AGENDA
REGULAR MEETING OF THE BOARD OF DIRECTORS
District Board Room, 2890 Mosquito Road, Placerville, California
April 23, 2018 — 9:00 A.M.

Board of Directors

Michael Raffety—Division 3
President

Alan Day—Division 5
Vice President

George Osborne—Division 1
Director

Greg Prada—Division 2
Director

Dale Coco, MD—Division 4
Director

Executive Staff

Jim Abercrombie
General Manager

Brian D. Poulsen, Jr.
General Counsel

Jennifer Sullivan
Clerk to the Board

Jesse Saich
Communications

Brian Mueller
Engineering

Mark Price
Finance

Jose Perez
Human Resources

Tim Ranstrom
Information Technology

Margaret Washko
Operations

PUBLIC COMMENT: Anyone wishing to comment about items not on the Agenda may do so during the public comment period. Those wishing to comment about items on the Agenda may do so when that item is heard and when the Board calls for public comment. Public comments are limited to five minutes per person.

PUBLIC RECORDS DISTRIBUTED LESS THAN 72 HOURS BEFORE A MEETING: Any writing that is a public record and is distributed to all or a majority of the Board of Directors less than 72 hours before a meeting shall be available for immediate public inspection in the office of the Clerk to the Board at the address shown above. Public records distributed during the meeting shall be made available at the meeting.

AMERICANS WITH DISABILITIES ACT: In accordance with the Americans with Disabilities Act (ADA) and California law, it is the policy of El Dorado Irrigation District to offer its public programs, services, and meetings in a manner that is readily accessible to everyone, including individuals with disabilities. If you are a person with a disability and require information or materials in an appropriate alternative format; or if you require any other accommodation for this meeting, please contact the EID ADA coordinator at 530-642-4045 or email at adacoordinator@eid.org at least 72 hours prior to the meeting. Advance notification within this guideline will enable the District to make reasonable accommodations to ensure accessibility.
CALL TO ORDER
Roll Call
Pledge of Allegiance
Moment of Silence

ADOPT AGENDA

COMMUNICATIONS
General Manager’s Employee Recognition

PUBLIC COMMENT

COMMUNICATIONS
General Manager
Clerk to the Board
Board of Directors
Brief reports on community activities, meetings, conferences and seminars attended by the Directors of interest to the District and the public.

APPROVE CONSENT CALENDAR
Action on items pulled from the Consent Calendar

CONSENT CALENDAR
1. Finance (Pasquarello)
Ratification of EID General Warrant Registers for the periods ending March 20, March 27, April 3, and April 10, 2018, and Board and Employee Expense Reimbursements for these periods.

Option 1: Ratify the EID General Warrant Register as submitted to comply with Section 24600 of the Water Code of the State of California. Receive and file Board and Employee Expense Reimbursements.
Option 2: Take other action as directed by the Board.
Option 3: Take no action.

Recommended Action: Option 1.

2. Clerk to the Board (Sullivan)
Approval of the minutes of the March 26, 2018 regular meeting of the Board of Directors.

Option 1: Approve as submitted.
Option 2: Take other action as directed by the Board.
Option 3: Take no action.

Recommended Action: Option 1.
3. **Operations / Engineering (Washko/Mueller)**
   Consideration to ratify Resolution No. 2017-014 to maintain the emergency declaration as a result of ongoing storm-related activities.

   Option 1: Ratify Resolution No. 2017-014 (*thus maintaining the emergency declaration*).
   Option 2: Decline to ratify Resolution No. 2017-014 (*thus terminating the emergency declaration*) or take other action as directed by the Board.
   Option 3: Take no action (*thus terminating the emergency declaration*).

   **Recommended Action:** Option 1 (*four-fifths vote required*).

4. **Office of the General Counsel (P. Johnson)**
   Consideration of a resolution authorizing execution of an easement quitclaim to property owners Joseph J. Murchison and Mary R. Murchison for a portion of an abandoned District ditch (APN 089-230-07).

   Option 1: Adopt a resolution authorizing execution of an easement quitclaim to property owners Joseph J. Murchison and Mary R. Murchison for a portion of an abandoned District ditch (APN 089-230-07).
   Option 2: Take other action as directed by the Board.
   Option 3: Take no action.

   **Recommended Action:** Option 1.

5. **Finance (Pasquarello)**
   Consideration to authorize funding approval for District Capital Improvement Plan (CIP) Projects: Strawberry Raw Water Pump Station Replacement, Project No. 17048 in the amount of $72,000.

   Option 1: Authorize funding approval for District Capital Improvement Plan (CIP) Projects: Strawberry Raw Water Pump Station Replacement, Project No. 17048 in the amount of $72,000.
   Option 2: Take other action as directed by the Board.
   Option 3: Take no action.

   **Recommended Action:** Option 1.

6. **Information Technology (Ranstrom)**
   Consideration to award an extended service agreement for data center computer equipment to CDW Government, Inc. (CDW-G) in the amount of $61,280.64.

   Option 1: Award an extended service agreement for data center computer equipment to CDW Government, Inc. (CDW-G) in the amount of $61,280.64.
   Option 2: Take other action as directed by the Board.
   Option 3: Take no action.

   **Recommended Action:** Option 1.
Consent Calendar continued

7. **Office of the General Counsel (Leeper)**
   Consideration to award a contract to Meyers Nave in the not-to-exceed amount of $55,000, for professional legal services to update and revise the District’s existing master construction contract template and to develop a short-form construction contract template.

   Option 1: Award a contract to Meyers Nave in the not-to-exceed amount of $55,000, for professional legal services to update and revise the District’s existing master construction contract template and to develop a short-form construction contract template.
   Option 2: Take other action as directed by the Board.
   Option 3: Take no action.

   **Recommended Action:** Option 1.

8. **Operations (Strahan)**
   Consideration to award a three-year professional services contract to AquaTech Company in the not-to-exceed amount of $560,970 for Potable Water Floating Covered Reservoir Maintenance.

   Option 1: Award a three-year professional services contract to AquaTech Company in the not-to-exceed amount of $560,970 for Potable Water Membrane Covered Reservoir Maintenance.
   Option 2: Take other action as directed by the Board.
   Option 3: Take no action.

   **Recommended Action:** Option 1.

9. **Operations (Strahan)**
   Consideration to award a professional services contract amendment to Water Quality and Treatment Solutions, Inc. in the not-to-exceed amount of $88,210 for implementation of a Disinfection Byproduct (DBP) Mitigation Plan and Tracer Study.

   Option 1: Award a professional services contract amendment to Water Quality and Treatment Solutions, Inc. in the not-to-exceed amount of $88,210 for Implementation of the Disinfection Byproduct (DBP) Mitigation Plan and Tracer Study.
   Option 2: Take other action as directed by the Board.
   Option 3: Take no action.

   **Recommended Action:** Option 1.

**END OF CONSENT CALENDAR**
DIRECTOR ITEMS

10. Board of Directors (Coco)
Consideration to agendize an action item for the May 14, 2018 regular Board meeting to consider delaying the implementation of the low-income assistance program for District residential wastewater customers.

Option 1: Agendize an action item for the May 14, 2018 regular Board meeting to consider delaying the implementation of the low-income assistance program for District residential wastewater customers.
Option 2: Take other action as directed by the Board.
Option 3: Take no action.

Recommended Action: Option 1.

INFORMATION ITEMS

11. Engineering (Kessler)
Status of the El Dorado Forebay Dam Modification, Project No. 17013H.

Recommended Action: None – Information only.

ACTION ITEMS

12. Operations (Crane)
Consideration to ratify the General Manager’s award of a contract to Doug Veerkamp General Engineering, Inc. in the not-to-exceed amount of $75,000 and approve a contract change order for an additional $17,569.39 for the emergency repair and replacement of a failed sewer lateral connection and associated segment of mainline located on Cambridge Road in Cameron Park.

Option 1: Ratify the General Manager’s award of a contract to Doug Veerkamp General Engineering, Inc. in the not-to-exceed amount of $75,000 and approve a contract change order for an additional $17,569.39 for the emergency repair and replacement of a failed sewer lateral connection and associated segment of mainline located on Cambridge Road in Cameron Park.
Option 2: Take other action as directed by the Board.
Option 3: Take no action.

Recommended Action: Option 1.

13. Engineering (Brink)
Request that the Board make a determination that the use of recycled water for the irrigation of front and backyards of single family homes within the Serrano Village J6 and Village J7 developments is not economically feasible.

Option 1: Make a determination that the use of recycled water for the irrigation of front and backyards of single family homes within Serrano Village J6 and Village J7 is not economically feasible.
Option 2: Take other action as directed by the Board.
Option 3: Take no action.

Recommended Action: Option 1.
14. Engineering (Mutschler)
Consideration to award a professional services contract to Frisch Engineering in the not-to-exceed amount of $93,550 for design of the Deer Creek Wastewater Treatment Plant Main Circuit Breaker Project, and authorize funding of $178,550 for Project No. 18001.

Option 1: Award a professional services contract to Frisch Engineering in the not-to-exceed amount of $93,550 for design of the Deer Creek Wastewater Treatment Plant Main Circuit Breaker Project, and approve funding of $178,550; Project No. 18001.
Option 2: Take other action as directed by the Board.
Option 3: Take no action.

Recommended Action: Option 1.

15. Engineering (Mutschler)
Consideration to award a professional services contract to Frisch Engineering in the not-to-exceed amount of $193,388 for design of the Wastewater Communication Upgrade Project, and authorize funding of $298,388; Project No. 18003.

Option 1: Award a professional services contract to Frisch Engineering in the not-to-exceed amount of $193,388 for design of the Wastewater Communication Upgrade Project, and approve funding of $298,388; Project No. 18003.
Option 2: Take other action as directed by the Board.
Option 3: Take no action.

Recommended Action: Option 1.

CLOSED SESSION
A. Closed session pursuant to Government Code section 54956.8 (Poulsen)
Property: District water rights (including, pre-1914, licensed and permitted, and contract-based rights (Central Valley Project Water Service Contract No. 14-06-200-1357A-LTR1; Warren Act Contract No. 06-WC-20-3315))
District negotiators: General Manager, General Counsel, Environmental and Water Resources Manager
Under negotiation: price and terms of payment for purchase
Negotiating parties: Westlands Water District and any other interested party

B. Closed session pursuant to Government Code section 54957.6 (Poulsen)
Conference with Labor Negotiators
Agency designated representatives: Directors Day and Coco
Unrepresented employee: General Counsel

C. Closed session pursuant to Government Code section 54957.6 (Abercrombie)
Conference with Labor Negotiators
Agency designated representatives: Directors Day and Coco
Unrepresented employee: General Manager
REVIEW OF ASSIGNMENTS

ADJOURNMENT

TENTATIVELY SCHEDULED ITEMS FOR FUTURE MEETINGS

Engineering
- Design contract for the wastewater collection facility relocation project, Action, May (Wells)
- Consideration of professional services for design of solar facility expansion, Action, May (Wells)
- Project update and contract amendment for El Dorado Hills Raw Water Pump Station replacement, Action, May (Money)
Awards and Recognitions
a) Congratulations, Gina Pike. Gina has been promoted to the position of Development Services Technician I in the Engineering Department.

b) Congratulations to Dana Strahan, who is retiring after more than 11 years of service. Dana is a dedicated public servant, and proudly represented the District's mission and guiding principles. We wish him great health and relaxation in his retirement journey.

Staff Reports and Updates
a) Brief analysis of impact of Proposed SB 606 and AB 1668 – Summary by Mark Price
General Manager Communications  
April 23, 2018

Brief analysis of impact of Proposed SB 606 and AB 1668

During the State Legislation Update at the March 26, 2018 Board meeting SB 606 and AB 1668 were discussed as well as reasons for the recommendation to oppose both the senate and assembly bills. A major concern of the District was the requirement of limiting indoor water usage to 55 gallons per person per day (GPCD).

EID reports to the SWRCB monthly via its monitoring report log water usage. Using the February reported numbers for 2016 & 2017 it is estimated the indoor usage to be between 69-71 GPCD. If the District were required to impose the 55 GPCD limit on our customers it would result in at least a 20% reduction in indoor water consumption with the estimated loss in water revenues being over $1 million with the corresponding loss in wastewater revenues being over $500,000.

To recoup the lost revenues through rate increases would mean an almost 8% increase in the water consumption charge and a $1.00 per CCF increase in the wastewater commodity charge (25% increase).

Initial target is 55 GPCD but under these bills further reductions may be required by 2025 and 2030 resulting in further rate increases to cover revenue losses.

These restrictions would also reduce the volume of wastewater to treat for recycled water use. This reduction would increase the need to pump more water out of the American River to augment the recycled water outdoor demands in the summer months.
EL DORADO IRRIGATION DISTRICT

Subject: Ratification of EID General Warrant Registers for the periods ending March 20, March 27, April 3, and April 10, 2018, and Board and Employee Expense Reimbursements for these periods.

Previous Board Action

February 4, 2002 – The Board approved to continue weekly warrant runs, and individual Board member review with the option to pull a warrant for discussion and Board ratification at the next regular Board meeting.

August 16, 2004 – Board adopted the Board Expense Payments and Reimbursement Policy.


Board Policies (BP), Administrative Regulations (AR) and Board Authority

Section 24600 of the Water Code of the State of California provides no claim is to be paid unless allowed by the Board.

Summary of Issue

The District’s practice has also been to notify the Board of proposed payments by email and have the Board ratify the Warrant Registers. Copies of the Warrant Registers are sent to the Board of Directors on the Friday preceding the Warrant Register’s date. If no comment or request to withhold payment is received from any Director by the following Tuesday morning, the warrants are mailed out and formal ratification of said warrants is agendized on the next regular Board agenda.

On April 1, 2002, the Board requested staff to expand the descriptions on the Warrant Registers and modify the current format of the Warrant Registers.

On July 30, 2002, the Board requested staff to implement an Executive Summary to accompany each Warrant Register which includes all expenditures greater than $3,000 per operating and capital improvement plan (CIP) funds.
**Staff Analysis/Evaluation**

Warrant registers submitted for March 20, March 27, April 3, and April 10, 2018 totaling $2,186,712.73, and Board and Employee Expense Reimbursements for these periods.

**Current Warrant Register Information**

Warrants are prepared by Accounts Payable; reviewed and approved by the Accounting Manager; the Director of Finance and the General Manager or their designee.

<table>
<thead>
<tr>
<th>Register Date</th>
<th>Check Numbers</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 20, 2018</td>
<td>666367 – 666519</td>
<td>$1,071,236.70</td>
</tr>
<tr>
<td>March 27, 2018</td>
<td>666520 – 666576</td>
<td>$99,256.91</td>
</tr>
<tr>
<td>April 3, 2018</td>
<td>666577 – 666725</td>
<td>$503,181.95</td>
</tr>
<tr>
<td>April 10, 2018</td>
<td>666726 – 666823</td>
<td>$513,037.17</td>
</tr>
</tbody>
</table>

**Current Board/Employee Expense Payments and Reimbursement Information**

The items paid on Attachment B and C are expense and reimbursement items that have been reviewed and approved by the Clerk to the Board, Accounting Manager and the General Manager before the warrants are released. These expenses and reimbursements are for activities performed in the interest of the District in accordance with Board Policy 12065 and Resolution No. 2007-059.

Additional information regarding employee expense reimbursement is available for copying or public inspection at District headquarters in compliance with Government Code Section 53065.5.

**Board Decision/Options**

Option 1: Ratify the EID General Warrant Register as submitted to comply with Section 24600 of the Water Code of the State of California. Receive and file Board and Employee Expense Reimbursements.

Option 2: Take other action as directed by the Board.

Option 3: Take no action.

**Staff/General Manager’s Recommendation**

Option 1.

**Support Documents Attached**

Attachment A: Executive Summaries
Attachment B: Board Expenses/Reimbursements
Attachment C: Employee Expenses/Reimbursements totaling $100 or more
Tony Pasquarello  
Finance Manager

Mark Price  
Finance Director (CFO)

Jennifer Sullivan  
Clerk to the Board

Jim Abercrombie  
General Manager
Executive Summary for March 20, 2018 -- $1,071,236.70:

This summary highlights significant disbursements made by major business activity:

General District Operations (Fund 110)

- $21,523—AT&T for phone service
- $21,566—Colantuono, Highsmith & Whatley, PC for outside legal services
- $13,851—Dataprose, LLC for February billing services
- $11,120—Hudson Henderson & Company, Inc. for 2017 audit review services
- $12,647—Hunt & Sons, Inc. for card lock fuels and fuel deliveries at various locations
- $3,225—Pro-Line Cleaning Services, Inc. for February janitorial services
- $3,655—Statseeker PTY, LTD for software license and renewal
- $4,510—Thyssenkrupp Elevator Corporation for 2018 elevator maintenance
- $6,331—U.S. Bancorp Services, Inc. for conference expenses, job postings, and office furniture

Engineering Operations (Fund 210)

- $5,550—All Pro Backflow, Inc. for backflow testing services
- $5,064—Tully & Young, Inc. for water hydrology support services

Water Operations (Fund 310)

- $3,182—KWA Safety and Hazmat Consultants, Inc. for air sampling services
- $5,185—Olin Chlor Alkali Products for sodium hypochlorite at Reservoir A and EDHWTP
- $5,760—PG&E for electric service
- $14,397—Pinpoint Products for four water leak detectors
- $4,057—Pump Repair Service Company, Inc. for two pump rebuild kits
- $8,453—Sterling Water Technologies, LLC for polymer at Reservoir A

Wastewater Operations (Fund 410)

- $3,159—El Dorado Disposal Service, Inc. for grit hauling and garbage service at DCWWTP, Bass Lake and EDHWWT
- $6,531—PG&E for electric service
- $7,606—Solenis, LLC for praestol at EDHWWT

Recycled Water Operations (Fund 510) none to report

Hydroelectric Operations (Fund 610)

- $4,465—GEI Consultants, Inc. for dam safety assessment at Silver Lake and Forebay spillway
- $4,755—GHD, Inc. for geotechnical services for Weber Dam landslide repair
- $4,072—KWA Safety and Hazmat Consultants, Inc. for air sampling services
- $4,605—Pace Supply Corporation for bolts, gaskets, and couplings
- $12,356—SybIon Reid for engineering services ($62,856). Pre-paid expense $50,500
- $4,458—U.S. Bancorp Services, Inc. for conference expenses and office furniture
- $17,924—Wilbur-Ellis Company, LLC for vegetation control supplies
Recreation Operations (Fund 710) none to report

Capital Improvement Projects (Construction Funds 140, 340, 440, 540, 640 and 740)

- $7,189—Area West Engineers, Inc. for topographical surveys and title reports:
  >Project #18004.01 – Chrome Ridge/Pleasant Valley ($4,953)
  >Project #17014.01 – Green Valley PRS #2 Upgrade ($2,236)
- $11,624—Far Western Anthropological Research Group, Inc. for cultural studies – Main Ditch-Forebay to Reservoir 1 Planning/Design/Engineering/Environmental [Project #11032.03]
- $27,113—Flo-Line Technology, Inc. for a submersible pump – 2017 Wastewater Equipment Replacement Program St. Andrews Lift Station [Project #17009.10]
- $5,014—Frank A. Olsen Company for a pump control valve – Sly Park Hills Pump Rehabilitation [Project #17044.01]
- $25,220—ICM Group, Inc. for on-call construction inspection services:
  >Project #14003.01 – Reservoir 3 Tank Upgrade ($15,964)
  >Project #16025.01 – Town Center Force Main Phase 2 ($9,256)
- $48,841—Russell Promontory, LLC for construction costs per the responsibility and reimbursement agreement – Ridgeview Lift Station 10 Elimination [Project #14026.01]
- $70,743—Stantec Consulting Services, Inc. for engineering services – Main Ditch-Forebay to Reservoir 1 [Project #11032.01]
- $498,660—Syblon Reid for engineering services ($2,536,767)
  Pre-paid expense $2,038,107
  >Project #17003.01 – Hazardous Mitigation/Canal Failure Downstream Flume 10 ($1,748,998)
  >Project #17004.01 – Hazardous Mitigation at Flume 5 ($392,628)
  >Project #17008.01 – Hazardous Mitigation at Flume 9 ($395,141)
- $8,622—Youngdahl & Associates, Inc. for on-call geotechnical services:
  >Project #14003.01 – Reservoir 3 Tank Upgrade ($5,384)
  >Project #16025.01 – Town Center Force Main Phase 2 ($1,824)
  >Project #16040.01 – Carson Creek 2 and Business Park 3 Lift Stations Abandonment ($1,414)
Executive Summary for March 27, 2018 -- $99,256.91:

This summary highlights significant disbursements made by major business activity:

**General District Operations (Fund 110)**
- $8,225—CDW Government for mobile device manager software
- $3,570—Golden State Flow Measurement, Inc. for warehouse inventory
- $18,267—Riverbed Technology, Inc. for network and application analysis software maintenance
- $5,000—U.S. Postal Service for postage for warehouse meter

