MesaWater DISTRICT

Dedicated to Satisfying our Community's Water Needs

AGENDA
MESA WATER DISTRICT
BOARD OF DIRECTORS
Tuesday, June 18, 2019
1965 Placentia Avenue, Costa Mesa, CA 92627
3:30 p.m. Special Board Meeting

ENGINEERING AND OPERATIONS COMMITTEE MEETING
Tuesday, June 18, 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. 2019 Public Health Goals Report
7. Administration Building Improvements & HVAC Replacement Project

PRESENTATION AND DISCUSSION ITEMS:

8. Programmable Logic Controllers and Supervisory Computer System Assessment
9. Well Automation and Rehabilitation Project Wrap Up

REPORTS:

10. Report of the General Manager
11. Directors' Reports and Comments

INFORMATION ITEMS:

12. Well and Facility Naming Conventions

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 2149	1620-1644 Whittier Avenue and 970 16th Street	89 Single Family Homes	Plans received and plan check fees paid 2/2/14. Permit issued on 7/23/15. Pre-con meeting held on 7/27/15. Pipeline installation on 10/21/15. Pressure test and chlorination on 11/5/15. Bac-T testing completed on 11/24/15 and 11/25/15. Waterline tied-in angle-stops locked on 12/14/15. 4-1" meters installed on model homes on 2/25/16. 1-1.5" irrigation meter and 1-1" domestic meter installed and locked on 4/5/16. Inspected rock base on 7/11/16. Installed 7-1" meters on 7/13/16. Flow-thru tested on 8/25/16, 9/8/16. Rock base and meters installed on 11/3/16. Flow-thru check on 12/1/16, 4/5/17. Meters installed on 8/21/17, 10/5/17. Meters installed on 4/25/18. Meters installed 6/28/18 and again on 8/13/18. Contacting site in order to test 2 irrigation backflow devices.
MC 2204	1672 Placentia	31 Single Family Homes	Plans received and plan check fees paid on 8/26/15. Second plan check submitted on 2/11/16 and returned on 2/26/16. Mylars submitted, fees paid, and permit issued on 5/5/16. Tee cut-ins on 6/22/16. Pressure Test and Bac-T test on 7/7/16. Water main turned on 7/21/16. Services installed and locked off on 9/6/16. Meter installation on 10/28/16. Backflows tested on 11/16/16. Backflow tested on 12/9/16. Rock base on 2/1/17. Service placement on 2/16/17. Meters installed on 3/28/17. Backflows tested on 3/30/17. Meters installed and locked off on 2/20/18. Contacting site in order to test remaining backflow devices.
MC 2233	1560 Placentia	81 Single Family Homes	Plans received and plan check fees paid on 1/20/16. Request for additional information requested on 1/28/16. Requested information submitted on 2/24/16. Plan check picked up on 4/18/16. Second plan check submitted on 5/18/16. Mylar drawings and fee payment received on 7/5/16. Permit issued on 7/11/16. Mainline installed on 8/24/16. Hydrant laterals installed on 8/25/16. Services installed on 9/1/16. Mainline installed on 9/20/16. Pressure and Bac-T test on 9/28/16. Laterals installed on 9/29/16 and 10/5/16. Mainline charged on 10/17/16. Angle stop adjusted on 12/6/16. Meter and meter box placement on 1/5/17. Services adjusted to grade on 3/2/17. Meter installation on 5/3/17. Site meeting on 7/26/17. Service placement on 9/6/17. Meter box placement on 2/9/18. Meters installed and locked off on 5/21/18, 6/28/18, 7/13/18, 8/8/18, and again on 10/10/18. Concrete pads placed on 10/24/18 and 10/25/18. Meters installed on 12/4/18, 1/7/19, 1/29/19 and again on 3/21/19. Contacting site in order to test remaining backflow devices.

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, and again on 3/12/19. Engineering coordinating with Operations and Customer Services to determine remaining items in order to close project.
C003-16-01	788 Center Street	2 Single Family Homes	Plans received and plan check fees paid on 6/28/16. Plans returned on 7/14/16. Fees paid and permit issued on 1/6/17. Pre-con held on 1/16/18. Service installed on 3/8/18. Meters installed and locked on 3/13/18. Flowthru system tested on 5/22/19.
C0012-17-02	929 Baker Street	55 Detached Condos	Plans received and plan check fees paid on 9/27/16. Plans picked up on 10/18/16. Plans submitted on 2/22/17. Plans returned on 3/6/17. Fees paid and permit issued on 3/21/17. Precon held on 6/1/17. Services installed on 8/31/17. Mainline turned on 9/14/17. Meters installed and locked on 2/26/18. Awaiting call for backflow testing to complete project. Meters installed and locked on 8/6/18. Backflow tested on 8/24/18. Site check done on 9/25/18, homes are still under construction. Meters installed and locked off on 11/2/18. Meters installed again on 1/10/19. Flowthru system tested on 3/22/19. Coordinating backflow testing for irrigation services. Backflow testing for irrigation services complted on 4/25/19.

DEVELOPER PROJECT STATUS REPORT

PROJECT STATUS - DEVELOPER PROJECTS			
FILE NO.	PROJECT ADDRESS	PROJECT DESCRIPTION	PROJECT NOTES/STATUS
C0014-18-01	1585 MacArthur	Commercial Building	Plans received and plan check fees paid on 3/27/18. Comments returned on 4/5/18. Awaiting resubmittal. Plans approved, final fees paid and permit issued on 8/7/18. Construction inspections are currently in progress with mainlines being excavated on 8/29/18, 9/5/18, 9/6/18. Backflow for fireline installed on 9/12/18. Service abandonments completed on 10/16/18. Services installed on 2/26/19. Meters installed and locked off on 2/28/19. One meter upgraded on 4/2/19 and the other on . Backflow testing for fire, domestic and irrigation system completed 4/26/19.
C0027-17-01	231 Flower Street	Meter Upgrade	Plans received and plan check fees paid on 3/23/17. Fees paid and permit issued on 4/21/17. Site visit on 10/30/17, and again on 5/30/18; no progress to report. Site visit on 8/20/18 and 9/25/18 with no activity. Engineering to follow up on 4/9/19. Meter to be set up with customer service and checking on backflow preventer testing.
C0029-17-01	127 23rd Street	4 Single Family Homes	Plans received and plan check fees paid on 5/12/17. Fees paid and permit issued on 8/3/17. Awaiting call for initial inspections. Service installed on 2/8/18. Meters installed and locked on 2/15/18. Awaiting call for backflow testing to complete project. Spoke to property owner on 10/10/18, construction will be done by the end of 2018 to test flowthru system. Service abandonments to be completed.
C0035-18-01	146 18th Street	2 Single Family Homes	Plans received and plan check fees paid on 8/8/17. Fees paid and permit issued on 9/21/17. Meters installed and locked on 10/20/17.Site visit on 1/9/18; awaiting schedule for backflow testing.
C0037-18-01	2850 Mesa Verde Drive East	11 Single Family Homes	Plans received and plan check fees paid on 8/17/17. Fees paid and permit issued on 10/18/17. Manifold installation on 12/6/17. Meters installed on 12/29/17. Irrigation meter installed on 3/28/18. Backflow test on 4/18/18. Meters placed and locked on 5/31/18. Site visit done to verify progress on 8/20/18. Meters installed on 9/21/18. Awaiting schedule for backflow testing.
C0039-18-01	172/174 Costa Mesa Street	2 Single Family Homes	Plans received and plan check fees paid on 8/22/17. Fees paid and permit issued on 8/29/17. Precon meeting held on 2/6/19. Services installed on 2/8/19. Meter installed and locked off on 2/19/19. Flowthru system tested on 5/30/19.

DEVELOPER PROJECT STATUS REPORT

PROJECT STATUS - DEVELOPER PROJECTS			
FILE NO.	PROJECT ADDRESS	PROJECT DESCRIPTION	PROJECT NOTES/STATUS
C0041-18-01	160 & 162 E 18th Street	2 Single Family Homes	Plans received and plan check fees paid on 9/27/17. Fees paid and permit issued on 11/2/17. Meters installed and locked on 3/26/18. Meters installed and locked on 6/28/18. Backflow tested on 10/29/18.
C0042-18-01	335 & 337 16th Place	2 Single Family Homes	Plans received and plan check fees paid on 10/26/17. Final fees paid on 8/8/18. Site visit on 8/20/18; contractor still grading the area. Precon held on 5/15/19.
C0044-18-01	276 E 19th Street	Meter Upgrade	Plans received and plan check fees paid on 1/21/18. Final mylar signed on 2/28/19. Precon held on 3/4/19. Meter installed and locked off on 3/6/19. Backflow tested on 3/7/19, and again 4/3/19.
C0047-18-01	3505 Cadillac Avenue	Commercial Building	Plans received and plan check fees paid on 1/22/18. Fees paid and permit issued on 4/10/18. Services placed on 5/2/18. Thrustblocks placed on 6/6/18. Pressure test performed on 7/9/18. Project is in process.
C0048-18-01	235 Baker	Commercial Building	Plans received and plan check fees paid on 2/15/18. Fees paid and permit issued on 4/13/18. Site visit on 8/20/18 to verify work status; no construction. Development back on track; precon held on 6/10/19.
C0049-18-01	428 E 17th Street	Restaurant	Plans received and plan check fees paid on 1/26/18. Fees paid and permit issued on 5/4/18. Pressure test on 5/25/18. Shutdown for tee cut-in on 6/5/18. One fire service is active, the other is stubbed to property. Awaiting call for fireline pressure test and samples. Water service manifold stubbed to property. Pressure test and Bac-T tests done on 9/7/18, 9/11/18 and again on 9/13/18. Pressure test performed on 10/22/18.
C0051-18-01	1650 Monrovia	Senior Living Complex	Plans received and plan check fees paid on 2/15/18. Comments returned on 3/12/18. Revised submittal received on 4/24/18. Project to undergo hydraulic model analysis. Second plan check complete. Easements recorded on 8/14/18. Final fees paid on 8/23/18. Precon meeting held on 9/26/18. Fireline excavation and thrustblock placement on 11/27/18. Meters installed on 1/10/19. Health samples performed on 1/30/19 and 1/31/19.
C0052-18-01	302 Cabrillo	2 Single Family Homes	Plans received and plan check fees paid on 2/26/18. Fees paid and permit issued on 5/7/18. Awaiting initial calls for inspections. Verified with new property owner on 3/11/19 that construction will begin in 2019.

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FILE NO.	PROJECT ADDRESS	PROJECT DESCRIPTION	PROJECT NOTES/STATUS
C0053-18-01	1908 Tustin	Single Family Home	Plans received and plan check fees paid on 3/8/18. Fees paid and permit issued on 3/13/18. Meter upgraded on 4/15/19. Awaiting schedule for backflow placement and test.
C0054-18-01	3505 Cadillac Avenue, Unit O-101	Commercial Building	Plans received and plan check fees paid on 5/7/18. Fees paid and permit issued on 5/22/18. Tapping sleeve, and hot tapping done on 5/2/18. Thrustblock placement inspections on 5/2/18, 6/6/18, and 7/9/18. Pressure test done on 7/9/18. Fireline turned on 9/12/18.
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.
C0010-19-01	2214 Elden Avenue	Single Family Home	Plans received and meter replacement fees paid on 4/15/19. 1st Plan check submitted on 4/18/19 and are in progress. Meter upgrade completed on 5/1/19. Flowthru system tested on 5/2/19 and project ready to close.
C0013-17-03	1845 Park Avenue	Lion's Park Project	Plans received and meter replacement fees paid on 11/13/17. Precon held on 7/19/18. Services installed on 9/11/18, 9/12/18, 9/13/18. Backflow placed on 10/3/19. Shutdoiwn performed on 10/9/18. Abandonments done on 12/18/18. Iriigation meter installed on 4/30/19. Backflows tested on 5/1/19, 5/2/19. Shutdown for more abandonments performed on 5/14/19.
C0013-19-01	Harbor and Wilson Medians	City Medians	Plans received and meter replacement fees paid on 4/16/19. 1st Plan check submitted on 4/16/19 and redlines returned on 4/19/19. Waiting for Payment Voucher and Water Service Agreement to be paid and signed.
C0058-18-01	585 & 595 Anton Boulevard	Apartment Complex	Plans received and plan check fees paid on 6/8/18. Currently in plan check. Meeting scheduled with owner on 9/12/18 to go over questions they have. Plans approved to perform demolition for grading only at this time. Operations is currently working on practice shutdowns for service connection tie-in. Precon with contractor held on 1/22/19. Shutdowns for abandonments performed on 3/14/19, 3/18/19, and on 3/19/19. Submitted hydraulic analysis on 4/5/19 Waiting for signed Water Service Agreement and all other plan check processes are completed.

DEVELOPER PROJECT STATUS REPORT

PROJECT STATUS - DEVELOPER PROJECTS			
FILE NO.	PROJECT ADDRESS	PROJECT DESCRIPTION	PROJECT NOTES/STATUS
C0060-19-01	3505 Cadillac Avenue, Unit F-9	Commercial Building New Fire Line	Plans received and plan check fees paid on 7/23/18. Permit issued for major service line and fire systems infrastructure. Final permit will be reviewed when tenant improvements are submitted. Fireline excavation and thrustblock placement on 12/10/18 and 12/14/18. New T.I. was submitted on 3/8/19 to continue plan check and approve final permit.
C0061-19-01	3033 Bristol Street, Space 2071	Restaurant Expansion	Plans received and plan check fees paid on 8/16/18. Awaiting final payment of fees. Engineering is following up on 4/9/19 and 4/25/19.
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 schedule.
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. Waiting for additional final permit fees to be paid.
C0064-19-01	1975, 1977, 1981, 1985 Placentia Avenue	Commercial Building	Plans received and plan check fees paid on 11/6/18. Currently in plan check. Final plan check fees paid on 1/15/19. Permit issued on 1/17/19. Precon held on 2/14/19. Hot-Tap performed on 2/20/19. Meters installed on 3/4/19, and again on 3/22/19. Backflow tested on 3/5/19, and another on 3/22/19.
C0065-19-01	245 Knox Rd	Single Family Home	Plans received and plan check fees paid on 11/7/18. Final fees paid on 2/5/19. Precon meeting held on 2/8/19. Meter installed and locked off on 2/21/19. Flowthru system tested on 3/20/19.
C0065-19-02	1545 Westminster	Single Family Home	Plans received and plan check fees paid on 11/7/18. Final fees paid on 2/5/19. Precon meeting held on 2/8/19. Services installed on 2/12/19. Meter installed and locked off on 2/21/19. Flowthru system tested on 3/20/19.
C0066-19-01	2062 Pomona	Single Family Home	Plans received and plan check fees paid on 11/29/18. Final fees paid on 1/22/19. Precon held on 2/5/19. Services installed on 2/11/19. Waiting for flowthru testing to be scheduled.

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FILE NO.	PROJECT ADDRESS	PROJECT DESCRIPTION	PROJECT NOTES/STATUS
C0067-19-01	3505 Cadillac Avenue, Suite A	Commercial Building New Fire Line	Plans received and plan check fees paid on 12/14/18. Plans picked up on 12/20/18. Second plan check submitted 1/9/19, and picked up again on 1/15/19. Third plan check submitted on 1/25/19. Final permit fees paid on 2/7/19. Permit issued on 2/13/19. Precon held on 2/22/19. Services installed on 2/28/19, and Chloriated. Hot-Tap done on 3/1/19. Bac-T tests perfomed on 3/5 and 3/6/19. Concrete pad done on 3/8/19. Backflow tested and fireline turned on, on 3/11/19.
C0069-19-01	767 W 17th Street	Meter Upgrade	Plans received and plan check fees paid on 1/7/19. Second plan check submitted 3/21/19, and redlines picked up on 3/26/19. Final permit fees paid on 3/27/19. Site visit/pre con completed on 4/26. Flowthru tested on 5/2/19, and additional backflow tested on 6/7/19.
C0070-19-01	3333 Bristol Street Space 3001	Commercial Building	Plans received and plan check fees paid on 1/3/19. Customer picked up redlines on 1/7/19. Second plan check submitted on 1/15/19, and redlines picked up on 1/31/19. Third plan check submitted on 2/12/19, and redlines picked up on 2/14/19. Final fees paid on 2/28/19. Permit issued on 3/11/19. Precon meeting held on 3/18/19. Precon held on 2/5/19. Meter upgraded on 3/25/19.
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.
C0073-19-01	55 Fair Drive	Vanguard University Student Center	Plans received and plan check fees paid on 1/14/19. Customer picked up redlines on 2/12/19. Second plan check submitted on 3/11/19. Third/Fourth (and final) plan check submitted on 3/14/19 and redlines picked up on 3/25/19. Final mylars submitted on 4/26/19.
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.

