014 Water Master Plan Update for Mesa Water®, CA.
- Staff engineer for system-wide hydraulic model development for the Metropolitan Water District of Southern California.

CURRENT WORKLOAD

Our overall firm workload projections indicate that we have sufficient production capacity available for your project. Individual commitment will be consistent with job requirements to provide high-quality service to Mesa Water®.

From a project management standpoint, Carollo makes sure that each individual has adequate availability to meet the project requirements prior to assembly of the project team.

SECTION 3

Scope of Work Understanding

The GIS and Hydraulic Model Hosting and Maintenance Services is the foundation for Mesa Water's GIS system. Mesa Water® is seeking a professional engineering consultant to develop an ESRI-based web application as a common access point for staff to access Mesa Water's GIS data.

PROJECT UNDERSTANDING

The selected consultant will serve as the extension of Mesa Water's staff by updating the GIS and linking the digital assets to Mesa Water's asset management systems and other outside digital resources. In addition to the GIS system, Mesa Water® needs a qualified hydraulic modeling team to provide as-needed hydraulic modeling services on an annual basis.

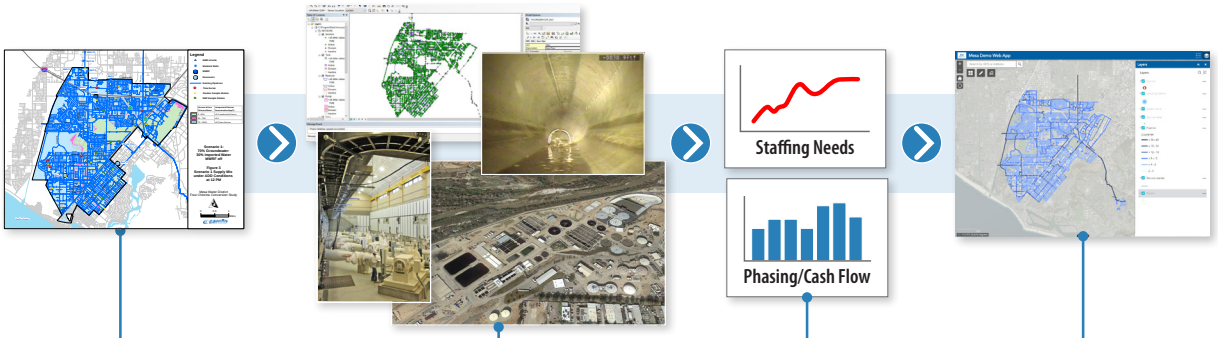
What We've Heard from You

Mesa Water® has a web-based portal with a common login which hosts Mesa Water's GIS, as well as GIS layers from the County of Orange and neighboring cities. Mesa Water® has defined a scope of work to develop a web application to host these GIS layers, establish a regular data update procedure, and update and maintain Mesa Water's hydraulic model. You want your GIS and hydraulic modeling engineering team to provide an easy-to-use and secure web application that builds on the Free Chlorine Conversion Study hydraulic model created in 2018. You also want system integration between the routine updated GIS layers hosted in the web-based application and Mesa Water's four asset management systems. Most importantly, you also want the web-based access point to be secure, mobile-friendly, and deployed within two weeks of signing the contract. You need a team of responsive GIS Specialists, system integration experts, and hydraulic modeling engineers to work alongside Mesa Water's staff to help you locate and manage digital assets at an affordable cost.

KEY CHALLENGES

In developing our understanding of this project, it's clear that project success is defined by meeting **four key challenges**. In the sections that follow, we explain our approach to addressing each key challenge.

1. Develop a secure, easy-to-use web application that is up and running of two weeks of Notice to Proceed.
2. Develop pre-configured search functionality to meet Mesa Water's needs.
3. Establish a 24-hour response team to update Mesa Water's GIS.
4. Establish a framework to link GIS web portal with asset management software.



Carollo will be here to help Mesa Water® at each phase in the project.

Key Challenge #1. Carollo's approach offers a non-proprietary secure solution that can be established quickly to build a long-term platform for GIS data access.

You are looking for a common point of reference that is secure, quick to deploy, easy-to-use, and loads quickly on multiple devices. We recommend hosting Mesa Water's GIS data in ESRI's ArcGIS Online portal. ArcGIS Online (AGO) is a cloud-based mapping and analysis solution that is managed and secured by ESRI. Quick deployment of the web-based portal is critical to minimizing disruption to Mesa Water® staff. By using ESRI's Web AppBuilder to configure the ArcGIS Online portal, you will have a secure, searchable, mobile-friendly, fast-loading, web-based GIS with a secure login for each Mesa Water® employee—all within two weeks of receiving the Notice to Proceed.

OUR APPROACH

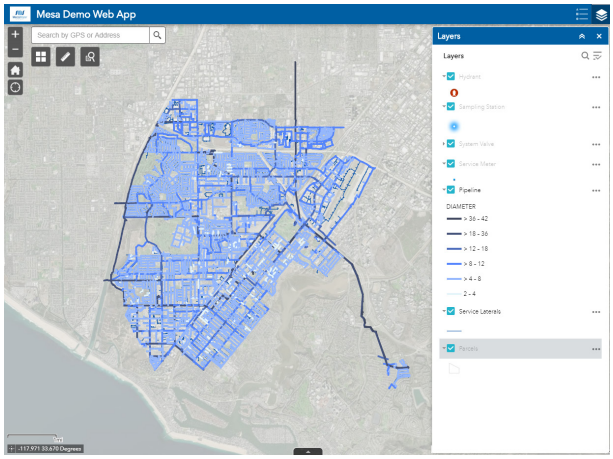
- Using ESRI's search engine, you will be able to search for an address or GPS coordinate.
- Utilize documented communication protocols to provide responsive GIS updates.
- Hosted by ESRI and secured access based on user account roles.
- Fast loading time by setting the visibility range for each layer.
- You own the AGO—we manage it for you.

ALREADY ON THE JOB

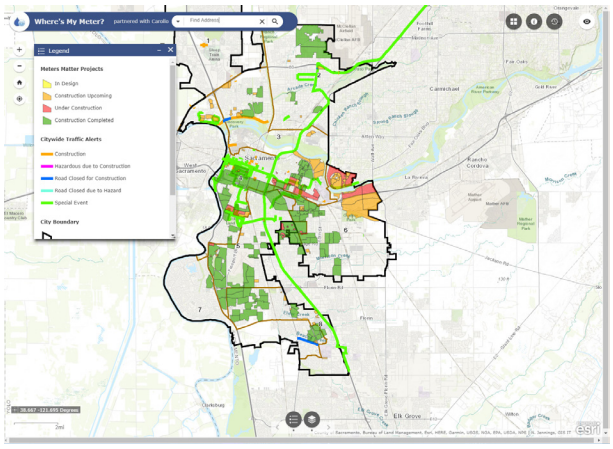
We have created a secure sample web application to give you an idea. Using the secure username: **MesaWaterDemo** and password: **M3s@W@t3r!** that only you have access to, we have created a sample web app for you to explore.

Please visit:

https://carollo.maps.arcgis.com/apps/webappviewer/index.html?id=67219981356c402b9c52c87d86b2df5b



Sample of Mesa Water's web application hosted in ESRI's ArcGIS Online.



Carollo is helping the City of Sacramento manage smart meter installation using AGO.

Building the web app on the ESRI platform will enable Mesa Water® to future-proof their digital assets. AGO provides the framework to enable field crew to edit GIS data using ArcGIS Collector.

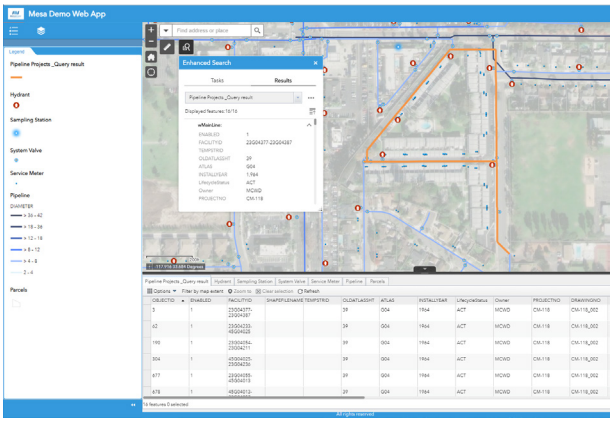
In addition, your data will be updated quickly and efficiently. Carollo has a team of talented GIS specialists that can update the master GIS database and the printable atlas based on record drawing, new customer meters, and service laterals. Once the data has been updated, our specialists will create a standard template that follows Mesa Water's branding guidelines as well as a symbology style guide to provide consistent symbology for mapping digital assets.

Carollo can help Mesa Water® locate high resolution full color orthoimagery at the 4 inch or higher resolution. If Mesa Water® already has a source for this imagery we can work to incorporate the imagery into the web app. If Mesa Water® has purchased the imagery, we can spin up an ArcGIS Image server to host the imagery and incorporate it into the web app.

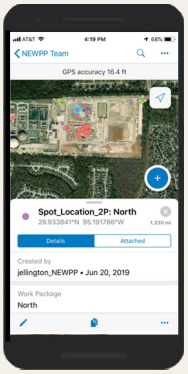
Key Challenge #2. Carollo's platform meets all standard requirements and allows for future enhancements to improve Mesa Water's GIS workflow and functionality.

Quick deployment of the web-based portal is critical to minimize disruption to Mesa Water® staff. By using ESRI's Web AppBuilder to configure the ArcGIS Online portal, you will have a secure, searchable, mobile-friendly, fast-loading, web-based GIS with a common login for each department—all within two weeks of receiving the Notice to Proceed.

Using ESRI's search engine, you will be able to search for an address or GPS coordinate. We will enhance the search functionality to search Mesa Water's GIS Layers with the Enhanced Search tool. The Enhanced Search tool will contain pre-configured search queries for each layer (pipelines, hydrants, etc.) to provide quick access to data you frequently query. The result is added as a temporary layer to the map along with a pop-up to confirm your search results. When you are ready to review all the attributes, a click of a button opens and displays the filtered set of attributes.



Our Mesa Water® app will provide the functionality you need based on an ESRI framework that will prepare you for the future.



Build on your ArcGIS Online application by using ESRI's mobile application ArcGIS Collector. Carollo used ArcGIS Collector on the NEWPP project to collect photos for site assessment.

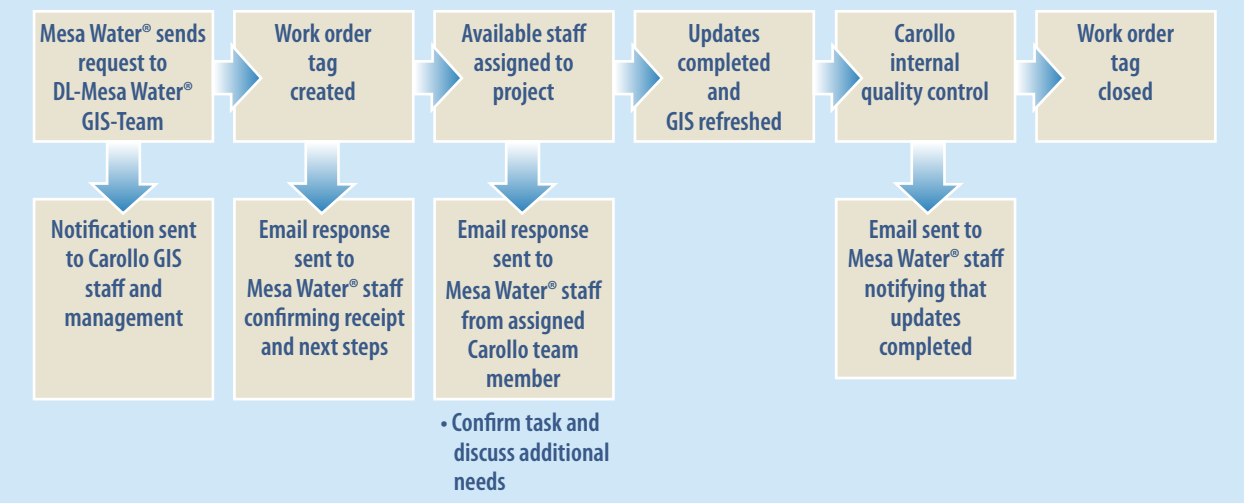
Basic functionality such as changing basemap layers and measuring areas will be added to the application. Security for cloud-based AGO web-applications is managed and secured by ESRI. Departmental user accounts will provide the right data based on privileges. User access controls and scale-based visibility ranges will help to provide fast loading times.

Key Challenge #3. Carollo's on-call GIS will follow a customized QA/QC workflow and work order generator to provide 24-hour response to GIS update requests.

Carollo's GIS specialists and hydraulic modelers have worked closely together for over a decade. Using the QA/QC workflow shown on the next page, we will work to quickly assign the right person to help update the GIS and/or hydraulic model, ask clarifying questions from Mesa Water® staff, and send the data for review to the GIS and hydraulic modeling leads before final review by Mesa Water®. Once Mesa Water® staff completes final review, the updated GIS will be posted to the web application.

Carollo's on-call system will include an extensive team of GIS and engineering professionals. As we have shown in our organization chart, our team includes three full time GIS professionals, but also multiple engineers to support Mesa Water® with efficient and quick GIS updates throughout the five-year contract period.

QA/QC Work Flow

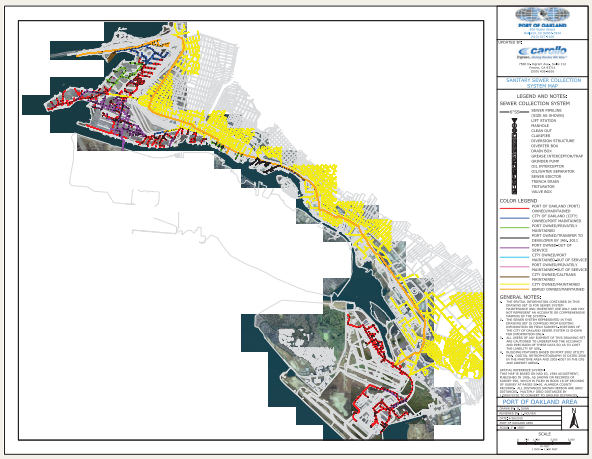


Carollo will complete multiple QA/QC steps along the way to check the quality of the GIS and model updates. Carollo will send Mesa Water® emails to keep you informed of our progress.

Key Challenge #4. Our GIS platform will allow seamless integration with Mesa Water's existing asset management systems and software through REST APIs.

Mesa Water's assets are managed in four separate applications. Carollo reached out to each of these vendors and confirmed these products are GIS-based. MaintStar in particular will be fully GIS-centric by the end of 2019 and will provide REST-based web services. These web services will allow Mesa Water® to click on an attribute link in the web app and open a connection to MaintStar to access facility IDs, valve information, etc. Cogsdale has a similarly GIS-centric system and has built development tools to access the data stored in SQL Server. (Cogsdale's REST API development tools are available as a separate purchase.) Tokay and Waches Water Vitals are also ESRI's based programs that can be linked to the data stored in the AGO web application.

ESRI-based asset management programs can be linked to the web application.



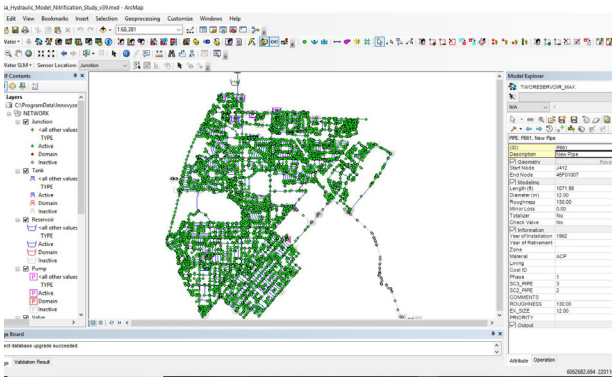
Carollo helped the Port of Oakland link their GIS system to a new set of Atlas Maps. Carollo worked with the Port to provide improved access to GIS data through easy to use formats.

Linking the asset management program information to the corresponding GIS layer in ArcGIS Online web application may require some custom programming. We have the team and experience to make these systems communicate.

Asset management includes providing access to staff to key data through GIS linkage to system maps. Carollo will not only provide a linkage to Mesa Water's existing asset management software but will create linkages to Atlas Maps or other easy to use formats. We have done this for other clients, such as the Port of Oakland.

Carollo's best in class modeling skills, along with our knowledge of your existing model, allows for accurate, and efficient on-call services.

Mesa Water's hydraulic model is in Innovyze's InfoWater and is used for hydraulic evaluation of Mesa Water's distribution system. Based on our experience from the Water Master Plan, Nitrification Study and the Chlorine Conversion Study, Carollo has significant experience with Mesa Water's hydraulic model and used the model for a variety of different system evaluations.



Mesa Water's hydraulic model is in Innovyze's InfoWater and is used for hydraulic evaluation of Mesa Water's distribution system.

Carollo will use the existing model to perform hydraulic evaluations required by Mesa Water®. These evaluations may range from fire flow capacity and system pressure evaluations, to what-if scenarios evaluating pipeline sizes and materials, to water age and source tracing evaluations. We will use Mesa Water's standard form to report pressure results for fire flow.

We also understand that part of our responsibility will be to keep the hydraulic model up-to-date. As GIS update requests are processed by our team, the model will be updated from the GIS to incorporate any modifications to pipelines and other facilities, so that the model reflects current field conditions.

We also understand that Mesa Water® may want to calibrate the hydraulic model based on SCADA system information for water production, reservoir levels, and a pressure logger survey. Proposed team members are currently writing the reference book for AWWA on water system hydraulic model calibration. Carollo owns 17 pressure loggers in which we can deploy to collect field data on behalf of Mesa Water®. Based on our proposed team's experience with hundreds of water system models, we know how to pinpoint the issues of concern and calibrate the results so that the model gives reasonable and realistic results.

Monthly Work Status Summary Report

Each month Tim, Jackie, and Matt will develop a summary report detailing the work completed in the previous month, any issues or concerns, and proposed work for the next month.