**Engineering Operations (Fund 210)** none to report

**Water Operations (Fund 310)**
- $3,280—Grainger for miscellaneous operating supplies

**Wastewater Operations (Fund 410)**
- $4,757—Hach Company for motor controllers and lab supplies
- $4,806—Univar USA, Inc. for caustic soda at EDHWWTP

**Recycled Water Operations (Fund 510)** none to report

**Hydroelectric Operations (Fund 610)**
- $3,274—Northern Datacom, Inc. for network cable installation

**Recreation Operations (Fund 710)** none to report

**Capital Improvement Projects (Construction Funds 140, 340, 440, 540, 640 and 740)**
- $16,894—Pacific Gas & Electric Company for electrical service to Carson Creek Unit 2A – Carson Creek 2 and Business Park 3 Lift Stations Abandonment (Project #16040.01)
Executive Summary for April 3, 2018 -- $503,181.95:

This summary highlights significant disbursements made by major business activity:

**General District Operations (Fund 110)**
- $3,776—Agiloft, Inc. for software licenses and maintenance
- $15,732—Hunt & Sons, Inc. for card lock fuel and fuel deliveries at various locations
- $7,700—Liebert Cassidy Whitmore for outside legal services
- $9,500—Reeb Government Relations, LLC for March 2018 retainer

**Engineering Operations (Fund 210)**
- $8,418—All Pro Backflow, Inc. for backflow testing services

**Water Operations (Fund 310)**
- $9,042—Sage Engineers, Inc. for engineering and design services
- $27,612—U.S. Bureau of Reclamation for Sly Park restoration fees and Folsom water deliveries

**Wastewater Operations (Fund 410)**
- $3,964—Arrow Fence Company for fence repairs at Camino Heights
- $4,363—Carnahan Electric LTD for miscellaneous electrical projects at DCWWTP
- $11,402—Denali Water Solutions, LLC for sludge hauling and disposal at EDHWWTP
- $4,337—Engineered Air for ozone odor control parts
- $12,803—Kemira Water Solutions, Inc. for water treatment compound

**Recycled Water Operations (Fund 510)** none to report

**Hydroelectric Operations (Fund 610)**
- $10,062—Alpine County for property taxes
- $22,784—Amador County for property taxes

**Recreation Operations (Fund 710)** none to report
Capital Improvement Projects (Construction Funds 140, 340, 440, 540, 640 and 740)

- $17,678—Black & Veatch Corporation for preparation and design services – EDH Raw Water Pump Station (Project #15024.01)
- $21,573—CDW Government for Ethernet adapters and networking cards – VM Hardware Replacement (Project #17043.01)
- $11,040—Controlpoint Engineering, Inc. for engineering services – Strawberry Water Treatment Plant System Equipment (Project #17040.01)
- $3,355—Geocon Consultants, Inc. for geotechnical services – Rancho Ponderosa Lift Station Relocation (Project #17023.01)
- $10,480—HDR Engineering, Inc. for project design services:
  >Project #15036.01 – Silva Valley/El Dorado Hills Sewer line ($5,705)
  >Project #17034.01 – Wastewater Collection Facility Relocation ($4,775)
- $16,890—HydroScience Engineers, Inc. for engineering design services:
  >Project #14038.01 – EDHWWTP Dissolved Air Floatation Tank ($3,172)
  >Project #16040.01 – Carson Creek 2 and Business Park 3 Lift Stations Abandonment ($5,030)
  >Project #17020.01 – Wastewater Collection System Pipeline ($8,688)
- $10,098—ICM Group, Inc. for on-call construction inspection services – Town Center Force Main Phase 2 (Project #16025.01)
- $35,923—Pace Supply Corporation for two 16” flanges – El Dorado Main #1 Pressure Reducing Station #5 Upgrade (Project #17016.01)
- $72,968—Preston Pipelines, Inc. for engineering services ($76,808) – Carson Creek 2 and Business Park 3 Lift Stations Abandonment (Project #16040.01). Retention held $3,840
- $40,696—Rexel USA, Inc. for two ETO drive systems – Pump Station Upgrades (Project #15021.01)
- $11,959—Sage Engineers, Inc. for engineering services – FERC:C50.8 Pacific Crest (Project #06081H.01)
- $6,280—Ski Air Incorporated for a mini-split HVAC unit – Sly Park Gatehouse HVAC/Windows (Project #18005.01)
Executive Summary for April 10, 2018 -- $513,037.17:
This summary highlights significant disbursements made by major business activity:

**General District Operations (Fund 110)**
- $11,010—Golden State Flow Measurement, Inc. for water meters and measuring chambers
- $4,962—Hunt & Sons, Inc. for fuel deliveries at various locations
- $5,224—Les Schwab Tire Centers of California, Inc. for tires
- $9,470—PG&E for electric service
- $3,121—Ron Dupratt Ford for vehicle maintenance supplies
- $3,941—U.S. Bancorp Services, Inc. for conference expenses and job postings

**Engineering Operations (Fund 210)** none to report

**Water Operations (Fund 310)**
- $4,046—Grainger for operating and repair supplies
- $78,246—PG&E for electric service
- $4,185—U.S. Bancorp Services, Inc. for conference expenses and weather station instrument parts

**Wastewater Operations (Fund 410)**
- $3,237—Hiebert Commercial Services for water heater removal and repairs
- $10,359—Industrial Electrical Company for pump repairs
- $138,453—PG&E for electric service
- $4,345—Univar USA, Inc. for caustic soda at EDHWWTP

**Recycled Water Operations (Fund 510)** none to report
- $10,012—PG&E for electric service
- $4,813—Univar USA, Inc. for caustic soda at EDHWWTP

**Hydroelectric Operations (Fund 610)** none to report
- $11,674—PG&E for electric service
- $4,305—U.S. Bancorp Services, Inc. for conference expenses and membership renewals

**Recreation Operations (Fund 710)**
- $16,005—Cademartori Construction, Inc. for repairing the deck at the Sly Park event center
- $7,096—U.S. Bancorp Services, Inc. for domain name renewal fees and ADA compliant signs
Capital Improvement Projects (Construction Funds 140, 340, 440, 540, 640 and 740)

- $5,291—Bay Area Coating Consultants, Inc. for Reservoir 3 tank inspection – Reservoir 3 Tank Upgrade (Project #14003.01)
- $28,684—Domenichelli and Associates, Inc. for engineering design services:
  >Project #11032.01 – Main Ditch-Forebay to Reservoir 1 ($10,625)
  >Project #06082H.01 – FERC:C50.1 Silver Lake ($5,200)
  >Project #14003.01 – Reservoir 3 Tank Upgrade ($1,080)
  >Project #17024.01 – Moose Hall Pressure Reducing Station Upgrade ($7,419)
  >Project #15025.01 – American River Bridge Pipeline ($4,360)
- $12,385—Far Western Anthropological Research Group, Inc. for cultural studies – Main Ditch-Forebay to Reservoir 1 Planning/Design/Engineering/Environmental (Project #11032.03)
- $69,719—GEI Consultants, Inc. for engineering services:
  >Project #06082H.01 – FERC:C50.1 Silver Lake ($6,849)
  >Project #17013.01 – Forebay Dam Modifications ($59,612)
  >Project #15016.01 – FERC:C50.2 Caples Lake Campground ($3,258)
- $6,700—State Water Resources Control Board for permit registration – Forebay Dam Modifications (Project #17013.01)
## Board Expenses/Reimbursements

Warrant Registers dated 03/20/18 - 04/10/18

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>George Osborne</th>
<th>Michael Raffety</th>
<th>Greg Prada</th>
<th>Dale Coco, MD</th>
<th>Alan Day</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Vehicle Expense</td>
<td>$59.95</td>
<td>$271.17</td>
<td>$49.05</td>
<td>$380.17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hotel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meals or Incidentals Allowance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$0.00</td>
<td></td>
</tr>
<tr>
<td>Airfare, Car Rental, Misc Travel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$0.00</td>
</tr>
<tr>
<td>Fax, Cell or Internet Service</td>
<td>$40.00</td>
<td></td>
<td>$80.00</td>
<td></td>
<td>$120.00</td>
<td></td>
</tr>
<tr>
<td>Meeting or Conference Registration</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$0.00</td>
</tr>
<tr>
<td>Meals with Others</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$0.00</td>
<td></td>
</tr>
<tr>
<td>Membership Fees/Dues</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$0.00</td>
<td></td>
</tr>
<tr>
<td>Office Supplies</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$0.00</td>
<td></td>
</tr>
<tr>
<td>Reimburse prepaid expenses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$0.00</td>
<td></td>
</tr>
<tr>
<td>Miscellaneous Reimbursements</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$0.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$59.95</td>
<td>$311.17</td>
<td>$0.00</td>
<td>$129.05</td>
<td>$0.00</td>
<td>$500.17</td>
</tr>
</tbody>
</table>
## Employee Expenses/Reimbursements
Warrant Registers dated 03/20/18 - 04/10/18

<table>
<thead>
<tr>
<th>EMPLOYEE</th>
<th>DESCRIPTION</th>
<th>AMOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ales Volcansek</td>
<td>ICS Certification Training Expenses</td>
<td>$180.31</td>
</tr>
<tr>
<td>Doug Venable</td>
<td>Endangered Species Regulation &amp; Protection Certification</td>
<td>$535.96</td>
</tr>
<tr>
<td>Raymond Salerno</td>
<td>Grade III Operator Certification</td>
<td>$325.00</td>
</tr>
<tr>
<td>Timothy Ranstrom</td>
<td>CIO Leadership Forum Expenses</td>
<td>$935.17</td>
</tr>
<tr>
<td>Jose Perez</td>
<td>Employment Law Conference Expenses</td>
<td>$159.46</td>
</tr>
<tr>
<td>Jesus Leanos</td>
<td>SCADA Security Training Expenses</td>
<td>$393.55</td>
</tr>
<tr>
<td>Mark Price</td>
<td>CPE Course Registration</td>
<td>$550.00</td>
</tr>
<tr>
<td>Brian Poulsen</td>
<td>Mileage for Various Meetings</td>
<td>$399.91</td>
</tr>
<tr>
<td>Douglas Fleming</td>
<td>Standby Expenses Due to Highway 50 Closure</td>
<td>$153.17</td>
</tr>
<tr>
<td>Elizabeth Wells</td>
<td>CMAA Conference Expenses</td>
<td>$120.20</td>
</tr>
<tr>
<td>James Proctor</td>
<td>ICS Certification Training Expenses</td>
<td>$422.58</td>
</tr>
<tr>
<td>Christine Lomba</td>
<td>Park Rangers Conference Expenses</td>
<td>$475.02</td>
</tr>
<tr>
<td>Martin Johnson</td>
<td>Backflow Prevention Training Expenses</td>
<td>$125.66</td>
</tr>
<tr>
<td>Jaramia Bond</td>
<td>Park Rangers Conference Expenses</td>
<td>$188.58</td>
</tr>
<tr>
<td>Todd Nordquist</td>
<td>ASE Test Fees</td>
<td>$241.00</td>
</tr>
<tr>
<td>Michael Elder</td>
<td>AWWA Symposium Expenses</td>
<td>$123.64</td>
</tr>
</tbody>
</table>

$5,329.21
MINUTES
REGULAR MEETING OF THE BOARD OF DIRECTORS
District Board Room, 2890 Mosquito Road, Placerville, California
March 26, 2018 — 9:00 A.M.

Board of Directors

<table>
<thead>
<tr>
<th>Name</th>
<th>Division</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michael Raffety</td>
<td>Division 3</td>
</tr>
<tr>
<td>Alan Day</td>
<td>Division 5</td>
</tr>
<tr>
<td>George Osborne</td>
<td>Division 1</td>
</tr>
<tr>
<td>Greg Prada</td>
<td>Division 2</td>
</tr>
<tr>
<td>Dale Coco, MD</td>
<td>Division 4</td>
</tr>
</tbody>
</table>

Executive Staff

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jim Abercrombie</td>
<td>General Manager</td>
</tr>
<tr>
<td>Brian D. Poulson, Jr.</td>
<td>General Counsel</td>
</tr>
<tr>
<td>Jesse Saich</td>
<td>Communications</td>
</tr>
<tr>
<td>Brian Mueller</td>
<td>Engineering</td>
</tr>
<tr>
<td>Jose Perez</td>
<td>Human Resources</td>
</tr>
<tr>
<td>Tim Ranstrom</td>
<td>Information Technology</td>
</tr>
<tr>
<td>Jennifer Sullivan</td>
<td>Clerk to the Board</td>
</tr>
<tr>
<td>Mark Price</td>
<td>Finance</td>
</tr>
<tr>
<td>Margaret Washko</td>
<td>Operations</td>
</tr>
</tbody>
</table>

PUBLIC COMMENT: Anyone wishing to comment about items not on the Agenda may do so during the public comment period. Those wishing to comment about items on the Agenda may do so when that item is heard and when the Board calls for public comment. Public comments are limited to five minutes per person.

PUBLIC RECORDS DISTRIBUTED LESS THAN 72 HOURS BEFORE A MEETING: Any writing that is a public record and is distributed to all or a majority of the Board of Directors less than 72 hours before a meeting shall be available for immediate public inspection in the office of the Clerk to the Board at the address shown above. Public records distributed during the meeting shall be made available at the meeting.

AMERICANS WITH DISABILITIES ACT: In accordance with the Americans with Disabilities Act (ADA) and California law, it is the policy of El Dorado Irrigation District to offer its public programs, services, and meetings in a manner that is readily accessible to everyone, including individuals with disabilities. If you are a person with a disability and require information or materials in an appropriate alternative format; or if you require any other accommodation for this meeting, please contact the EID ADA coordinator at 530-642-4045 or email at adacoordinator@eid.org at least 72 hours prior to the meeting. Advance notification within this guideline will enable the District to make reasonable accommodations to ensure accessibility.
CALL TO ORDER
President Raffety called the meeting to order at 9:00 A.M.

Roll Call
Board
Present: Directors Osborne, Prada, Raffety, Coco and Day

Staff
Present: General Manager Abercrombie, General Counsel Poulsen and Clerk to the Board Sullivan

Pledge of Allegiance and Moment of Silence
President Raffety led the Pledge of Allegiance followed by a moment of silence.

ADOPT AGENDA
ACTION: Agenda was adopted.

MOTION PASSED
Ayes: Directors Osborne, Coco, Prada, Raffety and Day

COMMUNICATIONS
General Manager’s Employee Recognition
Awards and Recognitions
None

PUBLIC COMMENT
Clerk to the Board Sullivan reported that the Board received an email dated March 22, 2018 from Paul Raveling titled File for public comment at the next EID board meeting. A copy of the email was provided to each Board member.
Paul Raveling, El Dorado Hills addressed the Board.

COMMUNICATIONS
General Manager
Staff Reports and Updates
March 2018 Storm Update – Summary by Margaret Washko

Clerk to the Board
None

Board of Directors
None
APPROVE CONSENT CALENDAR

ACTION: Consent Calendar was approved.

MOTION PASSED
Ayes: Directors Osborne, Prada, Raffety, Coco and Day

CONSENT CALENDAR

1. Finance (Pasquarello)
   Ratification of EID General Warrant Registers for the periods ending March 6 and March 13, 2018, and Board Reimbursements for this period.

   ACTION: Option 1: Ratified the EID General Warrant Register as submitted to comply with Section 24600 of the Water Code of the State of California. Received and filed Board Expense Reimbursements.

   MOTION PASSED
   Ayes: Directors Osborne, Prada, Raffety, Coco and Day

2. Clerk to the Board (Sullivan)
   Approval of the minutes of the March 12, 2018 regular meeting of the Board of Directors.

   ACTION: Option 1: Approved as submitted.

   MOTION PASSED
   Ayes: Directors Osborne, Prada, Raffety, Coco and Day

3. Operations / Engineering (Washko/Mueller)
   Consideration to ratify Resolution No. 2017-014 to maintain the emergency declaration as a result of ongoing storm-related activities.

   ACTION: Option 1: Ratified Resolution No. 2017-014 (thus maintaining the emergency declaration).

   MOTION PASSED
   Ayes: Directors Osborne, Prada, Raffety, Coco and Day

4. Office of the General Counsel (P. Johnson)
   Consideration of a resolution to authorize execution of an easement quitclaim to El Dorado County Department of Transportation. (APN 107-010-03)

   ACTION: Option 1: Adopted Resolution no. 2018-004, approving and authorizing execution of an Easement Quitclaim as submitted.

   MOTION PASSED
   Ayes: Directors Osborne, Prada, Raffety, Coco and Day

END OF CONSENT CALENDAR
DIRECTOR ITEMS

5. Board of Directors (Raffety)
   Board Meeting Procedures.

   Public Comment: Paul Raveling, El Dorado Hills
   Bill George, Placerville and former EID Board Member
   Bill Schultz, El Dorado County Recorder Clerk, Registrar of Voters and Interim
   Director of Veteran Affairs
   Edgar “Bud” Brown, American Legion Post 119 and 40 & 8 Society
   Harry Norris, Camino and former EID Board Member

   ACTION: None – Information only.

ACTION ITEMS

6. Office of the General Counsel (Poulsen)
   State Legislation Update.

   Public Comment: Paul Raveling, El Dorado Hills

   ACTION: Option 2: Took other action as directed by the Board and approved
   recommendations on proposed state legislation as the District’s
   official positions as presented with the exception of ACA 21 which
   was changed to a “watch” position.

   MOTION PASSED
   Ayes: Directors Prada, Day, Osborne, Raffety and Coco

CLOSED SESSION

A. Closed session pursuant to Government Code section 54957.6 (Poulsen)
   Conference with Labor Negotiators
   Agency designated representatives: Directors Day and Coco
   Unrepresented employee: General Counsel

   ACTION: The Board met with the advisory committee and gave direction but took no
   reportable action.

B. Closed session pursuant to Government Code section 54957.6 (Abercrombie)
   Conference with Labor Negotiators
   Agency designated representatives: Directors Day and Coco
   Unrepresented employee: General Manager

   ACTION: The Board met with the advisory committee and gave direction but took no
   reportable action.
REVIEW OF ASSIGNMENTS
Director Day requested staff prepare a proposal to amend the District’s Administrative Regulation 12082 that governs Board Meeting procedures to include specific guidelines on allowable dedications for the “Moment of Silence” prior to each Board meeting.

ADJOURNMENT
President Raffety adjourned the meeting at 11:44 A.M.

__________________________
Michael Raffety
Board President
EL DORADO IRRIGATION DISTRICT

ATTEST:

__________________________
Jennifer Sullivan
Clerk to the Board
EL DORADO IRRIGATION DISTRICT

Approved: _________________________
CONSENT ITEM NO. 3
April 23, 2018

EL DORADO IRRIGATION DISTRICT

Subject: Consideration to ratify Resolution No. 2017-014 to maintain the emergency declaration as a result of ongoing storm-related activities.

Previous Board Actions
February 13, 2017 – Board adopted Resolution No. 2017-007 declaring an emergency under the Public Contract Code and Public Resources Code as a result of recent and ongoing storm activities; ratified a construction contract to Doug Veerkamp General Engineering for emergency replacement of a failed section of the Town Center force main; ratified a pumping and hauling contract to Doug Veerkamp for emergency pumping of raw sewage from the El Dorado lift station; ratified a pumping and hauling contract with Advance Septic for emergency pumping of raw sewage from the Camino Heights wastewater treatment plant; and authorized and directed the General Manager and his designees to take all further actions reasonably deemed necessary to respond to the emergency.

February 27, 2017 – Board ratified Resolution No. 2017-007 to maintain the emergency declaration and ratified contracts awarded to Doug Veerkamp for landslide stabilization and Syblon Reid General Engineering Contractors (SRC) for drainage diversion, access road development, landslide stabilization and canal repair near Flumes 5 and 10.

March 13, 2017 – Board ratified Resolution No. 2017-007 to maintain the emergency declaration; ratified a professional services contract with GHD Inc. in the amount of $150,000 for geotechnical and engineering services; awarded a construction contract to Syblon Reid Contractors in the not-to-exceed amount of $5,780,386 and approved total project funding in the amount of $8,855,343 for Flume 10 construction.

March 27, 2017 – Board ratified Resolution No. 2017-007 to maintain the emergency declaration.

April 10, 2017 –
• Ratified Resolution No. 2017-007 to maintain the emergency declaration;
• Ratified professional services Change Order No. 1 with GHD Inc. in the not-to-exceed amount of $600,224;
• Ratified construction contract Change Order No. 1 for Doug Veerkamp General Engineering in the not-to-exceed amount of $300,000;
• Approved Change Order No. 2 with GHD Inc. in the not-to-exceed amount of $1,310,016;
• Approved a construction contract Change Order No. 1 to SRC in the not-to-exceed amount of $4,024,404;
• Awarded a construction contract to Doug Veerkamp General Engineering in the not-to-exceed amount of $1,462,479 for slides at Flume 45A; and
• Approved project funding of $5,970,595 for the following projects:
  o $3,044,560, Project No. 17004.01 (Hazard Mitigation at Flume 5);
  o $987,030, Project No. 17008.01 (Hazard Mitigation at Flume 9);
  o $568,588, Project No. 17007.01 (Hazard Mitigation #1 downstream Flume 45A);
  o $1,220,417, Project No. 17007.03 (Hazard Mitigation #3 downstream Flume 45A);
  o $150,000, Project No. 17002.01 (Town Center Force Main Emergency Replacement Phase 2 Schedule B).
May 22, 2017 – Board adopted Resolution 2017-014 to update the emergency declaration resulting from the 2017 storm activity.