DEVELOPER PROJECT STATUS REPORT

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FILE NO.	PROJECT ADDRESS	PROJECT DESCRIPTION	PROJECT NOTES/STATUS
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. Wating for 3rd plan check submittal. Recived fire department approval on 5/31/19.
C0075-19-01	2942 Century Place	Commercial Building	Plans received and plan check fees paid on 1/23/19. Customer picked up redlines on 1/29/19, and redlines picked up on 2/8/19. Second plan check submitted 3/25/19, and redlines picked up on 4/2/19. Final permit fees paid on 5/14/19. Precon meeting held on 5/30/19.
C0076-19-01	2948 Randolph	Commercial Building	Plans received and plan check fees paid on 1/23/19. Customer picked up redlines on 2/1/19. Second plan check/mylars submitted on 2/11/19. Final fees paid on 2/14/19. Permit issued on 2/14/19. Precon held 2/22/19. Services installed on 3/19/19. Meter installed and backflow tested on 3/20/19.
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. Owner in process of installing backflow to be tested.
C0078-19-01	3505 Cadillac Avenue, F-5	Commercial Building New Fire Line	Plans received and plan check fees paid on 1/31/19. Customer picked up redlines on 2/5/19. Second plan check submitted on 3/8/19. Final permit fees paid on 4/2/19. Recorded easement on 4/22/19 and waiting for site visit/pre-con meeting.
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.
C0080-19-01	246 Tulane Road	Meter Upgrade	Plans received and plan check fees paid on 2/6/19. Customer picked up redlines on 2/12/19. Second plan check was submitted on 3/4/19, and redlines picked up on 3/11/19. Plan check package approved by District Engineer on 4/15/19 and provided inspection card on 4/29/19. Permit issued on 4/15/19. Precon held on 4/29/19.

DEVELOPER PROJECT STATUS REPORT

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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 helf on 4/25/19. Final permit fees paid on 4/2/19. Permit issued on 4/18/19. Precon held on 4/25/19.
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. Procon meeting held on 5/10/19. Waiting for revised Easements and Quit Claims regarding legal entitities.
C0082-19-01	3323 Hyland Avenue	Apartment Complex	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.
C0083-19-01	175 Costa Mesa	Meter Upgrade	Plans received and plan check fees paid on 2/20/19. Customer picked up redlines on 3/4/19. Second plan check was submitted on 4/15/19, and redlines picked up on 4/18/19. Plan check package approved by District Engineer on 5/2/19 and provided inspection card on 5/3/19. Completed meter installation on 5/6/19 and tested flowthru system on 5/8/19.
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.
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. Waiting for Fire Department approval to issue permit.
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.

DEVELOPER PROJECT STATUS REPORT

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FILE NO.	PROJECT ADDRESS	PROJECT DESCRIPTION	PROJECT NOTES/STATUS
C0087-19-01	1885 Anaheim Avenue	Church	Plans received and plan check fees paid on 3/15/19. Precon meeting held on 4/1/19. Meter changed out on 4/1/19 and waiting for final mylar before closing out project.
C0088-19-01	239 Knox Street	Single Family Home	Plans received and plan check fees paid on 4/2/19. 1st Plan Check submitted on 4/9/19 and redlines picked up on 4/11/19. Second plan check submitted on 4/29/19. Third and final plan check submitted on 5/13/19.
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.
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.
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.
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.
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 submited on 5/13/19 and redlines picked up on 5/24/19.
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.
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.
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 4/230/19 and redlines to be picked up on 5/9/19.
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.

MESA WATER AND OTHER AGENCY PROJECTS STATUS REPORT
June 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. Held Project Progress meeting on 6/6/19) Project in Progress (6/6/19)

Project Title: Well Automation and Rehabilitation

File No.: MC 2101

Description: Rehabilitate all clear water wells and add remote control SCADA capabilities

Status: Construction activities began at Well 5 on October 3, 2016 with demolition and well rehabilitation beginning in the first week. Video of Well 5 showed scale on the louvers, and potential failure of an unused sounding tube and a small area of the louvers potentially requiring swage patches. Repair completed on November 29, 2016. Well 5 rehabilitation resumed on December 3, 2016. Well 5 chemical facility pad has been constructed and is awaiting a weather forecast of 8 days with no predicted rain to apply the chemical-resistant coatings to the concrete. Well 5 pumping development began on January 4, 2017, and produced fine sand at pumping rates above 1100 gpm. Repairs were made to Well 5, and test pumping performed in February showed acceptable well production over 2500 gpm with manageable sand. Construction is substantially complete at the Well 5 site. A start up planning meeting was held on March 29, 2017. Well 5 is running as needed and producing good quality water. Well 7 rehabilitation is complete, The Well 7 pump was installed the week of August 28, 2017, and Well 7 is operational and good quality water. Construction of the Well 3 chemical facilities was begun in July 2017. The concrete for the Well 3 chemical facilities is cured and coated, and the chemical tanks and canopy are currently being installed. Well 3 rehabilitation is complete and test pumping achieved over 1600 gpm. Construction at Well 9 began in October with relocation of the backup generator and chemical facilities construction. Coating of the Well 9 chemical facilities was completed in December, and the chemical tanks and canopy are installed. Witness testing for the new pumps for Wells 3 and 9 was completed January 2018, and pumps were installed the week of June 4. Construction at Well 3 and Well 9 is substantially complete. Flushing and chlorination of Well 3 and Well 9 were conducted during in July 2018. Well 3 initial startup was on July 17, 2018. Well 9 initial startup was on July 30, 2018. Well 3 and Well 9 have completed their seven-day tests. Work at Well 1 began on August 13, 2018. The video of Well 1 showed a biofilm. Well 1 has received brushing and airlifting of fill material, as well as acid and chlorine treatment in October 2018. Pumping redevelopment produced 2,300 gallons per minute. The Well 1 chemical facilities are constructed and the chemical tanks are set. The prefabricated electrical building was delivered and set on December 10, 2018, and the Well pump was installed on December 11, 2018. Startup of Well 1 occurred on February 21, 2019, and Well 1 completed its 7-day performance test with no interruption. The Construction and Start Up phase of the project is complete, and the project is being closed out. A project close-out briefing will be provided at the June E&O meeting. (6/10/19)

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: Extraction of six sections of ACP and two sections of CIP are in process for 2017 destructive testing. ACP samples were sent to WSP Canada for destructive testing. Results were received on August 1, 2017. CIP samples will be sent to McWane Ductile's lab in Ohio for destructive testing. Results were received on June 30, 2017. A Request for Qualifications for consulting services for the Pipeline Integrity Testing Program was released in May 2017. Four Statements of Qualifications were received and a recommendation for contract award to HDR was approved by the E&O Committee on July 20, 2017. ACP test results were received on July 31, 2017. Results have been analyzed, and were presented at the November Committee meeting. Average ACP total useful life is expected to be approximately 142 years. A process for determining when a pipeline has reached the end of its useful life and how much of the pipeline to replace was implemented. One 8" ACP line in Harbor Boulevard from Wilson to 19th Street was recommended for replacement. Kickoff meeting for a close interval survey of the 12" Cast Iron Pipe in 19th Street was held on December 28, 2017, and the Consultant has completed the field work. The report is expected in April 2018. Operations staff has collected four ACP pipe samples during valve replacement projects, and one during an AC mainline repair. The samples have been sent to a laboratory for remaining wall thickness measurements, and the reports show that while they have lost structural thickness, the remaining useful life is still 35 - 53 years. The mainline break sample showed the smallest remaining useful life and shortest total useful life of any AC sample. Additional AC pipe samples from valve replacements are being collected. Echologics performed three miles of non-destructive wall thickness measurements during the week of February 12, 2018. A report of the results was received in March 2018. A comprehensive review of cathodic protection test stations was performed in April and May 2018. The report and recommendations was received on June 20, 2018. Five AC pipe samples and nine soil samples collected during valve replacements in 2018 were delivered by the contractor and sent to labs for pipe wall thickness measurements and soil corrosivity analysis. Results show that the expected total useful life of AC pipe is approximately 138 years. Two AC pipe samples were collected during valve replacements in November 2018 and sent to the lab for wall thickness measurements. Results were received on January 10, 2019. One sample is being further analyzed. 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 is expected in July 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 August 2019. (6/10/19)

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 Administration Staff started moving to the temporary office trailer. The contractor continued working on the roof of the Operations 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 in progress. (6/7/19)

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, and is being reviewed by staff. 50% design documents for the existing building demolitions and well drilling were received on April 16, 2019, and are being reviewed by staff. (5/10/2019)

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. On 3/8/19 the contractor replaced damaged micro switch on train No. 4. Project in progress. (6/6/19)

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. (6/10/19)

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. (6/10/2019)

Water Quality Call Report
May 2019

Date: 5/7/2019
Source: Phone/Email
Address: 952 Denver Drive
Description: Customer read an article about arsenic and would like to know if arsenic is detected in the drinking water.

Outcome: Contacted customer and provided him the range and average level of arsenic. It was explained to customer that the detected arsenic level is very low compared to the state and federal level allowed in drinking water which is 10 ppb. Customer is pleased to hear about the low level.

Date: 5/17/2019
Source: Phone
Address: 3465 Santa Clara Circle
Description: Customer has noticed a strong chlorine odor in the water for the last week and a half.

Outcome: Explained and assured customer that the disinfection levels for the wells and treatment facilities have been operating normally. There has been no other call regarding chlorine odor and we have not noticed any significant change in chlorine residual in the distribution system. Staff went onsite to check chlorine, temperature, and pH of the water. All parameters were within normal range and no chlorine odor was detected in the water at time of visit. It was explained that primary and secondary standards to the customer and provided a hard copy of the WQ Report. He was satisfied.

Date: 5/31/2019
Source: Phone
Address: 440 Flower Street
Description: Customer inquired about the Annual Water Quality Report and MTBE levels.

Outcome: Explained to customers about the different tables in the 2018 Annual Water Quality Report. Informed her that MTBE levels, as well as many other constituents, were ND and therefore not listed on the Tables. She appreciated the information.

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	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, 2018 - May 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	154	144	3078	2784	$62,198	$51,859
WD-0102 - HYDRANT PAINTING	HYDRANTS	13	1	345	1	$5,138	$186
WD-0103 - HYDRANT REPAIR	HYDRANTS	47	35	55	23	$15,368	$17,819
Program 01 TOTAL		214	180			$82,704	$69,864
02 - VALVES							
WD-0201 - DISTRIBUTION VALVE MAINTENANCE	VALVES	109	125	2188	2428	$44,968	$49,505
WD-0202 - NIGHT VALVE MAINTENANCE	VALVES	14	0	164	0	$5,971	$0
Program 02 TOTAL		123	125			$50,939	$49,505
03 - METERS							
WD-0301 - NEW METER INSTALLATION	METERS	23	27	169	229	$55,398	$104,804
WD-0302 - RAISE REPLACE METER BOX	BOXES	11	5	52	11	$8,685	$2,000
WD-0303 - METER LEAK INVESTIGATION/REPAIR	INV/REP	37	39	285	254	$10,594	$17,272
WD-0305 - ANGLE STOP/BALL VALVE REPLACE	REPLACE	65	76	131	143	$38,542	$27,674
WD-0306 - LARGE METER TEST/REPAIR - C	TESTS	21	3	106	11	$8,850	$1,373
Program 03 TOTAL		157	150			$122,069	$153,123
04 - MAIN LINES							
WD-0401 - MAIN LINE REPAIR	REPAIRS	110	32	18	8	$49,835	$13,538
WD-0402 - AIR VAC MAINTENANCE/REPAIR	REPAIRS	24	20	145	113	$9,116	$6,700
WD-0403 - UNIDIRECTIONAL FLUSHING	FEET	0	0	338665	0	$0	$0
Program 04 TOTAL		134	52			$58,951	$20,238
05 - SERVICE LINES							
WD-0501 - SERVICE LINE REPAIR	REPAIRS	51	61	19	28	$20,833	$24,217
Program 05 TOTAL		51	61			$20,833	$24,217
06 - CAPITAL							
CAP AV - CAPITAL AIR VACUUM REPLACE	AIR VACS	60	0	10	0	$24,477	$0
CAP BI - CAPITAL BYPASS & METER INSTALL	REPLACE	12	1	1	1	$6,388	$253
CAP FH - CAPITAL HYDRANT UPGRADE	HYDRANTS	124	138	18	18	$99,756	$89,359
CAP LM - CAPITAL LARGE METERS	METERS	55	31	130	94	$151,697	$53,991
CAP MV - CAPITAL MAINLINE VALVE REPLACE	VALVES	103	114	18	22	$77,029	$59,193
CAP SL - CAPITAL SERVICE LINE REPLACE	SERVICES	34	25	3	5	$17,159	$9,594
CAP SM - CAPITAL SMALL METERS	METERS	106	121	1328	1384	$126,753	$161,832
CAP SS - CAPITAL SAMPLE STATION REPLACE	STATIONS	10	13	10	5	$4,216	$4,548
Program 06 TOTAL		504	443			$507,475	$378,770
TOTAL						$842,971	$695,717

MEMORANDUM

Dedicated to Satisfying our Community's Water Needs

TO: Engineering and Operations Committee

FROM: Tracy E. Manning, Water Operations Manager

DATE: June 18, 2019

SUBJECT: 2019 Public Health Goals Report

RECOMMENDATION

Recommend that the Board of Directors accept the Report on Mesa Water District's Water Quality relative to 2019 Public Health Goals and receive comments from the public at the July 11, 2019 Board of Directors meeting.

STRATEGIC PLAN

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

PRIOR BOARD ACTION/DISCUSSION

None.

DISCUSSION

Drinking water compliance is based upon state and federal Maximum Contaminant Levels (MCLs) developed and adopted by the United States Environmental Protection Agency (USEPA) or California State Water Resources Control Board Division of Drinking Water (DDW). Mesa Water District (Mesa Water®) is in full compliance with all drinking water regulations.

Senate Bill (SB) 1307 (Calderon-Sher; effective 01/01/97) added new provisions to the California Health and Safety Code which mandate that a Public Health Goals (PHG) report be prepared by July 1, 1998, and every three years thereafter. The attached 2019 PHG Report is intended to provide information to the public in addition to the annual Consumer Confidence Report that is made available online to customers each year.

California Health and Safety Code Section 116365 requires the State to develop a PHG for every contaminant with a primary drinking water standard or for any contaminant California is proposing to regulate with a primary drinking water standard. A PHG is the level which poses no significant health risk if consumed for a lifetime. A PHG is developed using a risk assessment based strictly on human health considerations.

The 2019 PHG Report compares Mesa Water's drinking water quality with PHG's adopted by California Environmental Protection Agency's Office of Environmental Health Hazard Assessment (OEHHA) and with the maximum contaminant level goals (MCLG's) adopted by the USEPA. The report also provides a cost estimate to treat each constituent to below the PHG. PHG's and MCLG's are not enforceable standards and no action to meet them is mandated.

The law requires that a public hearing be held for the purpose of accepting and responding to public comment on the report. The public hearing is scheduled for the July 11, 2019 Board meeting.

Mesa Water's system complies with all health-based drinking water standards and maximum contaminant levels. No additional measures are recommended to achieve compliance.

FINANCIAL IMPACT

In Fiscal Year 2019, $7,000 is budgeted for the estimated cost of preparing the Public Health Goals Report and advertising a public hearing.

ATTACHMENTS

Attachment A: Mesa Water District 2019 Public Health Goals Report

MESA WATER DISTRICT
2019 PUBLIC HEALTH GOALS REPORT

JUNE 2019

STETSON ENGINEERS INC.