The report will also include a summary of work effort and overall budget status, and will be submitted to Mesa Water® together with the monthly invoice.

Education

MS Environmental Engineering, University of California, Berkeley, 2005

BS Civil Engineering, California State University, Fresno, 2003

Licenses

Civil Engineer, California, Nevada

Professional Affiliations

Nevada Water Environment Association

American Water Works Association

Timothy J. Loper, P.E.

Timothy Loper has 18 years of experience in wastewater collection system modeling, water distribution system modeling, water system feasibility studies, wastewater treatment facilities planning, and infrastructure master planning.

Relevant Experience

→ Project engineer for the OneWater Morro Bay Master Plan, City of Morro Bay, California. The project included water system field data gathering (pressure logger installation, SCADA system data gathering, and fire flow test data). That information, combined with the City's GIS and as-built drawings, was used to develop dynamic hydraulic (water and sewer) and hydrologic (stormwater) models for those systems. The calibrated models were used to evaluate each system under both current and future scenarios. Based on this evaluation, deficiencies were identified and the associated improvements necessary to eliminate these deficiencies were determined.

→ Principal-in-charge for the City of Reno, Nevada, Northwest Reno Sewer Capacity Analysis and Master Plan. Carollo was retained to conduct a sanitary sewer capacity analysis and develop a master plan for the City's Northwest area. The team developed a temporary flow monitoring program; reviewed the City's existing SewerGEMS model to expand the existing wastewater collection system hydraulic computer model, including nine major trunk lines; calibrated the model using flow monitoring data; reviewed planning documents to determine existing and build-out wastewater flow projections; modeled existing and future system capacity evaluations; and developed prioritized, recommended capacity projects based on deficiencies.

→ Project manager for City of Tulare, California, Water Model Update, and Calibration. Tim was responsible for update and calibration of the City's existing water system model that was developed in the InfoWater hydraulic modeling software. Carollo worked closely with the City to collected and analyze SCADA data for water production to use in the development of maximum and average day demand peaking factors, as well as conducting a water system supply analysis to determine supply needs. Carollo installed temporary pressure loggers to collect pressure data to be used for model calibration. Carollo used the updated model to conduct an analysis of the system deficiencies and to make recommendations on system improvements.

→ Project manager for the City of Millbrae, California, Water System Master Plan. Carollo was contracted by the City to complete a water master plan that provided a capital improvement program to help mitigate storage deficiencies and hydraulic constraints caused by the separation of their four pressure zones. Tim was responsible for the update and calibration of the hydraulic model that was developed in InfoWater. The City's primary concern was lack of storage in its lower pressure zone and the potential for emergency outages in the event of a large earthquake. Carollo conducted a seismic evaluation of the water storage tanks and the optimization of the storage needs of the lower zone and rehabilitation of existing tanks.

→ Project manager for the City of Fresno Kings River Pipeline and Southeast Surface Water Treatment Plant (SESWTP) Design Project. Carollo designed and provided engineering services during the construction of a new 80-mgd SWTF as part of a 10 year Metro Water Plan. The 72-inch transmission pipeline will divert raw water from the Kings River to SWTF for treatment and potable water distribution.

→ Quality control engineer for the City of Banning, California, Water and Wastewater Master Plan. The project involved updating the City's water, sewer, and recycled water master plans into an integrated master plan to guide the City with budgeting and implementation of capital improvement projects. Responsible for quality review and project oversite and technical direction.

→ Project engineer for the City of Oceanside, California, Integrated Master

Plan, which included a new collection system hydraulic model prepared from GIS data using InfoSWMM. The existing system was evaluated with respect to existing and future capacity needs. The master plan also considered a phased plan for replacement of the City's water and wastewater pipelines as part of the rehabilitation and replacement program.

→ Project manager for the Shasta Lake 2016-2026 Water Master Plan, City of Shasta Lake, California. The project included development of a new water system hydraulic model based on the City's most recent GIS database of the water distribution system. The water distribution system hydraulic model was developed using the InfoWater hydraulic modeling software package, developed by Innovyze, Inc. The hydraulic model was calibrated using a three-step calibration approach, including a macro calibration, steady state (fire flow test) calibration, and an extended period simulation calibration.

→ Principal-in-charge for the ongoing Truckee Sanitary District, California, 2017 Hydraulic Modeling Assistance. The District hired Carollo provide assistance with the development and calibration of three of their four existing wastewater collection system models. The models are being calibrated to peak dry and peak wet weather flow conditions using flow monitoring data from the 2016 and 2017 storm season.

→ Project engineer for the Port of Oakland, California, Port-Wide Sewer System Management Plan, which was required to meet both the State and Regional Water Quality Control Board's Waste Discharge Requirements and to adhere to the Port's core business of operating the airport, seaport, and commercial real estate areas. Close coordination between three agencies (Port, City of Oakland, and East Bay Municipal Utility District) was necessary to develop accurate maps of the Port's sewer collection system and to establish the boundaries of responsibility among the three agencies.

The project included development of a fully dynamic (non-steady state) sewer system hydraulic model calibrated to both dry and wet weather conditions. Carollo also conducted a sewer system facilities condition assessment; fats, oils, and grease control plan; overflow emergency response plan; sewer use ordinances; sanitary sewer design and construction standards; and other items required to meet the WDRs.

→ Project engineer for the City of Livingston, California, Water Distribution System Master Plan. Responsible for construction and calibration of the City's water system computer model to simulate existing conditions and development of evaluation and planning criteria. Also responsible for evaluation and determination of existing system deficiencies and development of system improvements to mitigate those deficiencies. The City of Livingston is unique in that 65 percent of the potable water from the distribution system is used for a single industrial customer. Provided support to the City for the implementation of a California Prop 218 water rate increase. Attended public hearings and meetings with industrial users and made presentations to the public and the City Council.

→ Project manager for Marin Municipal Water District, California, Water System Improvements Storage Tank Sizing Project. Tim was responsible for development and analysis of project documentation to support the District's environmental review of recommended tank improvements to support the District's, Water System Improvement Program (WSIP). Carollo worked closely with the District to update the District's InfoWater hydraulic model and analyze multiple alternatives for the sizing of the Ross Valley and Five corners tank sites. Carollo worked closely with the District to develop alternatives that were acceptable for environmental and political considerations.

→ Collection system lead for the City of Riverside, California, Comprehensive Wastewater Master Plan. The Master Plan included both treatment and wastewater collections. Carollo built the City's collection system model using Innovyze's InfoSWMM modeling software.

Education

MGIS, Penn State University, 2017

BA Geography, California State University, Northridge, 2001

AA Geology, Pasadena City College, 1997

Certifications

Certified Geographic Information Systems Professional (GISP), Geographic Information Systems Certification Institute, 2012

Jackie M. Silber, GISP

Jackie Silber is a geographic information systems (GIS) lead with 18 years of professional experience in GIS and technical training. Her experience includes geospatial GIS analysis for water resource planning, environmental remediation sampling, and demographic forecasting projects. Her GIS skills focus on geodatabase design and optimization, manipulation and conversion of projections, CAD and KML to GIS conversion, spatial analysis, automation of repetitive analysis using Model Builder and Python, and creation of cartographic figures.

Relevant Project Experience

→ GIS lead for the Mesa Water District, California, Free Chlorine Conversion Study. Ms. Silber developed figures to illustrate the supply sources at different demand conditions.

→ ArcGIS online administrator/technical advisor for the City of Houston, Texas, Northeast Water Purification Plant.

→ ArcGIS online administrator for the City of Reno, Nevada, Northwest Model Expansion and Capacity Analysis and Master Plan Story Map project.

→ GIS specialist for the San Gabriel Valley Water Company Water System Master Plan Update, California. In addition to developing figures illustrating system deficiencies, Ms. Silber also developed a Python script to loop through an 11 million record table and sum the total water demands for every customer.

→ GIS specialist for the City of Banning, California. As part of the Integrated Master Plan, Ms. Silber developed figures representing the existing recycled water system as well as the proposed non-potable reuse system.

→ GIS specialist for the University of California, Irvine, Recycled Water System Analysis and Capital Improvement Program. Ms. Silber worked with hydraulic modelers to illustrate future system pressure deficiencies and pipeline velocities.

→ GIS specialist for the City of Medford, Oregon Sanitary Sewer Master Plan. To help the City anticipate future needs, Ms. Silber, developed figures illustrating the locations of high I/I due to sewer trunk line deficiencies. Also investigated existing and future land use changes per parcel as part of a wastewater capital charge per equivalent residential unit analysis.

→ GIS specialist for the Hillsborough County, Florida Capital Improvement Program. As part of the on-call potential Septic Replacement/Water Line Extension Program, Ms. Silber performed geospatial analysis to determine the number of septic parcels within wellhead protection and high hazard coastal areas. Additionally, produced figures of wastewater facilities and parcels served by current infrastructure.

→ GIS specialist for a Long-Range Wastewater Management Plan for the City of Renton, Washington. As part of the pipe risk approach, Ms. Silber developed an ArcGIS-based criticality and vulnerability model. The model identified and prioritized critical assets in close proximity to key infrastructure or that are susceptible to failure.

→ GIS specialist for the U.S. Agency for International Development (USAID) Infrastructure Needs Program Bulk Water Supply Systems Master Plan (Southern West Bank, Palestine). As part of a team responsible for defining the future water facility needs in the southern West Bank, developed GIS data, traveled to the West Bank, and presented the data to USAID and other key stakeholders. With the help of bilingual staff, also conducted a workshop for GIS specialists to review the data developed, which included three geodatabases and a file system of existing and recommended water and wastewater infrastructure. Pipeline data was imported from AutoCAD and created from heads up digitizing on aerial photography and was compared against the hydraulic schematic. Assisted project managers with locating potential wells/wellfields based on topology, cone-of-depression, and other hydrologic constraints. Additionally, elevation profiles from ground surface

data were created for proposed regional pipelines. Geologic scanned imagery was georeferenced to a common projection system and a file system was created to maintain organization. Also served as internal project coordinator for the final deliverable.

→ GIS specialist for the Los Angeles County Waterworks District 29, California, Water System Master Plan. Compiled and developed a water infrastructure geodatabase and geocoded the water billing data to correlate metered usage data with parcels. Using current land use and future zoning parcel data, analyzed water demands for private customers. Also created pressure zones and allocated commercial demands for fire flow in InfoWater.

→ GIS specialist for on-call GIS services for the City of Westminster Water Department, California. To provide current updates to the District's GIS data, Ms. Silber cleaned, projected, and updated the City's valves and hydrant attributes. Additionally, she cleaned the pipeline topology and created a map book for field personnel. The data was delivered and used as part of the training for water district personnel on using maintaining the map book.

→ GIS specialist for the Stormwater Capture BMP Site Suitability Analysis for the Upper San Gabriel River Enhanced Watershed Management Program, California. Using a uniform grid, performed a multi-criteria decision analysis of valued and binary constraints to identify potential stormwater BMP sites in the Watershed as part of the Los Angeles County MS4 Permit Compliance. The constraints were scored and weighted to rank the locations. Iterative tasks such as classifying the locations were automated using python scripts.

→ GIS specialist for the Mission Creek and Garnet Hill Subbasins Water Management Plan for the Coachella Valley Water District, Desert Water Agency, and Mission Springs Water Districts, California. As part of a collaborative groundwater replenishment program, analyzed population and other demographic projections and mapped the watersheds and multi-habitat conservation areas.

→ Lead cartographer for the Los Angeles Department of Water and Power (LADWP), California, Owens Lake Groundwater Evaluation Program, which is a collaborative program between LADWP and the Inyo County Water Department to evaluate use of groundwater for dust mitigation on Owens Lake. Provided GIS support for well location identification, and was responsible for managing the GIS data for the project. Working with hydrgeologists and modelers, mapped surface geology, groundwater contours, consumptive use, and water quality surrounding the Owens Lake Bed. Also produced well log illustrations.

Education

MS Civil and Environmental Engineering, Stanford University, 1999

BS Applied Ecology, University of California, Irvine, 1998

Licenses

Professional Engineer, Oregon, Washington

Civil Engineer, California

Professional Affiliations

American Society of Civil Engineers

American Water Works Association

Matthew M. Huang, P.E.

Matthew Huang is an expert on water and recycled water hydraulic modeling and master planning, but also has a broad base of experience, also working in water quality, water and wastewater treatment, water and sewer infrastructure, water resources, and wastewater system modeling and master planning, with experience in planning, design and construction. His project management background includes many large planning and design projects, with projects in ten states and seven foreign countries. In addition, Mr. Huang has experience with a number of specialized computer programs, including InfoWater, H2OMAP, H2ONET, InfoSewer, InfoSWMM, InfoWorks WS, WaterGEMS, GoldSim, WEAP, and ArcView GIS, as well as a number of database, programming, scheduling, and spreadsheet programs.

Relevant Experience

→ Project engineer for Mesa Water's Chlorine Conversion Study, California. This study performs a water source trace using the hydraulic model to determine under various operating conditions, which supply sources serve which customers. As Mesa is considering using both free chlorine and chloramines as disinfectants from different water supply sources, this study is performed to evaluate the potential impacts of the multiple disinfectant strategy to control nitrification.

→ Project engineer for Mesa Water District's Nitrification Study, California. Due to long detention times and large storage volumes, the District suffers from nitrification in their water distribution system. This study evaluates the feasibility of removing reservoirs from service in order to reduce water age and evaluating the impact of the hydraulics of the water system by doing so.

→ Project engineer for San Gabriel Valley Water Company's two water system master plans, for their Los Angeles County Division and for the Fontana Water Company. Mr. Huang served as the hydraulic modeling lead for this fast-paced project, completing two water system master plans within a five-month period. This project was in preparation for San Gabriel's rate case to the CPUC, providing project justifications for use in the rate case.

→ Project engineer for Antelope Valley East Kern Water Agency's Water System Master Plan, California. This first-ever master plan for AVEK provides a comprehensive evaluation of AVEK's demands, water supply reliability, water banks, water system, staffing, replacement programs, SCADA system, water quality, design standards, and seismic reliability. These recommendations were combined into a Capital Improvement Program.

→ Project reviewer for City of Dallas' Water Master Plan, Texas. He was involved in the development of the hydraulic model, including hydraulic and water age calibration of a multi-million population water system. His involvement included regular model review as well as hydraulic modeling strategy development.

→ Project engineer for City of Camas' On-Call Hydraulic Modeling Services, Washington. Mr. Huang is serving as the primary hydraulic modeler for services for Camas, including impact of additional supplies, development of short-term strategies to meet growing demands, and impacts of new development on the water system.

→ Project reviewer for EPCOR's Agua Fria System Water Master Plan, Arizona. This distribution system master plan for one of EPCOR's systems evaluates the hydraulics and operations of EPCOR's system. Mr. Huang's role was review and consultation for the hydraulic model.

→ Project reviewer for the Pressure Zone Study City of Lacey, Washington. Mr. Huang provided technical review and hydraulic modeling assistance for a complicated hydraulic model. This study evaluated addressing low pressures in certain parts of the City's water system, with alternatives of creating a new pressure zone, new storage, and operational modifications. The study also included evaluation of water system operations with a key reservoir out of service for a six month period.

Matthew M. Huang, P.E.

→ Project manager and technical review for Tualatin Valley Water District's On-Call Hydraulic Modeling Services, Oregon. Mr. Huang served as technical review for a master plan update for TVWD. He was also involved in supporting TVWD with hydraulic modeling requests associated with development of a new water source, reservoir replacement, and transfer of part of the water system to a neighboring agency.

→ Project reviewer for City of Tumwater's Water System Master Plan, Washington. Mr. Huang provided hydraulic modeling review and technical advice on the development of the master plan, hydraulic modeling, and system improvement recommendations.

→ Project reviewer for City of Prescott's Water Master Plan, Arizona. Mr. Huang provided hydraulic modeling review services for Prescott's InfoWater hydraulic model.

→ Project reviewer for Albuquerque Bernalillo County Water Utility Authority, New Mexico. Mr. Huang provided technical support in the development of the hydraulic model, including model debugging in support of the project.

→ Project manager for Elsinore Valley Municipal Water District's Western Murrieta Transfer Study, California. This project evaluates the feasibility for EVMWD to transfer water and serve Western Municipal Water District's Murrieta Division, identifying the required infrastructure, and defining costs for doing so.

→ Project engineer for City of Torrance's High Zone Water Evaluation, California. On this project, Mr. Huang is responsible for completion of this work, which includes a hydraulic evaluation of three pump stations feeding a pressure zone.

→ Project engineer for Clackamas River Water, Water System Master Plan, Oregon. Mr. Huang is serving as Project Engineer for CRW's master plan, updating the comprehensive master plan after 12 years since the previous plan. He is responsible for all aspects of the plan, including demand projections, hydraulic modeling, system evaluation, and CIP development.

→ Project reviewer for City of Salem Unidirectional Flushing Pilot Program, Oregon. Mr. Huang provided technical review for Salem's UDF study, developing flushing runs for a portion of Salem's system.

→ Technical expert for Woodinville Water District's Water System Master Plan, Washington. Mr. Huang provided technical assistance on the operation of Woodinville's water hydraulic model to resolve runtime errors and allow the model to be used for necessary evaluations.

→ Project engineer for Marin Municipal Water District's Pine Mountain Tunnel Replacement Evaluation, California. MMWD is taking a tunnel, which is used as a reservoir out of service, and the one of the recommended sites for a replacement reservoir was found to be infeasible. In this project, Mr. Huang performed hydraulic modeling to evaluate the impact of removing these two reservoirs out of service under normal and emergency situations, and replacing an existing storage tank with a larger one at the same location.

→ Project reviewer for City of Camas Water Master Plan, Washington. Mr. Huang provided thorough technical review of the hydraulic model of Camas' water distribution system, recommending modifications to hydraulic model controls and setup, and modifications to recommended capital improvement projects.

→ Project engineer for the Pasadena Water and Power Hydraulic Model Calibration. Mr. Huang's team was responsible for collecting field data, adding model controls, creating diurnal curves, and calibrating the model for both fire hydrant tests and for an extended period simulation.