June 12, 2017 – Board ratified Resolution No. 2017-014 to maintain the emergency declaration.

July 24, 2017 – Board ratified Resolution No. 2017-014 to maintain the emergency declaration as a result of the 2017 storm activity and ratified the construction contract with Mining Construction Inc. in the not-to-exceed amount of $539,677.

August 14 and August 28, 2017 – Board ratified Resolution No. 2017-014 to maintain the emergency declaration.

September 11, 2017 – Board ratified Resolution No. 2017-014 to maintain the emergency declaration and ratified a contract amendment to GHD in the not-to-exceed amount of $55,000 for inspection services on the Montclair Townhome sewer repair project.

October 10, 2017 – Board ratified Resolution No. 2017-014 to maintain the emergency declaration as a result of ongoing storm activities, and was updated on the status of the SAD bridge repair.

October 23, November 13 and December 11, 2017 – Board ratified Resolution No. 2017-014 to maintain the emergency declaration.

January 8, January 22, February 12, February 26, March 12 and March 26, 2018 – Board ratified Resolution No. 2017-014 to maintain the emergency declaration.

**Board Policies (BP), Administrative Regulations (AR), and Board Authority**

Public Contract Code section 22050(a)(1) provides that in the case of an emergency, a public agency, pursuant to a four-fifths vote of its governing body, may repair or replace a public facility, take any directly related and immediate action required by that emergency, and procure the necessary equipment, services, and supplies for those purposes, without giving notice for bids to let contracts. Subsection (c)(1) of that statute requires the governing body to review the emergency action at its next regularly scheduled meeting and at every regularly scheduled meeting thereafter until the action is terminated, to determine, by a four-fifths vote, that there is a need to continue the action.

Public Contract Code sections 1102, 20567, and 22050 authorize the District to forgo public bidding requirements in emergency circumstances.

Public Resources Code section 21080(b) and CEQA Guidelines section 15269 exempt emergency projects from the requirements of the California Environmental Quality Act (“CEQA”).

**Summary of Issue(s)**

On February 13, 2017, the Board unanimously adopted Resolution 2017-007 declaring an emergency as a result of the severe storms during January and February of 2017 and subsequently adopted Resolution 2017-014 to update the declaration. For the emergency declaration to remain in effect, the Board must find (by four-fifths vote for bidding and contracting purposes) at each regular Board meeting that the need for the emergency action still exists. The Board can do so today by ratifying Resolution No. 2017-014.
Staff Analysis/Evaluation
There have been over 40 separate storm related work tasks that have been documented since January 7, 2017. The remaining work is primarily related to the repair of the failure near Flume 10. However, due to winter conditions, ongoing construction work has been limited to inspection and maintenance of erosion control systems required by the State Water Resources Control Board. The remaining work includes completion of the final site grading, access road, Alarm 3, permanent fencing, security gate, and permanent erosion control. Resumption of this work is unknown and dependent on when the site dries out, but is expected to be complete before the end of summer 2018. As long as active construction work authorized under the emergency declaration continues, staff recommends the Board continue to maintain the emergency declaration.

Board Decisions/Options

Option 1: Ratify Resolution No. 2017-014 (thus maintaining the emergency declaration).

Option 2: Decline to ratify Resolution No. 2017-014 (thus terminating the emergency declaration) or take other action as directed by the Board.

Option 3: Take no action (thus terminating the emergency declaration).

Staff/General Manager’s Recommendation
Option 1 (four-fifths vote required)

Supporting Documents Attached
Attachment A: Resolution No. 2017-014
RESOLUTION OF THE BOARD OF DIRECTORS OF
EL DORADO IRRIGATION DISTRICT
DECLARING AN EMERGENCY

WHEREAS, El Dorado County received intense rainfall during the early months of 2017, saturating soils and causing collapses, soil failures, and earth movement all around the County; and

WHEREAS, multiple significant collapses of soil occurred on the District’s El Dorado Canal, resulting in the canal being taken out of service; and

Whereas, multiple slope failures occurred on District property off of 8-mile Road in Pollock Pines; and

WHEREAS, such storm activity has overwhelmed the District’s wastewater collections facilities at the El Dorado Lift Station and the Camino Heights Wastewater Treatment Plant increasing the risk of sanitary sewer overflows; and

WHEREAS, the District has encountered a break of a sanitary sewer collection main pipeline, the Town Center force main; and

WHEREAS, slope failure over a District sewer line near Montclair Road in Cameron Park has put the sewer pipeline at unacceptable risk of failure; and

WHEREAS, District staff have undertaken over 40 separate storm related work tasks since January 7, 2017 as a result of the incidents described above; and

WHEREAS, on February 13, 2017, the District’s Board of Directors adopted Resolution No. 2017-007, declaring an emergency within the meaning of several statutes included in the Government, Public Resources, and Public Contract Codes and directed the District General Manager and his designees to take all actions reasonably deemed necessary to respond to the emergency declared therein; and

WHEREAS, the District’s Board of Directors ratified Resolution No. 2017-007 at its regularly held Board meetings on February 27, March 13, March 27, and April 10; and

WHEREAS, as a result of continuously developing conditions, there exists real and reasonable potential for the District to discover and/or experience additional damage to critical infrastructure necessitating immediate repair; and

WHEREAS, all of these occurrences require prompt action to prevent or mitigate impairment to life, health, safety, property, and/or essential public services; and

///
WHEREAS, Government Code section 54956.5(a)(1) defines “emergency” as “a work stoppage, crippling activity, or other activity that severely impairs public health, safety, or both, as determined by a majority of the members of the legislative body;” and

WHEREAS, Government Code section 54956.5(a)(2) defines “dire emergency” as “a crippling disaster, mass destruction, terrorist act, or threatened terrorist activity that poses peril so immediate and significant that requiring a legislative body to provide one-hour notice before holding an emergency meeting may endanger the public health, safety, or both, as determined by a majority of the members of the legislative body;” and

WHEREAS, Public Contract Code section 1102 defines “emergency” as “a sudden, unexpected occurrence that poses a clear and imminent danger, requiring immediate action to prevent or mitigate the loss or impairment of life, health, property, or essential public services;” and

WHEREAS, CEQA Guidelines section 15359 defines “emergency” as “a sudden, unexpected occurrence, involving a clear and imminent danger, demanding immediate action to prevent or mitigate loss of, or damage to life, health, property, or essential public services;” and

WHEREAS, Government Code section 54956.5(b)(1) and (2) authorize legislative bodies to hold emergency meetings in the case of an emergency or dire emergency involving matters upon which prompt action is necessary due to the disruption or threatened disruption of public facilities; and

WHEREAS, District Board Policy 2050 authorizes the District’s General Manager to act “in emergency situations where no Board Policies or Administrative Regulations exist;” and

WHEREAS, Public Contract Code sections 22050(a)(1) and 20567 authorize irrigation districts to let contracts without notice for bids in case of an emergency; and

WHEREAS, Public Contract Code section 22050(b)(1) authorizes the Board of Directors, by a four-fifths (4/5ths) vote, to delegate to the General Manager the authority to order any action pursuant to paragraph (1) of subdivision (a); and

WHEREAS, District Board Policy 3060, delegates to the General Manager authority to approve any and all contracts necessary to abate an emergency after first informing the President of the Board of Directors and scheduling an emergency meeting of the Board of Directors at the earliest possible opportunity; and

WHEREAS, Public Resources Code section 21080(b)(2) exempts from the California Environmental Quality Act (CEQA) emergency repairs to public service facilities necessary to maintain services; and
WHEREAS, Public Resources Code section 21080(b)(4) and CEQA Guidelines section 15269(c) exempt from CEQA specific actions necessary to prevent or mitigate an emergency from CEQA;

NOW, THEREFORE, BE IT AND IT IS HEREBY RESOLVED by the Board of Directors of the El Dorado Irrigation District (Board) as follows:

1. The Board finds and declares that an emergency situation exists within the meaning of the enactments listed below:
   - Public Contract Code section 11102
   - CEQA Guidelines section 15359
   - Public Contract Code section 20567
   - District Board Policy 3060
   - Public Contract Code section 22050(a)(1)
   - Public Resources Code section 21080(b)(2)
   - Public Resources Code section 21080(b)(4) and CEQA Guidelines section 15269(c)

2. The foregoing findings and declarations are based upon written, oral, and visual evidence, including both facts and professional opinions, presented to the Board at the hearing of this Resolution and upon the Minutes of the meeting at which this Resolution was adopted.

3. The Board hereby ratifies all actions taken by the District General Manager and his designees, prior to the adoption of this Resolution, which the General Manager and his designees reasonably deemed necessary to respond to the emergency declared herein.

4. The Board hereby delegates, authorizes, and directs the District General Manager and his designees to take all further actions reasonably deemed necessary to respond to the emergency declared herein. The General Manager or his designees shall report to and seek ratification of the Board of Directors for each action taken in excess of their normal authority, at the first regular Board of Directors meeting held after each such action.

5. This Resolution shall take effect immediately upon adoption, and shall supersede Resolution No. 2017-007. Subject to the ratification required by Public Contract Code sections 22050(b)(3), (c)(1), and (c)(2), and by Board Policy 3060, this Resolution shall remain in full force an effect until rescinded by a subsequent Resolution of the Board of Directors.
The foregoing Resolution was introduced at a regular meeting of the Board of Directors of the EL DORADO IRRIGATION DISTRICT, held on the 22nd day of May 2017, by Director Day who moved its adoption. The motion was seconded by Director Prada and a poll vote taken which stood as follows:

AYES: Directors Day, Prada, Osborne, Raffety and Coco

NOES:

ABSENT:

ABSTAIN:

The motion having a majority of votes “Aye”, the resolution was declared to have been adopted, and it was so ordered.

George W. Osborne, President
Board of Directors
EL DORADO IRRIGATION DISTRICT

ATTEST:

Jennifer Sullivan
Clerk to the Board
EL DORADO IRRIGATION DISTRICT

(SEAL)
I, the undersigned, Clerk to the Board of the EL DORADO IRRIGATION DISTRICT hereby certify that the foregoing resolution is a full, true and correct copy of a Resolution of the Board of Directors of the EL DORADO IRRIGATION DISTRICT entered into and adopted at a regular meeting of the Board of Directors held on the 22nd day of May 2017.

Jennifer Sullivan
Clerk to the Board
EL DORADO IRRIGATION DISTRICT
EL DORADO IRRIGATION DISTRICT

Subject: Consideration of a resolution authorizing execution of an easement quitclaim to property owners Joseph J. Murchison and Mary R. Murchison for a portion of an abandoned District ditch (APN 089-230-07).

Previous Board Actions
None

Board Policies (BP), Administrative Regulations (AR), and Board Authority
Water Code Section 22500 authorizes the conveyance of District property when the Board determines by resolution that the property is no longer necessary for District purposes.

Water Code Section 22502 requires all conveyances of District property to be executed by the secretary and president on behalf of the District in accordance with a resolution of the Board.

Summary of Issue(s)
Landowners, Joseph J. Murchison and Mary R. Murchison, have requested that the District quitclaim its property interests in a ditch easement on their property in Placerville, California (APN 089-230-07). The ditch appears to be a tributary of the Gold Hill Ditch. The District abandoned its right by non-use of the subject ditch easement many years ago and therefore should quitclaim as requested by parcel owners.

Staff Analysis/Evaluation
Beginning in the Gold Rush days, the Gold Hill Ditch [located northeast of Placerville] served raw water to agricultural customers along its route. In 1994, the District began connecting ditch customers to the District’s piped conveyance system. By August 2000, all customers had converted to a metered connection, and the District ceased its use of the Gold Hill Ditch.

In 2003, after learning that the California Department of Transportation would require the District to relocate 2,200 feet of pipeline that formed a portion of the Gold Hill Ditch, at a cost of approximately $350,000, the District elected instead to abandon the ditch entirely.

The District’s property rights to the Gold Hill Ditch were never recorded. Instead, the property rights were established by legal doctrine known as “implied dedication by public use.” The District announced its intent to abandon the Gold Hill Ditch on January 6, 2003, after conducting a public workshop. Additionally, non-use of a ditch for five years is deemed sufficient to constitute abandonment. Appropriate time has run for abandonment of Gold Hill Ditch and also by District’s statement of intent in 2003.

Joseph J. Murchison and Mary R. Murchison, who own property adjacent to the Gold Hill Ditch have requested that the District quitclaim its easement interest in the Gold Hill Ditch. Although the District abandoned the Ditch many years ago, and therefore lost its easement by operation of law, it is appropriate for the District to issue a quitclaim as requested to provide property owners with clear title. Easement quitclaims are required to be presented to District’s Board of Directors for review and approval by resolution. After approval by the Board, easement quitclaims are then recorded at the El Dorado County Recorder’s Office. District staff has researched and prepared an easement quitclaim for property owners Joseph and Mary Murchison.
**Board Decision/Options**

**Option 1:** Adopt a resolution authorizing execution of an easement quitclaim to property owners Joseph J. Murchison and Mary R. Murchison for a portion of an abandoned District ditch (APN 089-230-07).

**Option 2:** Take other action as directed by the Board.

**Option 3:** Take no action.

**Staff/General Manager’s Recommendation**

Option 1.

**Supporting Documents Attached**

Attachment A: Proposed Resolution and Easement Quitclaim

---

Pat Johnson  
Paralegal

Brian D. Poulsen, Jr.  
General Counsel

Jim Abercrombie  
General Manager
RESOLUTION OF THE
EL DORADO IRRIGATION DISTRICT
APPROVING AND AUTHORIZING EXECUTION OF AN
EASEMENT QUITCLAIM TO
JOSEPH J. MURCHISON AND MARY R. MURCHISON
ASSESSOR PARCEL NO. 089-230-07

WHEREAS, El Dorado Irrigation District acquired all right, title and interest in the water
rights and real property interests to the Gold Hill Ditch in April 1927; and
WHEREAS, El Dorado Irrigation District retained water rights but abandoned the Gold
Hill Ditch service no later than 2005; and
WHEREAS, property owners Joseph J. Murchison and Mary R. Murchison have requested
the El Dorado Irrigation District quitclaim its interest to that portion of the Gold Hill Ditch found
on their property referenced as Assessor parcel Number 089-230-07; and
WHEREAS, El Dorado Irrigation District abandoned its easement within subject parcel
many years ago and desires to provide the property owners with clear title.

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of the
EL DORADO IRRIGATION DISTRICT that this easement interest is no longer necessary for
District purposes and that the District shall dispose of any interest in that portion of the Gold Hill
Ditch easement located on said parcel by execution of an easement quitclaim attached hereto as
Exhibit A-1.

The foregoing Resolution was introduced at a meeting of the Board of Directors of the
EL DORADO IRRIGATION DISTRICT, held on the 23rd day of April, 2018, by Director
_______________________________, who moved its adoption. The motion was seconded
by Director ________________________, and a poll vote taken which stood as follows:
AYES:  
NOES:  
ABSTAIN:  
ABSENT: 

The motion having a majority of votes “Aye,” the resolution was declared to have been adopted, and it was so ordered.

________________________________________________________________________

Michael Raffety  
President of the Board of Directors

[SEAL]

Attest: 

________________________________________________________________________

Jennifer Sullivan  
Clerk to the Board
I, the undersigned, Clerk to the Board of the EL DORADO IRRIGATION DISTRICT, hereby certify that the foregoing resolution is a full, true and correct copy of a Resolution of the Board of Directors of the EL DORADO IRRIGATION DISTRICT entered into and adopted at a regular meeting of the Board of Directors held on the 23rd day of April 2018.

Jennifer Sullivan
Clerk to the Board
Recording Requested By, & Mail To:
El Dorado Irrigation District
c/o Pat Johnson, Paralegal
2890 Mosquito Road
Placerville, CA 95667

Name: Joseph and Mary Murchison
Address: 1229 Wilkinson Court
          Placerville, CA 95667-9618
Assessor Parcel Nos.: 089-230-07
Documentary Transfer Tax $0 RTT 11911
Property value less than $100.00

Declarant: _____________________________

For County Recorder’s Use Only

EASEMENT QUITCLAIM

EL DORADO IRRIGATION DISTRICT (District) does hereby REMISE, RELEASE AND FOREVER QUITCLAIM to JOSEPH J. MURCHISON and MARY R. MURCHISON, Trustees of Joseph J. Murchison and Mary R. Murchison Living Trust dated January 29, 2018, and any amendments thereto, owners of the real property situate in the unincorporated area of Placerville, County of El Dorado, State of California, and more precisely described in the attached Exhibit A as APN 089-230-07-100 (Subject Parcel), all right, title, and interest held by the District in any portion of the Gold Hill Ditch within Subject Parcel.

By: ______________________________               Date: ______________________________
    Michael Raffety
    President of the Board of Directors
    EL DORADO IRRIGATION DISTRICT

By: ______________________________               Date: ______________________________
    Jim Abercrombie
    General Manager / Secretary
    EL DORADO IRRIGATION DISTRICT

~ Notary Acknowledgements Attached~
LOT 7 AS SHOWN ON THAT CERTAIN MAP ENTITLED “GOLD TRAIL ACRES”, FILED IN THE OFFICE OF THE COUNTY RECORDER OF EL DORADO COUNTY, STATE OF CALIFORNIA, ON AUGUST 10, 1977, IN MAP BOOK “F”, AT PAGE 75.
EL DORADO IRRIGATION DISTRICT

**Subject:** Consideration to authorize funding approval for District Capital Improvement Plan (CIP) Projects: Strawberry Raw Water Pump Station Replacement, Project No. 17048 in the amount of $72,000.

**Recent Board Action**
November 13, 2017 – The Board adopted the 2018-2022 CIP, subject to available funding.

**Board Policies (BP), Administrative Regulations (AR) and Board Authority**
Staff advised that each CIP project would be presented to the Board for funding approval.

**Summary of Issue**
Board approval is required to authorize CIP funding prior to staff proceeding with work on the projects.

**Staff Analysis/Evaluation**
The CIP projects identified in Table 1-1 on page 2 requires immediate funding.

**Funding Source**
The primary funding source for the District CIP project is listed in Table 1-1. Table 1-1 also lists the projects currently in progress and the amount of funding requested.

The CIP project description for this project is also attached for review. (Attachment A)
Table 1-1
CIP Funding Request

<table>
<thead>
<tr>
<th>Project Name and Number</th>
<th>2018-2022 CIP Plan(^1)</th>
<th>Funded to Date</th>
<th>Actual Costs to date(^2)</th>
<th>Amount Requested</th>
<th>Funding Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strawberry Raw Water Pump Station Replacement 17048</td>
<td>$350,000</td>
<td>$27,000</td>
<td>$20,248</td>
<td>$72,000</td>
<td>100% Water rates</td>
</tr>
</tbody>
</table>

TOTAL FUNDING REQUEST | | | | $72,000 | |

\(^1\) Includes all existing costs plus any expected costs in the 5 year CIP Plan.
\(^2\) Actual costs include encumbrances.

The following section contains a brief breakdown and description of the project in the table. For complete description of the CIP project see Attachment A.
## CIP Funding Request

### Project No. 17048

<table>
<thead>
<tr>
<th>Board Date</th>
<th>04/23/2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Name</td>
<td>Strawberry Raw Water Pump Station Replacement</td>
</tr>
<tr>
<td>Project Manager</td>
<td>Wilson</td>
</tr>
</tbody>
</table>

### Budget Status

<table>
<thead>
<tr>
<th>Status</th>
<th>$</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funded to date</td>
<td>27,000</td>
<td>--</td>
</tr>
<tr>
<td>Spent to date</td>
<td>20,248</td>
<td>75%</td>
</tr>
<tr>
<td>Current Remaining</td>
<td>6,752</td>
<td>25%</td>
</tr>
</tbody>
</table>

### Funding Request Breakdown

<table>
<thead>
<tr>
<th>Type</th>
<th>$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consulting services</td>
<td>45,000</td>
</tr>
<tr>
<td>Surveying services</td>
<td>7,000</td>
</tr>
<tr>
<td>Capitalized labor</td>
<td>20,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>72,000</td>
</tr>
</tbody>
</table>

### Funding Source

100% Water rates

### Description

The District has numerous distribution pump stations throughout the water service area that operate to increase pressures to customers at higher elevations. This is an annual program to replace, rehabilitate or upgrade pump stations that have reached the end of their service life. Engineering and O&M staff identify and prioritize pump stations in need of upgrades to ensure reliable supply of the necessary pressure and flow to their respective service areas, and to comply with fire flow requirements and incorporate emergency standby power where needed. Replacement components include pumps, hydropneumatic tanks, electrical control, valves, yard piping, SCADA equipment, and buildings to accommodate equipment. Strawberry Raw Water Pump Station was included in the 2018-2022 CIP as part of the planned Pump Station Replacement Program. The Program has a total of $350,000 in the CIP that will be used to complete the design, construction, and implementation of a new raw water pump station. This station has numerous freeze issues and failing pumps that have outlived their useful lives. The pump station is not on District property and is not vehicle accessible. Access to the site for maintenance and routine compliance water quality sampling is challenging and is potentially unsafe during winter months. The pathway to the pump station is located behind two homes along the river across uneven ground that is often covered in snow and ice during the winter months. District staff over the past few years has spent increasing hours to keep the existing station operational. The purpose of this funding request is to allocate funding for outside design of a new diversion structure within the American River, relocating the pump station onto District property, and relocating a Caltrans storm drain away from the new intake structure. There is additional funding for survey of the river for the diversion design, permitting for environmental and water resources for relocating the District's diversion, and capitalized labor to review design concepts and manage the project.
**Board Decisions/Options**

**Option 1:** Authorize funding approval for District Capital Improvement Plan (CIP) Projects: Strawberry Raw Water Pump Station Replacement, Project No. 17048 in the amount of $72,000.