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Northern California • Southern California • Arizona • Colorado

2019 Public Health Goals Report

Mesa Water District

1.0 Introduction

Under the Calderon-Sher Safe Drinking Water Act of 1996 public water systems in California serving greater than 10,000 service connections must prepare a report containing information on 1) detection of any contaminant in drinking water at a level exceeding a Public Health Goal (PHG), 2) estimate of costs to remove detected contaminants to below the PHG using Best Available Technology (BAT), and 3) health risks for each contaminant exceeding a PHG. This report must be made available to the public every three years. The initial PHG Report was due on July 1, 1998, and subsequent reports are due every three years thereafter.

This 2019 PHG Report has been prepared to address the requirements set forth in Section 116470 of the California Health and Safety Code. It is based on water quality analyses during calendar years 2016, 2017, and 2018. This 2019 PHG Report has been designed to be as informative as possible, without unnecessary duplication of information contained in the Consumer Confidence Report (also known as the Water Quality Report), which is mailed to customers by July 1st of each year.

There are no regulations explaining requirements for the preparation of PHG reports. A workgroup of the Association of California Water Agencies (ACWA) Water Quality Committee has prepared suggested guidelines for water utilities to use in preparing PHG reports. The ACWA guidelines were used in the preparation of this 2019 PHG Report. These guidelines include tables of cost estimates for BAT. The State of California (State) provides ACWA with numerical health risks and category of health risk information for contaminants with PHGs. This health risk information is appended to the ACWA guidelines.

2.0 California Drinking Water Regulatory Process

California Health and Safety Code Section 116365 requires the State to develop a PHG for every contaminant with a primary drinking water standard or for any contaminant the State is proposing to regulate with a primary drinking water standard. A PHG is the level of a contaminant in drinking water that poses no significant health risk if consumed for a lifetime. The process of establishing a PHG is a risk assessment based strictly on human health considerations. PHGs are recommended targets and are not required to be met by any public water system.

The State office designated to develop PHGs is the California Environmental Protection Agency's Office of Environmental Health Hazard Assessment (OEHHA). The PHG is then forwarded to the State Water Resources Control Board, Division of Drinking Water (DDW)

for use in revising or developing a Maximum Contaminant Level (MCL) in drinking water. The MCL is the highest level of a contaminant that is allowed in drinking water. State MCLs cannot be less stringent than federal MCLs and must be as close as is technically and economically feasible to the PHGs. DDW is required to take treatment technologies and cost of compliance into account when setting an MCL. Each MCL is reviewed at least once every five years.

Section 116470(b)(1) of the Health and Safety Code requires public water systems serving more than 10,000 connections to identify each contaminant detected in drinking water that exceeded the applicable PHG.

Section 116470(f) requires that where OEHHA has not adopted a PHG for constituent, water suppliers are to use the established maximum contamination level goals (MCLGs) adopted by the United States Environmental Protection Agency (USEPA). MCLGs are the federal equivalent to PHGs.

3.0 Identification of Contaminants

Section 116470(b)(1) of the Health and Safety Code requires public water systems serving more than 10,000 service connections to identify each contaminant detected in drinking water that exceeded the applicable PHG. Section 116470(f) requires the MCLG to be used for comparison if there is no applicable PHG.

Mesa Water District (Mesa Water®) water system has approximately 24,018 service connections serving 110,000 people. The following constituents were detected at one or more locations within the drinking water system at levels that exceeded the applicable PHGs or MCLGs:

- **Arsenic** – naturally-occurring contaminant. In addition, arsenic is a waste product from many industrial production processes. Arsenic was measured above the PHG level in Mesa Water® groundwater.
- **Coliform Bacteria, Total** – naturally-occurring in the environment but can also be an indicator of the presence of other pathogenic organisms originating from sewage, livestock or other wildlife. Total Coliform Bacteria was measured above the MCLG level in Mesa Water® distribution system.
- ***E. coli*** – a type of fecal coliform. Fecal coliform bacteria live specifically in the gut and feces of warm-blooded animals. *E. coli* is considered the best indicator of fecal pollution and that additional pathogens may be present. *E. coli* was measured above the MCLG level in one sample in 2017. Repeat samples were absent for *E. coli*.
- **Gross alpha particle activity** (gross alpha) – naturally occurring contaminant. Gross alpha was measured above the MCLG in treated surface water purchased from Metropolitan Water District of Southern California (MWD).
- **Gross beta particle activity** (gross beta) – naturally occurring contaminant. Gross beta was measured above the MCLG in treated surface water purchased from MWD.

- **Uranium** – naturally-occurring contaminant. Uranium was measured above the PHG in local groundwater and in treated surface water purchased from MWD.

Chart A shows the applicable PHG or MCLG and MCL or Action Level (AL) for each contaminant identified above. Chart A includes the maximum, minimum, and average concentrations of each contaminant in drinking water supplied by Mesa Water® in calendar years 2016 through 2018.

4.0 Numerical Public Health Risks

Section 116470(b)(2) of the Health and Safety Code requires disclosure of the numerical public health risk, determined by OEHHA, associated with the MCLs, ALs, PHGs and MCLGs. Available numerical health risks developed by OEHHA for the contaminants identified above are shown on Chart A. Only numerical risks associated with cancer-causing chemicals have been quantified by OEHHA.

Arsenic – OEHHA has determined that the theoretical health risk associated with the PHG is 1 excess case of cancer in a million people. USEPA has determined the risk associated with the MCL is 2.5 excess cases of cancer in 1,000 people exposed over a 70-year lifetime.

Coliform Bacteria, Total – OEHHA has not established a PHG. USEPA has established an MCLG of 0.

***E. coli* –** OEHHA has not established a PHG. USEPA has established an MCLG of 0.

Gross Alpha – OEHHA has not established a PHG. USEPA has established an MCLG of 0. USEPA has determined the risk associated with the MCL is 1 excess case of cancer in 1,000 people over a lifetime exposure.

Gross Beta – OEHHA has not established a PHG. USEPA has established an MCLG of 0. USEPA has determined the risk associated with the MCL is two excess cases of cancer in 1,000 people over a lifetime exposure.

Uranium – OEHHA has determined that the theoretical health risk associated with the PHG is 1 excess case of cancer in a million people. USEPA has determined the risk associated with the MCL is 5 excess cases of cancer in 100,000 people exposed over a 70-year lifetime.

5.0 Identification of Risk Categories

Section 116470(b)(3) of the Health and Safety Code requires identification of the category of risk to public health associated with exposure to the contaminant in drinking water, including a brief, plainly worded description of those terms. The risk categories and definitions for the contaminants identified above are shown on Chart A.

6.0 Description of Best Available Technology

Section 116470(b)(4) of the Health and Safety Code requires a description of the Best Available Technology (BAT), if any is available on a commercial basis, to remove or reduce the concentrations of the contaminants identified above. The BATs are shown in Section 7.0 and on Chart A.

7.0 Costs of Using Best Available Technologies and Intended Actions

Section 116470(b)(5) of the Health and Safety Code requires an estimate of the aggregate cost and cost per customer of utilizing the BATs identified to reduce the concentration of a contaminant to a level at or below the PHG or MCLG. In addition, Section 116470(b)(6) requires a brief description of any actions the water purveyor intends to take to reduce the concentration of the contaminant and the basis for that decision.

The following sections summarize the estimated cost of compliance and cost per Mesa Water® household to reduce the concentration of contaminants to a level at or below the PHG or MCLG. All cost estimates are adjusted to 2018 cost of construction.

Arsenic – The BATs for removal of arsenic in water for large water systems are: activated alumina, coagulation/filtration, electrodialysis, ion exchange, lime softening, oxidation/ filtration, and reverse osmosis. Arsenic was detected above the PHG in two Mesa Water® wells. Mesa Water® is in compliance with the MCL for arsenic. The estimated cost to reduce arsenic levels in local groundwater to below the PHG of 0.004 microgram per liter (µg/l) using ion exchange was calculated. Because the DDW detection limit for purposes of reporting (DLR) for arsenic is 2 µg/l, treating arsenic to below the PHG level means treating arsenic to below the DLR of 2 µg/l. There are numerous factors that may influence the actual cost of reducing arsenic levels to the PHG. Achieving the water quality goal for arsenic could be approximately $2,400,000 per year, or $98 per service connection per year.

Coliform Bacteria, Total and *E. coli* From 2016 to 2018, approximately 100 to 125 samples were collected each month for coliform analysis. During one of these months, the coliform levels were found positive in 0.8 percent of the samples. The MCL for total coliform is 5 percent positive samples of all samples per month and the MCLG is 0. During one of these months, one sample was found to be *E. coli* positive. The MCL for *E. coli* is based on either an *E. coli* positive repeat sample following a total coliform positive routine sample or a total coliform repeat sample following an *E. coli* positive routine sample. The MCLG for *E. coli* is 0. Mesa Water® is in compliance with the MCL for Total Coliform and *E. coli*.

The BAT for removal of coliform bacteria in drinking water has been determined by USEPA to be disinfection. Mesa Water® already disinfects all water served to the public. Chlorine is used to disinfect the water because it is an effective disinfectant and residual

concentrations can be maintained to guard against biological contamination in the water distribution system.

Coliform bacteria are indicator organisms that are ubiquitous in nature. They are a useful tool because of the ease in monitoring and analysis. Mesa Water® collects weekly samples for total coliforms at various locations in the distribution system. If coliform bacteria are detected in the drinking water sample, it indicates a potential problem that needs to be investigated and followed up with additional sampling. It is not unusual for a system to have an occasional positive sample. Although USEPA set the MCLG for total coliforms at 0 percent positive, there is no commercially available technology that will guarantee 0 percent positive every single month; therefore, the cost of achieving the PHG cannot be estimated.

Exceeding zero *E. coli* bacteria at any one time, in and of itself, would not normally constitute the need for any treatment or action. There is no action that could be taken with absolute certainty that could ensure that the system would always have zero-percent *E. coli* every single time. The one single action that would likely decrease the possibility of positive *E. coli* detection would be to significantly increase the disinfectant residual. This would likely result in increased disinfection byproducts (DBPs). DBPs can have potentially adverse chronic health risks. The limits to the amount of disinfectant residual allowed in the distribution system are the maximum residual disinfectant levels as established by the Disinfectants and Disinfection Byproducts Rule. Therefore, the cost of achieving the PHG cannot be estimated. Mesa Water® collects weekly samples for total coliform, which includes *E. coli*, at various locations in the distribution system. If a positive drinking water sample is found, it indicates a potential problem that needs to be investigated and followed up with additional sampling.

Mesa Water® will continue several programs that are in place to prevent contamination of the water supply with microorganisms. These include:

- Disinfection using chlorine and maintenance of a chlorine residual at every point in the distribution system
- Monitoring throughout the distribution system to verify the absence of total coliforms and the presence of a protective chlorine residual
- Cross-connection control program that prevents the accidental entry of non-disinfected water into the drinking water system.

Gross Alpha, Gross Beta and Uranium – The only BAT for the removal of gross alpha radioactivity in drinking water for large water systems is reverse osmosis, which can also remove gross beta, and uranium (and arsenic). The next available BAT is ion exchange, however, it can only remove gross beta. Consequently, reverse osmosis will be used in the calculation. Both Gross alpha and Gross beta were detected above their respective MCLGs in water supplied by MWD. Uranium was detected above the PHG in one Mesa Water® well, and also detected above the PHG in water supplied by MWD. The cost of providing treatment using reverse osmosis to reduce gross alpha levels in MWD water, and gross beta levels in MWD water to the MCLG of 0 (and consequently uranium in

groundwater and MWD water below the PHG) was calculated. Achieving the radioactivity water quality goals could range from $1,080,000 to $9,170,000 per year, or between $45 and $382 per service connection per year.

All Contaminants – In addition, a cost estimate to treat all water produced by Mesa Water® using reverse osmosis to remove all the contaminants detected above the PHGs or MCLGs was calculated. All the contaminants listed in Chart A may be removed to non-detectable levels by reverse osmosis, except total coliform bacteria and *E. coli*. As shown on Chart A, achieving the water quality goals for all contaminants, except total coliform bacteria and *E. coli*, using reverse osmosis could range from $4,650,000 to $39,660,000 per year, or between $194 and $1,651 per service connection per year.

8.0 Recommendations for Further Action

Section 116470(b)(6) also requires a brief description of any actions the water purveyor intends to take to reduce the concentration of the contaminant and the basis for that decision. Mesa Water's drinking water quality meets or exceeds all state and federal drinking water standards set to protect public health. To further reduce levels of the constituents identified in this report that are already below the health-based MCLs established to provide "safe drinking water," additional costly treatment process would be required. The effectiveness of the treatment processes to provide significant reduction in constituent levels at these already low values is uncertain. The health protection benefits of these further hypothetical reductions are not at all clear and may not be quantifiable. Therefore, no action is proposed.

For additional information, please contact Ms. Kaying Lee, Water Quality and Compliance Supervisor at (949) 207-5491, or write to Mesa Water District, 1965 Placentia Ave, Costa Mesa, California 92627.

CHART A

2019 PUBLIC HEALTH GOALS REPORT
MESA WATER DISTRICT

PARAMETER	UNITS OF MEASUREMENT	PHG OR (MCLG)*	MCL OR (AL)	DLR	CONCENTRATION GROUNDWATER		CONCENTRATION SURFACE WATER		CATEGORY OF RISK	CANCER RISK AT PHG OR MCLG	CANCER RISK AT MCL	BEST AVAILABLE TECHNOLOGIES	AGGREGATE COST PER YEAR	COST PER HOUSEHOLD PER YEAR
					VALUE	RANGE	VALUE	RANGE						
MICROBIOLOGICAL														
Total Coliform Bacteria (a)	% samples positive	(0)	5	NA	0.8	NA	NA	NA	NA	NA	NA	D	(c)	(c)
E. coli	number of positive samples	(0)	(b)	NA	1	NA	NA	NA	NA	NA	NA	D	(c)	(c)
INORGANIC CHEMICALS														
Arsenic	µg/l	0.004	10	2	ND	ND - 2.1	NA	NA	C	1×10^{-6}	2.5×10^{-3}	AA,C/F,E,IE,LS,O/F,RO	$2,400,000 (d)	$98 (d)
RADIOLOGICAL														
Gross Alpha Particle Activity	pCi/l	(0)	15	3	NA	NA	ND	ND - 4.0	C	0	1×10^{-3}	RO	$1,080,000 - $9,170,000 (e)	$45 - $382 (e)
Gross Beta Particle Activity	pCi/l	(0)	50	4	NA	NA	5.0	4.0 - 6.0	C	0	2 x 10-3	IE, RO	--	--
Uranium	pCi/l	0.43	20	1	ND	ND - 2.29	3.0	2.0 - 3.0	C	1×10^{-6}	5×10^{-5}	RO	--	--
ALL CONTAMINANTS	--	--	--	--	--	--	--	--	--	--	--	RO	$4,650,000 - $39,660,000 (f)	$194 - $1,651 (f)

* MCLGs are shown in parentheses. MCLGs are provided only when no applicable PHG exists.

RISK CATEGORIES
C (Carcinogen) = A substance that is capable of producing cancer.
CV (Cardiovascular Toxicity) = A substance that may cause high blood pressure
N (Developmental Neurotoxicity) = A substance that may cause neurobehavioral effects in children

NOTES
AL = Action Level
PHG = Public Health Goal
MCL = Maximum Contaminant Level
MCLG = Maximum Contaminant Level Goal
NA = Not Appplicable or Available
ND = Not Detected
ug/l = micrograms per liter or parts per billion
pCi/l = picoCuries per liter
DLR = Detection Limit for Purposes of Reporting

TREATMENT/CONTROL TECHNOLOGIES
AA = Activated Aluminum
C/F = Coagulation/Filtration
D = Disinfection
E = Electrodialysis
IE = Ion Exchange
LS = Lime Softening
O/F = Oxidation/Filtration
RO = Reverse Osmosis

(a) The table shows highest monthly percentage of positive samples as the detected value. Samples were collected in the distribution system.
(b) *E. coli* positive repeat sample following a Total Coliform positive routine sample or a Total Coliform positive repeat sample following an *E. coli* positive routine sample
(c) Costs could not be estimated.
(d) Estimated cost to remove arsenic using IE.
(e) Estimated cost to remove gross alpha particle activity using RO, which also removes gross beta particle activity and uranium.
(f) Assuming treating the entire production by RO, which can remove all contaminants listed in the above table to below the detectable levels, except for total coliform and *E. coli* , which can be detected anywhere in the distribution system.