→ Senior hydraulic modeler for the Cucamonga Valley Water District's Water Master Plan, California. He performed the hydraulic model calibration and evaluation of the water system. CVWD developed in house their first all pipe model, and Mr. Huang was responsible for calibrating the model, and used the model to evaluate the water system under existing and buildout demand conditions.

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, Ph.D., P.E.

Dr. Graham Juby, a vice president with Carollo Engineers, has 36 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 a number of planning projects. He has also been involved with several fast-track and alternative delivery projects.

Relevant Experience

→ Principal-in-charge for the 2014 Water System Master Plan for Mesa Water District, California. This ongoing 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

→ Project manager for the preparation of a Water System Master Plan for the Mesa Water District, California. He worked directly with Mesa staff to prepare a Water System Supply Plan, an Emergency Supply Plan, and a Water System Operations Plan for the master plan. He assisted Mesa staff to complete the Capital Improvement/Replacement Plan to identify budgetary requirements through the year 2010.

→ Project manager for the Colored Water Project, in the role of the owner's engineer, for the Mesa 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 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/builder.

→ Principal-in-charge for the preliminary and final design for the Colored Water Treatment Facility Technology Replacement and Expansion project for Mesa Water District, California. The project involved designing a new 9-mgd nanofiltration (NF) treatment facility to treat higher level colored water from two on-site wells at the Orange County Groundwater Basin by replacing the existing ozone and biologically enhanced activated carbon (BAC) filtration system. The process will recover up to 98 percent of the feed water as potable water and includes hydrogen sulfide and methane stripping facilities and use of the existing on-site storage and pumping equipment. The plant was brought on line in 2012.

→ Principal-in-charge for the Well Automation and Rehabilitation Project for Mesa Water District, California. Carollo is preparing contract plans, specifications, and construction cost estimates for the automation, rehabilitation, and facility retrofits of Mesa Water's five clear water wells (Wells 1, 3, 5, 7, and 9) and supporting site facilities.

→ Principal-in-charge for the Finished Water Quality Polishing Project for Mesa Water District, California. Carollo prepared contract plans, specifications, and construction cost estimates for the design of a permanent sodium bisulfite chemical feed and storage system as well as miscellaneous improvements at Mesa Water Reliability Facility

(MWRF). Four areas were identified for improvement during the project: sodium bisulfite storage and metering, degasifier clean-in-place system, carbonic acid injection, and finished water chemical addition. Carollo was hired by Mesa Water to investigate and propose solutions to the operational issues identified for each of these areas.

→ Principal-in-charge for Carollo's portion of the work for the 2015 Wastewater Facilities Master Plan Update Report for the Inland Empire Utilities Agency (IEUA), California. This assignment involved demand projections, analysis, hydraulic modeling, and evaluation of technology needs and cost estimates for five IEUA treatment facilities, through the planning horizon of 2060.

→ Project manager for planning investigations for Poseidon Resources Corporation, California, to provide desalinated seawater to a Southern California county. Preliminary modeling using $H_2ONET^{®}$ was used to assist with the evaluation of a number of alternative schemes to introduce water into the existing distribution pipework.

→ Project specialist on a team for establishing the realistic capacity of the Western Municipal Water District, California, Riverside Regional Water Quality Control Plant. Duties included preparing a process model for the nominal 40-mgd plant, evaluating plant performance data, calibration of the process model, and determining the allowable loading rates of the treatment processes. One important aspect of the analysis was determining the nitrogen removal capacity of the plant. Influent N-loads and de-nitrification capacity were used in the analysis to determine the effluent TIN expected when the plant reaches full capacity.

→ Principal-in-charge for the Stormwater Master Plan for the City of Torrance, California. The project included development of a Storm Water Quality Management Plan with the capability to model various land use and storm water Best Management Practices.

→ Principal-in-charge/project manager for preliminary design of a new brackish water desalting facility for Indian Wells Valley Water District, California. The project included developing a well sampling protocol; screening treatment processes that could deal with the wide range of contaminants in the water, such as selenium, arsenic, etc.; evaluating three feasible treatment trains from which one will be selected for further analysis; preparation of a site layout, process flow diagram, and hydraulic profile for the selected train; as well as estimating the cost of the treatment process.

→ Principal-in-charge for the Treatment of Perchlorate in Contaminated Groundwater project for the Castaic Lake Water Agency, California. The project involved evaluating perchlorate treatment options, pilot testing optimum alternatives, and designing a treatment train able to address multiple contaminants. Developed a membrane treatment train model to assist with selection of appropriate technologies for pilot testing.

→ Project manager for the preliminary design evaluation of brackish groundwater for the Indian Wells Valley Water District, California. The project first involved establishing the water quality in the North Well Field area as a source for potable treatment. Several treatment trains were then developed and modeled to treat the brackish water that contained elevated levels of iron and silica.

→ Principal-in-charge for an evaluation of alternatives to replace 26 mgd of potable water used for agricultural irrigation with high quality reclaimed water for the Rancho California Water District, California. Mass balance models for seven treatment alternatives were prepared to evaluate the capacity of the unit processes when treating wastewater effluent.

→ Principal-in-charge for the ongoing 2016 Wastewater Facilities Master Plan Update for the Eastern Municipal Water District (EMWD), California. This ongoing assignment involves demand projections, analysis, development of trigger curves based on plant organic loading, and evaluation of new facilities needs at all four of EMWD's regional wastewater treatment facilities. Capital costs were developed to take all facilities to their ultimate capacities in the year 2060.

Education

MSc Environmental Engineering, Agricultural University, Wageningen, Netherlands, 1997

BS Environmental Engineering, Hogeschool Van Utrecht, Netherlands, 1995

Licenses

Civil Engineer, California

Professional Affiliations

American Water Works Association

Association of Women in Water, Energy, and Environment

Water Environment Federation

WateReuse Association (Technical Chair of Los Angeles Chapter)

Inge Wiersema, P.E.

Inge Wiersema is an environmental engineer with 24 years of experience and is specialized in water system planning and water resources projects. She has been involved in more than 100 master planning and hydraulic modeling projects for water, recycled water, wastewater, and stormwater systems in Southern California.

She has also worked on various groundwater management plans, watershed management plans, urban water management plans, sewer system management plans, and water supply studies. Her technical experience also includes conceptual and preliminary design of pipelines, pump stations, and water treatment plants.

Relevant Experience

→ Project manager for the nitrification prevention modeling project for Mesa Water District, California. This project was a follow-up of the 2016 Nitrification Study and involved detailed hydraulic modeling analysis for a variety of reservoir and system configurations to reduce water age in the system. The findings were presented in a report and used to guide the district with system configuration and operational changes.

→ Project manager for the Nitrification Study for Mesa Water District, California. This project involved the analysis of extensive field data gathering and laboratory testing to identify trends and solutions for nitrification events. In addition, hydraulic modeling analysis was conducted to identify potential hydraulic contributing factors, such as water age. Findings were presented in a comprehensive report, including a nitrification mitigation and prevention plan.

→ Project manager for the 2014 water master plan for Mesa Water District, California. This project included 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 (eight groundwater wells, one treatment plant, two reservoirs, two 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 in a comprehensive CIP and water master plan report.

→ Project manager for the Hydraulic Water Quality Modeling project for the City of Glendale, California. The project included the preparation and calibration of an all-pipe hydraulic model created from a geographic information system (GIS), modeling training, assistance in preparation of the City's Initial Distribution System Analysis (IDSE) Plan, and additional water quality modeling. She conducted a number of water-age and water-quality modeling analyses to assist with the IDSE Plan and identify sampling station influence zones.

→ Project manager for the Water Master Plan for the City of Garden Grove, California. The project included development of a complete water system GIS, creation of a hydraulic model, demand projections, system analysis, CIP development, and preparation of a master plan. The model was calibrated for average and maximum day demands, as well as for water quality parameters.

→ Project manager for the Water and Recycled Water Master Plan Update for the City of Ontario, California. The project included potable and recycled water demand projections for both the existing city (Old Model Colony) and the recently annexed expansion (New Model Colony). Two new hydraulic models were created in H2OMAP Water® for the potable and recycled water systems. The potable water model was created from a geographic information system (GIS) and calibrated for seven days.

→ Project engineer for the Pomona Water and Recycled Water Master Plans for the City of Pomona, California. The project included creation and calibration of water, recycled water, and sewer models using the City's geographic information system (GIS).

→ Project manager for a Water Master Plan for the Elsinore Valley Municipal Water District, California. An all-pipe hydraulic model

for the entire district was created from the District's geographic information system (GIS).

→ Project manager for the Water System Pressure Zone Analysis for the City of Torrance, California. This project included hydraulic modeling analysis of six alternatives to evaluate potential rezoning of the City's High Zone to improve system reliability. In addition, the addition of a new pressure zone in the north part of the City was evaluated to mitigate high pressures.

→ Project manager for the hydraulic model development for the City of Pasadena, California. As part of this project, a new hydraulic model was created in InfoWater by Innovyze. Carollo conducted technical review of the model network and enhanced the model topology and added water system controls based on communications with the City's operations staff. A model calibration plan was prepared and the model will be calibrated for extended period simulation conditions. The model development process was documented in a report along with a model maintenance manual.

→ Project manager for system-wide hydraulic model development for the Metropolitan Water District of Southern California. As subconsultant to DHI, Carollo assisted in the development, calibration, and validation of four separate hydraulic models that collectively cover Metropolitan's entire conveyance system. The models were developed in Mike Urban modeling software.

→ Project manager for on-call water system modeling for the City of Santa Barbara, California. As part of this on-call contract, various modeling studies were conducted related to the new desalination plant. Each study was summarized in separate technical memoranda. Studies completed to date include: 1) Conveyance Alignment Study to support the preliminary design report of the desalination plant; 2) Energy Optimization Study for various production scenarios; 3) Extreme Drought Analysis with various supply options; and 4) Transmission Main analysis to serve Montecito Water District. An executive summary report was prepared that combined all studies.

→ Project manager for the on-call hydraulic modeling for the City of South Pasadena, California. The project consisted of various hydraulic modeling evaluations to the hydraulic impact and new water system infrastructure requirements when new developers are connected to the existing distribution system. The model that was developed and calibrated during a previous project was utilized for these studies.

→ Project manager for the hydraulic water system and pressure zone analysis for the City of Banning, California. This ongoing project includes the compilation of a City-wide model from multiple hydraulic models, storage analysis, storage siting, and preparation of a technical memorandum.

→ Project manager for the hydraulic model update project for the City of Santa Barbara, California. This project involved updating the existing water distribution system hydraulic model with recent GIS pipelines, geocoding of 2013 water billing records, updating facility controls, and recalibration.

→ Project manager for the hydraulic model development and Northeast Planning Study for the Yorba Linda Water District, California. The project included update of the District's hydraulic model, a two-week hydraulic calibration, and a water-quality calibration using InfoWater™ MSX software. The updated model was used for the planning study that identified system improvement needed to serve the District's last large infill development.

→ Project manager for the hydraulic model development project for the City of South Pasadena, California. The project consisted of the development of a new hydraulic model from water atlas maps, model calibration, documentation, and training. A detailed field testing plan was developed and executed to collect extensive field data for fire-flow, C-factor, and extended period simulation (EPS) calibration of the old and aging water system. Hydraulic model training was also provided at the end of the project.

Education

AAS Geographic Information Management, Green River Community College, 2013

Kevin R. Christensen

Kevin Christensen has experience preparing map documents using geographic information systems (GIS) data of varying levels of complexity. He has performed geospatial analyses utilizing a variety of ArcGIS tools and geoprocesses to create and visualize GIS data. Kevin has experience working on master planning projects for Carollo planning teams across the west coast. His duties include creating map documents, analyzing GIS data, and linking non-spatial data to GIS.

Relevant Experience

→ GIS analyst for the City of Oxnard, California, Public Works Integrated Master Plan. Responsible for creating map documents that show the City's sanitary sewer, potable water, reuse water, and stormwater systems.

→ GIS analyst for the City of West Sacramento, California, Water Master Plan Update. Responsible for creating and editing map documents that displayed the water distribution system and land use data.

→ GIS analyst for the Bella Vista Water District, California, 2010 Urban Water Management Plan. Assisted in population projections for the service area and created figures displaying the water system and population projections.

→ GIS analyst for the City of Glendale, California, 2013 Integrated Master Plan. Responsible for creating figures displaying the City's water system.

→ GIS analyst for the City of Auburn, Washington, Water System Plan Update. Assisted in editing map documents that display the City's current and future water system.

→ GIS analyst for the City of Bainbridge Island, Washington, Water System Plan. Assisted in editing the water system and land use map documents.

→ GIS analyst for the City of Auburn, Washington, Water Model On-Call Services. Involved in developing a set of unidirectional flushing program map documents. Responsible for creation of proposed directional flushing map figures that display the direction the pipes are flushing.

→ GIS analyst for the City of Stanwood, Washington, 2014 Water System Plan update. Updated the map documents based on a new influx of data. Duties included updating the capital improvement program and land use map documents.

→ GIS analyst for the City of Ashland, Oregon, TAP Emergency Supply Project. The project involved developing a transmission main to go from the City of Talent, Oregon, to the City of Ashland to relieve drought conditions. Responsible for mapping the water system improvements including the new pump station and new transmission main.

→ GIS analyst for the City of Modesto, California, Wastewater Collection Master Plan. Responsible for creating map documents that show the City's sanitary sewer system and land use data.

→ GIS analyst for the City of Modesto, California, River Trunk Realignment, Bead Brook Siphon and Cannery Segregation Project. Responsible for creating figures that showed the existing alignment, problem areas, and recommendations for the project area.

→ GIS analyst for the Navy Yard City, Washington. Responsibilities include converting a list of sewer defects captured by the client into a figure for analysis. The analysis was based on the type and severity of sewer defects within the Navy Yard City sewer system to create a heat map of possible problem areas. Engineers then took steps to create a set of proposed improvements to the sewer system in the Navy Yard City area.

→ GIS analyst for the City of Cottage Grove, Oregon, Storm Drainage and Sanitary Sewer Master Plan Update. Responsible for updating and creating new figures for the Cottage Grove Sanitary Sewer and Storm Drainage Master Plan update.

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Education

MS Civil and Environmental Engineering, Massachusetts Institute of Technology, 1997

BS Civil and Environmental Engineering, Villanova University, 1994

BA Honors Program, Villanova University, 1994

Certificate, Certified Construction Documents Technologist (CDT), Construction Specifications Institute

Licenses

Civil Engineer, California, Arizona

Professional Affiliations

American Water Works Association, Information Management and Technology Committee Member

Water Environment Federation, Automation and Information Technology Committee Member

California Water Environment Association, Member

AZ Water Association, Member

Project Management Institute, Member, currently pursuing PMP certification

Daniel P. Baker, P.E.

Daniel Baker has 27 years of experience in business and management consulting for water and wastewater utilities throughout the United States. His education and experience as a professional civil and environmental engineer provides him with the insight to understand his clients' engineering, business, and technology goals. He has managed numerous complex planning and implementation projects for large utilities and municipalities that have drawn on his expertise in a wide range of areas including performance assessments, asset management, operations and maintenance management, information systems, master planning, system optimization, and capital program development. His relevant experience includes:

Relevant Experience

→ Program controls lead for the City of Sacramento, California, Accelerated Water Meter Program. The project includes data collection and management to interface with City's business systems and GIS.

→ Program controls lead for the City of Houston, Texas, Northeast Water Purification Plant Program Owner's Engineer/Agent project.

→ Principal consultant for the Asset Management Implementation Plan, Central Contra Costa Sanitary District, California. Assisted in asset management framework development for standardized condition assessment of CCCSD's treatment and collection system facilities. Also provided recommendations on integration of condition assessment and risk analysis data into CCCSD's GIS and maintenance management systems.

→ Project manager for the El Estero Wastewater Treatment Plant Asset Management Support Services for the City of Santa Barbara, California. He led the development and implementation of an asset management program for the El Estero Wastewater Treatment Plant and sewage lift stations including upgrades to the maintenance program, computerized maintenance management system (CMMS) reporting, inventory management, procurement process, and a capital improvement program (CIP) asset renewal plan.

→ Principal consultant for the Sanitary Sewer System Planning Project and Asset Management Support for the Port of Oakland, California. The project included assistance with review and update of the management programs for the wastewater collection system including the Sewer System Management Plan (SSMP) and requirements related to the Environmental Protection Agency's Administrative Order for the City and Port of Oakland. He provided support for data improvements and integration of the Port's Oracle® EAM system with GIS and closed-circuit television (CCTV) inspection programs.

→ Project manager for the Asset Reliability Assessment and Financial Plan Project for the City of Simi Valley, California. He was responsible for development of the overall asset management program for the City's wastewater treatment plant and collection system. The project included complete asset inventory, condition assessment of aboveground assets, GIS-based analyses of belowground assets, risk-based assessments for probability and consequence of failure, asset valuation, rehabilitation and replacement (R&R) capital improvement program development, and a financial plan including proposed rate adjustments.

→ Principal consultant for the Miramar Pump Station Condition Assessment for the San Diego County Water Authority, California. The project included mechanical, structural, electrical, and instrumentation condition assessments of the Miramar Pump Station. He developed a renewal decision analysis report that evaluated alternatives for rehabilitation and replacement, conducted a life-cycle cost analysis that compared the alternatives, and provided final recommendations for the Water Authority.

→ Principal consultant for the Environmental Protection Agency Water System Improvements Asset Management, Sanitary Survey, and SCADA Project for the City of

Daniel P. Baker, P.E.

Surprise, Arizona. He led the evaluation of the existing asset management software, including Infor™ Hansen and ESRI ArcGIS, and made recommendations for system improvements and data integration to support best management practices for water and wastewater assets. He is currently assisting in the first phase of implementation of the system improvements.

→ Project manager for the Enterprise Resource Planning (ERP) System Requirements Definition, Software Selection, and Implementation for the Elsinore Valley Municipal Water District, California. He managed the requirements definition, business process analysis, procurement, and program management for replacement of the District's financial, human resources/payroll, customer service, and utility billing systems. He assisted in the ERP implementation of project/grants management and capital/operations and maintenance budgeting modules.