**Option 2:** Take other action as directed by the Board.

**Option 3:** Take no action.

**Staff/General Manager Recommendation**

Option 1.

**Support Documents Attached**

Attachment A: Capital Improvement Project Description and Justifications.

---

Tony Pasquarello
Finance Manager

Elizabeth Dawson Wells
Engineering Manager

Brian Mueller
Engineering Director

Mark Price
Finance Director (CFO)

Jim Abercrombie
General Manager
Project Number: 11032
Project Name: Main Ditch - Forebay to Reservoir 1
Project Category: Reliability & Service Level Improvements
Priority: 2
PM: Eden-Bishop
Board Approval: 11/13/17

Project Description:
The Upper Main Ditch is approximately three miles long and conveys a maximum of 15,080 acre-feet of raw water annually at a maximum rate of 40 cubic feet per second from Forebay Reservoir to the Reservoir 1 Water Treatment Plant. Because the Main Ditch is an unlined earthen canal, a portion of the flow up to 1,800 acre-feet per year on average, is lost to seepage and evapotranspiration. This water could be made available for drinking water or power generation. Piping the Upper Main Ditch provides improved supply reliability; elimination of contamination potential; reduced operations and maintenance costs; water rights protection from unreasonable use claims; reduction in Folsom Reservoir pumping costs in the long term; and on an interim basis, increased hydroelectric revenues. The District has received $568,000 in grant funding from the El Dorado County Water Agency (EDCWA) that has been used to conduct environmental, wetlands, and cultural resources studies, surveys and design work. Additional grant funding from EDCWA has been applied for final design and EIR preparation in the amount of $251,500. The Department of Water Resources and Reclamation have both committed $1 M grants for construction of the project. Final design, right of way acquisition and preparation of an environmental impact report are currently underway. The project cost estimate is based on 60% design and includes a 20% construction contingency. Construction is planned to begin Fall 2018. Total project cost is in the range of $9.6 M - $10.4 M depending on the alignment chosen. Estimated annual expenditures are reduced to account for grants and Carson Creek conservation charges.

Basis for Priority:
Improves water quality, conserves water supply, protects health and safety of customer and the public and reduces operations costs.

Project Financial Summary:

<table>
<thead>
<tr>
<th>Funded to Date:</th>
<th>$ 1,966,056</th>
<th>Expenditures through end of year:</th>
<th>$ 1,592,214</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spent to Date:</td>
<td>$ 1,292,214</td>
<td>2018 - 2022 Planned Expenditures:</td>
<td>$ 5,250,000</td>
</tr>
<tr>
<td>Cash flow through end of year:</td>
<td>$ 300,000</td>
<td>Total Project Estimate:</td>
<td>$ 10,442,214</td>
</tr>
<tr>
<td>Project Balance:</td>
<td>$ 363,842</td>
<td>Additional Funding Required:</td>
<td>$ 4,886,158</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description of Work</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design/Environmental</td>
<td>$250,000</td>
<td>$175,000</td>
<td>$175,000</td>
<td></td>
<td></td>
<td>$600,000</td>
</tr>
<tr>
<td>Construction Costs</td>
<td>$500,000</td>
<td>$4,100,000</td>
<td>$3,600,000</td>
<td></td>
<td></td>
<td>$8,200,000</td>
</tr>
<tr>
<td>Easement Acquisition</td>
<td>$50,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$50,000</td>
</tr>
<tr>
<td>Subtotal</td>
<td>$800,000</td>
<td>$4,275,000</td>
<td>$3,775,000</td>
<td></td>
<td></td>
<td>$8,850,000</td>
</tr>
<tr>
<td>Grant offsets</td>
<td>$300,000</td>
<td>$1,700,000</td>
<td>$1,600,000</td>
<td></td>
<td></td>
<td>$3,600,000</td>
</tr>
<tr>
<td>NET TOTAL</td>
<td>$500,000</td>
<td>$2,575,000</td>
<td>$2,175,000</td>
<td></td>
<td></td>
<td>$5,250,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Funding Sources</th>
<th>Percentage</th>
<th>2018</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Rates</td>
<td>100%</td>
<td></td>
<td>$136,158</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$0</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
<td>$136,158</td>
</tr>
</tbody>
</table>

Funding Comments:
The project replaces an existing facility, therefore is funded by water rates. Estimated annual capital expenditures have been reduced by grant funding from El Dorado County Water Agency, Department of Water Resources and US Bureau of Reclamation and Carson Creek conservation charge in the amount of approximately $3.6 M.
2018  CAPITAL IMPROVEMENT PLAN  Program:  Water

Project Number:  17048
Project Name:  Strawberry Raw Water Pump Station
Project Category:  Reliability & Service Level Improvements
Priority:  2  PM:  Wilson  Board Approval:  11/13/17

Project Description:
The District has numerous distribution pump stations throughout the water service area that operate to increase pressures to customers at higher elevations. This is an annual program to replace, rehabilitate or upgrade pump stations that have reached the end of their service life. Engineering and O&M staff identify and prioritize pump stations in need of upgrades to ensure reliable supply of the necessary pressure and flow to their respective service areas, and to comply with fire flow requirements and incorporate emergency standby power where needed. Replacement components include pumps, hydropneumatic tanks, electrical control, valves, yard piping, SCADA equipment, and buildings to accommodate equipment.

Basis for Priority:
Potential interruption to service throughout the District in the event of failures and continued use of expiring equipment that may pose a threat to the health and safety of customers, employees, and the public.

Project Financial Summary:

<table>
<thead>
<tr>
<th>Funded to Date:</th>
<th>$ 15,000</th>
<th>Expenditures through end of year:</th>
<th>$ -</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spent to Date:</td>
<td>$ -</td>
<td>2018 - 2022 Planned Expenditures:</td>
<td>$ 350,000</td>
</tr>
<tr>
<td>Cash flow through end of year:</td>
<td>$ -</td>
<td>Total Project Estimate:</td>
<td>$ 350,000</td>
</tr>
<tr>
<td>Project Balance</td>
<td>$ 15,000</td>
<td>Additional Funding Required</td>
<td>$ 335,000</td>
</tr>
</tbody>
</table>

Description of Work

<table>
<thead>
<tr>
<th>Design</th>
<th>$ -</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strawberry Raw Water/Treatment</td>
<td>$ 350,000</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$ 350,000</td>
</tr>
</tbody>
</table>

Estimated Annual Expenditures

<table>
<thead>
<tr>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design</td>
<td>$ -</td>
<td>$ -</td>
<td>$ -</td>
<td>$ -</td>
<td>$ -</td>
</tr>
<tr>
<td>Strawberry Raw Water/Treatment</td>
<td>$ 250,000</td>
<td>$ 100,000</td>
<td>$ -</td>
<td>$ -</td>
<td>$ 350,000</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$ 250,000</td>
<td>$ 100,000</td>
<td>$ -</td>
<td>$ -</td>
<td>$ 350,000</td>
</tr>
</tbody>
</table>

Funding Sources

<table>
<thead>
<tr>
<th>Percentage</th>
<th>2018</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Rates</td>
<td>100%</td>
<td>$235,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$0</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>$235,000</td>
</tr>
</tbody>
</table>

Funding Comments: Work involves planning the upgrade of existing facilities for reliability of service and does not increase capacity.
EL DORADO IRRIGATION DISTRICT

Subject: Consideration to award an extended service agreement for data center computer equipment to CDW Government, Inc. (CDW-G) in the amount of $61,280.64.

Previous Board Action
October 23, 2017 – Board approved the data center computer equipment replacement project.

Board Policies (BP), Administrative Regulations (AR) and Board Authority
BP 3060 and AR 3061.04 require Board approval for all purchases over $50,000.

AR 3061.05e allows procurement of goods or services from a single source with good cause.

Summary of Issues
Substantial components of the District’s current data center computer cluster – the modern equivalent of the mainframe – were recently replaced due to age and lagging performance. The new equipment included a one year service agreement, which staff recommends extending by an additional four years to ensure covered equipment gets prompt priority support in the event of a failure or malfunction, and to avoid potential future cost increases over the expected useful life of the equipment. This is not a request for additional funding.

Staff Analysis/Evaluation
The integrated pieces of equipment and system software comprising the computer cluster are unique to their manufacturer, so alternative sources for repair or technical support services are not an option. The extended service agreement lengthens the manufacturer’s warranty for about $393,000 of equipment, minimizing potential loss of IT services and resulting impact to District operations due to covered equipment failure or malfunction. The robust computer cluster design to ensure high availability provides an additional benefit by enabling use of the less costly service option of next business day problem response.

Service agreements rarely, if ever, decrease in cost over time. Annual increases of 2 to 5 percent are normal for technology support services, and even greater increases are not uncommon. Staff estimates such price increases could cost the District an additional $5,000 to $13,000 over the life of the proposed extended service agreement.

Risks of deferring
Deferring extension of the service agreement until closer to the November expiration date leaves the possibility for a cost increase to occur. The cost of the quoted four-year extension is almost certain to be the lowest offered to the District over the remaining life of the equipment.

Deferring the service agreement renewal beyond the November expiration date will leave essential components of the District’s main computing environment without repair or technical support services. If the computer cluster were to fail for any reason, the best-case scenario is a minor financial impact due to a loss of productivity. However, the potential for significant regulatory violations, disruption of service, equipment damage, or worse is very real.
Proposed Solution
The District’s Administrative Regulation 3061.05e allows procurement of goods or services from a single source with good cause. The maintenance of technology equipment and related off-site support services falls into this category.

Many vendors are the sole providers of the support for their products (e.g. software, hardware, and professional services). Many of these sole source providers do not sell directly to customers; they have outsourced all sales functions to distributors. Thus, technology software, equipment, and maintenance services may appear to have multiple sources but that is an artifact of the manufacturer having outsourced its sales functions. This is the case with this manufacturer, and why the service extension should be exempt from bidding.

The annual portion of the requested amount is contained in the approved operating budget of the Information Technology Department.

<table>
<thead>
<tr>
<th>Board Decisions/ Options</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Option 1:</strong> Award an extended service agreement for data center computer equipment to CDW Government, Inc. (CDW-G) in the amount of $61,280.64.</td>
</tr>
<tr>
<td><strong>Option 2:</strong> Take other action as directed by the Board.</td>
</tr>
<tr>
<td><strong>Option 3:</strong> Take no action.</td>
</tr>
</tbody>
</table>

Staff / General Manager Recommendation
Option 1

Support Documents Attached
Attachment A: CDW-G quote #1
DEAR JAMES PROCTOR,

Thank you for considering CDW•G for your computing needs. The details of your quote are below. Click here to convert your quote to an order.

<table>
<thead>
<tr>
<th>QUOTE #</th>
<th>QUOTE DATE</th>
<th>QUOTE REFERENCE</th>
<th>CUSTOMER #</th>
<th>GRAND TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>JPFR549</td>
<td>2/13/2018</td>
<td>DATRIUM SUPPORT</td>
<td>8608998</td>
<td>$61,280.64</td>
</tr>
</tbody>
</table>

**QUOTE DETAILS**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QTY</th>
<th>CDW#</th>
<th>UNIT PRICE</th>
<th>EXT. PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Datrium Next Business Day Support - extended service agreement - 1 month -</td>
<td>96</td>
<td>4344519</td>
<td>$466.62</td>
<td>$44,795.52</td>
</tr>
<tr>
<td>Mfg. Part#: SUP-D12X4-NBD-1MO</td>
<td>UNSPSC: 81111812</td>
<td>Contract: NJPA 100614#CDW Technology Catalog (100614#CDW)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Datrium Next Business Day Support - extended service agreement - 1 month -</td>
<td>288</td>
<td>4680357</td>
<td>$57.24</td>
<td>$16,485.12</td>
</tr>
<tr>
<td>Mfg. Part#: SUP-CN2000-NBD-1MO</td>
<td>UNSPSC: 81111812</td>
<td>Contract: NJPA 100614#CDW Technology Catalog (100614#CDW)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**PURCHASER BILLING INFO**

<table>
<thead>
<tr>
<th>SUBTOTAL</th>
<th>$61,280.64</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHIPPING</td>
<td>$0.00</td>
</tr>
<tr>
<td>GRAND TOTAL</td>
<td>$61,280.64</td>
</tr>
</tbody>
</table>

Billing Address:
INFORMATION TECHNOLOGY
EL DORADO IRRIGATION DISTRICT
2890 MOSQUITO RD BLDG P-6
PLACERVILLE, CA 95667-4761
Phone: (530) 642-4075
Payment Terms: Master Card

DELIVER TO

Shipping Address:
INFORMATION TECHNOLOGY
2890 MOSQUITO RD BLDG P-6
PLACERVILLE, CA 95667-4761
Phone: (530) 642-4075
Shipping Method: DROP SHIP-GROUND

Need Assistance? CDW•G SALES CONTACT INFORMATION

Jon Cacioppo | (877) 603-6330 | joncac@cdwg.com

This quote is subject to CDW's Terms and Conditions of Sales and Service Projects at http://www.cdwg.com/content/terms-conditions/product-sales.aspx
For more information, contact a CDW account manager

© 2018 CDW•G LLC, 200 N. Milwaukee Avenue, Vernon Hills, IL 60061 | 800.808.4239
EL DORADO IRRIGATION DISTRICT

**Subject:** Consideration to award a contract to Meyers Nave in the not-to-exceed amount of $55,000, for professional legal services to update and revise the District’s existing master construction contract template and to develop a short-form construction contract template.

**Previous Board Actions**
March 1, 2004 – Board awarded a professional services contract to Wulfsberg, Reese, Colvig & Firstman in the not-to-exceed amount of $91,000, and approved total funding of $141,000 for Contract Document Update, Project No. 03009E.

**Board Policies (BP), Administrative Regulations (AR) and Board Authority**
Board Policy 3060 and Administrative Regulation 3061 state that contracts for professional services greater than $50,000 must be approved by the Board.

Administrative Regulation 3061.04c states: “Under the direction of the General Counsel, the District shall adopt and maintain standard forms, which the District shall use for all contracts and procurements, unless the use of such standard forms is infeasible or otherwise not in the District’s best interests.”

Administrative Regulation 3061.10 states: “Standardized contracting documents will be developed and provided by the District’s Office of the General Counsel. Non-standard (vendor agreements) are not authorized for use unless approved by the Office of General Counsel.”

**Summary of Issue**
The District’s existing master construction contract template was developed over a decade ago and since that time applicable laws and industry standards have changed. The District’s legal and contracting staff has worked diligently to continuously update the master contract to reflect changes in the law, but a more complete and comprehensive legal review and update of the master contract is warranted. In addition, the existing master contract is not well-suited to smaller construction projects, such as building improvements, small pipeline replacement, and other small projects. Therefore, staff recommends that the District develop a short-form construction contract template that can be utilized for small-scale construction projects.

**Staff Analysis/Evaluation**

*Background and Overview*
Each year the District enters into many contracts for capital improvement projects and other construction projects. Our construction contract documents are essential for protecting the District’s interests, establishing the respective rights and obligations of the District and the contractor, and ensuring that we comply with applicable legal requirements.

The District has an existing master construction contract template which it utilizes for public works construction projects. The existing master contract was developed more than a decade ago, in the 2004-2006 timeframe, and since that time, there have been numerous changes in applicable laws and industry standards. Staff has strived to make necessary or appropriate
changes to the master contract in response to changes in applicable laws or changes in District procedures or policies, however, a comprehensive legal review and update to the master contract is warranted to improve the master contract.

In addition, a short-form construction contract template is needed to utilize for small-scale construction projects, such as building improvements, small pipe replacement projects, etc. The existing master contract is not well-suited for these smaller projects, as the master contract is approximately 340 pages in length, excluding any project-specific technical specifications, drawings, etc. A short-form construction contract will benefit the District by ensuring that we have a suite of contract templates (including professional services and services contracts) that we can select from to best fit the scope of work for a particular project.

A comprehensive review and update of the District’s master construction contract, along with development of an appropriate short-form contract, will require substantial time and relevant legal expertise in the field of construction law. Therefore, as described in more detail below, a Request for Proposals was issued for these legal services.

**Contracting Process for Legal Services**

On January 31, 2018, the District issued RFP18-05, a Request for Proposals for Legal Services Related to Updates to and Development of Public Works Construction Contracts (“RFP”). The RFP sought legal services to perform the review and update of the District’s existing master construction contract template, as well as to develop a short-form construction contract template for smaller-scale projects. In response to the RFP, the District received a total of ten (10) proposals. The proposals varied in terms of proposed hourly rates, estimated budget, experience and expertise, and responsiveness to the RFP.

District legal staff performed an initial evaluation of the 10 proposals and determined that 2 of the proposals demonstrated the greatest responsiveness to the RFP and relevant experience and expertise, while also providing for affordable rates. District legal and engineering staff consulted on the ultimate selection of the strongest proposal and selected the proposal presented by the law firm of Meyers Nave.

Meyers Nave proposes a project team consisting of Eric Firstman (principal attorney), Aaron Gest (associate attorney), and Andrea McAfee (paralegal). The proposal identifies a range of possible revisions to the existing master construction contract and estimates that the option of a more comprehensive update and revision, along with the development of the short-form contract, will cost up to $55,000. This more comprehensive update and revision will include updating the master contract from the existing Construction Specifications Institute (“CSI”) MasterFormat 1998 to the current CSI MasterFormat 2004 (updated through April 2016).

**District Staff Recommendation**

Staff recommends that the Board award a contract to Meyers Nave in the not-to-exceed amount of $55,000 for legal services to review and update the District’s master construction contract, and to develop a short-form construction contract template. The more comprehensive update and review as identified in the Meyers Nave proposal presents the best value and utility for the District. The Meyers Nave proposal also offers to update the District’s existing purchase order form at no additional cost, to ensure consistency and completeness in the District’s procurement documents. The legal team proposed by Meyers Nave has extensive expertise and experience in construction law and has familiarity with the District’s existing construction contract template.
**Board Decision/Options**

**Option 1**: Award a contract to Meyers Nave in the not-to-exceed amount of $55,000, for professional legal services to update and revise the District’s existing master construction contract template and to develop a short-form construction contract template.

**Option 2**: Take other action as directed by the Board.

**Option 3**: Take no action.

**Staff/General Manager’s Recommendation**

Option 1

**Supporting Documents Attached**

None

[Signatures]

---

Elizabeth Leeper  
Deputy General Counsel

---

Brian Mueller  
Director of Engineering

---

Brian Poulsen  
General Counsel

---

Jim Abercrombie  
General Manager
EL DORADO IRRIGATION DISTRICT

Subject: Consideration to award a three-year professional services contract to AquaTech Company in the not-to-exceed amount of $560,970 for Potable Water Floating Covered Reservoir Maintenance.

Previous Board Actions
December 30, 2016 – The Board adopted the 2017-2018 operations budget

December 11, 2017 – The Board adopted the mid-cycle budget update

Board Policies (BP), Administrative Regulations (AR) and Board Authority
BP 0010 District Mission Statement: The El Dorado Irrigation District is a public agency dedicated to providing high quality water, wastewater treatment, recycled water, hydropower, and recreation service in an environmentally responsible manner.

BP 3060 and AR 3061.04 require Board approval for all contracts over $50,000.

Summary of Issue
The District owns and operates seven floating-covered drinking water storage facilities. Under California’s Safe Drinking Water Act, as currently amended, the District is required to protect and maintain each water system facility free from contamination hazards. In addition, our public water system operator permit, through approved operations plans, requires the cleaning of the exterior surface of floating-covered storage facilities at a frequency of no less than two times per year or as directed by the State Water Resources Control Board Division of Drinking Water (DDW). Biannual cleanings and maintenance are conducted with the reservoirs in-service in strict accordance with drinking water regulations, waterworks standards, and industry best practices.