MesaWater DISTRICT®

Dedicated to Satisfying our Community's Water Needs

MEMORANDUM

TO: Engineering and Operations Committee

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

DATE: June 18, 2019

SUBJECT: Administration Building Improvements & HVAC Replacement Project

RECOMMENDATION

Recommend that the Board of Directors approve the following:

a. A change order with Snyder Langston Construction Company for $287,888 and a 10% project contingency for a not-to-exceed contract amount of $3,791,982 for refurbishment of the Boardroom and authorize execution of the change order;
b. A contract amendment with Jett Construction Management Services, LLC for $21,057 and a 10% contract contingency for a not-to-exceed contract amount of $248,038 to perform construction management services for the Boardroom refurbishment and authorize execution of the contract amendment;
c. A contract amendment with IBI Group for $12,525 and a 10% contract contingency for a not-to-exceed contract amount of $101,120 to perform design services for the Boardroom refurbishment and authorize execution of the contract amendment; and
d. A contract with Sound Image Company for $9,945 for design of the Boardroom sound system and authorize execution of the contract.

STRATEGIC PLAN

Goal #2: Practice perpetual infrastructure renewal and improvement.

PRIOR BOARD ACTION/DISCUSSION

On November 24, 2015 a contract was awarded to Goss Engineering, Inc. (GEI) to perform a heating, ventilation, and air conditioning (HVAC) system building analysis.

At its August 11, 2016 meeting, the Board of Directors (Board) awarded a contract to GEI for $72,620 and a 10% contingency for a not-to-exceed amount of $79,882 to perform design of a new HVAC system for the Administration and Operation Buildings.

At its June 20, 2017 meeting, the Engineering and Operations (E&O) Committee received an information item that a Request for Proposals was being solicited to perform design of a roof and skylight replacement for the Administration and Operations Buildings.

At its September 14, 2017 meeting, the Board approved a contract amendment to GEI in the amount of $52,467 to provide design and documentation for a new roof and skylight on the Administration and Operations Buildings as part of the HVAC Systems Design Project, and authorized execution of the contract amendment.

At its December 19, 2017 meeting, the E&O Committee received an information item that GEI had completed the design drawings, specifications, and contract documents.

At its October 11, 2018 meeting, the Board awarded a contract to Jett Construction Management,

LLC in the amount of $134,582 and a 10% contingency for a not-to-exceed amount of $148,040 to provide Construction Management Services for the Administration Building and HVAC Improvements Project, and authorized execution of the contract.

At its October 22, 2018 meeting, the Legislative and Public Affairs Committee rejected all bids for the Administration Building and HVAC Improvements Project; and authorized the General Manager, or his designees, to negotiate with one or more contractors to complete the project, and bring the negotiated contract back to the Board for approval.

At its November 8, 2018 meeting, the Board awarded a contract to Snyder Langston Construction Company (Snyder Langston) for $2,628,949 and a 10% contingency for a not to exceed amount of $2,891,844 to perform construction of the Administration Building Improvements and HVAC Replacement and Phase IV Office Refurbishment (Administration Building 2nd Floor) and authorized the execution of the contract; awarded a contract to Snyder Langston for $217,950 and a 10% contingency for a not to exceed amount of $239,745 to perform repairs to the Operations Building and authorized execution of the contract; and approved a contract amendment to Jett Construction Management, LLC for $24,850 for an amended contract amount of $159,432 and a 10% contingency for a not to exceed amount of $175,375 to provide Construction Management Services for the Operations Building Repair Project and authorized execution of the amendment.

At its January 10, 2019 meeting, the Board directed staff to agendize the Boardroom refurbishment and maintenance options at the next Finance Committee meeting.

At its January 17, 2019 meeting, the Finance Committee authorized contract change orders for a total amount not to exceed $750,000 with Snyder Langston, IBI Group, Sound Image Company, and Jett Construction Management, LLC to provide services related to the Administration Building Improvements and HVAC Replacement Project.

BACKGROUND

Mesa Water District (Mesa Water®) recently awarded a contract to Snyder Langston to replace the end-of-life HVAC system and roof membrane system at its District Headquarters for both the Administration and Operations Buildings. Snyder Langston's contract award also included the repair of the Operations Building interior offices that were damaged from a broken waterline in October 2018. Mesa Water facilities are over 30 years old; they have reached the end of their useful life and require extensive maintenance. Snyder Langston's contract has also included the refurbishment of the District's Administration Facilities to leverage economies of scale of the ongoing work.

DISCUSSION

Staff requested guidance from IBI Group and Sound Image Company on available refurbishment options that minimize the overall cost impacts and provide consistency with the refurbishment standards that have occurred throughout the rest of the District Headquarters' buildings. IBI Group and Sound Image completed the design and Snyder Langston obtained three quotes for each component of the new design package. The total lowest cost of the proposed Boardroom modifications was $838,308. The cost included design services, construction management services, millwork, acoustical wall panels, new dais, construction of structural modifications,

installation of flooring, walls, new doors, ceiling and lighting, new audiovisual and other improvements in the Boardroom including Closed Sesion Room, storage room, and kitchen. Therefore, staff recommends that the Board consider approving the contract change orders, amendments, and contract as detailed in the recommendations above.

FINANCIAL IMPACT

In Fiscal Year 2019, $1,808,000 is budgeted for the Administration Building and HVAC Improvements Project.

	Project Estimate Amounts	Project Cost Amounts
Initial Project Estimate (FY 2018)	$ 970,000	
Original Contracts		
1. GEI		$ 102,600
- Change Orders		$ 52,467
2. Jett Construction Management		$ 134,582
- Change Orders		$ 0
3. Snyder Langston (Building Improvements & HVAC Replacement		$ $2,628,949
4. Snyder Langston (Operations Building Repair		$ 217,950
5. Boardroom Refurbishment (incl. design, CM & construction)		$ 750,000
- Change Order		$ 287,888
6. Jett Construction Management		
Amendment 1		$ 24,850
Amendment 2		$ 21,057
7. IBI Group		$ 12,525
8. Sound Image		$ 9,945
9. Total Contracts		$ 4,242,813
Actual Spent to Date		$ 2,360,351
Revised Project Estimate	$4,242,813	

ATTACHMENTS

None.

MEMORANDUM

Dedicated to Satisfying our Community's Water Needs

TO: Engineering and Operations Committee

FROM: Phil Lauri, PE, Assistant General Manager

DATE: June 18, 2019

SUBJECT: Programmable Logic Controllers and Supervisory Computer System Assessment

RECOMMENDATION

Receive the presentation.

STRATEGIC PLAN

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

PRIOR BOARD ACTION/DISCUSSION

At its June 8, 2017 meeting, the Board of Directors (Board) awarded a contract for a period of five years with two one-year renewable options with an average annual amount of $92,775 to Prime Systems Industrial Automation, Inc. to provide maintenance and support of the Supervisory Control and Data Acquisition System.

At its October 11, 2018 meeting, the Board awarded a contract to TJC and Associates, Inc. in the amount of $70,050 and a contingency of $15,000 for a not to exceed amount of $85,050 to provide a Programmable Logic Controllers and Supervisory Computer System Assessment.

At its February 14, 2019 meeting, the Board awarded a contract to Prime Systems Industrial Automation, Inc. for $199,200 and a 10% contingency for an amount not to exceed $219,120 to furnish, install, and integrate new programmable logic controllers at the Mesa Water Reliability Facility.

BACKGROUND

TJC and Associates, Inc. (TJCAA) was retained to perform a District-wide assessment of Mesa Water District's (Mesa Water®) Programmable Logic Controllers (PLC) and supervisory control systems. The report, which is provided as Attachment A, includes an inventory of all PLC and supervisory control equipment, life cycle status for each, and short-term and long-term replacement recommendations. The results and recommendations of the report are summarized herein.

DISCUSSION

PLC Life Cycle Classifications

Table 1 summarizes the PLC and supervisory control inventory and life cycle classification. PLC technology has a life cycle that acknowledges that technologies improve over time. New generations of equipment tend to require less space and perform faster processing than the previous generation. Newer technologies may not be designed to be compatible with technologies that are several generations old. Over time, manufacturers and suppliers ultimately stop supporting older equipment. The PLC life cycles are typically defined as follows:

- **Active:** The most current equipment for sale.
- **Active Mature:** Equipment is for sale and fully supported even though there are newer models available.
- **End-of-Life:** The manufacturer has announced a date that the equipment will be discontinued.
- **Discontinued:** The equipment is no longer manufactured or supported by the manufacturer.

Table 1: PLC and Supervisory Control Equipment Inventory and Life Cycle Classification.

	Total Inventory	Discontinued (0-3 years)	End of Life (2-4 years)	Active Mature (5-10 years)	Active (>10 years)
PLCs	30	5	3	22	0
Input/Output Modules	~180	0	80	0	~100
Power Supplies	32	2	26	0	4
Radios	28	6	0	22	0
Switches	28	23	0	1	12
Uninterruptible Power Systems	33	0	0	0	33
Servers	2	0	0	2	0
Software Licenses	2	0	0	2	0

Summary of Recommendations

The report classified the recommendations by time frame as follows:

1. Immediate Recommendations;
2. Near-Term Recommendations (1-5 years); and
3. Long-Term Recommendations (5-10 years).

The recommendations are summarized as follows:

Immediate Recommendations (Fiscal Year 2020)

1. **MWRF Modicon Quantum PLCs & I/O**: TJCAA found that these four PLCs, along with the PLC for the TomCo carbon dioxide pH control system, have reached the "Discontinued" life cycle status, and are no longer supported by the manufacturer. The Board approved a contract with Prime Systems to furnish, install and integrate new PLC hardware and new input/output modules that are compatible with the new PLC hardware. The equipment has been delivered and is being tested prior to installation. The cost for this project is $199,200.

2. **Procure Spare Components**: TJCAA recommended procuring specified components to be kept as "shelf spares". These components are uncommon and may not be stocked locally. They are also important components where failure could result in significant down-time for a portion of the control system. The estimated cost of the spare components is $16,000.

The total cost for all Immediate Recommendations is approximately $215,200. These procurements will be performed during Fiscal Year 2020.

Near-Term Recommendations (1-5 Years)

1. **Control Panel Power Distribution Improvements:** The DC power supplies used in the 24 distribution system control panels are obsolete and should be replaced. In addition, most of the existing PLC control panels are designed with a single UPS system and a single DC power supply. These are single points of failure that can result in the loss of the PLC system. The cost estimate is $105,000.

2. **Radio Backbone Upgrade:** The existing Proxim Tsunami 5.8 GHz backbone radios have been discontinued. This recommendation to replace in the near-term because the backbone is in a ring configuration so the failure of one radio will not result in loss of communication. The cost estimate is $32,000.

3. **SCADA & Distribution Network Equipment Replacement:** The existing Weidmueller and Netgear SCADA network switches installed between 2010 and 2012, and the Weidmueller 5 or 8-port network switches installed at the 24 distribution system PLC panels are obsolete and should be replaced with Stratix 2000 8-port unmanaged network switches when the process controller is replaced. The cost estimate is $5,000.

4. **Upgrade the CompactLogix L43 Processors:** There are currently 3 Rockwell Automation CompactLogix 1768-L43 processors installed at RTU-35A, RTU-32 and Reservoir 1. These processors, their power supplies, and network switches are at the End-of-Life status and should be upgraded within the next three to five years. The cost estimate is $37,000.

5. **SCADA Hardware Upgrades:** The current SCADA servers and thin-client computers were installed in 2015 and are due to be replaced within the next three to five years. The hardware replacement should correspond to the SCADA software upgrade described below to ensure full operating system compatibility going forward. The cost estimate is $50,000.

6. **SCADA Software Upgrades:** The current SCADA software is System Platform 2014R2, by Wonderware (which is currently part of Schneider Electric), should be upgraded to the latest Wonderware version (System Platform 2017 Update 2). The initial software upgrade should be done in conjunction with the SCADA Hardware Upgrades to ensure that the hardware, operating system, and software are fully compatible. In addition, the Win-911 Remote Alarm Annunciation software is several generations old and should be upgraded to the latest version. The cost estimate is $100,000.

7. **Subscribe to Wonderware's Support and Upgrade Service:** Subscribing to Wonderware's support and upgrade service allows Mesa Water to receive software updates and complete version upgrades to SCADA software at any time. As software becomes progressively out of date, it becomes more difficult to support, more expensive, and increasingly unreliable as computer operating systems and hardware are revised. The cost estimate for the support contracts is $29,000.

The total cost for all Near-Term Recommendations is approximately $358,000.

Long-Term Recommendations (5-10 Years)

1. **Upgrade the CompactLogix L35E Processors:** The SCADA distribution system includes 21 Rockwell Automation CompactLogix 1769-L35E processors, which are currently at the Active Mature lifecycle stage and will move to the End-of-Life stage within five to seven years. The recommended replacement model is the Rockwell Automation L33ER CompactLogix controller. The cost estimate is $220,000.

2. **Periodic SCADA Software Upgrades:** Once the System Platform software has been upgraded to the latest version, the system integrator should perform annual updates to the computer operating systems and SCADA software to ensure that the installed software is up-to-date with the latest firmware patches, service packs, and security updates. The annual cost estimate is $4,000, or $20,000 in the Long-Term Recommendations time frame.

3. **Periodic Supervisory Control System Assessment:** Supervisory control systems products and technologies will continue to evolve over time, and TJCAA recommends that the system inventories and recommendations report be revisited and updated every five years. This will ensure that the District's system components remain current and reliable in the near-term and significant upgrades and improvements are planned for the long-term. The five-year recurring cost estimate is $25,000 during the Long-Term Recommendations time frame.

4. **Periodic Control Hardware, Software and Firmware Upgrades:** The PLC manufacturers, such as Schneider Electric and Rockwell Automation, typically release 1 or 2 hardware and/or software firmware versions every year and include upgrades such as bug fixes, performance improvements, and new features. Microsoft typically issues a new operating system every five years. In order to maintain the PLC programs and firmware versions supportable and current with computers running Microsoft's operating systems, it may be necessary to perform a software and firmware version upgrade at each of the related facilities every six to eight years. The cost estimate is $36,000 during the Long-Term Recommendations time frame.

5. **Periodic SCADA Hardware Upgrades:** TJCAA's recommendation is to evaluate all the computer systems every 5-7 years and upgrade the hardware (i.e., SCADA servers, network switches, UPS, computers, etc.) on a case by case basis. Even though the hardware may still be in good working order, manufacturer's support life cycle as well compatibility issues between hardware, the installed operating system, and the installed SCADA software may necessitate a hardware upgrade to stay current. The five-year recurring cost estimate is $25,000.

The total cost for all Long-Term Recommendations is approximately $326,000 over 5-10 years.

Implementation of the Near-Term and Long-Term Recommendations will be budgeted in future fiscal years.

FINANCIAL IMPACT

In Fiscal Year 2019, $100,000 is budgeted for the MWRF PLC Replacement Study; $51,041 has been spent to date.

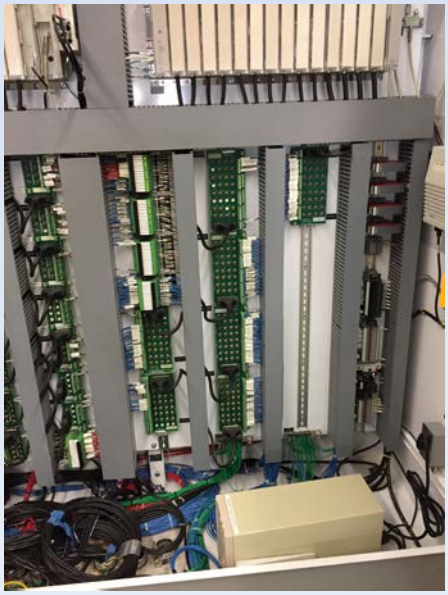
	Project Estimate Amounts	Project Cost Amounts
Initial Project Estimate	$100,000	
Original Contracts		$ 269,250
Change Orders		$ 0
Requested Funding		$ 0
Revised Contracts		$ 269,250
Actual Spent to Date		$ 51,041
Revised Project Estimate	$ 284,250	

ATTACHMENTS

Attachment A: Programmable Logic Controllers Assessment Recommendations Report, TJCAA, December 2018

MesaWater DISTRICT©

Recommendations Report



December 13, 2018

TJC and Associates, Inc.
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www.tjcaa.com

Table of Contents

1. Abbreviations and Definitions

The following are terms, acronyms, and initialisms that are commonly used in industrial automation.