→ Project manager for the Asset Management Plan Project for the Yorba Linda Water District, California. He was responsible for development of the overall asset management program for the District's complete water and sewer assets. The project included complete asset inventory, condition assessment of aboveground assets, GIS-based analyses of belowground assets, risk assessments for probability and consequence of failure, rehabilitation and replacement (R&R) program development, and funding analyses.

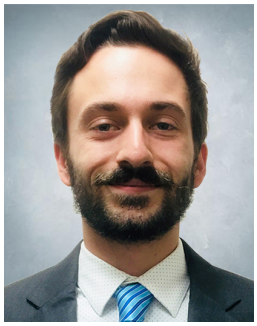
→ Project manager and principal consultant for the Asset Management and GIS Upgrade Project for the Anchorage Water and Wastewater Utility, Alaska. He was responsible for defining requirements for the upgrade and integration of the geographic information system (GIS) and Maximo® CMMS including the development of best practices for asset management as related to utility-wide information systems and business processes. He led the development of as-is and to-be business processes for the entire asset life-cycle from planning and budgeting, through construction, operations and maintenance, and asset retirement.

→ Principal consultant for the Asset Management Program for the City of Scottsdale, Arizona. He assisted with the assessment of linear, belowground assets for the City's water and wastewater facilities. His responsibilities included the planning and design of an asset management system, integrated with the City's existing CMMS, GIS, and financial and dashboard reporting systems to support the identification, prioritization, and planning for the renewal and replacement and Capital Improvement Program (CIP) projects.

→ Lead consultant and technical advisor for the Repair and Replacement (R&R) Program Pilot Project for Tampa Bay Water, Florida. He led the development of a pilot project for Tampa Bay Water's R&R Program including vision and strategy, asset condition and risk assessment, and (CIP) development for a well field and water treatment facility. The project included development of a plan for a full-scale implementation program and requirements definition for a customized Enterprise Maintenance Management System (EMMS) to support the R&R program.

→ Program management systems lead for City of Austin, Texas, Water and Wastewater Annexation Program and city-wide CIP management system implementation for over $1 billion in annual capital projects.

→ Project manager for the Granite XP Upgrade and Implementation Support Project for the North Tahoe Public Utilities District, California. He conducted an evaluation of the District's software, processes, and organization involved in the inspection of sewer mains, manholes, and laterals. He implemented upgrades to the CUES Granite XP closed-circuit television (CCTV) inspection software and made recommendations regarding use of the NASSCO Pipeline Assessment & Certification Program (PACP) for standardized condition assessment of the sewer system.



Education

BS Environmental Studies, Northern Michigan University, 2017

Certifications

Geographic Information Systems, Northern Michigan University

Riley C. Powers

Riley Powers joined Carollo during the summer of 2017 as a Geographic Information Systems (GIS) Analyst after graduating from Northern Michigan University. Prior to joining Carollo, he worked in water and wastewater infrastructure mapping with the City of Marquette, Michigan, Engineering Department. His skills focus on the collection and manipulation of data, creation and maintenance of geodatabases, conversion between program interfaces and data types for map creation, spatial analysis, and creation of cartographic figures.

Relevant Experience

→ GIS Analyst for the City of Reno, Nevada, Northwest Reno Sewer Capacity Analysis and Master Plan. Carollo conducted a sanitary sewer capacity analysis and developed a master plan for the City's Northwest area. Collected and reviewed existing data, ran analysis on data for modeling purposes, and created cartographic figures of the collection system and capital improvement projects for use in the Master Plan report.

→ GIS analyst for the City of Morro Bay, California, OneWater Water and Wastewater Master Plan. Riley aided in the addition of important invert elevation data in areas with data gaps so a model could be generated. Along with maintenance of Morro Bay's database, Riley created cartographic figures for display of pipeline and facility alternatives.

→ GIS analyst for the City of Tumwater, Oregon, Comprehensive Water System Plan Update. To assist with the RUL analysis of the current Tumwater Water Pipe Network, Riley updated the pipe network with pipe installation years along with their material with information provided by the City. The updated pipe information was used for creation of cartographic figures showing the updates, which were then sent to the City for verification. This information was used to determine the remaining life of the current pipes and to help determine what would need to be updated by Tumwater's Comprehensive Water System Plan.

→ GIS analyst for the City of Ukiah, California, Phase 1 and 2 Water Pipeline Final Design. To assist in the determination of irrigable acreage along the proposed water pipeline alignment, Riley recalculated the acreage based on new data provided by the City and crop type changes to parcels along the proposed alignment. The updated acreages and irrigation types were used to determine the overall demand by the current and new customers. The updated information was also used to create a cartographic figure displaying the ownership of each parcel and its irrigation type along the proposed alignments.

→ GIS analyst for the City of Lemoore, California, Water, Sewer, and Wastewater Treatment Plant Master Plans. To help the city fill gaps in its wastewater network pertaining to elevation data and determine flow monitoring locations, Riley located and entered important elevation data and created cartographic figures for verification of flow monitoring locations.

→ GIS analyst for the Clackamas River Water District, Oregon. To help the client determine its existing service area, urban growth boundary, and planning area for current water customers, Riley developed cartographic figures in cooperation with key Clackamas County professionals. Figures were developed and refined to determine accurate boundaries. Along with the creation of cartographic figures, Riley performed data alterations and joins based on the locations of features, and data needs for modeling and accurate analysis of the overall system requirements.

→ GIS analyst for the City of Renton, Washington, Water System Master Plan Update. Riley created a cartographic figure showing the City's overall system, its pressure zones, and potential annexation zones to help Carollo's project engineers get an overall understanding of the system and key areas in a spatial setting.

→ GIS analyst for the Dallas Water Utilities, Texas, White Rock Creek Ash Creek Line. To help the client determine a feasible

alternative for its water network, Riley created cartographic figures showing proposed alignments, along with important attributed information to help the client understand the proposed updates and alternatives moving forward.

→ GIS analyst for the City of Shelton, Washington, Water System Comprehensive Plan Update. Riley created an overall system map for City confirmation of pipe diameters throughout its water network.

→ GIS analyst for the Soquel Creek Water District, California, Groundwater Replenishment Recycled Water Feasibility Study. To aid in development of cartographic figures, Riley created data relating to the locations of important water purification facilities, based on previous documents, and their relation to the region's water districts and recharge wells. He also created cartographic figures of the potential Pure Water Soquel pipeline alternatives.

→ GIS analyst for the City of Porterville, California, Integrated Master Plan. Riley created cartographic figures showing the surrounding irrigations districts in proximity to the City of Porterville and how they intersect.

→ GIS analyst for the City of Riverside, California, Integrated Wastewater and Treatment Facilities Master Plan. Riley provided cartographic figures showing the collection service area, study area, overall topography, existing and buildout land use, temporary flow monitoring program, and rain gauge locations. He also provided technical support through manipulation of data for use in modeling.

→ GIS analyst for the Santa Cruz County Sanitation District, California, Phase 1 Inflow/Infiltration Mitigation Program. Riley is creating cartographic figures for the overall system and flow monitoring locations for overview and verification by the District.

→ GIS analyst for the City of Tacoma, Washington, Downtown Wastewater Model. To aid in the development of the downtown wastewater model, Riley performed various joins based on spatial location, along with geocoding addresses and other important information to be included in parcel shapefiles. These layers, created and altered by Riley, went into the creation of figures showing important project locations, noted roof drainage areas, vacant and historical parcel locations, missing invert and rim elevations, basins, and zoning and land use.

→ GIS analyst for the City of Banning, California, Capital Improvement Plan. To help the City anticipate existing and future deficiencies and how they will be resolved, Riley developed figures showing overall systems, locations of capital improvement projects, scheduled phasing of pipeline updates, and locations of important facilities.

→ GIS analyst for the Contra Costa County Sanitary District, California. To assist the project manager and graphics design department, Riley developed an overall system map with locations of key facilities, pipe information, and city boundaries to show the distribution of the District's sanitary sewer network.

Education

BS Civil Engineering, California State University, Fresno, 2006

Licenses

Civil Engineer, Nevada, California

Professional Affiliations

American Water Works Association

California Water Environment Association - Central San Joaquin Section

Ryan F. Orgill, P.E.

Ryan Orgill joined Carollo in 2005 and has experience in master planning, hydraulic modeling, sewer system management planning, urban water management planning, and geographic information systems (GIS).

Relevant Experience

→ Project Engineer for the City of Morro Bay, Califiornia, OneWater Morro Bay Plan. Responsible for overseeing the development of hydraulic models of the water distribution, sewer collection, and storm drainage systems. Improvement projects and a capital improvement plan were developed to mitigate capacity deficiencies.

→ Project manager for the City of Reno, Nevada, Northwest Reno Sewer Capacity Analysis and Master Plan. The City retained Carollo to conduct a sanitary sewer capacity analysis and develop a master plan for the City's Northwest area. Carollo collected and reviewed existing data; conducted site visits to gather additional information on the City's collection system; and interviewed staff to develop a better understanding of suspected operations and maintenance issues, flow diversions, and other collection system hydraulic information. The team developed a temporary flow monitoring program; reviewed the City's existing SewerGEMS model to expand the existing wastewater collection system hydraulic computer model, including nine major trunk lines; calibrated the model using flow monitoring data; reviewed planning documents to determine existing and build-out wastewater flow projections; modeled existing and future system capacity evaluations; and developed prioritized, recommended capacity projects based on deficiencies.

→ Hydraulic modeling support for the City of Tulare, California, J Street and Alpine Vista Water Storage Tank Improvements. The project involved planning, preliminary and final design, and engineering services during construction of two 2-MG concrete 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.

→ Hydraulic modeling lead on the City of West Sacramento, California, Water System Master Plan Update. Responsible for development and calibration of a water system hydraulic model, system evaluation under existing and year 2035 demand conditions, and development of a staged capital improvement plan for the City.

→ Project engineer for the City of Shasta Lake, California, 2016-2026 Water Master Plan. Responsible for hydraulic model development and calibration using InfoWater modeling software, and capacity evaluation of the distribution system.

→ Hydraulic modeling lead for the City of Santa Barbara, California Water Model Update. Responsible for update and calibration of the City's water system hydraulic model using the InfoWater modeling software application, development of a system specific diurnal pattern for the City, and custom hydraulic model training for City staff.

→ Staff engineer for the Port of Oakland, California, Port-Wide Sewer System Management Plan, which was prepared to meet the requirements of both the State and the Regional Water Quality Control Boards. As part of the project, responsibilities included development of several supporting documents specific to the Port. These include a System Evaluation and Capacity Assurance Plan (SECAP), sanitary sewer design and construction standards, sanitary sewer use ordinances, an overflow emergency response plan, and a fats, oils, and grease control plan. The SECAP included development and calibration of a fully dynamic hydraulic model of the sewer collection system calibrated to both dry weather and wet weather conditions, evaluation of the collection system for existing and future design flow conditions, recommendations for capital improvements to mitigate deficiencies, condition assessment of sanitary sewer facilities in the Port, and development of costs associated with the proposed capital improvements.

Ryan F. Orgill, P.E.

→ Project engineer for the City of Cotati, California, Sewer and Water System Master Plans. Responsible for hydraulic model development and calibration, existing and build out analysis of the water and sewer systems, development of capital improvements to mitigate existing deficiencies and to service future growth, development of a staged capital improvement plan, and development of the final Sewer and Water System Master Plan reports.

→ Project engineer for the City of Tulare, California, Water System Master Plan. Responsible for hydraulic model creation and calibration, development of analysis criteria, evaluation of the City's existing water system, development of improvement projects to mitigate existing deficiencies and to serve future growth, and development of a staged capital improvement plan.

→ Staff engineer for the Los Angeles International Airport (LAX) Phase I fire flow analysis for the Central Terminal Area (CTA) of LAX, California. Responsible for development and calibration of a hydraulic computer model of the CTA water distribution system, development of evaluation criteria, and fire flow analysis of the CTA distribution system. The model calibration consisted of both an extended period simulation and a fire flow calibration of the CTA system. The fire flow analysis of the CTA distribution system involved evaluation of a number of potential alternatives to increase the available fire flow at various areas in the CTA distribution system.

→ Staff engineer for the Victorville Water District, California, 20-Year Comprehensive Water Master Plan. Responsible for calibration of the District's ID2 water distribution system hydraulic model, evaluation of the ID2 water system, and development of improvement projects to mitigate existing deficiencies and accommodate future growth.

→ Distribution system modeling for the City of Sanger, California, Water Storage Tank Project. The project includes design and engineering services during construction of a 750,000-gallon tank, booster pump station, blending station, and small diameter pipeline from an existing well site to the new tank site. The project cost is $3.5 million. The design will be completed in September 2018 and construction will be completed in September 2019.

→ Staff engineer for the City of Galt, California, Water System Master Plan. Assisted in the preparation of the City's Master Plan report and development of a staged capital improvement plan.

→ Staff engineer for the City of Hughson, California, Water System Master Plan. Assisted in the preparation of the City's Master Plan report and development of a staged capital improvement plan.

→ Project engineer for the City of Hanford, California, Great Valley Ethanol Plant Special Study and Water Supply Assessment. Responsible for completion of a water supply assessment for the proposed Great Valley Ethanol Plant and evaluation of the effect of the proposed project on the City's industrial park water system.

→ Project engineer for the City of Hanford, California, GWF Power Systems Special Study. Responsible for completion of an evaluation of the effect of the proposed GWF Power Systems expansion on the City's industrial park water system.

→ Project engineer for the City of Turlock, California, Sanitary Sewer and Storm Water Master Plans. Responsible for overseeing the construction of the City's sewer and storm drainage system hydraulic models.

→ Project engineer for the City of Cotati, California, Sewer and Water System Master Plans. Responsible for hydraulic model development and calibration, existing and build out analysis of the water and sewer systems, development of capital improvements to mitigate existing deficiencies and to service future growth, development of a staged capital improvement plan, and development of the final Sewer and Water System Master Plan reports.

Education

BS Environmental Engineering, University of Central Florida, 2015

Licenses

Engineer Intern, Florida

Professional Affiliations

American Water Works Association

Florida Water Environment Association

Kirsten M. Burns, E.I.

Kirsten Burns has four years of experience, which includes master planning, hydraulic modeling, and distribution/collection systems flushing techniques. Her primary focus includes hydraulic model development, integrated with GIS, where she has developed new or updated existing hydraulic models, including providing system calibration and model training.

Relevant Experience

→ Intern engineer for the Orange County, Florida, Stormwater Inventory Project. Responsible for consolidation of stormwater inventory information in GIS including pump station and drainwell information for Orange County.

→ Intern engineer for the Orange County, Florida, Pond Mowing Study. Responsible for consolidation of pond information for Orange County contracted and non-contracted ponds with intent of producing mowing limits in GIS for maintenance of ponds.

→ Project engineer for the City of Daytona Beach, Florida, Wastewater Master Plan. Responsible for development and calibration of the hydraulic model to assist the City in planning for future development and capital improvement projects. Tasks include data collection; population, flow and diurnal pattern analysis; field testing; assessment of key infrastructure; model development; calibration for dry and wet weather scenarios; and overall system analysis for existing and future conditions.

→ Project engineer for the Pasco County Utilities, Florida, Calibrated Wastewater Hydraulic Model. Responsible for development of a calibrated wastewater hydraulic model for Pasco County Utilities wastewater collection system, which includes over 600 publically owned pump stations and extensive gravity sewer system connected to six active treatment plants. Tasks included on-site data collection; population, flow and diurnal pattern analysis; field testing; model development; calibration for dry and wet weather scenarios; and overall system analysis.

→ Project engineer for the City of Orlando, Florida, Eastern Regional Reclaimed Water Distribution System (ERRWDS) Narcoossee Road Reclaimed Water Model. Responsible for development of hydraulic model and analysis of reclaimed water system to determine necessary upsizing and improvements along Narcoossee Road. Tasks included development of reclaimed water demands using customer billing data for existing demands and applying Traffic Analysis Zone growth projections to develop future demands. Model updates and improvements were completed and hydraulic analysis of existing piping to determine necessary upsizing.

→ Project engineer for the City of Orlando, Florida, Eastern Regional Reclaimed Water Distribution System (ERRWDS) Water Model (Phase 2). Responsible for calibration of the reclaimed water hydraulic model and analysis of the existing and future conditions to determine necessary improvements through the year 2045. Improvements included locating and sizing a remote storage and re-pump facility and piping improvements to remove existing hydraulic limitations and improve overall system performance with a focus on low pressure issues during peak demand periods.

→ Project engineer for the Orange County Utilities, Florida, Meadow Woods Reclaimed Water Model Calibration and Alternatives Analysis. Responsible for hydraulic model updates and calibration, development of existing and five-year future demands for analysis of operation improvements for a remote storage and re-pump facility to optimize scheduled filling and draining to meeting local demands and address pressure issues to customers during peak demand periods.

→ Project engineer for the City of Orlando, Florida, Raleigh Street Sewer Improvements Preliminary Design. Responsible for the development of a hydraulic model in InfoSWMM and analysis of an existing gravity sewer system to determine necessary upsizing and improvements.

Kirsten M. Burns, E.I.

→ Project engineer for the City of St. Petersburg, Florida, Storage Reduction Evaluation Hydraulic Modeling and Unidirectional Flushing Program Design. Responsible for hydraulic model analysis for the reduction of oversized and parallel water mains as a method of reducing water main storage and therefore reducing high flushing requirements and water quality issues including nitrification. A unidirectional flushing program in the South Service Area was designed and implemented to reduce flushing requirements, improve water quality and defer upcoming CIP expenditures by scouring mains at high velocities through an effective flushing plan.

→ Project engineer for the Seminole County, Florida, Southwest Service Area & Remaining Enclave Areas Unidirectional Flushing Program Design. Responsible for hydraulic modeling and design of a unidirectional flushing (UDF) program for Seminole County's Southwest Service Area (SWSA) and additional enclave service areas focusing on an efficient and effective flushing regime to clean county's SWSA and the additional enclaves service areas distribution systems piping while conserving water, improving water quality, and deferring upcoming CIP expenditures.