Staff Analysis
Floating-covered storage facilities require regular, on-going maintenance to ensure that the integrity of the structure is maintained over the membrane material service life. Due to the design of floating-covered storage, debris and precipitation gathers and puddles on the floating cover. The accumulation of both debris and precipitation must be removed in order to prevent the potential of cross contamination of the drinking water supply in the event of a floating cover breech. As required by the District’s State Water Resources Control Board approved Floating Cover Reservoir Operations and Maintenance Manual, and utilizing specialized procedures, the exterior surface of the District’s floating-covered drinking water reservoirs are cleaned a minimum of two times per year. The storage facilities remain in-service for the majority of the routine cleaning work conducted. As previously stated, all work conducted is in accordance with the District’s approved Floating Cover Reservoir Operations and Maintenance Manual, drinking water regulations, waterworks standards and industry best practices. In addition to the surface cleaning, any material failures (tears, holes, leaking seams, etc.) identified must be repaired as quickly as possible. Cover inspections and some repairs of the cover require specialized diving services for potable water storage facilities. Aqua Tech is a specialized diving service for potable storage facilities and currently under contract with the District for cleaning and inspection of steel and concrete potable storage facilities.
In 1998, the District was issued Compliance Order NO. 01-09-98-ORD-001(Order) by the State of California, directing the District to abandon use of all uncovered reservoirs and replace with tanks constructed of steel or concrete. The Order was amended in 2002 with the additional directive to abandon the use of all floating covered drinking water reservoirs and replace with steel or concrete tanks as well. In 2008, however, the California Waterworks Standards were revised and adopted. The revised standard allowed the continued use of floating-covers as an approved method of drinking water storage as long as they were constructed, operated and maintained in accordance with AWWA published standards. Since the adoption of the 2008 Waterworks Standard, the District engaged with the State’s Drinking Water Program staff (currently the State Water Resources Control Board, Division of Drinking Water) to close the Order. As a requirement of the closure and in accordance with AWWA published standards, the District conducted a series of membrane covered storage facility evaluations that supported the development of the *Floating Cover Reservoir Operations and Maintenance Manual*. The Division of Drinking Water approved this document in April of 2018 along with the recent closure of the Order.

Since installation, the drinking water operations division has maintained an ongoing floating-covered storage facility inspection and cleaning program utilizing a potable water dive specialist when needed. The past practice for staff was to contact several approved and qualified vendors on a project-by-project basis to request quotes, a process that is very time consuming for staff. In order to gain better program management efficiency and ensure best competitive pricing, the drinking water division recently advertised for a multi-year contract for in-service floating-covered potable water storage cleaning, inspection and repair. Included in the advertisement was the total number of floating-covered potable water storage facilities, their volume, physical size and location so each bidder could supply an estimated time to clean and inspect each site along with their daily or hourly rates. The District received two proposals from the firms listed in the table below.

<table>
<thead>
<tr>
<th>Proposer</th>
<th>Base of Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>AquaTech Company</td>
<td>Carmichael, CA</td>
</tr>
<tr>
<td>Layfield Industries</td>
<td>Spring Valley, CA</td>
</tr>
</tbody>
</table>

Proposers supplied a cost for each facility based on their daily/hourly rates and their estimated time for each Reservoir. AquaTech was the lowest cost proposal to meet the District’s regulatory required cleaning schedule. Specifically, 40,000 sq. ft. of cleaning will occur at Reservoir 1, 25,000 sq. ft. at Moose Hall Reservoir, 70,000 sq. ft. at Dolomite Reservoir, 80,000 sq. ft. at Reservoir 11, 35,000 sq. ft. at Reservoir C, 35,000 sq. ft. at Reservoir B, and 47,000 sq. ft. at Pollock Pines Reservoir.

The table below summarizes the proposals received and the costs for each year of the three-year contract period.

<table>
<thead>
<tr>
<th>Proposer</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Layfield Industries</td>
<td>$334,596.20</td>
<td>$349,840.00</td>
<td>$365,738.00</td>
<td>$1,050,174.20</td>
</tr>
<tr>
<td>AquaTech</td>
<td>$184,890.00</td>
<td>$185,690.00</td>
<td>$190,390.00</td>
<td><strong>$560,970.00</strong></td>
</tr>
</tbody>
</table>
Proposers also provided a time and material rate to make repairs and dispose of debris if any unforeseen maintenance or repairs are required outside of the scheduled maintenance windows. The table below summarizes the daily rates for each proposer.

<table>
<thead>
<tr>
<th>Year</th>
<th>Layfield Industries</th>
<th>AquaTech</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>$5,761.00</td>
<td>$2,550.00</td>
</tr>
<tr>
<td>2019</td>
<td>$6,052.20</td>
<td>$2,550.00</td>
</tr>
<tr>
<td>2020</td>
<td>$6,354.83</td>
<td>$2,550.00</td>
</tr>
</tbody>
</table>

AquaTech is a local company and currently an approved vendor for the District. They have successfully completed many facility inspections, cleanings and repairs for the District over the past ten years and continue to supply competitive prices for this work. Additional work for minor repairs and debris disposal was included in the cost proposals and is part of the contract, and, if needed will be billed on a time and material basis at the rate obtained during the proposal process.

Funding for this contract is from the approved water operation’s budget.

<table>
<thead>
<tr>
<th>Board Decisions/Options</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Option 1:</strong> Award a three-year professional services contract to AquaTech Company in the not-to-exceed amount of $560,970 for Potable Water Membrane Covered Reservoir Maintenance.</td>
</tr>
<tr>
<td><strong>Option 2:</strong> Take other action as directed by the Board.</td>
</tr>
<tr>
<td><strong>Option 3:</strong> Take no action.</td>
</tr>
</tbody>
</table>

**Staff/ General Manager’s Recommendation**

Option 1

**Support Documents Attached**

Attachment A: AquaTech Proposal
Attachment B: Layfield Industry Proposal
Dana Strahan  
Drinking Water Operations Manager

Margaret P. Washko, P.E.  
Operations Director

Brian Mueller  
Engineering Director

Mark Price  
Finance Director

Brian Poulsen  
General Counsel

Jim Abercrombie  
General Manager
PROPOSER FORM
RFP P18-001RD Potable Water Reservoir Hypalon Cover Maintenance
Submittal Deadline: March 23rd, 2018, 3:00pm local time

To: El Dorado Irrigation District, 2890 Mosquito Road, Placerville, CA 95667

The undersigned Proposer agrees to the specified item(s), and will accept as full payment therefore the amount shown on the Proposal Sheet. Proposer further agrees; in addition to the terms and conditions specified herein, all the following terms and conditions that are a part of this proposal and any resulting contract.

From: Aqua-Tech Company

Name of Proposer
P.O. Box 1981

Mailing Address
Camille Avenue, CA 95667

City, State & Zip

PROPOSAL SELECTION
The award of contract may be made to the proposer whose proposal best meets the District’s requirements and represents the best value to the District. The District will determine which proposal is the best value and whether it is in the interest of the District to accept the proposal. The District reserves the right to request additional written or oral information from proposers in order to obtain clarification of their responses. The judgment of the District as to which proposal meets the District’s requirements and results in the lowest overall cost shall be final. Notice of Intent to Award the contract will be issued prior to the Board meeting at which the contract is considered. The proposer’s signed proposal and El Dorado Irrigation District’s acceptance by its Board of Directors, or when Board approval is unnecessary, by the execution of a written agreement signed by all appropriate District personnel, shall constitute a binding contract.

SIGNATURES
All information submitted by Proposer, including signatures, must be original. Copies will not be accepted.

TAXES
Proposers should not show California Sales Tax on their proposals. The El Dorado Irrigation District will calculate any appropriate California Sales Tax if applicable, and pay it to Successful Proposer(s) who are California suppliers or out-of-state suppliers who are registered with State of California and who have the appropriate California Seller’s Permit. The El Dorado Irrigation District will pay the State Sales Tax directly to the State of California when the Successful Proposer(s) is not registered with the state to collect it.

ADDITIONAL FEES, REGISTRATIONS, & DELIVERY
Proposer is responsible for all fees and costs relating to the transportation of goods, performance of services, required registration, licensing, or other related fees. The proposal price must reflect all and any such required costs. Any required licensing and or registration type obligations must be sufficiently completed at the time of delivery so the goods or services can be immediately put to use for their intended purpose. These costs, licensing, or registrations are not limited to hauling, trucking fees, shipping, transportation, drive-time, vehicle or equipment registration fees, special taxes. An exception is made only if costs are clearly required to be listed separately on the Proposal Sheet, or if specified differently.
RFP P18-001RD Potable Water Reservoir Hypalon Cover Maintenance

INTRODUCTION
The El Dorado irrigation District is requesting formal proposals from qualified service providers for water reservoir hypalon cover maintenance services.

CLEANING AND MEMBRANE REPAIRS

Cleaning and membrane repairs shall be according to:

1) AWWA Manual M25 Flexible-Membrane Covers and Linings for Potable-Water Reservoirs. Chapter 3; Maintenance; Cleaning, Membrane Repairs
2) AWWA California-Nevada Section, Reservoir Floating Cover Guidelines, Section 3-3.2.4 Floating Cover Wash Down. Repairs to follow guidelines 3-4.2 and 3-4.3 Major repairs and Minor repairs. Proposer shall be responsible for obtaining and adhering to the most current publications.

Additional instructions and expectations:

1) All finished drinking water covered reservoirs are to remain on-line in our normal operation modes and levels.
2) All work shall be performed within the hours of 7:30am and 5:00pm on regular EID work days, Mon-Fri. No work on weekends or EID holidays will be permitted.
3) Services required are inspections, cleaning, and repairs to the covers.
   a) SCUBA Diving services are required to aid in leak identification, proper leak repairs, and removal of floats once repaired portions of covers are acceptable to be placed back into contact with the drinking water. AWWA Procedure C652-11; disinfection procedures for underwater inspections of online, potable water storage facilities is required. Additionally, AWWA Manual M42 Steel Water Storage Tanks shall apply.
   b) Sand tubes need to be removed in order to properly clean and repair any leaks in the trough areas and properly placed back into the troughs. Add the following sentence as a bid item on the bid sheet below:
   c) Bidders need to include in its bid its methods for performing the work necessary to complete the inspections including end reports of damages, defects, and repairs, methods of cleaning the cover and troughs, and methods of hypalon repairs.
4) Add the following sentence as a bid item on the bid sheet below: Price the removal of debris from the site separately for each site.
5) Bidder must include in its bid product information regarding NSF certification and approved products and chemical used to repair the Hypalon covers above finished drinking water.

JOB-SITE VISIT and QUESTIONS
Job-site visits and questions pertaining to this RFP will only be taken into consideration for those potential proposers who submit a verifiable 5 year minimum experience to Ryan Deakyne, Senior Buyer, at Rdeakyne@EID.org. Only afterwards will a site-visit appointment and or questions from potential Proposers be considered. A job-site visit may not be required to submit a proposal. Site-visit appointments will be made only during the proposal process. The site-visits are not a time for the potential Proposer to inspect the covers but rather just to view them.

DURATION OF CONTRACT
Contract shall be awarded for 3 years. All services shall be performed twice per year during the Spring and Fall seasons.

PROPOSAL
RFP P18-001RD Potable Water Reservoir Hypalon Cover Maintenance

Proposer must bid on all reservoirs to be eligible for award. Proposer should describe its method of maintenance and over-all approach to providing hypalon cover maintenance and repairs to potable water reservoir covers. Proposer may also include any additional information or items it deems pertinent to the required work.

PROPOSAL SELECTION
The award of contract may be made to the Proposer whose proposal best meets the District’s requirements and represents the best value to the District. The District will determine which proposal is the best value and whether it is in the interest of the District to accept the proposal. The District reserves the right to request additional written or oral information from Proposer in order to obtain clarification of their responses. The judgment of the District as to which proposal meets the District’s requirements and results in the lowest overall cost shall be final. The El Dorado Irrigation District reserves the right to reject any proposal, all proposals, or any part of a proposal. The District reserves the right to reject a proposal if a proposal does not include the required information.

PUBLIC WORKS PROJECT
Awarded proposer must be registered with CA DIR. Contractor Registration and Information for Public Works Projects: http://www.dir.ca.gov/Public-Works/Contractors.html

Proposal and related items should consist of the following:

1) 5-Year minimum experience submitted to Rdeakyne@EID.org no later than 5 business days before submittal deadline.
2) Method of maintenance and over-all approach.
3) Bid Sheet.
4) Public works registration with CA DIR.

WORK REQUIREMENT and BID SHEET (2 pages)

*Price leak repairs as T&M effort. Please state a flat hourly rate.
HIGHLIGHTED TABLES BELOW REQUIRE FILL IN

1) Reservoir 1, 5575 Gilmore Rd., Pollock Pines, CA 95726

Cover Size, approximately 40,000 sq.ft.

a) Cleaning: Year 1: $12,990.00 Year 2: $12,990.00 Year 3: $13,290.00 Total x 2 $78,540.00

b) T&M RATE for leak repair: Year 1: $2.75.00 Year 2: $2.75.00 Year 3: $2.75.00 Total x 2 $1,650.00

2) Moosehall Reservoir 4310 Eight Mile Rd., Camino, CA 95663

Cover Size, approximately 25,000 sq.ft.

a) Cleaning: Year 1: $9,750.00 Year 2: $9,750.00 Year 3: $10,150.00 Total x 2 $60,000.00

b) T&M RATE for leak repair: Year 1: $2.75.00 Year 2: $2.75.00 Year 3: $2.75.00 Total x 2 $1,650.00

3) Dolomite Reservoir, 5807 Dolomite Rd., El Dorado, CA 95623

Cover Size, approximately 70,000 sq.ft.

a) Cleaning: Year 1: $14,850.00 Year 2: $14,700.00 Year 3: $14,850.00 Total x 2 $87,100.00

b) T&M RATE for leak repair: Year 1: $2.75.00 Year 2: $2.75.00 Year 3: $2.75.00 Total x 2 $14,500.00
4) Reservoir 11, 4950 Rocking Horse Lane, Shingle Springs, CA 95682.

Cover Size, approximately 80,000 sq.ft.

a) Cleaning: Year 1: $14,250.00 Year 2: $14,350.00 Year 3: $14,650.00 Total x 2 $81,700.00

*b) T&M RATE for leak repair: Year 1: $2.75.00 Year 2: $2.75.00 Year 3: $2.75.00 Total x 2 $1,450.00

5) Reservoir C, Bodega Way, Placerville

Cover Size, approximately 35,000 sq.ft.

a) Cleaning: Year 1: $13,990.00 Year 2: $13,990.00 Year 3: $13,940.00 Total x 2 $70,980.00

*b) T&M RATE for leak repair: Year 1: $2.75.00 Year 2: $2.75.00 Year 3: $2.75.00 Total x 2 $1,450.00

6) Reservoir B, 5227 Campini Road, Placerville

Cover Size, approximately 35,000 sq.ft.

a) Cleaning: Year 1: $13,990.00 Year 2: $13,990.00 Year 3: $13,690.00 Total x 2 $70,540.00

*b) T&M RATE for leak repair: Year 1: $2.75.00 Year 2: $2.75.00 Year 3: $2.75.00 Total x 2 $1,450.00

7) Pollock Pines Reservoir, 7404 Twin Mountain Rd, Pollock Pines

Cover Size, approximately 47,000 sq.ft.

a) Cleaning: Year 1: $13,175.00 Year 2: $13,275.00 Year 3: $13,550.00 Total x 2 $60,000.00

*b) T&M RATE for leak repair: Year 1: $2.75.00 Year 2: $2.75.00 Year 3: $2.75.00 Total x 2 $1,650.00

* See Attached Sheet For Description.

Total Bid Price: $560,970.00

ON-SITE INCIDENTAL BID PRICE

Proposer should include in this section a price for all services (not including materials) for unforeseen maintenance and repairs the District may require to the Hypalon covers. Included in this price shall be a crew of necessary and sufficient size, including vehicles and tools, to perform labor services.

* On-Site Price per Hour. Year 1: $3.45.00 Year 2: $3.95.00 Year 3: $3.95.00 Total $885.00

*On-Site Price per Day: Year 1: $2,450.00 Year 2: $2,550.00 Year 3: $2,550.00 Total $7,550.00

* See Attached Sheet For Description.
March 16, 2018

El Dorado Irrigation District
2890 Mosquito Road
Placerville, Ca 95667

Attn: Ryan Deakyne, Senior Buyer

Mr. Deakyne,

Per the above proposal please review the following items:

-We have noticed that the hourly repair rate for diving cannot be quoted per hour on the bid sheet as it is currently written. All divers per the Prevailing Wage guideline, attached for your review, must be paid at least eight (8) hours of pay for any day or part of day worked. Currently our hourly rate listed on the bid form is for non-diving and the hourly rate for diving will be $410.00 per hour or $3,280.00 per day when diving is needed to further repairs. This usually equates to about two (2) to three (3) days per reservoir depending upon overall reservoir size.

-The T&M Rate for leak repair on each reservoir bid line is set as an hourly rate of $275.00 per hour as it is impossible to determine how many or how long repairs will take since this information can not be known at time of bid.

-Debris removal from each site will be a flat fee of $1,250.00 per site.

-Inspection of reservoir cover prior to cleaning and after sand tube removal will be documented with a high resolution color fixed focus camera. We will provide a written report on findings as well per each reservoir.
I hope this clarifies this part of the bid process. Please let me know if you have any questions.
Thank you.

Michael Johnson
Aqua-Tech Company

(916) 482-3703
GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS
PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1

FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

CRAFT: # PILE DRIVER (CARPENTER)

**DETERMINATION:** NC-23-31-11-2017-1
**ISSUE DATE:** August 22, 2017

**EXPIRATION DATE OF DETERMINATION:** June 30, 2018**

The rate to be paid for work performed after this date has been determined. If work will extend past this date, the new rate must be paid and should be incorporated in contracts entered into now. Contact the Office of the Director – Research Unit for specific rates at (415) 703-4774.

**LOCALITY:** All localities within Alameda, Alpine, Amador, Butte, Calaveras, Colusa, Contra Costa, Del Norte, El Dorado, Fresno, Glenn, Humboldt, Kings, Lake, Lassen, Madera, Marin, Mariposa, Mendocino, Merced, Modoc, Monterey, Napa, Nevada, Placer, Plumas, Sacramento, San Benito, San Francisco, San Joaquin, San Mateo, Santa Clara, Santa Cruz, Shasta, Sierra, Siskiyou, Solano, Sutter, Tehama, Trinity, Tulare, Tuolumne, Yolo, and Yuba Counties.

<table>
<thead>
<tr>
<th>Classification</th>
<th>Employer Payments</th>
<th>Straight-Time</th>
<th>Overtime Hourly Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(Journeyperson)</strong></td>
<td><strong>Basic</strong></td>
<td><strong>Health</strong></td>
<td><strong>Pension</strong></td>
</tr>
<tr>
<td><strong>Pile Driver, Wharf, and Dock Builder</strong></td>
<td><strong>Rate</strong></td>
<td><strong>Rate</strong></td>
<td><strong>Rate</strong></td>
</tr>
<tr>
<td>Pile Driver, Wharf, and Dock</td>
<td>$45.65$</td>
<td>11.45</td>
<td>13.85</td>
</tr>
<tr>
<td>Diver (wet) up to 50 ft depth**</td>
<td><strong>$55.12</strong></td>
<td>11.45</td>
<td>13.85</td>
</tr>
<tr>
<td>Diver’s Tender**</td>
<td><strong>$50.22</strong></td>
<td>11.45</td>
<td>13.85</td>
</tr>
<tr>
<td>Assistant Tender**</td>
<td>45.65</td>
<td>11.45</td>
<td>13.85</td>
</tr>
<tr>
<td>Diver (stand-by)**</td>
<td>51.22</td>
<td>11.45</td>
<td>13.85</td>
</tr>
</tbody>
</table>

FOR "PILE DRIVER-BRIDGE BUILDER" - SEE NORTHERN CALIFORNIA CARPENTER PAGE 34.

**PLEASE NOTE:** To obtain wage rate information for Saturation Diver, Manned Submersible, Manifold Operator/Life Support Technician, Remote Controlled/Operated Vehicle (RCV/ROV) Pilot/Technician, Navigator Surveyor, Bell Winch Operator & Diving Equipment Technician, please contact the Office of the Director - Research Unit at (415) 703-4774.

# Indicates an apprenticeable craft. The current apprentice wage rates are available on the Internet @ http://www.dir.ca.gov/OPRL/PWD. To obtain any apprentice wage rates as of July 1, 2008 and prior to September 27, 2012, please contact the Division of Apprenticeship Standards or refer to the Division of Apprenticeship Standards' website at http://www.dir.ca.gov/das/das.html.

a Includes Industry Promotion, Carpenters International Training Fund, Pile Drivers Employers Contract Administration, and LMCC.

b Includes an amount per hour for Annuity Trust Fund. Pursuant to Labor Code Sections 1773.1 and 1773.8, the amount paid for this employer payment may vary resulting in a lower taxable basic hourly wage rate, but the total hourly rates for straight time and overtime may not be less than the general prevailing rate of per diem wages.

c Includes an amount per hour for work fees.

d Rate applies to the first 2 daily overtime hours and the first 8 hours worked on Saturdays. All other time is paid at the Sunday/Holiday overtime rate. For work associated with cast-in-place piles, drill shaft, Tubex piles, Tubex grout injection piles, geo piles, soil improvement piles, sand piles, augured cast in place piles, CISS and CIDH: Rate applies to all hours worked after 8 hours Monday-Friday and all hours worked on Saturday.

e Shall receive a minimum of 8 hours pay for any day or part thereof worked.

f For specific rates over 50 ft depth, contact the Office of the Director – Research Unit.

g On bridges, powerhouses and dams, men working from bosun’s chairs or swinging scaffolds or suspended from rope, cable, safety belts, or any device used as a substitute for or in lieu thereof (excluding pile driving rigs) shall receive $0.15 per hour above this rate.