AI	Analog Input
AO	Analog Output
AOI	Add-On Instruction
CPU	Central Processing Unit
CRA	Communication remote adaptor
CRP	Communication remote Processor
CWTF	Colored Water Treatment Facility
DI	Discrete Input
DO	Discrete Output
EOC	Emergency Operations Center
HMI	Human Machine Interface
I/O	Input and Output
MCWD	Mesa Consolidated Water District
MWRF	Mesa Water Reliability Facility
OPC	Opinion of Probable Cost
OIT	Operator Control Interface Terminal
PAC	Programmable Automation Controller
PID	Proportional, Integral, Derivative
PLC	Programmable Logic Controller
RIO	Remote I/O
RTU	Remote Telemetry Unit or Remote Terminal Unit
SCADA	Supervisory Control And Data Acquisition
SOP	Standard Operating Procedure
UDT	User-Defined Tag
UPS	Uninterruptible Power Supply
WAN	Wide Area Network

2. Background and History

Mesa Water Reliability Facility (MWRF) automation controllers and RTUs are primarily associated with operation of the potable water treatment plant and associated potable water pumping station. The first five PLCs at the MWRF were purchased for the plant's initial construction between 1998 and 2000. These include Modicon Quantum Central Processing Units (CPUs), I/O, and power supplies that are no longer supported.

Three additional PLCs were added and 2 PLCs were removed for the treatment plant expansion and treatment technology change from 2010-2012. The three PLCs that were added are also Modicon Quantum CPUs and I/O.

In 2012, as part of the District-wide SCADA system upgrade, SCADA RTUs at 24 distribution system sites, including the MWRF, were installed. Aside from the MWRF, RTU site locations include groundwater pumping wells, reservoir pumping stations, pressure monitoring stations, and water import stations. These RTUs are Rockwell Automation CompactLogix controllers that are presently supported by the manufacturer and programmed with the version of RSLogix5000 that was current at the time of installation.

Mesa Water District also installed three SCADA Data Concentrator PLC backbone sites in 2012. These sites are located at Mesa Water Headquarters, Reservoir 2, and at the MWRF. These systems each consist of a Rockwell Automation CompactLogix PLC.

3. Scope

The scope for this report is to provide a summary of the current supervisory control system hardware and software installed at Mesa Water District and to provide recommendations to the District for system-wide upgrades. The recommendations prioritize the upgrades based on existing equipment hardware/software obsolescence, reliability impacts, and the availability of replacement equipment.

A summary overview of our recommendations is included in Section 5. Detailed technical backup for the recommendations and associated opinions of probable cost are included in later Sections and Appendices.

4. System Inventory and Lifecycle Status

As part of the Supervisory Control System Assessment, TJCAA performed an inventory of the current hardware and software installed at the Mesa Water District. The inventory has been split into four categories and summarized in Appendices as follows:

- Appendix A – PLC Equipment
- Appendix B – Software
- Appendix C – SCADA Hardware
- Appendix D – Radios

For the purposes of this report, we have borrowed Rockwell Automation's definitions of the product lifecycle and included the lifecycle status as part of our research into the current hardware and software. Rockwell Automation uses the following descriptions for their product's life cycle status:

- ***Active*** – The most current offering within a product category.
- ***Active Mature*** – The product is fully supported and available but is not the latest model or product series currently available.
- ***End of Life*** – The manufacturer has announced the Discontinued date. The product may be available for purchase for a limited time.
- ***Discontinued*** – The product is no longer manufactured and cannot be purchased as new.

The lifecycle status of each system component is included in the inventory lists (see Appendices).

5. Summary of Recommendations

Based on our field investigations and assessment of the current supervisory control system, TJCAA recommends equipment upgrades and improvements that will improve system reliability, enhance maintainability, and set the District on a path that will keep the

supervisory control system current. Recommendations are broken down into three time-frames, based on urgency and risk:

- Immediate recommendations - to be implemented within the next year
- Near term recommendations - to be implemented between one to five years
- Long-term recommendations - to be implemented between five to ten years.

The cost estimates for these recommendations are summarized in **Table 1**.

Table 1: Recommendations Summary

Description	Estimated Cost
Immediate Recommendations	
1. Upgrade the Modicon Quantum PLCs and I/O at the MWRF.	$480,000
2. Procure spares for key components.	$16,000
Near Term Recommendations	
1. Control Panel Power Distribution Improvements	$105,000
2. Upgrade the 5.8 GHz Point-to-Point Backbone Radios	$32,000
3. SCADA and Distribution Network Equipment Replacement	$5,000
4. Upgrade the CompactLogix L43 Processors	$37,000
5. SCADA Hardware Upgrades	$40,000
6. SCADA Software Upgrades	$100,000
7. Subscribe to Wonderware's Support and Upgrade Service	$29,000
Long Term Recommendations	
1. Upgrade the CompactLogix L35E Processors	$220,000
2. Periodic SCADA Software Upgrades	$4,000 (Annual Cost)
3. Periodic Supervisory Control System Assessment	$25,000 (5 yr. Recurring cost)
4. Periodic Control Hardware, Software and Firmware Upgrades	$36,000
5. Periodic SCADA Hardware Upgrades	$36,000

Refer to Appendix E for a detailed breakdown of cost estimates.

5.1 Immediate Recommendations

The following recommendations are listed in order of priority for upgrades recommended for implementation within the next year.

5.1.1 Upgrade the Modicon Quantum PLCs and I/O at the MWRF.

The Modicon Quantum PLCs and I/O have been discontinued and will become increasingly difficult to maintain. The Concept programming software that was originally used to program the Quantum PLCs is also obsolete and developed under Windows XP so will no longer run on current Microsoft operating systems.

In order to maintain direct compatibility with the existing SCADA application, the Quantum PLC systems will need to be replaced with Schneider Electric's[1] M580 series PACs, X80 series I/O and programmed with current Modicon software (Unity Pro). The M580 processors can be programmed such that the data exchanged between the PAC and SCADA system are mapped into identical HMI memory locations in identical formats. This approach eliminates the need to make any modifications to the SCADA HMI software.

See Section 6 for a detailed description of the recommendations and alternatives for replacement.

Opinion of Probable Cost - $480,000

5.1.2 Procure spares for key components.

TJCAA recommends procuring the components listed below to be kept as "shelf spares". These components are uncommon and may not be stocked locally. They are also important components where failure could result in significant down time for a portion of the control system.

Table 2: Key Components Spare List

Manuf.	Model	Part Number	Approx. Material Cost (ea)	Qty
General Electric	MDS iNET-II	MD9A1AVFCD1NN0	$1800	1
General Electric	MDS Series SD4	SD04MD-CES-NNSNN	$1600	1
PCTEL	Bluewave	BGYD890M	$160	1
Rockwell Automation	CompactLogix Controller	1769-L33ER	$3200	1
Rockwell Automation	CompactLogix Power supply	1769-PB4	$520	1
Rockwell Automation	CompactLogix DI Module	1769-IQ16	$280	1
Rockwell Automation	CompactLogix DO Module	1769-OB16	$360	1
Rockwell Automation	CompactLogix AI Module	1769-IF8	$900	1
Rockwell Automation	CompactLogix AO Module	1769-OF8C	$1700	1

The existing RTU Rockwell Automation L35E CompactLogix controller is in the Active Mature state. The recommended replacement model is the Rockwell Automation L33ER CompactLogix controller. In the event of a processor failure at one of the distribution facilities, the failed processor can be directly replaced with the new processor and the existing application program can be upgraded to the current version of Studio5000 used at the District. There is no need to reprogram the existing application software.

Opinion of Probable Cost - $16,000

[1] Modicon became a part of AEG Schneider Automation in 1996. AEG Schneider Automation would later be known as Schneider Electric in 1999.

5.2 Near Term Recommendations

The following recommendations are listed in order of priority for upgrades recommended for implementation within one to five years

5.2.1 Control Panel Power Distribution Improvements

The DC power supplies used in the distribution system control panels are obsolete and should be replaced. In addition, most of the District's existing PLC control panels are designed with a single UPS system, and a single DC power supply. Both of these devices are single points of failure that, when they do fail, will result in the loss of the PLC system.

See Section 7 for details on reliability improvements for the control panel power distribution circuits. The OPC estimate below includes the hardware costs and panel modifications to implement redundant DC power distribution to each of the 24 RTU sites. The OPC for implementing the power distribution improvements at the MWRF PLC panels is included in the cost of the Modicon Quantum PLC upgrades above.

Opinion of Probable Cost - $105,000

5.2.2 Upgrade the 5.8 GHz Point-to-Point Backbone Radios

The District's existing Proxim Tsunami 5.8 GHz backbone radios have been discontinued. We have included the recommendation to replace in the near-term instead of the immediate time-frame because; a) the backbone is in a ring configuration so the failure of one radio will not result in loss of communication; and b) in the event of a failed radio, the radio pair that includes the failed radio can be replaced as a pair without impacting communications between the remaining backbone radios. See Section 8 for detailed recommendations for replacement of the existing backbone radios.

Opinion of Probable Cost - $32,000

5.2.3 SCADA and Distribution Network Equipment Replacement

The existing Weidmueller and Netgear SCADA network switches installed between 2010 and 2012 are obsolete and should be replaced.

Weidmueller 5 or 8-port network switches installed at the 24 distribution system PLC panels have all become obsolete. Our recommendation is to replace them with Stratix 2000 8-port unmanaged network switches when the process controller is replaced. Refer to Section 9 for modernization approach and cost estimates for distribution sites.

The NETGEAR gigabit switches at the MWRF, Operations Control Center, and Emergency Operations Center, although in good working order, have a manufacturer's mean time between failure (MTBF) of 87,600 hours, which is about 10 years. Since these components are relatively inexpensive and readily available by multiple vendors, we recommend that they be replaced. **Table 3** lists current replacement components for NETGEAR switches used at the District.

Table 3: Network Routers and Switches

Installed Location	Part Number	Description	Material Cost (ea.)	Qty
MWRF, EOC	JGS524v2	NETGEAR 24-Port Gigabit Ethernet Unmanaged Switch	$320	2
MWRF, OCC	FS105Ev3	NETGEAR FS105 10/100 Desktop Switch 5 ports	$20	2
Distribution Sites	1783-US8T	Stratix 2000 Switch, Unmanaged, 8 ports	$190	24

Opinion of Probable Cost - $5,000

5.2.4 Upgrade the CompactLogix L43 Processors

There are currently 3 Rockwell Automation CompactLogix 1768-L43 processors installed in the District's distribution system (RTU-35A, RTU-32 and Res 1). These processors, their associated power supplies and the Weidmuller network switches are at the End of Life status and should be upgraded within the next three to five years. The current application software program can be upgraded to a current version Studio5000 without the need to reprogram the existing application software. A detailed description of the recommendations and alternatives for replacement are included in Section 9.1.

OPC - $37,000

5.2.5 SCADA Hardware Upgrades

The Mesa Water District supervisory control system hardware and software consists of SCADA Servers, workstation computers, thin clients, SCADA Software, monitors, external backup hard drives, network switches, modems, and routers. Some of the equipment has been in service since 2008. Currently, all of the hardware and software is functional and in good working order.

Monitors, backup hard drives, network switches, routers and other ancillary components are readily available as off-the-shelf commodity items that can easily be purchased at a local office supply store or online. These devices can be run to failure or replaced proactively when the related computer hardware is replaced and are not specifically addressed as part of this assessment report.

Computer equipment has an inherently short shelf life. New product models are only available for six months to one year before they are replaced with newer and better (and often cheaper) models. Unlike industrial control system hardware, where there is an extended life with a hard date for "End of Life" based on available replacement technologies, computer systems tend to be on the market for a relatively short period of time. As a general rule, we recommend that SCADA computer hardware be replaced and updated every five to seven years, or within three years of a major operating system release.

The current SCADA servers and thin-client computers were installed in 2015 and are due to be replaced within the next three to five years. The hardware replacement should correspond to the SCADA software upgrade described below to ensure full operating system compatibility going forward.

Replacement server computers should substantially exceed the minimum technical requirements for the latest SCADA software and have the latest version release of the Windows Server operating system that is compatible with the SCADA software (Currently

Microsoft Windows Server 2016). Thin-client computers should be upgraded simultaneously to ensure compatibility with both the Server hardware and the SCADA software.

Opinion of Probable Cost - $50,000

5.2.6 SCADA Software Upgrades

The District's current SCADA software is System Platform 2014R2, by Wonderware (which is currently part of Schneider Electric). The latest version available from Wonderware is System Platform 2017 Update 2, that was released in the second quarter of 2018.

The initial software upgrade should be done in conjunction with the SCADA Hardware Upgrades to ensure that the hardware, operating system, and software are fully compatible. The existing System Platform application should be ported over to the new servers and tested prior to being deployed at the District's facilities.

Mesa had the Wonderware Support Contract in 2015 which was used to upgrade their Wonderware system at that time. Because the District's support subscription expired in 2017 and was not renewed, Wonderware charges the full price to upgrade to the current version.

In addition, the Win-911 Remote Alarm Annunciation software currently used at Mesa is several generations old. The Win-911 package can be upgraded to the latest version, or the software functions currently performed by Win-911 can be replaced with the remote alarm annunciation software recommended and supported by Wonderware, which is called TopView.

The OPC for this upgrade includes Wonderware software licensing, Dream Reports, TopView, and a 1-year support contract with Wonderware. Please note that when Wonderware is upgraded with a 1-year support contract, Wonderware offers a 25% discount on the software licensing upgrade. Refer to section 5.2.7 for Wonderware standalone support contract cost.

Refer to Appendix C for software licenses at the District and HMI Wonderware quote to upgrade to version 2017 Update 2.

Opinion of Probable Cost - $100,000

5.2.7 Subscribe to Wonderware's Support and Upgrade Service.

The District's support subscription expired at the end of 2017. By subscribing to Wonderware's support and upgrade service, the District will be eligible to receive software updates and complete version upgrades to their SCADA software at any time.

While the support subscription may seem unnecessary for a District that does not have a programmer on staff, the subscription does ensure that any District contractors and consultants that do work on the SCADA software will have access to both telephone support and software patches that may become necessary as the District's hardware and operating systems are upgraded. The primary benefit of the support subscription is the ability to maintain compatibility with future hardware and operating systems. As software becomes progressively out of date, it becomes more difficult to support, more expensive, and increasingly unreliable as computer operating systems and hardware are revised.

The cost of the Wonderware support subscription is based on the software licenses that the District owns. TJCAA has reviewed the District's current licenses and found that some of the licenses owned are obsolete, unused, or unnecessary based on current use. The support

subscription will be due for renewal one-year after the SCADA software upgrade is purchased.

Refer to Appendix C for software licenses at the District and HMI Wonderware quote to upgrade to version 2017 Update 2.

Opinion of Probable Cost - $29,000

5.3 Long Term Recommendations

The following recommendations are listed in order of priority for upgrades recommended for implementation within the next five to ten years.

5.3.1 Upgrade the CompactLogix L35E Processors

The District's distribution system includes 21 Rockwell Automation CompactLogix 1769-L35E processors. These processors are currently at the Active Mature lifecycle stage and we anticipate that they will move to the End of Life stage within five to seven years. These processors should be upgraded within the next five to ten years. The recommended replacement model is the Rockwell Automation L33ER CompactLogix controller. A detailed description of the recommendations and alternatives for replacement are included in Section 9.2.

Opinion of Probable Cost - $220,000

5.3.2 Periodic SCADA Software Upgrades

Once the System Platform software has been upgraded to the latest version, the District's system integrator should perform annual updates to the computer operating systems and SCADA software to insure the installed software is up-to-date with the latest firmware patches, service packs, and security updates so the software continues to perform optimally.

Opinion of Probable Cost - $4,000 annual cost

5.3.3 Periodic Supervisory Control System Assessment

Supervisory control systems products and technologies will continue to evolve over time. TJCAA recommends that the system inventories and recommendations report be revisited and updated every five years. Reliability requirements at the District should also be evaluated when implementing SCADA control system upgrades (i.e. Virtualized machines, controller redundancy/hot failover, etc.) to insure optimal performance and maximum uptime. This will ensure that the District's system components remain current and reliable in the near-term and significant upgrades and improvements are planned for the long-term.