→ Project engineer for the City of St. Petersburg, Florida, Wastewater Hydraulic Modeling Assessment. Responsible for performing an independent assessment of the wastewater hydraulic model in Innovyze's InfoWorks ICM SE software related to its validity and functionality, including current operational practices by the water resources department who maintains, updates and utilizes the wastewater hydraulic model. The model was assessed for its ability to support capacity evaluations and the development of a Wet Weather Overflow Mitigation Program as well as to prioritize repair and replacement issues for the wastewater transmission and collection system.

→ Project engineer for the Brevard County, Florida, West Cocoa Transmission Planning. Responsible for developing a hydraulic model in Innovyze's InfoSWMM software for the West Cocoa wastewater transmission system prior to the design of required improvements. The purpose of developing a hydraulic model was to computer-simulate scenarios within the West Cocoa wastewater transmission system such that the interaction between lift stations could be determined, and an optimized system solution could be established; the resulting selected scenario was then be utilized to develop a scope for the design of improvements in a more cost-effective manner.

→ Project engineer for the City of Port St. Lucie, Florida, Hydraulic Model Conversion. Responsible for conversion of the water, wastewater and reclaimed water hydraulic models from Bentley's WaterCAD software to Innovyze's H2OMap software to support City staff with planning of capital improvement projects, design, operations, regulatory compliance and optimization of services to their existing customers.

→ Project engineer for the Orange County Utilities, Florida, Eastern Water Reclamation Facility (EWRF), Facilities Planning Project. Responsible for the development of an asset management program for the EWRF, including development of an assessment criteria, asset inventory, condition assessment, risk evaluation, and prioritization of rehabilitation and replacement needs.

→ Project engineer for the City of St. Petersburg, Florida, Maximo Area Flow Monitoring, Metering and Analysis Study. Responsible for flow data compilation and analysis at three sites equipped with Hach flow monitoring units for approximately three months. The data was compiled and utilized in a pilot infiltration and inflow study.

→ Project engineer for the City of Sanford, Florida, Unidirectional Flushing Program Update. Responsible for updating the unidirectional flushing model and program implementation materials to include new developments and operational changes. Recommendations were made for prioritizing flush zones based on provided water quality data.

Education

M.S., Water Resources Engineering, University of Central Florida, 2016

B.S., Environmental Engineering, University of Central Florida, 2012

Licenses

Professional Engineer, Florida

Professional Affiliations

Florida Water Environment Association

- Member

American Water Works Association, Florida Section Region III Chair

Kunal Nayee, P.E.

Kunal Nayee has six years of experience in the water utility field. While in college, he studied environmental engineering with a focus on water/wastewater treatment and hydraulic engineering. Mr. Nayee's consulting experience ranges from GIS, permit writing, potable design, gravity design and data acquisition. His focus is working with municipalities on asset management studies as well as utility design. Mr. Nayee's projects include hydraulic modeling for city- and county-level systems, asset management studies, and potable water system designs. Mr. Nayee's project experience includes playing a central role in hydraulic water and wastewater models for a city-level system, asset management plan using GIS techniques for criticality modeling for a county-level forcemain system, and a potable water system replacement design for a city CIP. Along with hydraulic modeling and asset management, Mr. Nayee has worked extensively on permit writing and application preparation for utilities and private clients.

Relevant Experience

→ Project engineer for the Indian River County Wastewater Hydraulic Model Update, Indian River County, Florida. Converted existing GIS information from the County into WaterCAD for use in a hydraulic model. Data aggregation of the SCADA from all of the County owned lift stations was also organized and incorporated into the model of analysis. The project was completed in 2015.

→ Project engineer for the City of Coconut Creek Water/Wastewater/Stormwater Utilities Master Plan, Coconut Creek, Florida. The project included a master plan for the City of Coconut Creek utilizing exiting City data and external sources. Created the wastewater hydraulic model and determined CIP's for the City on a 5 year basis starting from 2015 to 2030. Pressure recording of the distribution system was conducted in field to collect calibration information onsite. Aided in the analysis of the water model created for the City and the water quality analysis. An existing asset management system created in house by Mr. Nayee and the Water Infrastructure group customized to the City's GIS system and ran to determine areas of the distribution system that require maintenance. Capacity, Management, Operation and Maintenance (CMOM) were all taken into account when analyzing the City's existing and proposed systems. With the aid of the hydraulic model and the asset management system prevention of sanitary sewer overflows was achieved by determining locations where pipes were undersized or in need of maintenance. Listing out the improvement projects based on CIP years was also a goal for the study. In addition to overflows and CIP management alternate collection flow scenarios were investigated to allow the City to redirect the wastewater flow in a varying number of scenarios. Also reviewed the City's existing GIS schema and layering and recommended changes based on the Esri standard practices. The project was completed in 2016.

→ Project engineer for the Pembroke to Hollywood Blvd Water Main Replacement Program, Hollywood, Florida. Aided in the creating on the contract documents related to approximately 59,000 LF of water main as part of a replacement program. The size of pipe ranged from 4-inch to 12-inch within a heavily congested portion of Hollywood. Additional support was provided for GIS layer creation of the site for use in layout maps, water meter schedules for the contract documents and field investigations and data aggregation of related information. The project was completed in 2017.

→ Project engineer for the Mims Water System Pipeline Replacement, Brevard County, Florida. Supported GIS data creation from existing CAD layers, partial clearance permitting, and other design support roles. This work supports efforts to update and finalize the pipeline design, including revisions based on site changes occurring since previous design and completion of bidding and construction services. Services also include completing and resubmitting

expired project permits. The project was completed in 2015.

→ Project engineer for the Force Main and Gravity Sewer System Condition Assessment and Rehabilitation Plan Development, Seminole County, Florida. Supporting this assessment and development of a rehabilitation plan specific to Seminole County Environmental Services Department below ground infrastructure needs for force mains, air release valves, gravity sewers, and manholes. Created forcemain criticality geoprocessing model to access assets using an ArcGIS interface. The project was completed in 2015.

→ Project engineer for the Evaluations and Calculations for Force Main Upsizing, City of Winter Haven, Florida. Supported the evaluation of force main upsizing to improve wastewater system flows generated by approximately 21 lift stations that discharge flow through an existing force main along SR 452. Major tasks included GIS data creation, wastewater flow mapping, and assistance with development of final design report. The project was completed in 2015.

→ Engineer for the Taft and Sheridan Street Water Improvements, City of Hollywood, Florida. Provided engineering and design support services for water line replacement in the City of Hollywood between Taft and Sheridan Street. Including GIS digitization, shop drawing review and in field inspections. The project was completed in 2015.

→ Project engineer for the Black Mountain Ranch Hydraulic Modeling, San Diego, California. Created a potable water hydraulic model for a new development within the City of Chula Vista city limits. The hydraulic model allowed for proper sizing of the water mains that will serve the property as well as the internal piping to serve each of the individual properties. The project was completed in 2016.

→ Project engineer for the ECDD Water, Wastewater and Reclaimed Water Hydraulic Model, Celebration, Florida. Created the water and reclaimed hydraulic model for use in a master plan for the Celebration development located in Central Florida. Data provided by the client was aggregated and incorporated into the models. Analysis was conducted on the sizing, pipe routing and capability of the systems to supply potable/reclaimed and remove wastewater from the system during peak usage while maintaining minimum velocities in the system. Recommendations were then determined based on the model results and CIP's listed. The project was completed in 2015.

→ Engineer for the High Desert Water District Wastewater Collection System Program, High Desert Water District Yucca Valley, California. Project consisted of a septic to sewer program for approximately 25,000 residents and business. The project contains over 77 miles of pipelines (sewer mains, truck sewers and force mains) and three lift stations. The 2017 project will be constructed in three phases. Modeling in InfoSWMM was conducted on Phase 1 and 2 to confirm pipe sizes and pumping capabilities.

→ Engineer for the Triton Mayport Hanger Extension, Naval Facilities Engineering Command. Project included construction of a new hanger bay ad adjacent supporting facilities which includes two-bay aircraft operation and maintenance hangar. Potable utilities were modeled in WaterGems and the subsequent sizing and route was designed in AutoCAD Civil 3D. The project was a 2017 design build project with heavy involvement from the contractor.

→ Engineer for the MCO South Terminal C Phase 1, Greater Orlando Aviation Authority, Florida. Provided engineering support for the landside utilities, which included hydraulic modeling of the proposed site. Work also included field verifying hydrants flow rates.

→ Project engineer for the Disney Master Utility Plan, Western Way Expansion, RCES, Winter Garden, Florida. Created water and reclaimed water hydraulic model for a residential and commercial expansion. Analyzed the future growth and potential worst case scenario for two utilities owning and operating two separate portions of the distribution mains to serve the expansion. Fire flow scenarios were ran for each of the short and long term scenarios to ensure coverage during all times.

Education

BS Civil Engineering, California State Polytechnic University, Pomona, 2012

Licenses

Engineer-in-Training, California

Professional Affiliations

American Society of Civil Engineers

California Water Environment Association

Ryan M. Hejka, E.I.T.

Ryan Hejka is a civil engineer with six years of professional experience. He is specialized in water and recycled water system hydraulic modeling and master planning projects and is skilled in the use of a wide variety of hydraulic modeling packages including InfoWater, H_2OMAP, Mike Urban, and Water GEMs. In addition, he has extensive experience with ArcGIS and proficient in multiple programming languages that he utilized to build several customized water optimization models and tools for water agencies. His experience includes:

Relevant Experience

→ Staff engineer for the Nitrification Study for Mesa Water District, California. This project involved extensive field data gathering and analysis to identify trends and solutions for nitrification events. He was responsible for the hydraulic modeling analysis that was conducted to identify potential hydraulic contributing factors, such as water age and system operations. Alternative operations were evaluated to determine the impact of hydraulics changes. Recommendations were included in the nitrification mitigation and prevention plan.

→ Staff engineer/water system planner for the 2014 Water Master Plan Update for Mesa Water District, California. He was responsible for coordinating data gathering, designing the custom water supply and demand optimization model (WSDOM) in Microsoft® Excel, supply analysis, and preparing the report. This project involved 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.

→ Staff engineer for system-wide hydraulic model development for the Metropolitan Water District of Southern California. As subconsultant to DHI, Carollo assisted in the development, calibration, and validation of four separate hydraulic models that collectively cover Metropolitan's entire conveyance system. The models were developed from existing GIS data in Mike Urban modeling software. Ryan assisted in the model development, model calibration, model validation, and model development documentation.

→ Task engineer for the Mass Balance Model for the One Water LA 2040 Plan, California. This project looks at the integration of all of the City's water assets. He was responsible for the development of a custom mass balance planning model that tracks all major flows in the City of Los Angeles in annual time steps from 2015 through 2020 under normal, wet, and dry year conditions. The modeled flow components include imported water, groundwater, wastewater, recycled water, stormwater, and discharges to the LA River and ocean. This model also includes a cost module and will be utilized in the alternatives analysis of the One Water LA 2040 Plan.

→ Staff engineer for the Water and Recycled Water Master plan for UC Irvine, California. The project includes the creation of water system and recycled water system models from AutoCAD maps, as well as a blueprint for additional facilities for UC Irvine to handle their projected growth and development on campus. This is the first water and recycled water master plan for UC Irvine. He was responsible for the model network creation from UCI's water system maps in AutoCAD, as well as the preparation of the model calibration plan.

→ Staff engineer/modeler for the existing and future system supply and storage study for the Greenbelt pipeline system. The Greenbelt pipeline system is a main recycled water supply line of the Los Angeles/Glendale Water Reclamation Facility.

Ryan M. Hejka, E.I.T.

→ Staff engineer/modeler for the water and fire water system analysis for the Utilities Infrastructure (UIP) master plan for LAX. The UIP included analyzing future water demand projections based on passenger counts. As part of this effort, As-Builts were utilized to update the existing LAX hydraulic model. Alternatives were then developed in the model to analyze existing and future water and fire water system deficiencies. Improvement projects were then prioritized into a phased capital improvement program (CIP) within the UIP.

→ Project engineer for the on-call hydraulic modeling for the City of South Pasadena, California. The project consisted of various hydraulic modeling evaluations to the hydraulic impact and new water system infrastructure requirements when new developers are connected to the existing distribution system. The model that was developed and calibrated during a previous project was utilized for these studies.

→ Staff engineer for the 2016 Water Master Plan for the City of Colton, California. This project included water demand forecasting, hydraulic model development and EPS calibration using field fire flow testing. Existing and future system analysis was conducted to develop a CIP including a rehabilitation and replacement program. The findings were presented in a comprehensive water master plan report that was developed in conjunction with the 2016 Sewer Master Plan.

→ Staff engineer for the 2015 Water Master Plan for the City of Oxnard, California. This project included water demand forecasting, hydraulic modeling analysis using WaterGEMS, existing and future system analysis, development of a capital improvement program (CIP) including a rehabilitation and replacement program. The findings were presented in a comprehensive water master plan report that was part of the overall Integrated Master Plan.

→ Staff engineer/modeler for the Metropolitan Water District hydraulic model development and calibration. He was part of a team responsible for building the District's hydraulic model from existing GIS data. He also assisted in the calibration of the model using historic data, as well as the calibration the model to utilize active controls.

→ Staff engineer/modeler for the 2015 Comprehensive Facilities Master Plan for Padre Dam Municipal Water District, California. The project included (recycled) water demand/sewer flows forecasting, water supply analysis, hydraulic model updates for the water and recycled water systems, development and calibration of a new sewer system model, and field condition assessment of key findings. He was responsible for the modeling of the existing and future infrastructure. The feasibility of the wastewater plant expansion for an IPR project was also evaluated. The findings were combined into a comprehensive CIP and water master plan report.

→ Staff engineer/modeler for the on-call hydraulic modeling services for the expansion of the Los Angeles International Airport (LAX), California. Various fire flow scenarios were analyzed using the InfoWater hydraulic model developed by Carollo. He was responsible for updating the hydraulic model with their current facilities, hydraulic model analysis of pipeline velocities and residual fire flow pressures, and providing future infrastructure recommendations. The modeling results were used to advise the design team on layout and sizing of pipelines, valve configuration, and residual pressure.

→ Staff engineer/modeler for the 2015 Integrated Water, Wastewater, and Recycled Water Master Plans for the City of Oceanside, California. He was responsible for coordinating data gathering, supply analysis, and preparing the report on this $1.2 million assignment. The project involved water demand/sewer flows forecasting, water supply analysis, hydraulic model updates for the water and wastewater systems, and development of a new recycled water system model.

→ Staff engineer for the 2013 Integrated Water Master Plan for the City of Riverside, California. He was responsible for identifying potential stormwater recharge sites, sizing detention basins, sizing recharge site infrastructure, and preparing the report.

Appendix B: Professional Services Agreement Acceptance Form

Firm Name: Carollo Engineers, Inc.

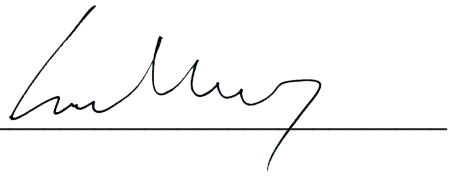
Address: 3150 Bristol Street, Suite 500

City Costa Mesa State CA Zip Code 92626

Telephone: 714-593-5100 Fax: 714-593-5101

I have reviewed the RFP and Professional Services Agreement in their entirety. Our firm will execute the Professional Services Agreement with no exceptions.

Name of Authorized Representative: Graham J.G. Juby, PhD, PE, Vice President

Signature of Authorized Representative: 

Date: August 22, 2019

MEMORANDUM

MesaWater DISTRICT®

Dedicated to Satisfying our Community's Water Needs

TO: Engineering and Operations Committee

FROM: Phil Lauri, P.E., Assistant General Manager

DATE: September 17, 2019

SUBJECT: Replacement of Assets Including Pipeline and Well Rehabilitation

RECOMMENDATION

Recommend that the Board of Directors adopt Resolution No. XXXX Regarding the Replacement of Assets including Pipeline and Well Rehabilitation Superseding Resolution No. 1442.

STRATEGIC PLAN

Goal #1: Provide a safe, abundant, and reliable water supply.
Goal #2: Practice perpetual infrastructure renewal and improvement.
Goal #3: Be financially responsible and transparent.

PRIOR BOARD ACTION/DISCUSSION

At its June 5, 1980 meeting, the Board of Directors (Board) adopted Resolution No. 891 Governing Vehicle Replacement.

At its July 11, 2002 meeting, the Board adopted Resolution No.1268 Regarding the Replacement of Assets Superseding Resolution No. 891.

At its March 15, 2014 meeting, the Board adopted Resolution No.1442 Regarding the Replacement of Assets Including Pipeline and Well Rehabilitation Superseding Resolution No. 1268.

BACKGROUND

Replacement of Assets Policy Evolution
Since 1980, the Board has acknowledged the finite life of the District's assets. Beginning with Resolution No. 891, the Board set a vehicle and equipment replacement policy based on age and usage. This policy was enhanced by Resolution No. 1268 in 2002, which provided flexibility on replacing assets based on their performance, not just their age. As the Board became focused on aging infrastructure, a financial evaluation of age-based pipeline asset replacement was performed as part of the 2014 Water Systems Master Plan Update. This evaluation used industry-average useful life estimates for pipeline materials which ranged from 65 to 85 years. The resulting pipeline replacement cost curve (Figure 1) showed all 317 miles of pipeline requiring replacement in the next 100 years for an approximate total of $552M (in 2013 dollars).