**RECOGNIZED HOLIDAYS:** Holidays upon which the general prevailing hourly wage rate for Holiday work shall be paid, shall be all holidays in the collective bargaining agreement, applicable to the particular craft, classification, or type of worker employed on the project, which is on file with the Director of Industrial Relations. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code. You may obtain the holiday provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/PreWageDetermination.htm. Holiday provisions for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**TRAVEL AND/OR SUBSISTENCE PAYMENT:** In accordance with Labor Code Sections 1773.1 and 1773.9, contractors shall make travel and/or subsistence payments to each worker to execute the work. You may obtain the travel and/or subsistence provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/PreWageDetermination.htm. Travel and/or subsistence requirements for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.
PREDETERMINED INCREASE FOR

PILE DRIVER (CARPENTER)
(NC-23-31-11-2017-1)

IN 46 NORTHERN CALIFORNIA COUNTIES

The predetermined increases for the above named craft applies only to the above referenced determination for work being performed on public works projects with bid advertisement dates on or after September 1, 2017, until this determination is superseded by a new determination or a predetermined increase modification notice becomes effective.

When referencing our prevailing wage determinations, please note that if the prevailing wage rate determination which was in effect on the bid advertisement date of a project has a single asterisk (*) after the expiration date, the rate will be good for the life of the project. However, if a prevailing wage rate determination has double asterisks (**) after the expiration date, the rate must be updated on the following date to reflect the predetermined rate change(s).

PILE DRIVER (CARPENTER): All Classifications
Determination NC-23-31-11-2017-1 is currently in effect and expires on June 30, 2018**.

Effective July 1, 2018: there will be an increase of $2.61 allocated as follows: $2.00 to Basic Hourly Rate, $0.35 to Health and Welfare, $0.15 to Pension, $0.06 to Work fee (Vacation/Holiday), and $0.05 to Training.

There will be no further increases applicable to this determination.

Please note for “Pile Driver-Bridge Builder”- see Northern California Carpenter.

---

Issued 8/22/2017, Effective 9/1/2017 until superseded.
This page will be updated when wage rate breakdown information becomes available.
Last Updated: September 1, 2017
**Hypalon Covered/Lined Maintenance Service Details**

All persons working on any floating cover will wear/carry with them at all times the following while on cover:

1. Life Vest
2. Approved Boots
3. Knife
4. Radio/communication device

First, covered reservoirs will be cleaned of all debris, when cleaning is required, by removing all sand trough weight tubes and cover rain water drain systems prior to debris collection/removal. Once the above is completed we will walk cover thoroughly and remove all debris found on cover. This will include all organic materials, rocks, bird droppings, sticks/branches and any other type of debris encountered. During this service all entry hatches will remain closed. Once all debris is removed we will wash the cover down thoroughly and scrub soiled cover areas as needed (covers are older so no pressure washing or cover inflation will be allowed). All wash water will be contained at one (1) end of reservoir then pumped off through a fabric filter bag and all discharge water will be dechlorinated. The only cleansing agent allowed is simple green and that will only be used on severely dirty areas that need additional remediation.

Second, we will mark all holes/leaks in cover and install either repair floats or inner tubes from underneath the cover to raise repair area out of water so a dry repair can be accomplished. Divers most likely will be needed to install floats/inner tubes below cover. We will repair cover with approved cover repair material (hypalon 45 mil reinforced) and approved glue adhesive (Pangofol Hypalon Glue) which are the best products on the market for this type of service. **All repairs will need to bond overnight prior to cover drain trough re-assembly.**

Third, after repairs have cured we will reinstall cover rain drain trough systems and cover drain trough weight bags so that original placement and function are achieved. All floats and/or inner tubes for repair areas will be removed at the end of service and prior to leaving site.
PROPOSER FORM
RFP P18-001RD Potable Water Reservoir Hypalon Cover Maintenance
Submittal Deadline: March 23rd, 2018, 3:00pm local time

To: El Dorado Irrigation District, 2890 Mosquito Road, Placerville, CA 95667

The undersigned Proposer agrees to the specified item(s), and will accept as full payment therefore the amount shown on the Proposal Sheet. Proposer further agrees; in addition to the terms and conditions specified herein, all the following terms and conditions that are a part of this proposal and any resulting contract.

From: Layfield USA Corp
Name of Proposer
2500 Sweetwater Springs Blvd #110
Mailing Address
Sparks, Nevada, CA 89431
City, State & Zip

PROPOSAL SELECTION
The award of contract may be made to the proposer whose proposal best meets the District’s requirements and represents the best value to the District. The District will determine which proposal is the best value and whether it is in the interest of the District to accept the proposal. The District reserves the right to request additional written or oral information from proposers in order to obtain clarification of their responses. The judgment of the District as to which proposal meets the District’s requirements and results in the lowest overall cost shall be final. Notice of Intent to Award the contract will be issued prior to the Board meeting at which the contract is considered. The proposer’s signed proposal and El Dorado Irrigation District’s acceptance by its Board of Directors, or when Board approval is unnecessary, by the execution of a written agreement signed by all appropriate District personnel, shall constitute a binding contract.

SIGNATURES
All information submitted by Proposer, including signatures, must be original. Copies will not be accepted.

TAXES
Proposers should not show California Sales Tax on their proposals. The El Dorado Irrigation District will calculate any appropriate California Sales Tax if applicable, and pay it to Successful Proposer(s) who are California suppliers or out-of-state suppliers who are registered with State of California and who have the appropriate California Seller’s Permit. The El Dorado Irrigation District will pay the State Sales Tax directly to the State of California when the Successful Proposer(s) is not registered with the state to collect it.

ADDITIONAL FEES, REGISTRATIONS, & DELIVERY
Proposer is responsible for all fees and costs relating to the transportation of goods, performance of services, required registration, licensing, or other related fees. The proposal price must reflect all and any such required costs. Any required licensing and or registration type obligations must be sufficiently completed at the time of delivery so the goods or services can be immediately put to use for their intended purpose. These costs, licensing, or registrations are not limited to hauling, trucking fees, shipping, transportation, drive-time, vehicle or equipment registration fees, special taxes. An exception is made only if costs are clearly required to be listed separately on the Proposal Sheet, or if specified differently.
INTRODUCTION
The El Dorado irrigation District is requesting formal proposals from qualified service providers for water reservoir hypalon cover maintenance services.

CLEANING AND MEMBRANE REPAIRS
Cleaning and membrane repairs shall be according to:

1) AWWA Manual M25 Flexible-Membrane Covers and Linings for Potable-Water Reservoirs. Chapter 3; Maintenance; Cleaning, Membrane Repairs
2) AWWA California-Nevada Section, Reservoir Floating Cover Guidelines, Section 3-3.2.4 Floating Cover Wash Down. Repairs to follow guidelines 3-4.2 and 3-4.3 Major repairs and Minor repairs. Proposer shall be responsible for obtaining and adhering to the most current publications.

Additional instructions and expectations:

1) All finished drinking water covered reservoirs are to remain on-line in our normal operation modes and levels.
2) All work shall be performed within the hours of 7:30am and 5:00pm on regular EID work days, Mon-Fri. No work on weekends or EID holidays will be permitted.
3) Services required are inspections, cleaning, and repairs to the covers.
   a) SCUBA Diving services are required to aid in leak identification, proper leak repairs, and removal of floats once repaired portions of covers are acceptable to be placed back into contact with the drinking water. AWWA Procedure C652-11; disinfection procedures for underwater inspections of online, potable water storage facilities is required. Additionally, AWWA Manual M42 Steel Water Storage Tanks shall apply.
   b) Sand tubes need to be removed in order to properly clean and repair any leaks in the trough areas and properly placed back into the troughs. Add the following sentence as a bid item on the bid sheet below:
   c) Bidders need to include in its bid its methods for performing the work necessary to complete the inspections including end reports of damages, defects, and repairs, methods of cleaning the cover and troughs, and methods of hypalon repairs.
4) Add the following sentence as a bid item on the bid sheet below: Price the removal of debris from the site separately for each site.
5) Bidder must include in its bid product information regarding NSF certification and approved products and chemical used to repair the Hypalon covers above finished drinking water.

JOB-SITE VISIT and QUESTIONS
Job-site visits and questions pertaining to this RFP will only be taken into consideration for those potential proposers who submit a verifiable 5 year minimum experience to Ryan Deakyne, Senior Buyer, at Rdeakyne@EID.org. Only afterwards will a site-visit appointment and or questions from potential Proposers be considered. A job-site visit may not be required to submit a proposal. Site-visit appointments will be made only during the proposal process. The site-visits are not a time for the potential Proposer to inspect the covers but rather just to view them.

DURATION OF CONTRACT
Contract shall be awarded for 3 years. All services shall be performed twice per year during the Spring and Fall seasons.

PROPOSAL
RFP P18-001RD Potable Water Reservoir Hypalon Cover Maintenance

Proposer must bid on all reservoirs to be eligible for award. Proposer should describe its method of maintenance and over-all approach to providing hypalon cover maintenance and repairs to potable water reservoir covers. Proposer may also include any additional information or items it deems pertinent to the required work.

PROPOSAL SELECTION
The award of contract may be made to the Proposer whose proposal best meets the District's requirements and represents the best value to the District. The District will determine which proposal is the best value and whether it is in the interest of the District to accept the proposal. The District reserves the right to request additional written or oral information from Proposer in order to obtain clarification of their responses. The judgment of the District as to which proposal meets the District's requirements and results in the lowest overall cost shall be final. The El Dorado Irrigation District reserves the right to reject any proposal, all proposals, or any part of a proposal. The District reserves the right to reject a proposal if a proposal does not include the required information.

PUBLIC WORKS PROJECT
Awarded proposer must be registered with CA DIR. Contractor Registration and Information for Public Works Projects: http://www.dir.ca.gov/Public-Works/Contractors.html

Proposal and related items should consist of the following:

1) 5-Year minimum experience submitted to Rdeakyne@EID.org no later than 5 business days before submittal deadline.
2) Method of maintenance and over-all approach.
3) Bid Sheet.
4) Public works registration with CA DIR.

WORK REQUIREMENT and BID SHEET (2 pages)

*Price leak repairs as T&M effort. Please state a flat hourly rate.

HIGHLIGHTED TABLES BELOW REQUIRE FILL IN

1) Reservoir 1, 5575 Gilmore Rd., Pollock Pines, CA 95726

Cover Size, approximately 40,000 sq.ft.

- a) Cleaning: Year 1: $19,914 Year 2: $20,909 Year 3: $21,955 Total x 2 $125,556
- b) T&M RATE for leak repair: Year 1: $91.30 Year 2: $95.50 Year 3: $95.50 Total x 2 $564.04

2) Moosehall Reservoir 4310 Eight Mile Rd. Camino, CA 95663

Cover Size, approximately 25,000 sq.ft.

- a) Cleaning: Year 1: $17,498 Year 2: $18,902 Year 3: $19,260 Total x 2 $110,240
- b) T&M RATE for leak repair: Year 1: $91.30 Year 2: $95.50 Year 3: $95.50 Total x 2 $564.04

3) Dolomite Reservoir, 5807 Dolomite Rd., El Dorado, CA 95623

Cover Size, approximately 70,000 sq.ft.

- a) Cleaning: Year 1: $29,900 Year 2: $31,853 Year 3: $32,920 Total x 2 $188,240
- b) T&M RATE for leak repair: Year 1: $91.30 Year 2: $95.50 Year 3: $95.50 Total x 2 $564.04
4) Reservoir 11, 4950 Rocking Horse Lane, Shingle Springs, CA 95682.

Cover Size, approximately 80,000 sq.ft.

a) Cleaning: Year 1: $31,034 Year 2: $33,448 Year 3: $39,292 Total x 2 $112,356

b) T&M RATE for leak repair: Year 1: $91.30 Year 2: $95.86 Year 3: $95.86 Total x 2 $316.04

5) Reservoir C, Bodega Way, Placerville

Cover Size, approximately 35,000 sq.ft.

a) Cleaning: Year 1: $19,114 Year 2: $20,128 Year 3: $21,128 Total x 2 $120,828

b) T&M RATE for leak repair: Year 1: $91.30 Year 2: $95.86 Year 3: $95.86 Total x 2 $316.04

6) Reservoir B, 5227 Campini Road, Placerville

Cover Size, approximately 35,000 sq.ft.

a) Cleaning: Year 1: $19,114 Year 2: $20,128 Year 3: $21,128 Total x 2 $120,828

b) T&M RATE for leak repair: Year 1: $91.30 Year 2: $95.86 Year 3: $95.86 Total x 2 $316.04

7) Pollock Pines Reservoir, 7404 Twin Mountain Rd, Pollock Pines

Cover Size, approximately 47,000 sq.ft.

a) Cleaning: Year 1: $24,082 Year 2: $25,283 Year 3: $26,495 Total x 2 $151,520

b) T&M RATE for leak repair: Year 1: $91.30 Year 2: $95.86 Year 3: $95.86 Total x 2 $316.04

Total Bid Price: $1,050,174.28

ON-SITE INCIDENTAL BID PRICE
Proposer should include in this section a price for all services (not including materials) for unforeseen maintenance and repairs the District may require to the Hypalon covers. Included in this price shall be a crew of necessary and sufficient size, including vehicles and tools, to perform labor services.

On-Site Price per Hour: Year 1: $60.41 Year 2: $67.44 Year 3: $70.68 Total $201.93

On-Site Price per Day: Year 1: $576.44 Year 2: $605.27 Year 3: $635.81 Total $1,817.12
Date: March 23, 2018
To: El Dorado Irrigation District
    2890 Mosquito Rd.
    Placerville, CA 95667
Attn: Ryan Deakyne
Re: Potable Water Reservoir Hyplao Cover Maintenance RFP P18-001RD

Bid Proposal Letter

Layfield USA Corporation, contractor license number in California 837614 is pleased to present our proposal for the above referenced work. Our proposal scope, pricing, exclusions, and clarifications are detailed below for your information.

A. PROJECT DESCRIPTION: Layfield will provide one (1) Supervisor and four (4) Technicians for the floating cover wash of the Potable Water Reservoirs for El Dorado Irrigation District in Placerville, CA. The cleaning will include a complete cover scrub, removal of sand tubes for proper cleaning and inspection of the trough areas, and a complete cover inspection. Layfield will provide hoses and all other necessary equipment for the cover cleaning. The District shall provide water for the cleaning. Layfield has included an estimated T & M Hourly Rate for the leak repairs. We anticipate cover cleanings will require a total of twenty-three (23) fair weather days to complete.

B. PRICING:
   As per schedule of values

C. CONDITIONS OF PROPOSAL:
   - Bid proposal is good for 30 days from date above.
   - Materials Net 30 days upon receipt of goods.
   - Final payment Net 30 days upon Layfield’s completion.
   - Union or prevailing wages (per Davis-Bacon) have been applied to this job. Layfield is not a union contractor and our bid does not include union initiation fees or dues for our employees.

D. INCLUDED IN THE PROPOSAL:
1. Supply and installation of geosynthetic work scope in accordance with bid documents received from Ryan Deakyne, namely request for Proposals; RFP P18-001RD.
2. Provide a full crew to perform a cover cleaning at the Morro Reservoir in Fallbrook, CA
3. Provide a cover inspection on the troughs, pumps, and moving parts of the Morro Reservoir Floating Cover.
4. Repair leaks found in cover at T & M Rate.
5. Mobilization & demobilization costs. Our quote is based on one mobilization/demobilization.
6. Layfield will provide one (1) working Supervisor and four (4) Technicians.
7. Onsite testing of field seams.
9. A full Layfield labor crew (credit could be negotiated if a local labor force were provided). Layfield will provide one (1) working supervisor and four (4) technicians.
10. Third party testing of geomembranes.

E. EXCLUSIONS:

Layfield has not included the following allowances in our pricing, all of which shall be extra to the contract or shall be provided at no charge to Layfield by others:

1. Material off loading, storage, and staging of materials within 200’ of work area.
2. Dewatering for the purposes of maintaining the geosynthetic installations work area dry and free from standing water.
3. All earthworks including anchor trench excavation, spoils removal & backfill, sub grade preparation, piping systems installations and structures.
4. Protection of the Work or repair of damage to the Work, or portions thereof, caused by others after such portions of the Work is placed in their final installed position.
5. Bonds are not included in this proposal (to add bonds to this proposal please see Attachment A, item 7).
6. On-site disposal bins and sanitary facilities per local regulation, located within 200’ of the work area, for the entirety of Layfield’s work.
7. Protective devices, work clothing and specific safety training or certification exceeding standard provisions of Layfield’s Safety Program.
8. A weather tight and secure (under lock and key) storage area or facility for Layfield equipment for the duration of the liner installation.

Layfield’s Proposal is subject to the following Project Clarifications and our Standard Terms and Conditions as stipulated in the attached Appendix A.

F. PROPOSAL CLARIFICATIONS

Our Pricing is based upon the following conditions.

1. The Work shall be permitted to continue up to ten (10) hours per day, six (6) days per week at Layfield’s discretion and subject to compliance with legislated limits. We anticipate the cover wash will require six (6) fair weather days to complete.
2. Layfield reserves the right to modify our proposal to reflect any material increases in costs incurred by resin and freight after the quotation expiration time limit.
3. Quantities variations from those specified in the quotation shall be extra to the Contract at quoted unit prices adjusted for shipping & handling.
4. Safe, complete and clear worksite access at all times during prosecution of the Work including, but not limited to, unobstructed access for installation equipment around the entire top perimeter of the Work.
5. Layfield will require a minimum, three to five (3-5) weeks, notice in order to procure materials and to schedule the arrival of our Installation Crew at the site. Project Final Design drawings shall be issued to Layfield, prior to Layfield procurement of materials so that the quantities stipulated in our Quotation can be reconciled.
6. Layfield's standard QA/QC Testing program shall be the exclusive testing program used on this project.
If you require more information or clarification to evaluate Layfield’s proposal, please contact the undersigned.

Regards,
Layfield

Mike Da Silva            Bill Morris            Gregg Peterson
U.S. Marketing Manager    Estimating Manager    Senior Estimator/Design
madasilva@layfieldgroup.com bmorris@layfieldgroup.com gpeterson@layfieldgroup.com
Ph (619) 631-1283         Ph (619) 797-1969     Ph (619) 797-1970
Cell (619) 495-2903       Cell (619) 925-2761

Acceptance of Price Quotation:
I (the undersigned) accept this Price Quotation and authorize Layfield Environmental Systems Corporation to proceed with the entire scope of work stated herein.

Company Name: ___________________________ Date: __________________
Name and Title: ___________________________
Signature: ___________________________ Purchase Order No. : __________________
EL DORADO IRRIGATION DISTRICT

Subject: Consideration to award a professional services contract amendment to Water Quality and Treatment Solutions, Inc. in the not-to-exceed amount of $88,210 for implementation of a Disinfection Byproduct (DBP) Mitigation Plan and Tracer Study.

Previous Board Actions
December 12, 2016 – The Board adopted the 2017-2018 operations budget.
August 22, 2016 – The Board awarded a professional services contract to WQTS in the not-to-exceed amount of $92,600 for a system-wide Disinfection Byproduct Analysis.

Board Policies (BP), Administrative Regulations (AR) and Board Authority
BP 0010 District Mission Statement: The El Dorado Irrigation District is a public agency dedicated to providing high quality water, wastewater treatment, recycled water, hydropower, and recreation service in an environmentally responsible manner.

BP 3060 and AR 3061.04 require Board approval for all contracts over $50,000.