Opinion of Probable Cost - $25,000 five year recurring cost

5.3.4 Periodic Control Hardware, Software and Firmware Upgrades

The PLC/PAC manufacturers, such as Schneider Electric and Rockwell Automation, typically release 1 or 2 hardware and/or software firmware versions every year. These product releases are within the same model and series, but include upgrades such as bug fixes, performance improvements, and new features. At the same time Microsoft is continually updating their current operating systems (e.g., service packs) and typically issues a new operating system every five years. In order to maintain the PLC/PAC programs and firmware versions supportable and current with computers running Microsoft's operating

systems, it may occasionally be necessary to perform a software and firmware version upgrade at each of the related facilities.

It is also beneficial to maintain like controllers on the same programming version and firmware version. Currently, both the existing Modicon and Rockwell Automation process controllers have three different firmware versions and the integrator that maintains the system must be able to run three different programming software versions to troubleshoot programs and maintain the system.

Based on the history of controller software and firmware upgrades and the goal to maintain compatibility with Microsoft operating systems, we estimate that an upgrade of PLC/PACs will only be necessary every six to eight years.

Opinion of Probable Cost - $36,000

5.3.5 Periodic SCADA Hardware Upgrades

Our recommendation is to evaluate all the computer systems every 5-7 years and upgrade the hardware (i.e. SCADA servers, network switches, UPS etc., computers, etc.) on a case by case basis. Even though the hardware may still be in good working order, manufacturer's support life cycle as well compatibility issues between hardware, the installed operating system, and the installed SCADA software may necessitate a hardware upgrade to stay current.

Opinion of Probable Cost - $25,000 five-year recurring cost

6. Quantum PLC System Upgrade

The main control system that operates MWRF are five Quantum PLCs at the MWRF (Site 35). In December 2016 Schneider Electric released the RED Flag Notice identifying the End of Commercialization for the complete line of Modicon Quantum PLCs and Quantum I/O. (Schneider's RED Flag Notice is equivalent to Rockwell Automation's End of Life Notification)

The five Quantum systems at MWRF are:

- PLC01: Well 6 and Well 11 PLC
- PLC05: WTP Chemical PLC
- PLC06: High Service Area PLC
- PLC07: Nano Filter PLC
- Tomco CO2 PLC (Packaged System)

The District does not stock spare parts for the Modicon Quantum control systems. The District does reclaim components from previously upgraded systems, if available (e.g. CWTF panels). If the Quantum PLC hardware does fail and the replacement component is not available at site, it will become increasingly expensive to repair this obsolete system.

Analyzing the PLC Logic for the PLC01, PLC05, PLC06 and PLC07, Table 3 is an estimate of the I/O Count of the Modicon Systems:

Table 4: MWRF Quantum PLC Program I/O Count

Signal Type	I/O Points
PLC01	
Analog Input	10
Analog Output	6
Discrete Input	32
Discrete Output	3
PLC05	
Analog Input	57
Analog Output	17
Discrete Input	192
Discrete Output	48
PLC06	
Analog Input	32
Analog Output	3
Discrete Input	64
Discrete Output	17
PLC07	
Analog Input	113
Analog Output	16
Discrete Input	198
Discrete Output	50

6.1 Hardware Recommendations

Schneider Electric M580 controller with the X80 I/O modules is the recommended platform to replace the existing Modicon Quantum controllers and I/O at MWRF (PLC01, PLC05, PLC06 and PLC07) and Tomco packaged control systems.

The Schneider Electric M580 PAC provides innovative features and a high-end processor. Some of the important features include:

- Configuration in a standalone or hot-standby redundant configuration
- Requires no battery minimizing maintenance costs and eliminating risk of program loss because of a power failure.
- Compact size (4 in. height by 3.7 in. depth), which reduces panel size and costs.
- Accepts high-density 64 point discrete I/O cards that are only 1.25 in. wide and provide the ability to manage large amounts of I/O in a very compact space.
- Utilizes high-density 8-channel analog I/O for voltage or current.
- Offers pre-terminated cables with flying leads or Telefast™ connections to reduce wiring time.
- Uses enhanced EtherNet/IP 4-port switch that supports both EtherNet/IP and Modbus™ TCP/IP and can connect I/O in a daisy-chain architecture.

- Supports communications with up to 16 remote X80 I/O drops, and 64 Ethernet based communication devices, such as drives, soft starters, and other PACs.
- Available with up to 64 MB of programming memory and 4 GB of data storage memory.

The Schneider Electric X80 I/O platform serves as a common platform for Schneider Electric M580 controllers and future Schneider Electric Mx80 controllers. With a common platform, a much smaller stock of spare parts needs to be held, and maintenance and training costs are significantly reduced. A common configuration tool is used for all PAC modules using Unity Pro with a high level of services such as bit forcing, structured device DDT, etc. This platform offers a wide choice between several Schneider Electric I/O modules (discrete, analog, expert, and communication).

The Schneider Electric X80 I/O platform serves as the common base for automation platforms by simply adding a dedicated processor.

It may also:

- form part of a Quantum and M580 Ethernet I/O architecture as an Ethernet RIO (EIO) drop with a CRA bus terminal module
- form an Ethernet Modbus/TCP DIO drop with a PRA module

The X80 I/O platform is available in single-rack or multi-rack configuration. This platform may also accept automation platform-dedicated modules (communication, application, etc.).

One X80 drop may support two racks separated by a cumulative distance of up to 30 meters/98.42 feet. This platform, common to several automation platforms, can reduce maintenance and training costs as it comprises:

- a single range of spare parts in stock
- training common to several PLCs

Based on the latest I/O technology, the X80 I/O platform offers:

- high-quality ruggedness and compactness
- compliance with international certifications (ATEX, IEC, etc.)
- a wide selection of modules: discrete or analog I/O, expert modules, communication modules, etc.
- a wide variety of wiring terminal block including blocks native to the module and remote to the module

This platform is programmed and configured using Unity Pro software. Bit forcing simplifies simulation and structured data simplifies diagnostics.

The X80 I/O platform, which can be used in-rack and/or in remote I/O drops (RIO), Ethernet remote I/O drops (EIO), and/or distributed I/O drops (DIO) depending on the type of PLC/PAC (M580, M340, Quantum, etc.), comprises the following elements:

- X-bus racks with 4, 6, 8, or 12 slots or Ethernet + X-bus racks with 4, 8, or 12 slots
- AC or DC power supply modules
- discrete and analog I/O modules
- RTU serial link, AS-Interface, and other communication modules

The additional modules offered include:

- Ethernet (Modbus/TCP, Ethernet/IP) communication and supplementary modules compatible with multiple automation platforms such as M340 or M580
- communication via optical transceiver modules
- application-specific modules: counting, motion control, SSI encoder, time stamping
- Schneider Electric Collaborative Automation Partner Program[2] modules: e.g., weighing, Wi-Fi, etc.

The specific I/O modules specified for this project will be as follows:

- Analog inputs, 8-channel 4-20mA (individually isolated, remote power supply) with 15-Bit resolution, X80 model BMXAMI0810, no equal.
- Analog outputs, 4-channel 4-20mA (individually isolated) with 14-Bit resolution, X80 model BMXAMO0410, no equal.
- Discrete inputs, 16-point, 24VDC sinking, X80 model BMXDDI1602, no equal.
- Discrete outputs, 16-point 24 VDC sourcing (with interposing relays, including spare points), X80 model BMXDDO1602, no equal.

6.2 Software Recommendations

The Quantum PLCs at MWRF (PLC01, PLC05, PLC06, and PLC07) are currently programmed using Modicon Concept software. The application logic is programmed using an older version of Modicon ladder logic called LL984 implemented under the ProWorx platform. LL984 is a type of ladder logic developed in the late 1980s and does not conform to IEC 61131-3 an industry recognized programming standard for programming logic controllers. In addition, the latest version of Concept software is version 2.6, and requires a computer running Windows 7 or Windows XP, 32-bit operating systems. Concept will not run in the Windows 10 environment.

The modernization of the Quantum PLCs to the Schneider Electric M580 will require the application code be migrated to Unity Pro software. There are two options for this migration.

1) Straight LL984 conversion and keep the existing coding structure and style.
2) Re-write the code using IEC 61131-3 programming languages and modern programming techniques such as Derived Function Blocks (DFB) to improve modularity, troubleshooting, and reliability.

The table below outline and the advantages and disadvantages of both options:

[2] Schneider Electric Collaborative Automation Partner Programs enables technology from 3rd party manufacturers to be integrating with Schneider Electric product offerings.

Table 5: Concept Software Migration Options

ALTERNATIVE	Advantages	Disadvantages
1. Conversion Only	• Requires minimal testing • Requires very little effort to convert the code (approximately 8 hours/program to convert and bench test) • Lower initial cost	• May not be supported in future product releases • Does not take advantage of modular programing styles • Does not take full advantage of the new programming features available in Unity Pro • Results in substantially slower processor performance • LL984 is more difficult to read and troubleshoot • Difficult to maintain and modify in the future since younger programmers will not be familiar with the limited instruction set available • Potentially higher life cycle cost
2. Re-write	• Allows District to establish a common programming standard that can be used for all process areas and facilities • Allows District to take advantage of more advanced programming techniques offered in Unity Pro • Compatibility with future SCADA software that uses modular objects and user-defined data types • Lower life cycle cost	• Requires the application to be completely revalidated • Requires more time to implement and test • Higher initial cost • Requires accurate description of operations in existing code and/or documentation to program against

While rewriting the programs is not an immediate necessity, we strongly recommend that rewriting the programs be included in the District's near-term improvements.

As an aside, the Quantum PLC in the Tomco packaged CO2 system, is already programmed using Unity Pro version 4.10 software. The Tomco system is programmed using Unity Pro's IEC 61131-3 compliant ladder logic, which simplifies the software conversion required to upgrade to the M580 controller at this location.

6.3 Recommended Upgrade Approach

The following sections will discuss the proposed options to modernize the legacy Quantum PLC to the Schneider Electric M580 for PLC 01, PLC06, PLC05, PLC07 and the Tomco packaged systems.

Since the hardware and installation requirements of the project are so easily defined, TJCAA recommends that this project be implemented using a simplified Request for Proposals (RFP) process, in lieu of the traditional Design-Bid-Build process. The project scope of work can be defined in an RFP that is developed by the District, and at significantly lower cost than having an outside engineering firm develop a complete set of plans and specifications that would be required in a Design-Bid-Build project. The implementation scope is well suited to a number of local Systems Integration firms that hold a Class C-10 contractor's license.

This approach will lower the overall cost of implementing the upgrade project and significantly reduce the amount of time required to complete the upgrade.

6.3.1 PLC01 and PLC06 Upgrade Approach

PLC01 and PLC06 panels were installed in the 1999-2000 upgrade and include control systems with the discontinued Quantum controllers (part number 140CPU43412) and Quantum series I/O in 16-slot chassis. TJCAA's recommendation for these two panels is a complete internal components replacement. This will allow the complete back panel assemblies to be manufactured and tested prior to installation. Field wires will need to be disconnected from the existing terminal blocks and then re-terminated when the new mounting panels are installed. An advantage to this approach is that all of the pre-2000 manufactured components will be replaced in the upgrade, and the new panels based on the smaller M580 processor and X80 I/O will have substantially more space for future I/O and expansion.

120VAC discrete input modules will be replaced with 24VDC input modules with interposing relays for the externally powered 120VAC input signals. Existing AC output modules and relay output modules will be replaced with 24VDC sourcing output modules with interposing relays. This will enable the plant to standardize on only four different I/O modules for the discrete and analog inputs and outputs.

6.3.1.1 General Scope of Work

The following sections outline the scope of work for migrating to an M580 based control system.

- Fully assemble a new back panel with the M580/X80 I/O system, new DC power supplies, UPS circuit, new power distribution, and new field interface terminal blocks.
- Re-write existing Concept programs in Unity Pro using IEC61131-3 programming languages and District standard programming tools (e.g., DFBs). SCADA interface registers to remain mapped as they are currently so that no additional Wonderware programming will be required.
- Perform point to point testing and functional testing of the complete back panel assemblies and converted PLC programs at the fabrication facility.
- Disconnect existing field wires from existing terminal blocks and re-label existing field wires with new field wire markers to ensure that the wires can be identified.
- Remove the existing back panel.
- Install the new back panel with M580 controller and associated hardware.
- Connect existing field wires to the new field interface terminal blocks.
- Perform point to point testing from field devices to the new back panel assembly to confirm that all signals have been connected to the correct terminal blocks.

Confirm functional performance of the field installed program.

6.3.1.2 Bills of Materials

Refer to Appendix E for breakdown of OPC.

6.3.2 PLC05 and PLC07 Upgrade Approach

The control panels for PLC05 and PLC07 were installed in the plant upgrade in 2010-2012. PLC05 panel has two (2) 16-Slot Quantum Racks and PLC07 panel has three (3) 16-Slot Quantum Racks. Both panels have the discontinued Quantum controller part 140CPU53414.

The recommended approach for these two panels is to replace each existing Quantum Racks with M580/X80 I/O rack. The other internal control panel components, including power supplies, circuit breakers, and CableFast field wiring interface modules will be retained.

This approach will replace each I/O module in-kind but will not require removal of any of the existing field wiring from the CableFast modules. For rewiring of the new X80 I/O modules, we have identified two alternatives:

Alternative A – This option replaces the entire Quantum control system with the M580 platform using Schneider Electric's X80 I/O quick wiring adaptor and swing-arm kits. The swing arm assembly is adapted to receive the terminal block from the Quantum PLC. A circuit board with cable assembly is then plugged in and allows connection to the new X80 I/O modules. This approach allows wiring to be pre-validated, pre-verified and greatly reduces risk of wiring errors. This alternative is pending Schneider Electric's release of the swing arm and wiring harness kits to market, which is currently scheduled for Q1 2019.

Alternative B – This option replaces the entire Quantum control system with the Schneider Electric M580/X80 I/O platform and will require rewiring of the existing CableFast field wiring interface modules to the new X80 I/O modules. This can be accomplished by either individually connecting the existing CableFast connector wiring to the X80 I/O module terminals, or by procuring custom manufactured cables to interconnect between the X80 I/O module terminals and the CableFast pin-type connectors.

Alternative A allows for a quick and easy way to perform the conversion, but the system will always look like a conversion. In addition, there is no guarantee that the conversion kits will be available when the upgrade is performed.

We recommend Alternative B. Rewiring the new X80 I/O modules to the existing CableFast connectors will require several days of down time for the treatment plant. However, the end result will be a clean installation that simplifies maintenance over the long term.

The existing Concept programming application will be converted to Unity Pro using the Unity M580 Application Converter. In our experience this conversion is straightforward. While some symbols require updating, for the most part, symbol names, descriptions, comments and logic will be identical to the existing Concept program.

6.3.2.1 General Scope of Work

The following sections outline the scope of work to replace the Quantum controls system hardware.

- Disconnect existing I/O modules from the existing CableFast field interface cables.
- Remove existing Quantum racks.
- Install M580 and X80 I/O racks and modules in place of the Quantum racks.
- Wire existing CableFast modules to the new X80 I/O modules.
- Connect the CRA modules in the X80 racks to the M580 processor modules using Ethernet cables in a ring configuration.
- Re-write existing Concept programs in Unity Pro using IEC61131-3 programming languages. SCADA interface registers to remain mapped as they are currently so that no additional Wonderware programming will be required.
- Energize the control panel and perform point to point testing from each CableFast field I/O point to the corresponding PLC input variables.
- Confirm functional performance of the field installed program

6.3.2.2 Bills of Materials

Refer to Appendix E for breakdown of OPC.

6.3.3 Tomco PLC

The packaged Tomco CO2 System has a Quantum Unity controller and Quantum series I/O modules. The Quantum controller (part number 140CPU65260) is a newer controller type than the others installed at MWRF, but reached its end of life status on December 1, 2018.

The modernization recommendation for this system is rack replacement using M580 processor and X80 I/O. I/O modules will be replaced in kind. Existing internal panel wiring will be re-used and connected to the new X80 I/O modules. Wiring to the field interface terminals in the panel will remain in place.

The PLC application for this packaged system is written in Unity Pro version 4.1 and will need to be upgraded to the current version of Unity Pro at the time of the upgrade. However, the logic will not need to be converted.