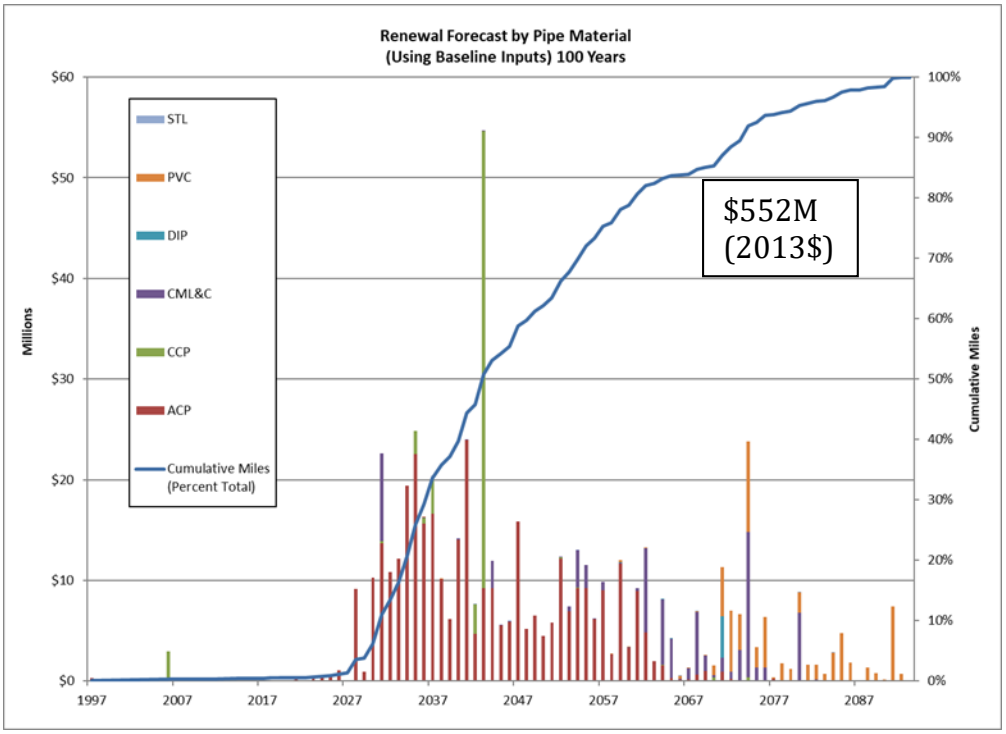


Figure 1. 100-Year Age-Based Pipeline Replacement Curve, 2013.

More than half of that investment ($272M) was required in the first 30 years of the replacement cycle. The need for this level of investment did not align with observed pipeline performance. With a low break rate of approximately 13 breaks per year, or 0.04 breaks per mile per year, the pipeline system appeared healthy and not in need of such a high level of replacement. Therefore, a performance-based definition was sought that could be used to plan and budget for asset replacement that reflected actual pipe performance and conditions. Resolution No. 1442 was adopted in 2014 to address replacement of Mesa Water District's (Mesa Water®) pipeline and groundwater well assets.

Resolution No. 1442 Implementation

Resolution No. 1442 required quantifiable, measurable factors to drive water system asset replacement. For pipelines, this included non-destructive and destructive measurements of the pipe wall's ability to resist internal forces (e.g., water pressure) and external loads (e.g., traffic and soil). Non-destructive testing was used to measure the average remaining pipe wall thickness for a segment of pipe. Approximately 12 miles of pipeline was evaluated by non-destructive testing (e.g., acoustics testing from 2014-2019). Where pipe walls appeared to have lost more than 30% of their original thickness, samples of the pipe were excavated and sent for destructive testing, including direct measurement of remaining pipe wall thickness, hydrostatic failure pressure, and crush load failure. A total of 23 pipe samples (5 metal and 18 asbestos cement (AC)) were excavated. The remaining useful life was estimated based on the results of the testing. It was determined that AC pipe can be expected to have a total average useful life of 142 years. As AC pipe is approximately 74% of Mesa Water's system, this finding reduced the pipeline replacement requirements over the 100-year period by $352M to $200M, including a reduction of $210M to $62M in the first 30 years of the replacement cycle (Figure 2).

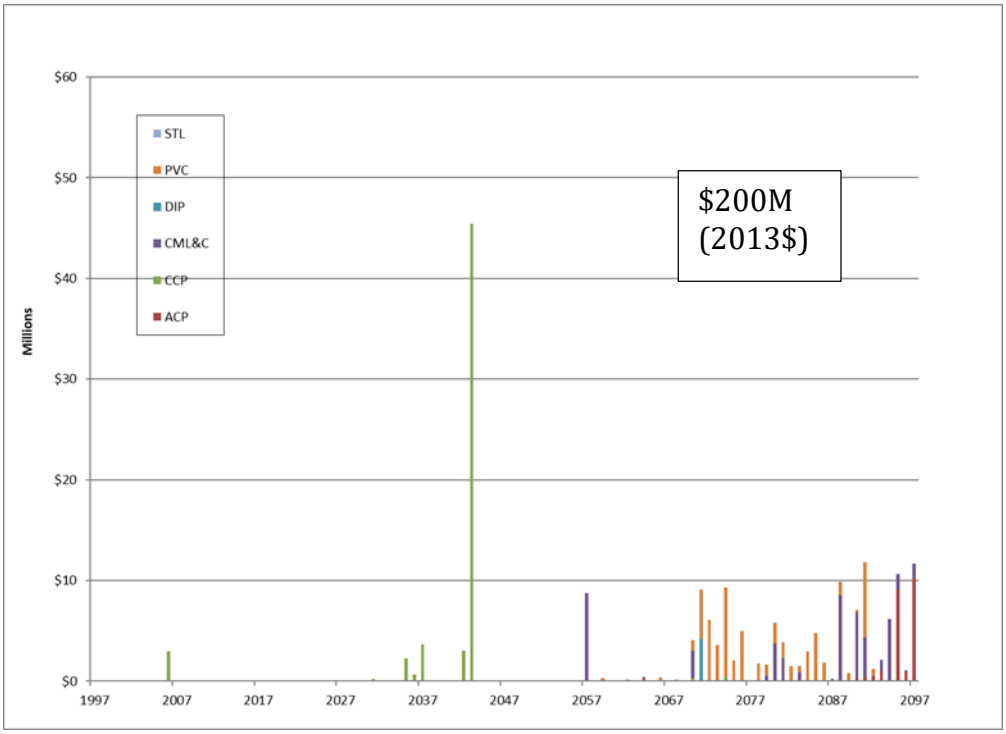


Figure 2. 100-Year Pipeline Renewal Forecast Implementing Res. No. 1442, 2014.

Resolution No. 1442 also required groundwater production well rehabilitation when production capacity from any well drops by more than 20%, or when overall well production capacity drops by more than 10%. Wells 1B, 3B, 5, and 7 have been rehabilitated since the adoption of Resolution No. 1442 as part of the Well Automation and Rehabilitation project. In addition, Well 9 was replaced with Well 9B in 2016. The overall production capacity for the clear groundwater wells was increased by 15% (nearly back to the original installed production capacity) or approximately 1,200 gallons per minute compared to the 2016 clear water well production capacity.

Resolution No. 1442 Challenges

While the findings and implementation of Resolution No. 1442 has been beneficial to Mesa Water for the last five years, it has not addressed all of the factors for pipeline replacement planning. As pipeline walls thin and approach the minimum thickness required to withstand hydrostatic pressure, it is expected that these pipelines will experience breaks. However, one AC pipeline that testing showed to be near its critical thickness had no breaks at all. And when AC and metal pipelines that had experienced multiple breaks were sent for testing, the results often showed decades of remaining useful life. This lead to re-evaluation of Resolution No. 1442 to take break performance into account as part of the remaining useful life characterization. In addition, the key destructive testing requirement by Resolution No. 1442, hydrostatic failure pressure of pipelines, is no longer available in the United States or Canada for AC pipe due to regulatory considerations.

Implementation of Resolution No. 1442 for metal pipelines greater than 8” in diameter was also problematic. Metal pipeline walls tend to thin where the soil is more corrosive. This tends to occur at discrete points along the pipeline rather than continuously along the pipeline alignment. Insertion tools for measuring pipeline steel wall thickness and remaining useful life are maturing for smaller diameter pipelines. However, technologies for condition assessment of large diameter metal pipe are not yet able to measure pipeline steel wall thickness and remaining useful life.

DISCUSSION

The major proposed changes to Resolution No. 1442 are as follows:

- Pipeline break history and end of useful life will have to both occur prior to a pipeline being identified for replacement;
- Destructive testing will continue when a pipeline is exposed for valve replacements or pipeline repairs (approximately 60 per year);
- Non-destructive testing will continue to be performed on pipelines with a history of condition-related breaks; and
- Evaluate transmission and distribution pipelines separately.

New Insights

Working with Mesa Water's pipeline consultants to improve the pipeline integrity program provided access to pipeline break data and pipeline wall thickness measurements from several water agencies in California. Several iterations of correlating pipeline wall thickness to pipeline breaks were considered. Positive correlations were found that have provided the following new insights to pipeline performance:

1. **Synchronizing of Breaks and Remaining Useful Life:** Research of multiple pipeline breaks across multiple agencies have shown that, as pipelines approach the end of their useful life, breaks will exponentially increase (Figure 3).

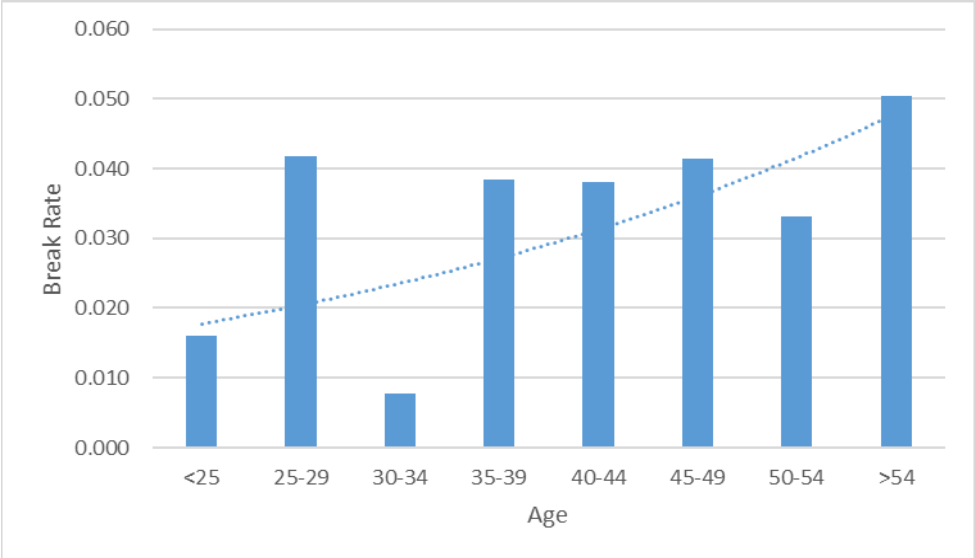


Figure 3. Relationship Between Number of Breaks and Pipeline Age.

The average useful life of the forecasted break rate for AC pipe is approximately 164 years, which is greater than the average useful life of 142 years based on destructive testing data. This is an example of why a pipe near its critical thickness can be identified for replacement based on remaining useful life, but has not yet experienced actual breaks. However, this assumes that pipelines were manufactured and installed correctly. Pipelines that actually show failures before the forecasted break rate or remaining useful life periods are examples of pipelines that had manufacturing defects or external factors affecting it. Thus, synchronization of break rate and remaining useful life is the next critical step in refining Mesa Water's asset replacement policy.

2. **Pipeline Segment Versus Cohort:** Resolution No. 1442 defined a pipeline segment as the length of pipe that could be isolated for replacement by closing two adjacent valves. This definition prevented a broader understanding of the break history of a group of pipe segments that were installed together in one project. Pipelines installed together as one project are approximately the same age and can be assumed to be manufactured under similar conditions and to be installed by the same contractor. These installations can be grouped into "pipe cohort" groups of pipelines of similar age, material, and construction conditions that can be expected to perform in the same way. A key distinction made for the pipe cohorts is as follows:
    - **Distribution Pipelines** (14-inch diameter and smaller): Distribution pipelines have customer services directly connected to them. A break in a distribution pipeline will affect the small number of customers in the vicinity of the break and cause minor property damage.
    - **Transmission Pipelines** (16-inch diameter and greater): Transmission pipelines bring water to the distribution pipelines. A break in a transmission line can cause outages to entire neighborhoods and business districts, and result in major property damage due to the volume of water released.

Resolution No. 1442 Proposed Update

An update to Resolution No. 1442 (Attachment A) is being proposed that uses the break history of the pipe cohort group and pipe condition assessment to drive replacement decisions. Pipe cohorts with a higher break rate (breaks per mile per year) or overall number of breaks in the pipe cohort's lifetime will trigger a condition assessment using non-destructive testing to indirectly measure the remaining wall thickness and estimate remaining useful life. Pipe cohorts with lower break rates will be allowed to continue operation. Table 1 summarizes the break thresholds by pipe cohort group based on the criteria discussed above.

Table 1. Pipe Break Thresholds for Action

	Condition Assessment		Replacement		
Type of Pipeline	Number of Breaks	Annual Break Rate	Remaining Useful Life	Number of Breaks	Annual Break Rate
Distribution (14" Dia. and smaller)	3	0.2	<10 years	5	1.0
Transmission (16" Dia. and greater)	2	0.2	<10 years	3	0.5

Applying the proposed updates to Resolution No. 1442 to the pipeline system demonstrates that approximately 97% of the distribution system would remain in operation with no further action and approximately 3% of the system (10 miles) would receive non-destructive testing. The updated 100-year replacement cost curve for this scenario is shown in Figure 4.

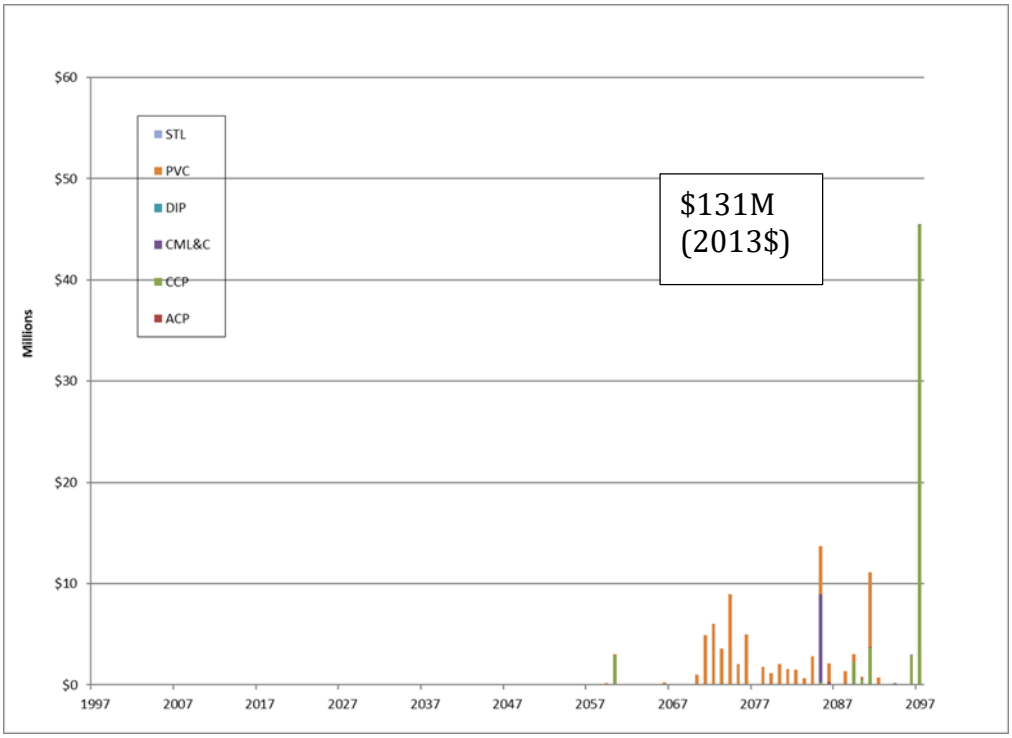


Figure 4. 100-Year Renewal Forecast Implementing Resolution No. XXXX.

Projecting the break rate by material type out until the replacement criterion is triggered, the assumed useful life for AC pipe is 164 years and for metallic pipe is 134 years. PVC pipe is too new a material with too few breaks to make a break rate prediction; therefore, 85 years of useful life is assumed for PVC. The 100-year replacement cost is $131M, with an overall savings of $426M (in 2013 dollars) from the original age-based replacement analysis.

Pipeline Integrity Testing Program Updates

Under the proposed Resolution No. XXXX, the Pipeline Integrity Testing Program will also be updated. Non-destructive testing will continue to be performed in-situ with the pipe in operation. Exposed pipe testing will be performed whenever a pipe is exposed, such as a break repair, valve replacement, or new service connection. Soil samples from the pipe's immediate environment will also be collected and sent for corrosivity testing.

Non-Destructive Testing

- **AC pipe:** Staff have found that AC pipe wall thickness measurement using acoustic equipment to be valuable for screening average pipe wall thickness between system valves and hydrants. This technology will be continued for AC pipe per the proposed policy update.
- **Metal pipe:** For small diameter metal pipe, condition assessment using electromagnetic technologies inside the pipe to measure the steel wall thickness will be used.
- **PVC pipe:** As no PVC pipe currently needs non-destructive testing, test methods are limited and have not been evaluated further.

Exposed Pipe Testing

- **AC pipe:** The most useful test for determining remaining useful life of AC pipe is the combined phenolphthalein stain test and Scanning Electron Microscopy/Energy Dispersive X-Ray Spectroscopy (EDS). A small sample of AC pipe will be collected during valve replacements (approximately 60 per year) or pipeline break repairs.
- **Metal pipe:** As part of a break repair, staff will document the condition of the pipe with photographs and collect a soil sample for corrosivity testing.
- **PVC pipe:** If a portion of PVC is removed as part of a break repair, it will be collected and visually evaluated.

Clear Water Production Wells

Since the adoption of Resolution No. 1442, Mesa Water's five clear groundwater wells have been rehabilitated or re-drilled and are also performing well. Pump efficiency data is available in real time on the SCADA system. No changes are proposed to Resolution No. 1442's triggers for clear water well rehabilitation. Clear water production wells will be rehabilitated when well production drops by more than 20% for a given well, and overall clear water well production drops by more than 10%, taking into consideration the annual variation in groundwater levels. The well(s) prioritized for rehabilitation will be determined based on the highest loss of production capacity.