Summary of Issue
In recent years and within several areas of the drinking water distribution systems, there has been an increase in the formation of disinfection byproducts (DBP’s) to levels that do not meet broadened drinking water standards implemented by State and Federal Clean Water Act requirements over the past 16 years. The District was required to issue two public notifications for excursions and is under Compliance Order 01_09_17C_001 issued by the State Water Resources Control Board to reduce the formation of DBP’s within the water system. In order to ensure the District continues to deliver safe, high quality drinking water to our customers, the Board approved a contract with WQTS to help identify a successful course of action to minimize the formation of DBP’s in 2016. Based upon the results of the WQTS study, additional scientific work is needed to implement the plan to bring the main water system into consistent compliance

Staff Analysis
Background
Disinfection in drinking water treatment has led to great success in the elimination of water borne disease for over 100 years. Today, adequate disinfection remains a regulatory requirement under the amendments and rules of both State and Federal Safe Drinking Water Acts. However, Disinfection By-Products (DBPs) form over time in drinking water when disinfectants react with normal organic matter found in source waters. This is particularly the case in surface water sources due to elevated levels of organic matter from surface water run-off verses ground water sources. DBPs do not cause an acute issue with human health as bacteria could, but because of their classification as potential human carcinogens, the effect is considered chronic. Regulations for control with similar scrutiny as bacteria have been increasing as outlined below.
In 1979, the United States Environmental Protection Agency (USEPA) established the first regulation managing concentrations of the disinfection by-products classified as Total Trihalomethanes (TTHM) in public drinking water systems. Over the next two decades, the USEPA, other government, public health and industry stakeholders worked together to develop two stages of comprehensive regulatory rules. The use of disinfectants to protect the public’s health from acute water borne disease and managing the formation of disinfection by-products that may have chronic health effects are uniquely tied together. The USEPA introduced each stage of the disinfectant/disinfection by-product rules in conjunction with Enhanced Surface Water Treatment Rules to ensure that the risk balance always leans toward reduction of acute exposure to water borne disease.

The Stage 1 Disinfectants/Disinfection By-Product Rule (Stage 1) went into effect in 2002. It lowered the maximum contaminant level (MCL) for TTHM from 100 ug/l (micrograms per liter or parts per billion) to 80 ug/l and introduced a new MCL of 60 ug/l for the family of five Haloacetic Acids (HAA5). The Running Annual Average (RAA) of all quarterly samples determined compliance for the MCL.

The Stage 2 Disinfectants/Disinfection By-Product Rule (Stage 2), promulgated in 2006, has a phased compliance based on populations served from 2012-2016. While the MCL’s for TTHM and HAA5’s remained the same, Stage 2 included a different strategy toward the selection of monitoring locations and the calculations for compliance. The selection for Stage 2 monitoring locations are based on specific criteria from a six-quarter monitoring plan known as the Initial Distribution System Evaluation (IDSE). In addition, compliance changed from the running annual average of all quarterly samples to a Locational Running Annual Average (LRAA) of each monitoring locations’ quarterly samples in order to address specific areas of concentrations of DBP’s within the distribution system.

The District completed the IDSE in 2008 and selected the final eight Stage 2 locations for compliance monitoring beginning in 2013. However, operations elected to continue to collect quarterly samples from these locations for further assessment prior to final compliance monitoring. This additional monitoring identified several locations that needed modification to ensure Stage 2 sample results are representative of the water delivered to our customer’s taps.

**Health Effects**

DBP’s are chronic contaminants. The required Health Effects language for public notification states: “Some people who drink water containing haloacetic acids in excess of the MCL over many years may have an increased risk of getting cancer.” According to Centers for Disease Control and Prevention Web Article (http://www.cdc.gov/safewater/chlorination-byproducts.html), World Health Organization studies have estimated the potential cancer risk at one extra case per 100,000 people after 70 years of continuous exposure above the DBP MCL. This risk is far less than the acute risk of water borne diseases controlled by chlorine disinfection.

The formation of DBP’s are a result of three combined variables: 1) disinfectant type and concentration, 2) precursor concentrations of natural organic matter in source waters (measured as Total Organic Carbon or TOC), and 3) time (water age within the system). One identified contributing factor to the increased DBP levels in the District can be associated with conservation (time/water age) due to the recent drought. Utility pricing also contributes to conservation but plays a lesser role than drought conservation. Other contributing factors were unclear prior to the analysis. However, WQTS was able to identify contributing factors because of their scientific examination in Phase I of the work.
As operations noted the rise in DBP’s, staff took action to manage their formation utilizing the operational tools at their disposal, which included: Treatment and disinfection optimization, enhanced monitoring of source waters, disinfection residuals and DBP’s, water age management in storage tanks and increased system flushing. Despite these efforts, DBP formation continued to rise up to and beyond compliance levels. In particular, the family of five Haloacetic Acids have proven to be the most difficult to manage.

**Excursion Events**

The first excursion of DBP’s occurred in the Strawberry water system in 2012. The running annual average of HAA5’s had elevated to 63 micrograms per liter (ug/l), exceeding the MCL of 60 ug/l. This resulted in the issuance of a Compliance Order from the California Department of Public Health on August 28, 2012. Public notice was delivered to 147 affected customers explaining the health effects of DBP’s and what actions the District was taking to resolve the issue. District staff worked with a consultant to identify and implement operational practices to enhance the management of DBP formation. This included a mixer in the distribution storage tank to eliminate stratification in the tank; re-operation to reduce storage reserves; installation of an auto flusher at the end of the distribution system to help manage water age, and the optimization of the disinfection process to manage chlorine residuals throughout the distribution system. These actions did result in the Strawberry water system’s return to compliance in the fourth quarter of 2013. Prior to 2011, the Strawberry water system did not experience elevated DBP’s. However, in 2009 the District installed meters for all connections, which resulted in an approximate 60% reduction in water demand. Conservation resulting from meter installation was considered a contributing cause of the elevated DBP’s because of increased water age due to customers understanding the cost of their water.

On May 8, 2015, the District received a Compliance Order from the State Water Resources Control Board, Division of Drinking Water (DDW) for the Main water system as a result of elevated HAA5 levels in the District’s Monte Vista tank service area. The LRAA in the Monte Vista service area for HAA5’s for the first quarter 2015 was 64 ug/l. Public notice was delivered to 66 affected customers explaining the health effects of DBP’s and what actions the District was taking to resolve the issue. Staff evaluated the operational conditions of the area and took action to optimize the management of DBP’s. This included the reoperation of the Monte Vista pump station; increased system water quality monitoring; increased flushing in the area to reduce water age and engaging engineering teams to evaluate long-term improvements to the Monte Vista tank service area. These actions resulted in the Monte Vista tank service area returning to compliance in the second quarter of 2015.

On March 3, 2016 District staff reported a DBP MCL violation for HAA5 in our Gold Hill service area. The LRAA for HAA5 for the first quarter in the Gold Hill area was 62 ug/l. Public notice was delivered to 944 affect customers (including two schools) explaining the health effects of DBP’s and what actions the District was taking to resolve the issue. District staff took action to reduce water age in the area utilizing manual and mobile automated flushers. In addition, staff increased system water quality monitoring frequency and collected additional samples for analysis of DBP’s. The Gold Hill area returned to compliance in the second quarter of 2016.

Both the first quarter 2015 and 2016 DBP MCL exceedances are related to water age issues due to drought response conservation. The exceedances also correspond to the lower demand times of the year. However, other contributing factors need addressing through detailed examination of our source waters and treatment technologies.
To assist the District in maintaining compliance with the Stage 2 Disinfectants/Disinfection By-Products Rule and Compliance Order 01_09_17C_001, in 2016 a professional service contract was awarded by the Board to WQTS to conduct a system-wide DBP analysis and make recommendations for the mitigation or enhanced management of the formation of DBP’s in the District’s water systems.

One of the findings of the Technical Report analysis identified Reservoir A Water Treatment Plant (RAWTP) as a source of elevated DBP’s, possibly due to treatment technology and operational practices. Staff tasked WQTS to conducted further bench test analysis of operational practices at RAWTP with the objective of producing recommendations for a DBP mitigation plan. A Technical Memorandum detailed the findings of the bench test and recommended a mitigation plan that has potential to reduce DBP formation with little to no initial capital expense.

In order for the mitigation plan to be implemented, additional support from WQTS is needed for scientific oversight and technical support with any permit amendments required by DDW for proposed operational changes that could mitigate the current DBP formation. As a separate additional task, WQTS and staff identified the need to validate and update the Reservoir A storage baffling factor. If the storage-baffling factor is increased, it will enhance the DBP mitigation strategy. The validation task would require a tracer study. While District staff will be conducting the actual tracer study, WQTS will provide an independent evaluation of the results and support for the permit amendment process with DDW as required.

Below are the two tasks and costs necessary to complete the DBP mitigation and tracer study amendment:

<table>
<thead>
<tr>
<th>Amendment Proposals</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tracer Study</td>
<td>$13,500</td>
</tr>
<tr>
<td>DBP Mitigation Implementation</td>
<td>$74,710</td>
</tr>
<tr>
<td><strong>Total Amendment Cost</strong></td>
<td><strong>$88,210</strong></td>
</tr>
</tbody>
</table>

**Funding**

The DBP mitigation implementation and tracer study will be funded from the approved operating budget. The estimated time to complete the implementation and tracer study, which includes permit amendments with DDW, is twelve months with cost spread between 2018 and 2019 budget years.

**Board Decisions/Options**

**Option 1:** Award a professional services contract amendment to Water Quality and Treatment Solutions, Inc. in the not-to-exceed amount of $88,210 for Implementation of the Disinfection Byproduct (DBP) Mitigation Plan and Tracer Study.

**Option 2:** Take other action as directed by the Board.

**Option 3:** Take no action.

**Staff/General Manager’s Recommendation**

Option 1
Support Documents Attached
Attachment B: Technical Memorandum Results of Bench-Scale Testing of the impact of Prechlorination on DBP Formation
Attachment C: WQTS Proposal - Full-scale Implementation of DBP Mitigation Strategy prop
Attachment D: WQTS Proposal – Technical Support for Tracer Testing of Reservoir A

Dana Strahan
Drinking Water Operations Manager

Margaret P. Washko, P.E.
Operations Director

Brian Mueller
Engineering Director

Jim Abercrombie
General Manager
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executive Summary</td>
<td>1</td>
</tr>
<tr>
<td>1. Background &amp; Objectives</td>
<td></td>
</tr>
<tr>
<td>2. Main Water System</td>
<td></td>
</tr>
<tr>
<td>2.1. Water System Description</td>
<td>2</td>
</tr>
<tr>
<td>2.2. Disinfection By-Products (DBPs)</td>
<td>6</td>
</tr>
<tr>
<td>3. Reservoir A Water Treatment Plant</td>
<td>9</td>
</tr>
<tr>
<td>3.1. Plant Description</td>
<td></td>
</tr>
<tr>
<td>3.2. Plant Operations &amp; Performance</td>
<td>9</td>
</tr>
<tr>
<td>3.3. SDS DBP Formation Testing</td>
<td>14</td>
</tr>
<tr>
<td>3.4. Disinfection Compliance</td>
<td>15</td>
</tr>
<tr>
<td>4. Reservoir 1 Water Treatment Plant</td>
<td>19</td>
</tr>
<tr>
<td>4.1. Plant Description</td>
<td>19</td>
</tr>
<tr>
<td>4.2. Plant Operation &amp; Performance</td>
<td>19</td>
</tr>
<tr>
<td>4.3. Disinfection By-Products</td>
<td>23</td>
</tr>
<tr>
<td>4.4. Disinfection Compliance</td>
<td>24</td>
</tr>
<tr>
<td>5. El Dorado Hills Water Treatment Plant</td>
<td>27</td>
</tr>
<tr>
<td>5.1. Plant Description</td>
<td>27</td>
</tr>
<tr>
<td>5.2. Plant Operation &amp; Performance</td>
<td>27</td>
</tr>
<tr>
<td>5.3. Disinfection By-Products</td>
<td>31</td>
</tr>
<tr>
<td>5.4. Disinfection Compliance</td>
<td>32</td>
</tr>
<tr>
<td>6. Strawberry Water Treatment Plant</td>
<td>34</td>
</tr>
<tr>
<td>6.1. Plant Description</td>
<td>34</td>
</tr>
<tr>
<td>6.2. Plant Operation &amp; Performance</td>
<td>34</td>
</tr>
<tr>
<td>6.3. Disinfection By-Products</td>
<td>36</td>
</tr>
<tr>
<td>7. Outingdale Water Treatment Plant</td>
<td>38</td>
</tr>
<tr>
<td>7.1. Plant Description</td>
<td>38</td>
</tr>
<tr>
<td>7.2. Plant Operation &amp; Performance</td>
<td>38</td>
</tr>
<tr>
<td>7.3. Disinfection By-Products</td>
<td>41</td>
</tr>
<tr>
<td>8. Conclusions &amp; Recommendations</td>
<td>42</td>
</tr>
</tbody>
</table>
EXECUTIVE SUMMARY

The El Dorado Irrigation District (EID) is responsible for the operation and maintenance of three water systems: Main system, Strawberry system, and Outingdale system. The Main system represents 99% of the District's water demand serving approximately 40,600 connections compared to the Strawberry system, which serves 150 connections, and the Outingdale system, which serves approximately 190 connections. The Main system has three water treatment plants: Res 1 WTP, Res A WTP, and the El Dorado Hills WTP (EDHWTP). Each of the Strawberry system and the Outingdale system has one small treatment plant.

The water treated by all of the District's water treatment plants is mostly snowmelt water from the western slopes of the Sierra Nevada Mountains. This water is typically of high quality in that it contains low levels of natural organic matter (NOM). NOM is problematic for drinking water treatments because it reacts with chlorine added for disinfection and results in the formation of disinfection by-products (DBPs), such as trihalomethanes (THMs) and haloacetic acids (HAAs). In spite of the low NOM levels in the water sources, the District has been challenged in recent years with elevated levels of DBPs, especially HAAs, which have exceeded their regulatory limits on multiple occasions in the Main system and the Strawberry system.

This report includes a thorough analysis of the raw water quality, treated water quality, and operational conditions of all of the District’s treatment plants with the goal of identifying potential causes for the elevated DBP levels, which in turn allows for the identification of potential mitigation measures that can be implemented by the District to minimize the DBP levels in its drinking water.

MAIN SYSTEM

The Main system has a number of challenges related to DBP formation, some of which can be mitigated at the treatment plants. The Main system covers 220 square miles. With 40,600 connections, this translates into an average of one connection every 3.5 acres. This means that the water produced by the treatment plants has to travel long distances before it reaches customers, and longer water age results in increased DBP formation. This problem is exacerbated by the wide seasonal fluctuations in water demand. During the cold winter months, when the residential demand is low and the agricultural demand is minimal, the water could reside in the system for very long periods of time resulting in continued DBP formation. In fact, while most water agencies experience their highest DBP levels during the warm summer months, the District's highest DBP levels are measured during the cold winter months, mostly due to the long water age in the system.

All three plants in the Main system practice prechlorination, which means that chlorine is added to the raw water as it enters the plant. Prechlorination is practiced by many water treatment plants, and its benefits to turbidity and manganese removal have long been recognized. Unfortunately, prechlorination also results in the formation of higher levels of DBPs because the added chlorine is contacted with the highest level of NOM in the water. For example, monitoring conducted at the Res A WTP in February 2017 showed that the HAA5 level in the plant effluent was already 48 µg/L.
compared to the regulatory limit of 60 µg/L. Analysis conducted in this study showed that the District’s three Main system plants should be able to meet their disinfection requirements without prechlorination. If chlorine addition could be delayed till after sedimentation (at Res 1 WTP) or after filtration at Res A WTP and EDHWTP, it has the potential to significantly lower DBP levels in the District’s distribution system. This effect was clearly demonstrated when the District eliminated prechlorination at the Outingdale WTP in early 2012. Monitoring data suggest that this change resulted in a significant reduction in the DBP levels in the Outingdale system.

Based on the analysis conducted in this report, the following four recommendations are proposed for the Main system:

**Recommendation #1 – Utilize Res 1 WTP to meet system demand instead of Res A WTP.** The District currently turns off Res 1 WTP during the cold winter months and serves the majority of the Main system from Res A WTP. However, Res A WTP is a direct filtration plant with very limited TOC removal capabilities. This means that during the period of longest water age in the system, the plant serving the system has the least capability to reduce TOC levels compared to the two other plants. Alternatively, Res 1 WTP has a sedimentation process, which allows the District to maximize its TOC removal during periods of elevated DBP formation (i.e., winter months). For this reason, the District may want to rely on Res 1 WTP to meet the Main system water demand during the low-demand winter months.

**Recommendation #2 – Eliminate (or minimize) prechlorination at all plants.** There are many benefits to preoxidation in water treatment. For example, preoxidation typically improves coagulation and filtration performance for removal of particulate matter. In plants that treat water with elevated manganese levels, sufficient oxidation prior to filtration is necessary to achieve manganese oxidation and removal. However, in the face of high DBP formation, the use of chlorine for preoxidation cannot continue. It is recommended that alternative preoxidation strategies be evaluated.

**Recommendation #3 – Conduct Bench-Scale Testing.** Bench-scale testing is an excellent tool to answer questions about DBP formation under varying pre-treatment conditions. Specifically, bench-scale testing can identify the potential type and doses of alternative coagulants that can improve TOC removal, it can quantify the potential reduction in DBP formation without prechlorination, and it can identify chemical needs to meet alternative treatment goals. However, it is noted that bench-scale testing cannot determine the impact of eliminating pre-chlorination, or substituting it with an alternative preoxidant, on the performance and operation of the media filters, which is a critical deciding factor. That question will have to be answered either with pilot-scale or full-scale testing.

**Recommendation #4 – Conduct a Facilities Master Plan.** WQTS believes that the District can benefit from a Facilities Master Plan (FMP) for the Main system’s three treatment plants. The FMP would include a thorough evaluation of the Plants’ structural, mechanical, and electrical components; chemical feed systems; and the plant’s overall performance for meeting current and
potential future treatment goals. The outcome of the FMP will provide valuable information that feeds into the District’s CIP plan, budget, and schedule.

**STRAWBERRY SYSTEM**

The Strawberry system is also challenged with elevated HAA5 levels. Unfortunately, the Strawberry system has two limitations: First, the Strawberry WTP is a membrane filtration plant, and membrane filtration processes are greatly limited in their ability to remove NOM. Second, the water demand in the system is quite low compared to the storage volume required for fire fighting. This results in long water age in the storage tanks, which translates into increased DBP formation as the water stays in contact with free chlorine. Based on our evaluation of the Strawberry system, there are two potential alternatives to reducing DBP formation:

**Option 1** – Construct an NOM removal process that reduces the TOC concentration in the water before chlorine addition. The two options are chemical pretreatment upstream of membrane filtration, or adsorption on Granular Activated Carbon (GAC) after membrane filtration but before chlorine addition. Considering the remote location of this system, a static GAC adsorption system is likely to be more feasible than the operation of a chemical pre-treatment process that results in increased sludge generation requiring handling and disposal.

**Option 2** – Convert the Strawberry system from free chlorine to chloramine. This is achieved by adding ammonia to the water after the chlorine contactor. Chloramine does not form THMs or HAA5, and thus should result in substantial reduction in DBP levels in the system. Systems operating with chloramine in the distribution system could experience higher incidences of biological nitrification in the storage tanks. However, considering the low water temperature and low NOM concentration, the potential for nitrification are likely to be significantly low. At a minimum, the small-size Strawberry system may prove to be an ideal place for District staff to evaluate the operation and maintenance of a chloraminated system, which would greatly help in the District’s evaluation of solutions for the larger Main system.

**Recommendation** – WQTS recommends that bench-scale testing be conducted to evaluate the applicability of GAC adsorption or chloramine conversion for DBP reduction in the Strawberry system.
SECTION 1.0 –
BACKGROUND & OBJECTIVES

The El Dorado Irrigation District (EID) serves drinking water and irrigation water to nearly 120,000 residents in El Dorado County. The District operates one large system (the Main system), and two small systems: the Strawberry system and the Outingdale system. The Main system, which is shown in the adjacent map, extends southwest along Hwy 50 from Pollock Pines to El Dorado Hills by Folsom Lake covering a total of 220 square miles. The system has three water treatment plants, two of which are in the northeast corner of the system in Pollock Pines and one by Folsom Lake in El Dorado Hills. The Strawberry System is located approximately 40 miles east of Placerville along Highway 50, while the Outingdale system is located approximately 15 miles southeast of Placerville.

The raw water supply is predominantly snowmelt water from the western slopes of the Sierra-Nevada Mountains. The water is typically of high quality with very low organic content. The District uses chlorine as its primary and secondary disinfectant at all three systems. Like all community water systems, the District is required to comply with strict limits for chlorine Disinfection By-Products (DBPs) in its drinking water. DBP limits have been imposed on drinking water suppliers since 1979 when a Maximum Contaminant Limit (MCL) of 100 µg/L was set for total trihalomethanes (TTHMs) as an average across the entire system. In 1998, the TTHM MCL was lowered to 80 µg/L, and another MCL of 60 µg/L was added for the sum of five haloacetic acids (HAA5). Compliance with these MCLs continued to be based on a system-wide average of four consecutive quarters using samples collected quarterly. However, in 2012, the compliance with the DBP rules was changed from a running annual average of system-wide average to a running annual average of samples collected at each location. This is referred to as the Locational Running Annual Average (LRAA).

Prior to 2012, EID was able to meet the two DBP MCLs. However, after the change in compliance from a system-wide average to the LRAA calculation, it has been challenging for the District to maintain its DBP compliance levels below the MCL. It is evident the District needs to make changes to its system configuration and/or operation to lower DBP levels comfortably below the regulatory limits.