6.3.3.1 General Scope of Work

The following sections outline the scope of work to replace the panels to migrate to M580 Quantum control system.

- Disconnect internal panel wires from existing Quantum I/O modules.
- Remove the existing Quantum PLC racks.
- Install the new M580 and X80 I/O racks.
- Connect existing internal panel wires from existing terminal blocks to the new I/O modules.
- Upgrade the version 4.1 Unity program to the latest version and update the configuration for the M580 processor and X80 I/O.
- Perform point to point testing from the field interface terminal blocks to the M580 program variables.
- Confirm functional performance of the field installed program

6.3.3.2 Bills of Materials

Refer to Appendix E for breakdown of OPC.

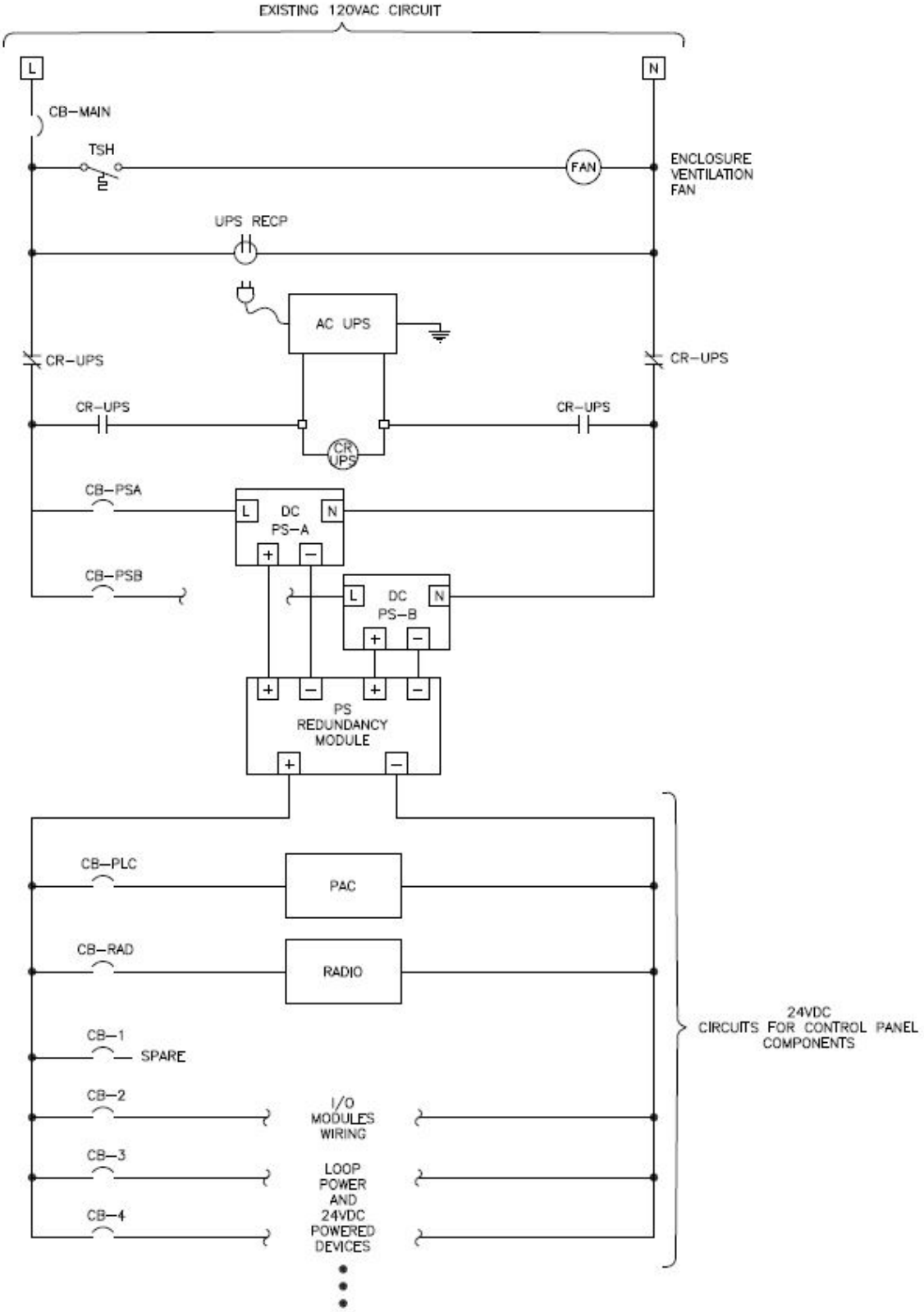
7. Control Panel Power Distribution Improvements

In addition to replacing the existing obsolete DC power supplies, adding a second DC power supply and a redundancy module (diode bridge), or a pair of paralleling DC power supplies to each distribution system RTU panel will improve reliability by eliminating the DC power supply as a single point of failure. The redundant power supply configuration is widely used in the industry. The control panels for PLC05 and PLC07 at the MWRF, which were installed in 2012, include redundant DC power supplies.

Adding a UPS switching relay to all control panels that have AC UPS systems installed will prevent the loss of the PLC system should the UPS fail or become disconnected. It also provides the ability to switch out the UPS system without interrupting the PLC or telemetry system. The capacitance in the DC circuit maintains the DC loads through the relay contact switching from UPS power to utility power, and back. Contacts for the UPS relay should have a minimum contact rating of 16-amps at 120 VAC, such as the Finder Series 62 power relay.

An example wiring diagram which includes a UPS switching relay (CR-UPS) and redundant power supplies is shown in Figure 2. These relatively simple wiring changes provide improved system reliability at a reasonable cost.

Figure 1 - Recommended Control Panel Power Distribution



Refer to Appendix E for OPC for estimates on material and labor cost to upgrade all 24 RTU sites.

Table 6: RTU Power Distribution Hardware Cost

Manuf.	Part Number	Description	Material Cost (ea)	Qty
Puls	QS10.241	Power Supply, 240W, 100-240VAC 1PH, 24-28VDC, 10-9A	$345	48
Puls	YR2.DIODE	DIN RAIL REDUN MODULE 10-60V 20A	$90	24
Finder Relay	Series 62	16-Amp Power Relay, plug-in style with base	$65	24

8. 5.8 GHz Backbone Radio Replacement

The existing 5.8 GHz Proxim Transceiver part number QB-8100-LNK was installed in 2012 and is no longer available to be procured from the manufacturer. The radio transceiver is a critical component and it is recommended that the District upgrade this module.

Each communication link between the high-speed network sites requires one pair of 5.8 GHz point-to-point (PTP) radios. For the District, three pairs of radios are installed at the following sites:

- MWRF (Site 35)
- Main Office (Site 38, 37, 30)
- Reservoir 2 (Site 32)

The District has an option to replace the radio with current model of Proxim or consider other manufactures. Our team researched available products and selected two based on technical performance, product availability, and suitability for the District's specific application requirements: Cambium Networks and Proxim Wireless.

Table 7: 5.8 GHz PTP Radio Manufacturers and Models

Manufacturer and Model	Cambium PTP 670	Proxim Tsunami QB-10100	Proxim Tsunami QB-10100L
Broadcast Frequency Range (GHz)	4.94-6.05	4.90-5.93	4.90-5.93
Radio Frequency Power[1] (dBm)	27	28	28
Radio Channel Bandwidth (MHz)	5, 10, 15, 20, 30, 40, 45	20, 40, 80	20, 40
Network bandwidth (Mbps)	450	866	400
Duplex Type	TDD	OFDM	OFDM
Licensed Required[2]	Yes/No	Yes/No	Yes/No
Power Supply	AC Adapter	POE 36-57 VDC	POE 36-57 VDC
Electrical Power Consumption	30 W	20 W	20 W
Cost per Radio	$2,400	$2,900	$2,000

Notes:
1. *The Radio Frequency Power indicated is the maximum transmit power.*
2. *Certain radios operate in both licensed and unlicensed broadcast frequency ranges. The 4.9 GHz range is a 'lightly licensed frequency'. All bands in the 5GHz frequency range and above are unlicensed.*

Please note the following:

- Radio frequency power is an indicator of the radio's ability to transmit a signal to the receiver.
- Network bandwidth is a measure of the bit-rate data capacity of the system. The PTP radio ultimately chosen for the network backbone should have enough network bandwidth to handle communication to the RTU sites, SCADA data, and future video surveillance.
- Duplex type indicates how the radio system will transmit and receive information; Half-duplex indicates that the transmit and receive operations occur at different times, and full-duplex indicates that the radio can transmit and receive simultaneously on different channels.

In addition to the technical specifications of the products researched, we also evaluated the technical service and support options available from each manufacturer. Table 7 summarizes the support and service options available from Proxim and Cambium.

Table 8: Support Comparison of High-Speed Radio Manufacturers

Manufacturer and Model	Cambium	Proxim
Local Sales Office	Yes	Yes
Phone Support	Yes	Yes
Online Support	Yes	Yes
Technical Case Management	Yes	Yes
24/7/365 Support Available (Additional Cost)	Yes	No
User Groups	Yes	Yes
Online Documentation	Yes	Yes
Training[1]	Yes	Yes

Notes:
1. *Training courses offered are geared toward radio technicians and likely aren't appropriate for District staff.*

Based on our research, both Proxim and Cambium radio will provide excellent performance and reliability to meet the District's current and future needs. Since the District currently has Proxim radios, we recommend replacing the existing radios with the Proxim QB-10100 model.

Table 9: Radio Backbone

Installed Location	Part Number	Description	Material Cost (ea.)	Qty
MWRF, Main Office, Reservoir 2	902-00769	Tsunami QB-10100	$2,900	6

9. Rockwell Automation Control System Migration

The RTU equipment the 24 RTU sites at the District consists of Rockwell Automation CompactLogix controls system hardware and software. There are currently two models of CompactLogix controllers at the RTU sites: 1768-L43 and the 1769-L35E.

The L43 model has reached its *End of Life* status as of July 2018 and will be discontinued as of June 30, 2020. The L35E model is currently *Active Mature* and the *End of Life* or *Discontinued* date has not been announced by Rockwell Automation. All CompactLogix I/O modules at the RTU sites are *Active* and do not require upgrading.

The firmware for the PLC controller at the RTU sites is version 19.01 for the L43 controllers and version 16.04 or 20.01 for the L35E controllers. Controller firmware version 16.04 requires RSLogix software version 16.00, firmware version 19.01 requires software version 19.00 and firmware version 20.01 requires software version 20.00. To the extent possible, we recommend maintaining like CPUs on the same firmware and software version.

In addition to the Rockwell hardware components, the Weidmuller network switches are also obsolete. These are critical components and it is recommended that they be upgraded at the same time the CPU modules are upgraded.

9.1 Recommendations

The 1769-L35E controller is an “Active Mature” product, which means that the product is fully supported by the manufacturer. However, the benefits of migrating the controller to the latest platform is to take advantage of CompactLogix controllers with faster processing speeds and increased memory capacity as well as to extend Rockwell Automation product support. Each processor firmware version requires a different software version; having the same CompactLogix controller models at all the sites all running on the same firmware version simplifies system maintenance.

The firmware for the 1769-L35E controllers at the RTU sites are either 16.04 or 20.01. The firmware for the 1768-L43 controllers is 19.01. Though there are no specific concerns with operating with firmware version 16.04, 19.01 or 20.01, the software required to maintain the application is not compatible with most current operating systems, including Windows 10 and Windows Server 2016. In addition, each firmware requires a different software installation. These reasons may pose to be challenges to systems integrators and staff at the District who maintain the system. It is recommended that along with the controller upgrade, the software be upgraded to Studio 5000 version 30.01 or at least to a common version.

The following sections describe a two-phase approach to upgrading the Rockwell Automation controllers.

9.1.1 Modernization Phase 1: Upgrade the L43 Controllers Only

The 1768-L43 has reached its end of useful life. Though the product is currently still supported, the discontinued date is slated for June 2020, after which the product may no longer be procured through the OEM. It is recommended that 1768-L43 controller be upgraded to 1769-L33ER. The CompactLogix power supplies provided with the 1768-L43 controllers are also obsolete and should be replaced in the near term. All existing I/O modules are compatible with the 1769-L33ER controller and do not need to be replaced.

Modernization Phase 1 upgrades only the three 1768-L43 controller sites and their associated power supplies. Panel modification to include redundant 24 VDC power

distribution with a redundancy module. Refer to Section 7 for control panel distribution improvements.

In addition to the Rockwell hardware components, the Weidmuller network switches are also obsolete. These are critical components and it is recommended that they be upgraded at the same time the CPU modules are upgraded.

Reservoir 2 (Site 32) RTU and Reservoir 1 (for Murcal communication interface) have a Prosoft Modbus interface module (MVI69-MCM) that has reached the "Active Mature" Status. This product is still fully supported but a newer product is available. We have included replacement of this module in the Phase 1 upgrade.

9.1.1.1 General Scope of Work

- Remove CompactLogix L43 CPU, power supply and network switch
- Replace CPUs with the 1769-L33ER. Install the new power supply, and network switch
- Download firmware version 30.014 (or latest) from Rockwell Automation website.
- Flash the controller to firmware version 30.014 (or latest) using Rockwell Automation tools.
- Migrate application software to Studio 5000 version 30.00.
- Download new application software to the 1769-L33ER

9.1.1.2 Bills of Materials

Table 10: Phase 1 – Upgrade L43 CPU

Manufacturer	Part Number	Description	Material Cost (ea)	Qty
Rockwell Automation	1769-L33ER	CompactLogix 5370 L3 Controllers, Dual Ethernet w/DLR capability, 2MB memory, 16 I/O Expansion, 32 Ethernet IP Nodes. Controllers are shipped with 1GB SD card and can support up to 2GB SD card.	$3,200	3
Rockwell Automation	1769-PB4	Power supply unit – 24VDC	$520	3
Rockwell Automation	1783-US8T	Stratix 2000 Switch, Unmanaged, 8 Copper Ports	$190	3
Prosoft	MVI69E-MBS	Modbus Master/Slave Network Interface Module for CompactLogix	$1,500	2

9.1.2 Modernization Phase 2: Upgrade L35E Controllers

Modernization Phase 2 will upgrade the 1768-L35E controller, which are currently *Active Mature* status, to current technology. Products that have the *Active Mature* are still fully supported by the manufacture, however we anticipate that these controllers will reach *End of Life* stage within five to seven years. The advantage of replacing these parts with current technology is to extend the product lifecycle and Rockwell Automation support.

Active Mature controllers 1769-L35E will be replaced with the 1769-L33ER controller for the 21 RTU sites. Discontinued Weidmuller network switches will be replaced with Stratix 8-port unmanaged network switches for the 21 RTU sites. Panel modifications to include redundant 24 VDC power distribution with a redundancy module. Refer to Section 7 for control panel distribution improvements.

9.1.2.1 General Scope of Work

- Remove CompactLogix CPU, PLC power supply and network switch
- Replace CPUs with the 1769-L33ER. Install new network switch
- Download firmware version 30.014 (or latest) from Rockwell Automation website.
- Flash the controller to firmware version 30.014 (or latest) using Rockwell Automation tools.
- Migrate application software to Studio 5000 version 30.00.
- Download new application software to the 1769-L33ER

9.1.2.2 Bills of Materials

Table 11: Phase 2 – Upgrade L35E CPU

Manufacturer	Part Number	Description	Material Cost (ea)	Qty	Net Cost
Rockwell Automation	1769-L33ER	CompactLogix 5370 L3 Controllers, Dual Ethernet w/DLR capability, 2MB memory, 16 I/O Expansion, 32 Ethernet IP Nodes. Controllers are shipped with 1GB SD card and can support up to 2GB SD card.	$3,200	21	$67,200
Rockwell Automation	1769-PB4	Power Supply 24VDC Input 4A @ 5VDC 2A @ 24VDC	$520	21	$10,920
Rockwell Automation	1783-US8T	Stratix 2000 Switch, Unmanaged, 8 Copper Ports	$190	21	$3,990

9.1.3 Software Applications

Software application at all the RTU sites are programmed in RSLogix 5000. The application code is programmed in either ladder diagram or function block diagram.