Continuous Improvement

Mesa Water's pipeline system continues to perform well, with a condition-related break rate over the five years of approximately 16.4 breaks per year, or 0.05 breaks per mile per year for the 317 miles of pipeline in the system. Staff recommends that the Board revaluate Resolution No. XXXX in five years to determine if there are changes in the performance of the pipeline system or in condition assessment or pipeline renewal technologies that warrant an update to the policy.

FINANCIAL IMPACT

None.

ATTACHMENTS

Attachment A: Draft Resolution No. XXXX
Attachment B: Resolution No. 1442, Redline

RESOLUTION NO. XXXX

RESOLUTION OF THE MESA WATER DISTRICT BOARD OF DIRECTORS REGARDING THE REPLACEMENT OF ASSETS INCLUDING PIPELINE AND WELL REHABILITATION SUPERSEDING RESOLUTION NO. 1442

WHEREAS, the Mesa Water District (Mesa Water®) is a county water district organized and operating pursuant to the provisions of the laws of the State of California (State or California); and

WHEREAS, Mesa Water has assets that will eventually need to be replaced, abandoned, or discarded because they have a finite life; and

WHEREAS, currently the most valuable assets include the water distribution system and the water wells, which group of assets shall therefore be the scope of this resolution; and

WHEREAS, age alone is a poor indicator of individual asset condition and remaining useful life; and

WHEREAS, the useful life of an individual asset in an asset class may be longer or shorter than the average useful life for that class.

NOW, THEREFORE, THE BOARD OF DIRECTORS OF THE MESA WATER DISTRICT DOES HEREBY RESOLVE, DETERMINE, AND ORDER AS FOLLOWS:

Section 1. Effective October 10, 2019, assets will not be replaced solely because they have reached the average useful life for their asset class and assets will not be kept merely because they have not yet reached the average useful life for their asset class.

Section 2. Before an asset is included in a proposed budget for replacement, Mesa Water's staff will evaluate its replacement or rehabilitation need based on operations and maintenance cost, improvements in technology, changing laws and regulations, risk management/safety implications, market availability and repair history.

Section 3. Pipes in the water distribution system will be replaced when their useful life has been achieved. The pipeline useful life and pipeline cohort group herein are defined as follows:

a) Pipeline Useful Life – The pipeline useful life will be deemed to have been reached if testing and pipe cohort performance exceeds limits described in Appendix A.

b) A pipe cohort is a group of pipelines with similar characteristics that can be evaluated as a group. The similar characteristics include the following:
    a. Installation Project Number
    b. Material of Construction
        i. Asbestos Cement Pipe (ACP)
        ii. Polyvinyl Chloride (PVC)
        iii. Metallic
    c. Diameter
        i. Transmission Pipelines 16 Inches and Above
        ii. Distribution Pipelines 14 Inches or Less
    d. Pipe Performance or Condition

Section 4. Groundwater production wells will be rehabilitated if and when well capacity drops by more than 20 percent for a given well, and overall clear water well capacity drops by more than 10 percent, taking into consideration the annual variation in groundwater levels. The well(s) prioritized for rehabilitation will be determined based on the highest loss of production capacity.

Section 5. The General Manager is hereby authorized and directed to take such actions as may be deemed necessary or advisable to effect the intent of the foregoing resolution.

Section 6. This Resolution shall be reevaluated in five years and supersedes Resolution No. 1442 and all other actions of the Board of Directors governing replacement of assets.

ADOPTED, SIGNED, and APPROVED this 10th day of October 2019 by a roll call vote.

AYES: DIRECTORS:
NOES: DIRECTORS:
ABSENT: DIRECTORS:
ABSTAIN: DIRECTORS:

_____
Shawn Dewane
President, Board of Directors

_____
Denise Garcia
District Secretary

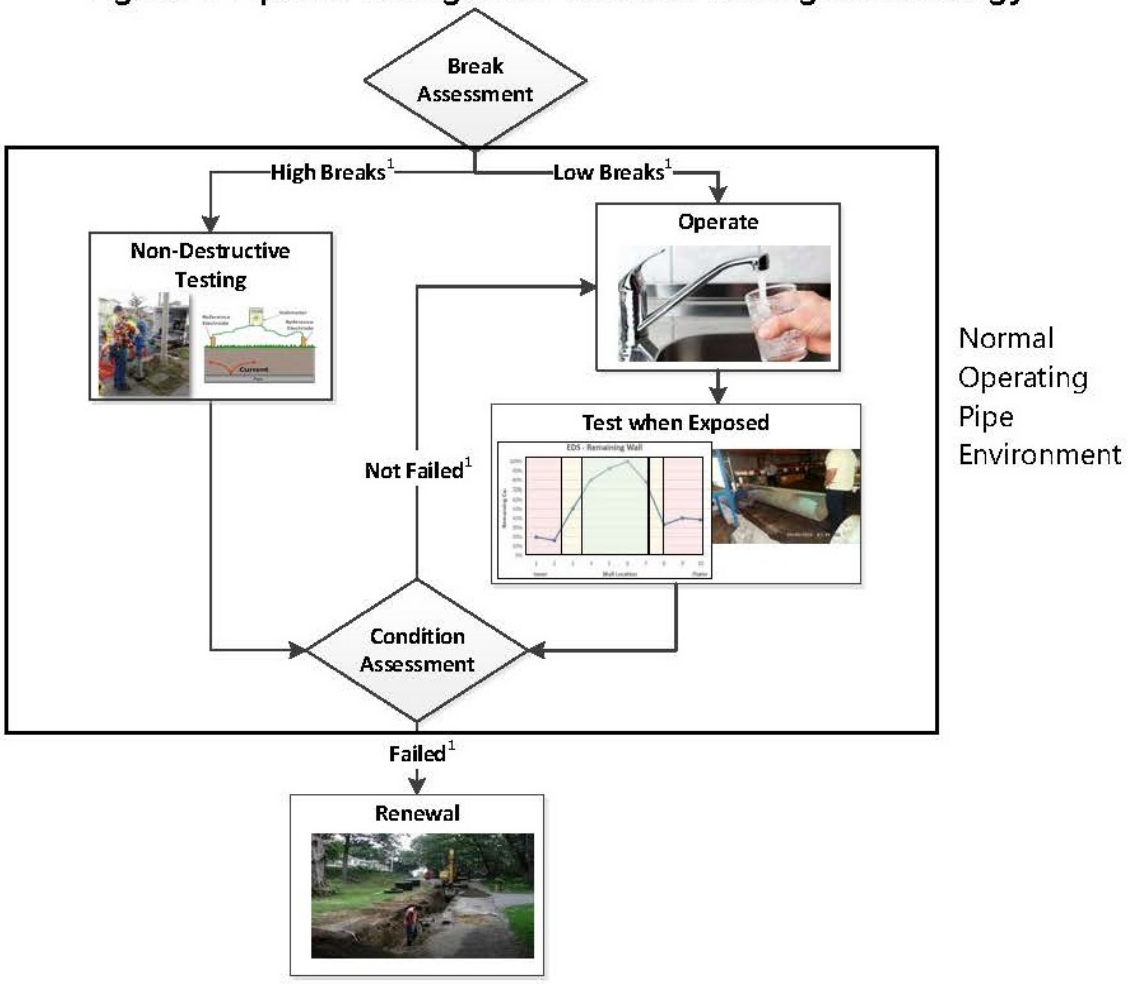
RESOLUTION NO. XXXX

APPENDIX A

RESOLUTION OF THE MESA WATER DISTRICT BOARD OF DIRECTORS REGARDING THE REPLACEMENT OF ASSETS INCLUDING PIPELINE AND WELL REHABILITATION SUPERSEDING RESOLUTION NO. 1442

Figure 1 summarizes the METHODOLOGY that shall be used to determine whether a pipe cohort warrants opportunistic testing, proactive testing, and if the useful life has been achieved and should be replaced. The terms used are defined below:

Figure 1. Pipeline Management Decision Making Methodology



[1]The definitions of "Low Breaks", "High Breaks", "Failed", and "Not Failed" are documented in Appendix A and dependent upon whether the pipe cohort is a transmission or distribution pipe.

a) Breaks Assessment – The performance of each cohort will be evaluated on an annual basis. Pipes that are performing well will be classified as “low breaks” and the cohort will continue to be operated and tested as opportunities emerge. As cohorts approach the end of useful life, performance will deteriorate. Cohorts categorized as having a performance of “high breaks” will be assessed using proactive testing. The definitions of “high” and “low” breaks are included below:
    a. “High Breaks”
        i. Distribution – If a distribution pipe cohort has 3 or more breaks and a historic break rate that exceeds 0.2 annual breaks per mile, the performance will be categorized as “high”.
        ii. Transmission – If a transmission pipe cohort has 2 or more breaks and a historic break rate that exceeds 0.2 annual breaks per mile, the performance will be categorized as “high”.
    b. “Low Breaks” – If the performance does not meet or exceed the thresholds for “high breaks” performance, the pipe cohort performance will be categorized as “low breaks” and the cohort will continue to be operated and tested as opportunities emerge.

b) Exposed Pipeline Testing – When a pipe is exposed for another reason (e.g. service tap, break, valve replacement, pipe replacement), it provides a unique opportunity to cost effectively gather condition assessment data since roughly 90 percent of the cost of testing is in exposing the pipe. Testing varies by pipe material and will consist of the following:
    a. ACP – When a full ring sample or wall remnant can be taken, the sample will be collected and tested for remaining wall thickness.
    b. PVC – If a stick of pipe must be removed as part of break response, the sample will be collected and tested.
    c. Metallic – As part of break response, take photos of the pipe and collect a soil sample for corrosivity testing.

c) Non-Destructive Testing – When the performance of a pipe begins to deteriorate, proactive testing will be used to determine if the useful life has been achieved and the pipe should be replaced. Examples of proactive testing used by Mesa Water include electromagnetic testing, acoustic velocity testing, close interval surveys, and pipe sampling and testing. Engineering staff will continuously learn about proactive testing technologies, and strategically apply cost-effective proactive condition assessment to the pipelines.

d) Condition Assessment – When non-destructive or exposed pipeline testing is performed on a cohort, the results will be evaluated to determine if the useful life has been achieved and the cohort should be categorized as “failed” or “not failed”. The definitions of “failed” and “not failed” are included below:

a. “Failed” – The cohort will be categorized as failed and considered for replacement if the condition assessment testing shows less than 10 years of remaining useful life and one of the following criteria are met:
    i. Distribution cohorts
        1. Break rate exceeds 1.0 annual breaks per mile
        2. 5 or more condition-related breaks total
    ii. Transmission cohorts
        1. Break rate exceeds 0.5 annual breaks per mile
        2. 3 or more condition-related breaks total
b. “Not Failed” – If the performance does not meet or exceed the thresholds for “failed” condition, the pipe cohort will be categorized as “not failed” and the cohort will continue to be operated and assessed as opportunities emerge.

e) Interagency Coordination – Staff will continue to meet with other local agencies such as the City of Costa Mesa and Costa Mesa Sanitary District to schedule water pipeline replacement projects in conjunction with other projects requiring road closures.

f) This policy is designed to address typical decision-making. Staff shall apply good engineering and operational judgment and override this policy when special circumstances result in increased value for Mesa Water and ratepayers. This may include optimizing cohort boundaries or overriding decision-making. If the policy is overridden, staff shall gain approval from the Board prior to implementation.

g) Staff shall refine and continuously improve this policy as lessons are learned.

RESOLUTION NO. ~~1442~~XXXX

RESOLUTION OF THE MESA WATER DISTRICT BOARD OF DIRECTORS REGARDING THE REPLACEMENT OF ASSETS INCLUDING PIPELINE AND WELL REHABILITATION SUPERSEDING RESOLUTION NO. ~~1268~~1442

WHEREAS, the Mesa Water District (Mesa Water®) is a county water district organized and operating ~~according to California Law; and~~pursuant to the provisions of the laws of the State of California (State or California); and

WHEREAS, Mesa Water has assets that will eventually need to be replaced, abandoned, or discarded because they have a finite life; and

WHEREAS, currently the most valuable assets include the water distribution system and the water wells, which group of assets shall therefore be the scope of this resolution; and

WHEREAS, age alone is a poor indicator of individual asset condition and remaining useful life; and

WHEREAS, the useful life of an individual asset in an asset class may be longer or shorter than the average useful life for that class.

NOW, THEREFORE, THE BOARD OF DIRECTORS OF THE MESA WATER DISTRICT DOES HEREBY RESOLVE, DETERMINE, AND ORDER AS FOLLOWS:

Section 1. Effective ~~March 15, 2014~~October 10, 2019, assets will not be replaced solely because they have reached the average useful life for their asset class and assets will not be kept merely because they have not yet reached the average useful life for their asset class.

Section 2. Before an asset is included in a proposed budget for replacement, Mesa Water's staff will evaluate its replacement or rehabilitation need based on operations and maintenance cost, improvements in technology, changing laws and regulations, risk management/safety implications, market availability and repair history.

Section 3. Pipes in the water distribution system will be replaced when their useful life has been achieved. The pipeline useful life and pipeline cohort group~~segment~~ herein are defined as follows:

~~a)~~ Pipeline Useful Life~~:~~ –

~~i.~~a) The pipeline useful life will be deemed to have been reached if ~~non-destructive~~ testing and ~~has determined that the~~ pipe cohort performance exceeds limits~~wall thickness has reduced to less than 70 percent of that of a new pipe per the Methodology~~ described in Appendix A.~~, or if a pipe failure rate greater than 0.1 breaks per mile per year has occurred in a given segment of pipe; and~~

b) A pipe cohort is a group of pipelines with similar characteristics that can be evaluated as a group. The similar characteristics include the following:
   a. Installation Project Number
   b. Material of Construction
      i. Asbestos Cement Pipe (ACP)
      ii. Polyvinyl Chloride (PVC)
      iii. Metallic
   c. Diameter
      i. Transmission Pipelines 16 Inches and Above
      ii. Distribution Pipelines 14 Inches or Less
   d. Pipe Performance or Condition

~~ii. The pipeline useful life will be deemed to have been reached if destructive testing and reasonable engineering judgment determines that there is only a minimal safety factor between the measured burst pressure of a section of pipe from the pipe segment in question and that of a new pipe.~~

~~iii. Should a pipeline reach 150 percent of its average age based useful life as defined by AWWA, then prior to replacement, conditions (i) and (ii) above shall be evaluated to confirm replacement need. Should conditions (i) and (ii) not be satisfied, the section of pipeline in question shall be tested every 5 years until replacement conditions are met.~~

~~b) Pipe segment:~~

~~i. A pipe segment is the length of pipe that can be isolated by closure of existing gate valves or other appurtenances, which is generally the distance between pipeline intersections and/or a change in pipeline diameter, material, or year of installation.~~

Section 4. Groundwater production wells will be rehabilitated if and when well capacity drops by more than 20 percent for a given well, and overall clear water well capacity drops by more than 10 percent, taking into consideration the annual

variation in groundwater levels. The well(s) prioritized for rehabilitation will be determined based on the highest loss of production capacity.

Section 5. The General Manager is hereby authorized and directed to take such actions as may be deemed necessary or advisable to effect the intent of the foregoing resolution.

Section 6. This Resolution shall be reevaluated in ~~three to~~ five years and supersedes Resolution No. ~~1268~~1442 and all other actions of the Board of Directors governing replacement of assets.

ADOPTED, SIGNED, and APPROVED this ~~15th day of March 2014~~ 10th day of October 2019 by a roll call vote.

AYES: DIRECTORS: ~~Atkinson, Bockmiller, Temianka, Dewane, Fisler~~
NOES: DIRECTORS:
ABSENT: DIRECTORS:
ABSTAIN: DIRECTORS:

_____
~~James R. Fisler~~Shawn Dewane
President, Board of Directors

_____
~~Coleen L. Monteleone~~Denise Garcia
District Secretary

RESOLUTION NO. ~~1442~~XXXX

APPENDIX A

RESOLUTION OF THE MESA WATER DISTRICT BOARD OF DIRECTORS REGARDING THE REPLACEMENT OF ASSETS INCLUDING PIPELINE AND WELL REHABILITATION SUPERSEDING RESOLUTION NO. ~~1268~~1442

Figure 1 summarizes the ~~The following~~ METHODOLOGY that shall be used ~~by Mesa Water staff~~ to determine whether~~pipeline useful life:~~

~~a) Where no historical failure data is available, the default useful life shall be determined by the average industry standard age-based condition. Pipe segments that have less than 10 years of remaining life should be the focus of non-destructive testing identified in (c) below.~~

~~b) Where soil corrosivity testing has determined~~ a ~~high potential for~~ pipe cohort warrants opportunistic testing, proactive testing, and if the useful life~~corrosion, the pipe segments in these areas should be the focus of non-destructive testing identified in (c) below.~~