There are two slightly different programming styles used at the RTU sites. One style uses User-Defined tags (UDT) as listed in **Table 12**. This programming technique uses similar logic structures for common functions which are then programmed in individual programs. The UDT allows for a consistent data structure. Common functions include analog input

scaling, analog output control, discrete alarms, and discrete output pump control. The following UDTs are defined in the applications at the District:

Table 12: User-Defined Datatypes at RTU sites

User-Defined Name	Usage
Comm_Command_UDT1	Array for storing process parameters (analog) as a SCADA Message Handler
Comm_Status_UDT1	Array for storing process parameters (analog and discrete) as a SCADA Message Handler
DateTime	Structure for the DateTime attribute from the Controller Wallclock accessed by the GSV/SSV instruction
Diagnostics	This template contains the control functions for monitoring the status of the PLC
DWAnalogDevice	Analog input scaling and alarming
DWAnalogIO	Template for raw analog output signal
DWCL2Pump	Template for pump monitoring and control with PID loops requirement
DWDiscreteAlarm	Discrete alarming with configurable delay time
DWClayValve	Template for flow analog flow valve
DWNH3Pump	Template for pump monitoring and control (no PID loops)
DWTotalizedFlow	Template for flow totalization
DWWellPump	Template for pump monitoring and control with pump runtime accumulation

The other style uses Add-On Instructions (AOI). Unlike the above-mentioned style using UDTs and separate programs for each function, AOIs contain process logic that is encapsulated within an instruction block. The interface to the program is through inputs and outputs but the logic itself is contained within the instruction block. When the logic for any AOI is altered, the change will be propagated to all instances of the module within the program, which allows for modularity and ease of programming maintenance.

The following 3 AOIs are defined:

Table 13: Add-On Instructions at RTU sites

User-Defined Name	Usage
ALMA1	Processes logic for analog alarming for high, high, low, low low alarms
Analog_SCALE_ALARM	Scales analog input and processes logic for analog alarming for high, high high, low, low low and out of range alarms
HOA_OCA	Processes logic for operating modes for Hand/Off/Auto switch

Only Analog_SCALE_ALARM is used.

Twenty-one of the 24 sites use the UDT approach to programming (Sites 2, 4 and 34 use AOI instructions). Overall, most of the programming techniques used are common to all RTU sites.

9.1.4 Software Recommendations

For the most part, software at the RTU sites do not utilize Rockwell Automation's Add-On Instructions. Rather, User-Defined tags (UDT) and similar logic structures for common functions are used.

There are advantages of programming using Add-On instructions. Some of the benefits include:

- Code can be reused, which promotes consistency between projects by reusing the commonly-used control algorithms.
- The code is incorporated inside an AOI instruction which allows for modularity and easier to reuse.
- Complicated algorithms can be contained in the AOI instruction and then provide an easier to understand interface by making only essential parameters visible or required.
- AOIs can be exported to an .L5X file that can then be imported into another project. You can also copy and paste between projects.
- Proprietary code can be programmed inside of an Add-On Instruction, then use Source Protection to prevent others from viewing or changing your code.
- Code maintenance is simplified because AOI logic, monitored in the Logix Designer application, animates with tag values relative to that specific instance of the Add-On Instruction.

We have identified two options for software migration at the RTU sites:

Option A – Migrate application software to Studio 5000 version 30.00. Do not reprogram using modules for common functions.

Option B –Migrate application software to Studio 5000 version 30.00. Reprogram software to use Add-On instructions for common functions that aligns with the same data structures as the modules in Unity Pro XL software application.

Our recommendation at this time is Option A. The PLC programs are consistent, well documented, and serve the District's current needs. If the District decides to upgrade or rewrite the current SCADA application in the future this issue can revisited. There are significant benefits to updating the programs to use AOI and data structures that can be mapped directly to HMI objects in the SCADA application.

Appendix A

PLC Inventory

Appendix B

SCADA Software Inventory

Appendix C

SCADA Hardware Inventory

Appendix D

Radio Inventory

Appendix E

Opinion of Probable Costs

MesaWater DISTRICT®

Dedicated to Satisfying our Community's Water Needs

MEMORANDUM

TO: Engineering and Operations Committee

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

DATE: June 18, 2019

SUBJECT: Well Automation and Rehabilitation Project Wrap Up

RECOMMENDATION

Receive the presentation.

STRATEGIC PLAN

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

PRIOR BOARD ACTION/DISCUSSION

At its March 15, 2014 workshop, the Board of Directors (Board) adopted Resolution No. 1442 Replacement of Assets Including Pipeline and Well Rehabilitation, which calls for rehabilitation of groundwater production wells if and when well production drops by more than 20% for a given well and 10% for overall clear water well production.

At its March 18, 2014 meeting, the Engineering and Operations (E&O) Committee received information describing the scope of the Well Automation and Rehabilitation Project.

At its September 11, 2014 meeting, the Board awarded a contract to Carollo Engineers, Inc. in the amount of $749,995 with a 10% contingency for a not-to-exceed amount of $824,995 to provide professional design services for the Well Automation and Rehabilitation Design Project.

At its March 12, 2015 meeting, the Board awarded a contract to RBF Consulting, a Michael Baker International Company, in the amount of $778,270 with a 10% contingency for a not-to-exceed amount of $856,097 for professional Construction Management Services of the Well Automation and Rehabilitation Project.

At its May 19, 2015 meeting, the E&O Committee received an information item on the planned appearance of the well sites, including the new chemical facility aesthetics.

At its November 12, 2015 meeting, the Board approved the Well Automation and Rehabilitation Project and the filing of the Notice of Categorical Exemption from the California Environmental Quality Act.

At its February 11, 2016 meeting, the Board awarded a contract to Pacific Hydrotech Corporation for $10,488,500 with a 5% contingency for a not-to-exceed amount of $11,012,925 for construction of the Well Automation and Rehabilitation Project.

At its August 16, 2016 meeting, the E&O Committee received an update on the Well Automation and Rehabilitation Project.

At its July 13, 2017 meeting, the Board approved a change order to Carollo Engineers, Inc. in the amount of $195,960 to continue providing engineering services for the Well Automation and Rehabilitation Project.

At its October 12, 2017 meeting, the Board approved a change order to Pacific Hydrotech, Inc.'s contract for construction of the Well Automation and Rehabilitation Project for a not-to-exceed amount of $800,000 to furnish, install, and integrate Variable Frequency Drives at Wells 1, 3, 7, and 9.

At its November 9, 2017 meeting, the Board approved a change order to Michael Baker International's contract for $420,673, for a total not-to-exceed amount of $1,276,770, to continue construction management services for the Well Automation and Rehabilitation Project and approved an increase in the authorized contingency to the Well Automation and Rehabilitation construction contract with Pacific Hydrotech, Inc. from 5% ($524,425) to 7.5% ($786,637).

At its July 12, 2018 meeting, the Board approved a change order to Pacific Hydrotech, Inc.'s contract for construction of the Well Automation and Rehabilitation Project for a not-to-exceed amount of $158,368.61 for compensable project delays.

At its September 18, 2018 meeting, the E&O Committee received an information item on the status of the Well Automation and Rehabilitation Project.

At its December 13, 2018 meeting, the Board approved a contract amendment to Michael Baker International's contract for Construction Management of the Well Automation and Rehabilitation Project for $142,495 for a not to exceed amount of $1,419,265 to continue to provide Construction Management Services to project completion.

DISCUSSION

The Well Automation and Rehabilitation Project has been completed at Wells 1, 3, 5, 7, and 9. These wells have all been returned to service and are reliably producing high quality drinking water.

Table 1: Description of all the project objectives and implementation that have been met.

	Objective	Implementation
1	Rehabilitate All Clear Wells	• Wells Mechanically Brushed and Redeveloped • Well 5 Casing Repaired • 15% Capacity Increase (1,200 gpm)
2	Provide Automation Functionality	• Remote Operation Capability • Real-Time SCADA Monitoring • Real-Time Chemical Management
3	Equipment Standardization	• Increase in Maintenance Efficiency • Streamlined Operations • Increased Reliability
4	Chemical Management	• Increased Storage Capacity by 12 to 33 times • Decreased Hypochlorite Deliveries

		(Weekly to Monthly) • Decreased Ammonia Deliveries (Weekly to Semi-Annual) • Reduction in Chemical Delivery Labor
5	Resource Optimization	• Reduction in Energy Usage w/Variable Controls • Enhanced Water Quality w/Real-Time Chemical Management • Reduction in Onsite Labor
6	Perpetual Agency Asset Replacement	• Replaced End-of-Life Equipment - New Pumps and Motors - New Electrical Switchgear
7	Back-up Power	• Diesel Generators at Wells 3, 7 and 9
8	Security	• Installed Security System Infrastructure at All Wells • Supports Future District Integrated Security Project

Unforeseen Conditions

The project was budgeted with a 5% contingency on the construction contract and a 10% contingency on the professional services contracts (Design and Construction Management). Unforeseen conditions, such as the holes in the Well 5 casing, buried footings at all the sites, maintaining a 100% local groundwater supply mandate and the associated construction phasing, and various improvements to the design during construction led to an extended construction duration (e.g., 34 months verses the scheduled 26 months) and an overall 12% increase to the original budget.

In order to provide operational flexibility with future changing basin conditions, the Board approved a staff recommendation to add variable frequency drives (VFDs) to the well motors during construction. The VFDs allow efficient pumping and consistent and additional capacity as the depth to groundwater changes with drought years, wet years, and varying basin management requirements. The VFD change order added approximately 9% to the original budget. Installation of the VFDs as a separate future project was estimated to be more than double the installed VFD change order amount, thus, saving Mesa Water overall in future capital expenditures.

Table 2: Summary of the construction original contracts and change orders.

Service	Original Contracts	Change Orders	% Change	Total Contract
Construction	$10,488,500	$697,939	6.6%	
VFDs	$0	$ 947,711	9.0%	
Total	**$10,488,500**	**$1,487,283**	15.6%	**$12,134,150**

Construction work on existing facilities is deemed to be successful if change orders are managed to less than ten percent of the original contract budget for large and complex projects. Thus, the Well Automation Project, with its 6.6% in change orders, is considered to be an efficiently implemented construction project.

Table 3: Summary of the Well Automation Project design and construction management original contracts and change orders.

Service	Original Contracts	Change Orders	% Total Construction Contract	Total Contract
Design	$765,275	$346,407	9.3%	$1,111,682
Construction Management	$778,270	$640,995	11.7%	$1,419,265

Design and construction management services are deemed to be successful if each is managed to less than fifteen percent of the total construction contract for large and complex projects. Design and construction management of well automation functionality, chemical management, and well rehabilitation are considered to be complex design elements. Thus, Mesa Water's design and construction management team excelled at delivering the Well Automation Project at or under the fifteen percent industry design and construction management guidelines in spite of the difficult and unforeseen field conditions that were encountered during construction and the addition of the VFDs design and oversight.

Project Outcomes

The Well Automation and Rehabilitation Project met all of its goals and has improved safety, efficiency, and water quality. The capital investment made in the well sites to improve all equipment and operations in one large project provides for standardized equipment and operations and reduces the capital and operating costs of the well sites for the next several years. Key success factors include the following:

- **Capacity**: Improved production by 1,200 gpm, which is the equivalent of a moderate production well, without incurring the cost of drilling a new well.

- **Efficiency:** Efficiency testing performed by Southern California Edison (SCE) found an overall 11% increase in pumping efficiency and a 15% decrease in kilowatt-hours per acre-foot of water pumped compared to the same testing performed in the year before the project began.

- **Water Quality**: The automated disinfection system maintains the desired monochloramine disinfection residual while producing minimal free ammonia. Free ammonia is the precursor of undesired nitrification events.

- **Safety:** The new electrical equipment has reduced the arc flash incident energy potential from a "4" rating to a "2" rating.

FINANCIAL IMPACT

In Fiscal Year 2019, $2,450,000 is budgeted for the Well Automation and Rehabilitation Project.

	Project Estimate Amounts	Project Cost Amounts
Initial Project Estimate (FY 2016)	$12,032,045	
Original Contracts		$12,032,045
Change Orders		$ 2,633,052
Requested Funding		$ 0
Revised Contracts		$14,665,097
Actual Spent to Date		$ 14,665,097
Revised Project Estimate	$14,665,097	

ATTACHMENTS

None.

REPORTS:

10. REPORT OF THE GENERAL MANAGER

REPORTS:

11. DIRECTORS' REPORTS AND COMMENTS

MEMORANDUM

MesaWater DISTRICT®

Dedicated to Satisfying our Community's Water Needs

TO: Engineering and Operations Committee

FROM: Denise Garcia, Administrative Services Manager

DATE: June 18, 2019

SUBJECT: Well and Facility Naming Conventions

RECOMMENDATION

Receive the information and take action as the Board desires.

STRATEGIC PLAN

Goal #1: Provide a safe, abundant, and reliable water supply.
Goal #4: Increase public awareness about Mesa Water and about water.

PRIOR BOARD ACTION/DISCUSSION

At its December 14, 1972 meeting, the Board of Directors (Board) named Well 2 the Wakeham Well in honor of the Wakeham family.

At its October 13, 1977 meeting, the Board named Well 4 Segerstrom 2 in honor of the Segerstrom family and Well 5 in honor of Nate Reade, former Director of Mesa Water District.

At its November 12, 1980 meeting, the Board discussed what criteria are used for the naming of the District wells. It was determined that no definite criteria are used.

At its January 16, 1992 meeting, the Board discussed the naming of District wells again, stating that the names should be consistent and continue the tradition of naming wells after people who were, or are, in public service. Another suggestion was given that the criteria for the naming of wells be after events or streets. The Board did not reach an agreement as to the criteria for the naming of wells.

At its February 13, 1992 meeting, the Board named Well 7 in honor of William Patrick, former Director of the Coastal Municipal Water District and Fairview County Water District, and Well 8 in honor of Warren Booth, former Director of Mesa Water District.

At its October 24, 1996 meeting, the Board dedicated Reservoir 2 in honor of Karl Kemp, former General Manager of Mesa Water District.

At its September 25, 2012 meeting, the Board approved the renaming of the Colored Water Treatment Facility (Well 11) to the Mesa Water Reliability Facility.

DISCUSSION

This information is provided for the Board's consideration.

FINANCIAL IMPACT

There is no financial impact for the discussion of this item.

ATTACHMENTS

Attachment A: Wells & Facilities

WELLS & FACILITIES

Facility Type	Number	Name	Named in Honor of	Year	Status	Location
Well	1	**Segerstrom 1**	Segerstrom Family	1970	Closed	Sunflower Ave.
	1B			1994	Active	
Well	2	**Wakeham**	Wakeham Family	1972	Closed	Sunflower Ave.
Well	3	**Lee Pickens**	Former Mesa Water District Director	1975	Closed	Harbor Blvd.
	3B			1989	Active	
Well	4	**Segerstrom 2**	Segerstrom Family	1977	Closed	Fairview Rd.
Well	5	**Nathan L. Reade**	Former Mesa Water District Director	1980	Active	Cadillac Ave.
Well	6	N/A	N/A	1983	Active	Gisler Ave.
Well	7	**William Patrick**	Former Coastal Municipal Water District and Fairview County Water District Director	1986	Active	Harbor Blvd.
Well	8	**Warren Booth**	Former Mesa Water District Director	1990	Closed	South Coast Dr.
Reservoir	1	N/A	N/A	1990	Active	Placentia Ave.
Well	9	**Mario Durante**	Former Mesa Water District Director	1993	Closed	Sunflower Ave.
	9B			2015	Active	
Well	10	N/A	N/A	1994	Closed	S. Flower, Santa Ana
Reservoir	2	**Karl Kemp Reservoir**	Former Mesa Water District General Manager	1996	Active	Orange Ave.
Well	11	**Mesa Water Reliability Facility (MWRF)**	Formerly Colored Water Treatment Facility	1999	Active	Gisler Ave.
Closed Session Room	N/A	**Panian Conference Room**	Hank Panian - Former Mesa Water District Director	2000 - 2007	Under Construction	1965 Placentia Ave.
MWRF Electrical Room	N/A	**Robert “Bob” Pavlovich Electrical Room**	In Memory of Former MWH, Constructors Inspector	2012	Active	Gisler Ave.
Well	12	N/A	N/A	2020	In Design	Chandler Ave., Santa Ana
Well	14	N/A	N/A	2020	In Design	S. Croddy Wy., Santa Ana