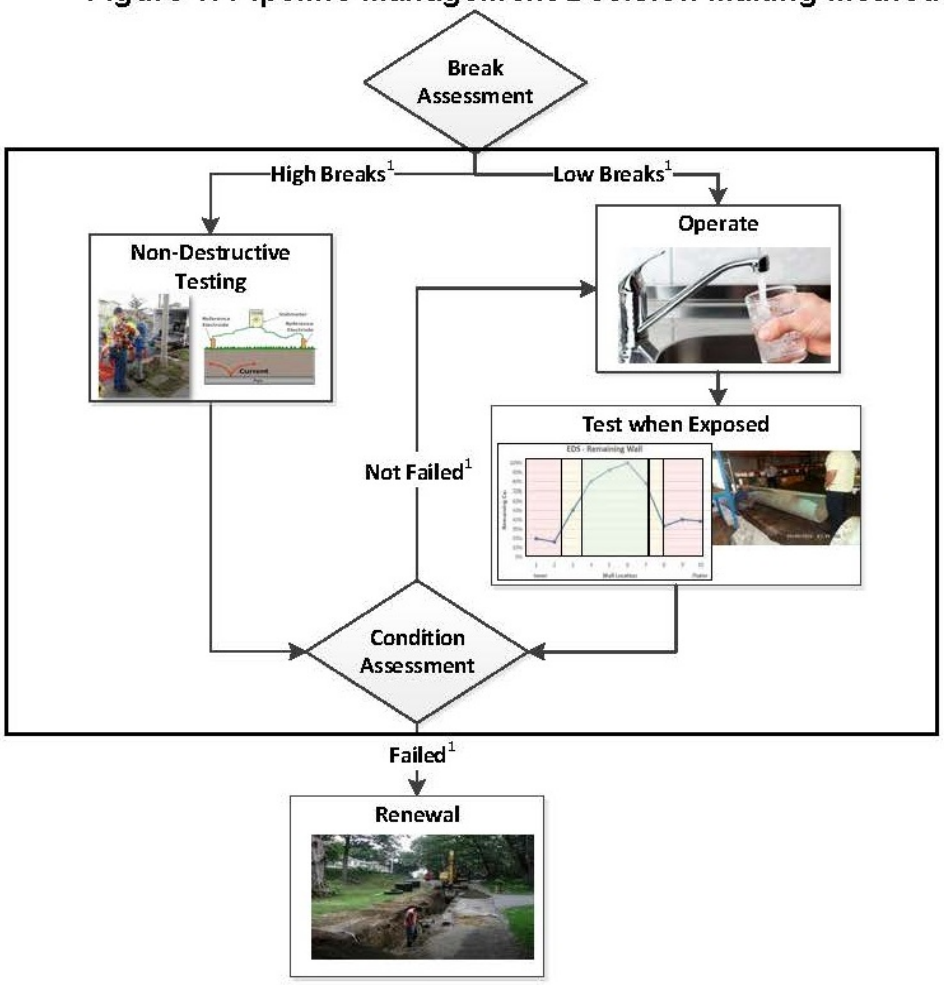
~~c) Each year approximately 1 percent of Mesa Water's distribution system shall be tested using a non-destructive testing method to determine remaining pipe wall thickness, based on the following priority:~~

~~i. Pipe segments identified in (a) above~~
~~ii. Pipe segments identified in (b) above~~
~~iii. Pipe segments with the greatest age by decade~~
~~iv. Pipe segments with the largest diameter~~

~~d) Where non-destructive testing~~ has been achieved~~performed, pipes identified with less than 70 percent of remaining wall thickness shall be subject to selective destructive testing to determine pipe burst pressure. If it is determined by the pipe burst pressure test and reasonable engineering judgment that an acceptable safety factor still exists for the anticipated operating pressure of the pipe compared with a new pipe, the pipe segment(s) in question will be allocated a remaining useful life of 10 years~~ and should be replaced. The terms used~~testing will be repeated within 5 years.~~

~~Where non-destructive testing methods~~ are defined below:~~.~~

Figure 1. Pipeline Management Decision Making Methodology



[1]The definitions of "Low Breaks", "High Breaks", "Failed", and "Not Failed" are documented in Appendix A and dependent upon whether the pipe cohort is a transmission or distribution pipe.

a) Breaks Assessment – The performance of each cohort will be evaluated on an annual basis. Pipes that are performing well will be classified as "low breaks" and the cohort will continue to be operated and tested as opportunities emerge. As cohorts approach the end of useful life, performance will deteriorate. Cohorts categorized as having a performance of "high breaks" will be assessed using proactive testing. The definitions of "high" and "low" breaks are included below:
    a. -"High Breaks"
        i. Distribution —- If a distribution pipe cohort has 3 or more breaks and a historic break rate that exceeds 0.2 annual breaks per mile, the performance will be categorized as "high".
        ii. Transmission —- If a transmission pipe cohort has 2 or more breaks and a historic break rate that exceeds 0.2 annual breaks per mile, the performance will be categorized as "high".

    b. "Low Breaks" – If the performance does not meet or exceed the thresholds for "high breaks" performance, the pipe cohort performance will be categorized as "low breaks" and the cohort will continue to be operated and tested as opportunities emerge.

b) Exposed Pipeline Testing – When a pipe is exposed for another reason (e.g. service tap, break, valve replacement, pipe replacement), it provides a unique opportunity to cost effectively gather condition assessment data since roughly 90 percent of the cost of testing is in exposing the pipe. Testing varies by pipe material and will consist of the following:
    a. ~~Asbestos Cement Pipe~~ – When a full ring sample or wall remnant can be taken, the sample will be collected and tested for remaining wall thickness.
    b. PVC – If a stick of pipe must be removed as part of break response, the sample will be collected and tested.
    c. Metallic – As part of break response, take photos of the pipe and collect a soil sample for corrosivity testing.

c) Non-Destructive Testing – When the performance of a pipe begins to deteriorate, proactive testing will be used to determine if the useful life has been achieved and the pipe should be replaced. Examples of proactive testing used by Mesa Water include electromagnetic testing, acoustic velocity testing, close interval surveys, and pipe sampling and testing. Engineering staff will continuously learn about proactive testing technologies, and strategically apply cost-effective proactive condition assessment to the pipelines.

d) Condition Assessment – When non-destructive or exposed pipeline testing is performed on a cohort, the results will be evaluated to determine if the useful life has been achieved and the cohort should be categorized as "failed" or "not failed". The definitions of "failed" and "not failed" are included below:

a. “Failed” – The cohort will be categorized as failed and considered for replacement if the condition assessment testing shows less than 10 years of remaining useful life and one of the following criteria are met:
    i. Distribution cohorts
        1. Break rate exceeds 1.0 annual breaks per mile
        2. 5 or more condition--related breaks total
    ii. Transmission cohorts
        1. Break rate exceeds 0.5 annual breaks per mile
        2. 3 or more condition--related breaks total

b. “Not Failed” – If the performance does not meet or exceed the thresholds for “failed” condition, the pipe cohort will be categorized as “not failed” and the cohort will continue to be operated and assessed as opportunities emerge.

e) Interagency Coordination – ~~.~~Staff will continue to meet with other local agencies such as the City of Costa Mesa and Costa Mesa Sanitary District to schedule water pipeline replacement projects in conjunction with other projects requiring road closures.

f) This policy is designed to address typical decision-making. Staff shall apply good engineering and operational judgment and override this policy when special circumstances result in increased value for Mesa Water and ratepayers. This may include optimizing cohort boundaries or overriding decision-making. If the policy is overridden, staff shall gain approval from the Board prior to implementation.

g) Staff shall refine and continuously improve this policy as lessons are learned.

~~e) not yet available or not suitable for the given pipe material (such as CMLC, steel, DIP or other ferrous pipeline materials) destructive testing shall be performed on selected pipe segments within approximately 1 percent of Mesa Water’s distribution system each year. If it is determined through such destructive testing methods and reasonable engineering judgment that the pipe still has an acceptable safety factor, the pipe segment(s) in question shall be allocated a remaining useful life of 15 years. If on the other hand, it is determined through such destructive testing methods and reasonable engineering judgment that the pipe segment(s) do not have an acceptable safety factor, the pipe segment(s) in question shall be deemed to have reached their useful life and shall be recommended for replacement.~~

REPORTS:

8. REPORT OF THE GENERAL MANAGER

REPORTS:

9. DIRECTORS' REPORTS AND COMMENTS

MEMORANDUM

Dedicated to Satisfying our Community's Water Needs

TO: Engineering and Operations Committee
FROM: Tracy E. Manning, Water Operations Manager
DATE: September 17, 2019
SUBJECT: Unregulated Contaminants Requiring Monitoring

RECOMMENDATION

This item is provided for information.

STRATEGIC PLAN

Goal #1: Provide a safe, abundant, and reliable water supply.

PRIOR BOARD ACTION/DISCUSSION

At its July 11, 2019 meeting, the Board of Directors (Board) requested information on Unregulated Contaminants Requiring Monitoring.

BACKGROUND

Mesa Water District (Mesa Water®) provides high quality local, and reliable drinking water that meets or surpasses all State and Federal drinking water regulations.

Federal regulations are developed and enforced by the United Stated Environmental Protection Agency (USEPA) as part of the 1974 Safe Drinking Water Act (SDWA), which was passed by Congress to protect public health by regulating the nation's public water supplies. Currently, the EPA regulates over 90 contaminants and has developed maximum contaminant levels (MCL) for health-based contaminants that must be met by all public drinking water systems.

Individual states may be given primacy to oversee the drinking water program. California is one of those states, and as such, oversees the drinking water program and must adopt the existing regulations and has the authority to develop regulatory levels that are more stringent than the Federal regulations. Primacy agencies that have not yet adopted regulations that are federally mandated must also enforce the Federal standards.

Federal Drinking Water Standards Development
The SDWA requires EPA to consider three criteria when making a determination to regulate a contaminant:

- The contaminant poses an adverse health effect on the population or sub-population.
- The contaminant occurs, or is likely to occur, often enough and at high enough levels to impact public health.
- The EPA Administrator determines the regulation of a contaminant provides a meaningful opportunity for health risk reductions for persons served by public water systems.

The process for determining the need to develop a drinking water standard begins with a Contaminant Candidate List (CCL). The 1996 amendments to the SDWA required the EPA to publish a list of unregulated contaminants that present a potential public health concern in drinking water. The first Contaminant Candidate List (CCL 1) was published in 1998 and included 50

chemicals and 10 microbes. The list was developed with input from scientists, researchers, and other stakeholders and is meant to help prioritize the EPA's research and data collection efforts. The CCL is required to be updated and published every five years. This was done in 2005 (CCL 2), 2009 (CCL 3), and 2016 (CCL 4). Contaminants remain on each subsequent list until a regulatory determination has been made to either develop an MCL or not. The EPA is required to make such a determination on at least five contaminants every five years. Nominations for CCL 5 are currently open and stakeholders are required to provide information on the contaminant along with any data that shows that it is known or is anticipated to occur in drinking water and any data that supports that the contaminant may have an adverse health effect on the general population or any specific sub-population (e.g., infants, pregnant women, etc.).

The 1996 SDWA Amendments also require that once every five years the EPA issue a list of no more than 30 unregulated chemicals from the CCL to be monitored by public water systems. Additional contaminants may be included based on current research or occurrence data. The first Unregulated Contaminant Monitoring Rule (UCMR 1) was published in 1999, with subsequent UCMRs in 2007 (UCMR 2), 2012 (UCMR 3), and 2016 (UCMR 4). Monitoring schedules allow for sampling over a three-year period and are divided into contaminant lists. Not all public water suppliers must monitor for all lists. Results from this monitoring helps the EPA determine both the breadth and concentration of contaminants across the nation in order to identify contaminants that require regulation.

After reviewing health effects data, EPA sets a maximum contaminant level goal (MCLG). The MCLG is the maximum level of a contaminant in drinking water at which no known or anticipated adverse effect on the health of persons would occur. MCLGs are non-enforceable and non-regulatory public health goals. MCLGs consider only public health and not the limits of detection and treatment technology effectiveness. Therefore, they sometimes are set at levels which water systems cannot meet because of technological limitations.

Once the MCLG is determined, EPA sets an enforceable standard which, in most cases, is a maximum contaminant level (MCL). The MCL is the maximum level allowed of a contaminant in water which is delivered to any user of a public water system. The MCL is set as close to the MCLG as feasible, taking into account cost considerations, available treatment technologies, and laboratory analytical capabilities. MCLs must be met by all public water systems. Monitoring results for all regulated contaminants as well as unregulated contaminants requiring monitoring must be published and made available to the public annually in a Consumer Confidence Report.

The EPA is also required to perform a Six-Year Review of national primary drinking water standards to review additional data on occurrence, health effects, analytical improvements, and treatment improvements to identify the need to modify existing MCLs and MCLGs.

California Drinking Water Standards Development

The EPA has delegated primary enforcement responsibility (Primacy) to the State of California. Enforcement authority lies within the California Environmental Protection Agency (CalEPA), specifically with the State Water Resources Control Board's Division of Drinking Water (DDW). DDW must have regulations for contaminants with national drinking water standards that are at

least as stringent as the Federal MCL. DDW may adopt standards that are more stringent than the Federal level and may regulate contaminates that have not yet been regulated at the Federal level. For example, there is no Federal MCL for perchlorate, but California adopted one in 2015. There are also 26 contaminants where the California MCL is set below the Federal MCL.

In order for DDW to establish new or more stringent MCLs, it looks to CalEPA's Office of Environmental Health Hazard Assessment's (OEHHA), which performs major risk assessment and hazard evaluation activities relating to chemical contaminants in drinking water. These activities include developing recommended Notification Levels (NLs) and Public Health Goals (PHGs) for chemical substances in drinking water. A PHG is the level of a chemical contaminant in drinking water that does not pose a significant risk to health. PHGs are not regulatory standards. California state law requires DDW to set MCLs as close as feasible to a contaminant's PHG, much like the EPA sets MCLs as close to a contaminants MCLG as feasible.

Notification Levels are health-based advisory levels that are established for chemicals for which there are no MCLs or PHGs. Notification Levels may be established by DDW when a chemical threatens or is found in drinking water sources. OEHHA develops recommended Notification Levels at the request of DDW. OEHHA performs a risk assessment of the chemical using standard risk and exposure assumptions and proposes a health-protective level. A notification level is then established by DDW, and amended as necessary as conditions or risk assessment methods change. Contaminants with Notification Levels may eventually develop PHGs and MCLs, at which time the Notification Level would then be rescinded.

Each Notification Level has a corresponding Response Level, which is the level at which DDW would recommend removing a source from service. Response Levels for contaminants with non-cancer end-points are generally set at 10 times the Notification Level. Response Levels for contaminants with cancer end-points are generally set at 100 times the Notification Level. There are currently 31 contaminants with Notification and Response Levels in California.

DISCUSSION

Since the publication of UCMR 1 in 1999, there have been four cycles of mandatory testing, with the fourth cycle still in progress. Certain testing is required of only surface water systems or ground water systems under the direct influence of surface water, others are for all large water systems, while there may be additional sub-groups for representative, randomly chosen large and small water systems.

UCMR 1 was published in 1999. Sampling occurred in 2001-2003 for 24 contaminants which are listed in Table 1 below:

Table 1

UCMR 1 Monitoring Requirements	
2,4-dinitrotoluene	2-methyl-phenol
2,6-dinitrotoluene	2,4-dichlorophenol
Acetochlor	2,4-dinitrophenol

DCPA mono-acid degradate	2,4,6-trichlorophenol
DCPA di-acid degradate	Diazinon
EPTC	Disulfoton
Molinate	Diuron
MTBE	Fonofos
Nitrobenzene	Linuron
Perchlorate	Prometon
Terbacil	Terbufos
1,2-diphenylhydrazine	Aeromonas

UCMR 2 was published in 2007. Sampling occurred in 2008-2010. The required 25 constituents are listed in Table 2 below:

Table 2

UCMR 2 Monitoring Requirements	
Dimethoate	Acetochlor ethane sulfonic acid (ESA)
Terbufos sulfone	Acetochlor oxanilic acid (OA)
2,2',4,4'-tetrabromodiphenyl ether (BDE-47)	Alachlor ethane sulfonic acid (ESA)
2,2',4,4',5-pentabromodiphenyl ether (BDE-99)	Alachlor oxanilic acid (OA)
2,2',4,4',5,5'-hexabromobiphenyl (HBB)	Metolachlor ethane sulfonic acid (ESA)
2,2',4,4',5,5'-hexabromodiphenyl ether (BDE-153)	Metolachlor oxanilic acid (OA)
2,2',4,4',6-pentabromodiphenyl ether (BDE-100)	N-nitroso-diethylamine (NDEA)
1,3-dinitrobenzene	N-nitroso-dimethylamine (NDMA)
2,4,6-trinitrotoluene (TNT)	N-nitroso-di-n-butylamine (NDBA)
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	N-nitroso-di-n-propylamine (NDPA)
Acetochlor	N-nitroso-methylethylamine (NMEA)
Alachlor	N-nitroso-pyrrolidine (NPYR)
Metolachlor	

UCMR 3 was published in 2012. Sampling occurred in 2013-2015. The required 30 constituents are listed in Table 3 below:

Table 3

UCMR 3 Monitoring Requirements	
1,2,3-trichloropropane	Perfluorooctanesulfonic acid (PFOS)
1,3-butadiene	Perfluorooctanoic acid (PFOA)
Chloromethane (methyl chloride)	Perfluorononanoic acid (PFNA)
1,1-dichloroethane	Perfluorohexanesulfonic acid (PFHxS)

Bromomethane (methyl bromide)	Perfluoroheptanoic acid (PFHpA)
Chlorodifluoromethane (HCFC-22)	Perfluorobutanesulfonic acid (PFBS)
Bromochloromethane (halon 1011)	17-β-estradiol
1,4-dioxane	17-α-ethynylestradiol (ethinyl estradiol)
Vanadium	16-α-hydroxyestradiol (estriol)
Molybdenum	Equilin
Cobalt	Estrone
Strontium	Testosterone
Chromium-3	4-androstene-3,17-dione
Chromium-6	Enteroviruses*
Chlorate	Noroviruses*

*Not required for Mesa Water. Required for select small water systems only.

UCMR 4 was published in 2017 with sampling occurring in 2018-2020. The required 30 constituents are listed in Table 4 below:

Table 4

UCMR 4 Monitoring Requirements	
germanium	1-butanol
manganese	2-methoxyethanol
alpha-hexachlorocyclohexane	2-propen-1-ol
chlorpyrifos	butylated hydroxyanisole
dimethipin	o-toluidine
ethoprop	quinoline
oxyfluorfen	total microcystin*
profenofos	microcystin-LA*
tebuconazole	microcystin-LF*
total permethrin (cis- & trans-)	microcystin-LR*
tribufos	microcystin-LY*
HAA5	microcystin-RR*
HAA6Br	microcystin-YR*
HAA9	Nodularin*
total organic carbon (TOC)	anatoxin-a*
bromide	Cylindrospermopsin*

*Not Required for Mesa Water. Required for surface water systems.

Mesa Water performs all monitoring required by the EPA and DDW and meets or surpasses all Federal and State Drinking Water compliance regulations. Data collected as part of UCMR is reported to consumers along with compliance monitoring results in Mesa Water's Consumer Confidence Report which is published annually in June.

UCMR 5 monitoring lists are currently under development and are expected to be published in 2022. Mesa Water will continue to monitor under all mandated programs.

FINANCIAL IMPACT

None.

ATTACHMENTS

None.