The objective of this study is twofold. First, to analyze the operational and water quality data from the last 5 to 10 years at all of the District's water treatment plants, with the goal of identifying potential options for lowering the formation of DBPs in the distribution system. Second, to evaluate the engineering and economic applicability of these options.

This report includes a thorough analysis of the quality of the water generated by the District's treatment plants in all three systems and presents recommendations for the 2nd phase of the study.
SECTION 2.0 – MAIN WATER SYSTEM

The District’s Main system serves more than 99% of the District’s customers. This section presents general information on the Main system’s components, and discusses the challenges the District faces with regards to DBP levels in the system.

2.1 – WATER SYSTEM DESCRIPTION

The Main System includes three surface water treatment plants that treat water from different sources. The three plants are referred to as:

- Reservoir A Water Treatment Plant (Res A WTP)
- Reservoir 1 Water Treatment Plant (Res 1 WTP)
- El Dorado Hills Water Treatment Plant (EDH WTP)

The capacities and types of the three treatment plants are listed in Table 2.1. The permitted production capacities are 19.3 MGD for EDH WTP, 26 MGD for Res 1 WTP and 56 MGD for Res A WTP. More in-depth discussions of the three treatment plants are presented in subsequent sections of this report. For the purposes of DBP formation, it is important to note all three plants utilize free chlorine as the primary and secondary disinfectant. Free chlorine is also added at the inlet to each plant for the purpose of pre-oxidation, which is needed for improved coagulation and filtration performance.

<table>
<thead>
<tr>
<th>Plant</th>
<th>Capacity</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reservoir A WTP</td>
<td>56 MGD</td>
<td>Approved Alternative, In-Line Filtration Plant</td>
</tr>
<tr>
<td>Reservoir 1 WTP</td>
<td>26 MGD</td>
<td>Conventional Filtration Plant</td>
</tr>
<tr>
<td>El Dorado Hills WTP</td>
<td>19.3 MGD</td>
<td>Approved Alternative Filtration, Boyant Media Flocculation and Filtration Plant</td>
</tr>
</tbody>
</table>

Figure 2.1 shows a general map of the locations of the three plants and the water storage tanks in the system. The majority of the Main System is fed from Res A WTP and Res 1 WTP, which draw their waters from Jenkinson Lake and Forebay Reservoir, respectively. The western portion of the system (Zone 2 service area) is fed primarily by the EDH WTP, which draws its water from Folsom Lake. The Main System also contains 34 storage tanks, five of which are currently out of service. Table 2.2 lists the names and capacities of the 29 in-service tanks in the Main System. The total storage capacity in the system is calculated at 65.3 MG. However, based on feedback from EID staff, the tanks operate at approximately 60% to 80% of capacity. Assuming an average of 70%, the typical storage volume in the system is estimated at 46 MG.
SECTION 2 – MAIN WATER SYSTEM

El Dorado Irrigation District

WQTS

El Dorado Irrigation District - WTPs, Storage Facilities & DBP Sampling Sites
Figure 2.1

Sources: Esri, HERE, DeLorme, Intermap, Increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Earl Japan, METI, Eari, China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community.
Table 2.2 – Water Storage Tanks in the Main System

<table>
<thead>
<tr>
<th>Tank Designation</th>
<th>Capacity, MG</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOLRES</td>
<td>3.90</td>
</tr>
<tr>
<td>MHRES</td>
<td>0.80</td>
</tr>
<tr>
<td>PPRES</td>
<td>2.60</td>
</tr>
<tr>
<td>RES1</td>
<td>2.70</td>
</tr>
<tr>
<td>RES11</td>
<td>4.80</td>
</tr>
<tr>
<td>RESA</td>
<td>2.28</td>
</tr>
<tr>
<td>RESB</td>
<td>1.50</td>
</tr>
<tr>
<td>RESC</td>
<td>1.50</td>
</tr>
<tr>
<td>BASS LAKE DW TANK 2</td>
<td>4.00</td>
</tr>
<tr>
<td>GREENSTONE DW TANK</td>
<td>0.40</td>
</tr>
<tr>
<td>HIGHLAND VIEW DW TANK 1</td>
<td>0.32</td>
</tr>
<tr>
<td>MONTE VISTA DW TANK</td>
<td>0.13</td>
</tr>
<tr>
<td>OAKRIDGE DW TANK 1</td>
<td>3.00</td>
</tr>
<tr>
<td>OAKRIDGE DW TANK 2</td>
<td>5.00</td>
</tr>
<tr>
<td>RDSDWT</td>
<td>0.30</td>
</tr>
<tr>
<td>RES12DWT1</td>
<td>4.20</td>
</tr>
<tr>
<td>RES12DWT2</td>
<td>4.20</td>
</tr>
<tr>
<td>RES2DWT1</td>
<td>5.87</td>
</tr>
<tr>
<td>RES4DWT</td>
<td>0.50</td>
</tr>
<tr>
<td>RES5DWT</td>
<td>1.00</td>
</tr>
<tr>
<td>RES6DWT</td>
<td>3.50</td>
</tr>
<tr>
<td>RES7DWT2</td>
<td>2.80</td>
</tr>
<tr>
<td>RES9DWT</td>
<td>2.00</td>
</tr>
<tr>
<td>RVDWT</td>
<td>1.00</td>
</tr>
<tr>
<td>SFDWT</td>
<td>2.00</td>
</tr>
<tr>
<td>SPHDWT</td>
<td>0.75</td>
</tr>
<tr>
<td>SBDWT</td>
<td>0.40</td>
</tr>
<tr>
<td>VVDWT1</td>
<td>3.00</td>
</tr>
<tr>
<td>VVDWT2</td>
<td>0.84</td>
</tr>
<tr>
<td><strong>Total Capacity</strong></td>
<td><strong>65.3 MG</strong></td>
</tr>
<tr>
<td><strong>Operating Range as % of Total</strong></td>
<td>~70%</td>
</tr>
<tr>
<td><strong>Approx. Total Operating Volume</strong></td>
<td><strong>45.7 MG</strong></td>
</tr>
</tbody>
</table>

Figure 2.2 shows a profile of the daily water demand in the Main system and Figure 2.3 shows the annual water demand from 2006 through 2016. It should be noted that the reference to water demand in this document is somewhat misleading since the values actually reflect the water production from the three treatment plants in the Main System. Therefore, these values actually reflect the sum of the water demand and water loss in the system. However, for the purposes of this report, the water production will be used to represent water demand.

As shown in Figure 2.2, the system demand fluctuates drastically between seasons with the total demand decreasing to approximately 10 MGD in the winter months and increasing to as high as
87 MGD (2006) during the summer months. Moreover, there is a clear trend in decreasing water demand over the last 10 years reflected in the annual demand (Figure 2.3).

Using the demand information presented in Figures 2.2 and 2.3, and assuming a system storage volume of 46 MG, Figure 2.4 and 2.5 present the annual average water age and maximum daily water age in the system. With the decrease in annual water demand from 46,000 AFY in 2006 to 29,000 AFY in 2016, the annual average water age has increased from 26 hours to 42 hours (Figure 2.4). However, during the winter season when the entire water system demand decreases to 10 MGD or below, the water age increases to as high as 9.2 days (2012 in Figure 2.4). It should be emphasized that these values are merely average values across the entire system. It is understood that the water age has a broad distribution, and some locations are expected to have a water age that is substantially higher than the average.
2.2 – DISINFECTION BY-PRODUCTS (DBPs)

Distribution system DBP monitoring results obtained by the District between 2005 and 2016 were carefully analyzed with the goal of understanding their trends and variability. Before discussing the analysis, it is worth noting the DBP compliance requirement. Prior to 2012, the Stage 1 D/DBP Rule mandated compliance with the DBP limits be based on the system wide Running Annual Average (RAA) calculated quarterly using quarterly samples collected from various locations in the distribution system. This applied to TTHMs, which had an MCL of 80 µg/L, and to HAA5, which had an MCL of 60 µg/L. However, the Stage 2 D/DBP Rule, which became applicable in 2012, changed the requirements by mandating compliance with the same MCL levels at individual sites in the distribution system in which the running annual average at each location, referred to as the Locational Running Annual Average (LRAA), is calculated quarterly using quarterly samples.

Figure 2.6 shows the systemwide RAA for THMs in the Main System calculated using all values reported during each period. The solid circles represent the RAA levels prior to 2012 (Stage 1 D/DBP Rule) when the systemwide RAA calculation was used to determine compliance. After 2012, the calculated RAA levels are represented by the shaded circles to emphasize that the RAA calculation is not application during this period. It is presented only to evaluate changes in average system levels. It is also noted that the sampling sites used to calculate the RAA values after 2012 are not the same as those used to calculate it before 2012. On the other hand, Figure 2.7 shows the LRAA profiles at three compliance locations under the Stage 2 D/DBP Rule (after 2012). Two of these locations were a carryover from the Stage 1 D/DBP Rule monitoring, and therefore their results were used to evaluate how the LRAA levels would have been at those locations prior to 2012. Those results are presented in hashed symbols in Figure 2.7.

The profiles in both Figures 2.6 and 2.7 suggest that there has been a gradual increase in systemwide THM level in the distribution system. However, had compliance continued to be based on the systemwide RAA, the highest compliance level would have still remained below 65 µg/L. However, under Stage 2 D/DBP Rule compliance calculation, the LRAA level at ST2-13 (diamond
symbols in Figure 2.7) came very close to the MCL of 80 µg/L in 2015 and early 2016. In addition, Figure 2.7 shows the LRAA been used as the basis for THM MCL compliance prior to 2012, the MCL would have been exceeded at ST1-230 (square symbols).

A similar analysis was conducted for the HAA5 levels, and the results are presented in Figures 2.8 and 2.9. In Figure 2.8, the systemwide RAA profile is presented under Stage 1 D/DBP Rule, and then after Stage 2 D/DBP Rule became in effect. The profiles show that the RAA HAA5 has been relatively stable since 2011. On the other hand, Figure 2.9 shows the LRAA profiles at the three Stage 2 sampling sites. The LRAA levels at ST1-550 and ST1-230 were also back calculated in the Stage 1 D/DBP Rule period (prior to 2012). The analysis also shows that had the Stage 2 D/DBP Rule applied in 2011, the MCL would have been exceeded at ST1-550 (shaded triangles). It is noted that the LRAA HAA5 level at ST2-13 exceeded the HAA5 MCL of 60 µg/L during the first quarter of 2015 (61 µg/L). This location was not monitored during the Stage 1 D/DBP Rule compliance period, and therefore, no historical values are available for it.

Figures 2.10 and 2.11 present 10-year profiles of the quarterly TTHM and HAA5 levels measured at three locations in the Main System. An interesting observation from these profiles is that the seasonal variability of either DBPs was quite low through 2009. However, since then, there seems to be high seasonal fluctuations in the levels of TTHMs and HAA5 at each sampling location. It is unclear yet what caused this change in the seasonal variability.
Seasonal fluctuations in DBP levels in the distribution system are experienced by all water systems. These fluctuations are caused by the compounding effects of various factors that cause changes in the rate and extend of DBP formation. Of particular interest are temperature and water age. DBP formation is accelerated at higher water temperatures experienced during the summer months. However, longer water age experienced during the low-demand winter months result in an increase in DBP levels at the sampling sites. For most agencies, the effect of higher summer temperature on DBP formation surpasses the effect of longer contact time during cold(er) winter months resulting in higher levels of DBPs during the summer months than the winter months. However, that is not the case for the District. Figures 2.12 and 2.13 present the average THM and HAA5 levels for each monitoring quarter (2012 to 2016) at the same three sampling sites analyzed in Figure 2.10 and 2.11. The analysis shows that, in general, the THM and HAA5 levels in the third quarter are the lowest compared to all the other quarters, and those measured in the first quarter are typically the highest. This stresses the significance of the long water age in the distribution system during the low-demand winter months.
3.1 – PLANT DESCRIPTION

Res A WTP is a 56 MGD inline filtration plant that treats water from Jenkinson Lake and discharges it into Reservoir A. Figure 3.1 presents a schematic line diagram of the treatment plant unit processes. Chlorine is added to the raw water approximately 100 feet upstream of the flash mix process at which a coagulant is added. The water then flows through a short pipe before it splits between 12 filters operated in parallel. The filters, each of which has the dimensions of 24 ft by 26 ft, contain 24 inches of anthracite over 12 inches of sand. Filtered water collects in a common channel and then overflows into a clearwell where chlorine, caustic soda, and orthophosphate are added. Pumps draw some water from the clearwell to the Sly Park Hills pressure zone. The remaining water flows by gravity to Reservoir A, and then to the distribution system.

Figure 3.1 – Schematic Line Diagram of Reservoir A Water Treatment Plant

3.2 – PLANT OPERATION & PERFORMANCE

Figures 3.2 shows a profile of flow through Res A WTP between 2006 and 2016. As with the total system, flow through Res A WTP varies from a low of about 5 MGD during the low-demand winter months, and a high of approximately 45 MGD during the summer months.

Figures 3.3 and 3.4 present profiles of temperature and pH of the raw water entering Res A WTP. It is noted that the water is drawn from the bottom of Jenkinson Lake, which explains the generally cold water temperature.
of 6 to 10 °C year-round. The rise in temperature to a high of 14 °C in the fall of 2015 is likely a result of a lake turnover during that year. As shown in Figure 3.4, the raw water pH averages 7.0, and fluctuates between 6.5 and 7.5. It is noted that the raw water alkalinity is relatively stable at approximately 15 mg/L as CaCO$_3$.

Figure 3.3 – Profile of Water Temperature entering the Res A WTP

Figure 3.4 – Profile of Water pH in the Influent to Res A WTP

Figure 3.5 and 3.6 present the coagulant dose and chlorine dose applied at the rapid mix of Res A WTP. From 2006 through 2013, SWT 8809 was the coagulant type used and was applied at a dose ranging from 1 mg/L to approximately 4 mg/L. In 2014, the coagulant was changed to NTU925 and has been applied at a similar dose as that used for SWT 8809. Figure 3.6 shows the pre-chlorine dose applied at Res A WTP averaged about 2 mg/L through 2014. However, the chlorine dose appears to have increased significantly in 2015, reaching as high as 5.8 mg/L during the fall of 2015. The pre-chlorine dose is commonly set to achieve a target chlorine residual in the combined filter effluent (CFE) in order to meet the Giardia and virus inactivation requirements.

Figure 3.5 – Profile of Coagulant Dose Applied at Res A WTP

Figure 3.6 – Profile of Chlorine Dose Applied at the Rapid Mix of Res A WTP
Figures 3.7 and 3.8 present the profiles of the chlorine residual levels in the CFE and plant outlet, respectively. In general, the chlorine residual leaving the plant is maintained at an average of 1 mg/L, but has fluctuated significantly during the last three years compared to earlier years.

Caustic addition to the filtered water at Res A WTP began in 2014 and continues through today. The caustic dose is currently maintained between 2.5 mg/L and 3.0 mg/L. The effect of the chemical doses applied on the pH of the water in the clearwell and Reservoir A outlet is depicted in Figures 3.9 and 3.10, respectively. Prior to the initiation of caustic addition in late 2014, the clearwell water pH fluctuated greatly between a low of <7.0 to a high of >9.5. After start of caustic addition, the pH fluctuations decreased significantly, but were not eliminated. As shown in Figure 3.9, the clearwell water pH was approximately 7.0 at the end of 2015, and then increased to about 7.8 in early 2016. It then gradually decreased back to 7.0 towards the end of 2016. Fortunately, the 2.6 MG water volume in Reservoir A tempers the fluctuations in pH (Figure 3.10) and helps maintain a somewhat narrow pH range in the water entering the distribution system.

When evaluating the formation of DBPs, the concentration of natural organic matter in the water is of critical importance. Figure 3.11 shows the profiles of the total organic carbon (TOC)
concentrations in the raw water and treated water from the Res A WTP. Figure 3.12 presents the calculated percent TOC removal achieved. Figure 3.11 shows that the raw water TOC is typically between 1.0 and 2.0 mg/L with only few excursions above 2.0 mg/L. With the low coagulant dose applied, TOC removal through the plant is typically at or below 20% as shown by Figure 3.12.

![Figure 3.11 – Profiles of TOC in the Raw and Treated Waters from the Res A WTP](image1.png)

![Figure 3.12 – Profile of Percent TOC Removal through the Res A WTP](image2.png)

Figures 3.13 and 3.14 show profiles of the quarterly THM and HAA5 levels, respectively, measured in samples collected from three Stage 2 D/DBP compliance stations. Also plotted on each graph is the LRAA compliance level as calculated under the Stage 2 D/DBP Rule. The top pair of graphs is from 4771 Sly Park Road, which is at the corner of Sly Park Road and Jenkinson Circle. This site is supplied by Res 1 WTP. However, it receives 100% Res A WTP when Res 1 WTP is offline. The middle graphs are for the THM and HAA5 levels measured at 5170 Highcrest Road, and the bottom graphs are for the levels measured at 7944 Crystal Blvd. Both of these sites are believed to receive almost 100% Res A WTP water.

The profiles of TTHMs and HAA5 levels at 4771 Sly Park Road show a dramatic shift in behavior between 2010 and 2011. While the TTHMs were approximately 40 μg/L prior to 2011, they dramatically increased to 80 μg/L starting in the first quarter of 2011, and continued at that level through the middle of 2012 before they decreased to approximately 60 μg/L. In addition, while the TTHMs and HAA5 levels fluctuated seasonally prior to 2011, the fluctuations were mild. However, starting in 2011 for HAA5 and 2013 for TTHMs, quarterly fluctuations were significantly larger. It is unclear whether these changes were caused by a change in treatment practice, water source quality, or other factors.
For the Highcrest Dr. site, the TTHMs fluctuated somewhat normally and remained generally between 40 and 50 µg/L. However, the HAA5 levels were relatively stable below 40 µg/L prior to 2009. After 2009, the average level continued to gradually increase, but also the seasonal fluctuations increased dramatically. By 2015, the HAA5 level was 40 µg/L during the first quarter, and increased to 80 µg/L by the first quarter of 2016.

The 7944 Crystal Blvd. site was added after the promulgation of the Stage 2 D/DBP Rule, which is why its results are limited to 2012 and beyond. Considering the location of this site in the system, it is believed to be 100% dominated by Res A WTP water. The TTHM values at this site fluctuated seasonally between 50 and 80 µg/L, which is reasonable. As for HAA5, they were measured at approximately 40 µg/L in 2012, and have since declined to an average of 30 µg/L.
3.3 – SDS DBP FORMATION TESTING

On February 16, 2017, EID staff conducted a Simulated Distribution System (SDS) DBP formation test on a water sample collected from the effluent of the Res A WTP. In this test, four amber glass bottles were filled with treated water from the outlet of the Res A WTP. At the time of sampling, TTHM and HAA5 samples were also collected from the plant effluent. The plant effluent was also analyzed for chlorine residual, pH, and temperature. The four bottles were then stored at the temperature of the plant effluent water for several days. One bottle was then opened at days 1, 4, 7, and 14 and analyzed for TTHMs, HAA5, chlorine residual, pH, and temperature.

The SDS testing results are presented in Figures 3.15 through 3.18. Figure 3.15 shows that the water pH was relatively stable at 8.0, while the temperature ranged from 5.6 °C and 12 °C. It is likely that the wide temperature range is only an artifact of the procedure used to measure the temperature, while in fact the temperature of the water in the bottles during the test remained relatively steady. Figure 3.16 shows the decay of the chlorine residual in the water over the 14-day contact period. The line shown is a 1st-order decay rate fit to the data.

Figures 3.17 and 3.18 present the TTHM and HAA5 results, respectively. In Figure 3.17, the results show that the TTHM concentration leaving the plant was already 54 µg/L. Over the next 14 days, the concentration appears to have increased to 75 µg/L and then decreased to 60 µg/L. Nonetheless, the results show that the water leaving the plant already contains 80% to 90% of the total TTHM formation over 14 days of exposure to chlorine. Similarly, Figure 3.18 shows that the HAA5 level in the plant effluent water was already at 48 µg/L, which is already 80% of the HAA5 MCL. After the first day of contact with chlorine, the concentration increased to 62 µg/L, and then remained at approximately that level for the next 6 days, increasing only to 73 µg/L on the 14th day of contact with chlorine. These results support the observation from the TTHM results that the vast majority of the DBPs are formed before the water leaves the treatment plant.
3.4 – DISINFECTION COMPLIANCE

As a direct filtration plant, the Res A WTP is required to meet the minimum disinfection requirements listed in Table 3.1 below. The key target organism for the plant is giardia cysts. The plant must achieve a minimum of 1.0 logs of giardia inactivation with chlorine before the water is served to the first customer.

Table 3.1 – Minimum Disinfection Requirements for the Res A WTP

<table>
<thead>
<tr>
<th>Target Organism</th>
<th>Min. Total Log Removal Required</th>
<th>Direct Filtration Log Removal Credit</th>
<th>Min. Required Log Inactivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Giardia cysts</td>
<td>3.0</td>
<td>2.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Virus</td>
<td>4.0</td>
<td>1.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Cryptosporidium oocysts</td>
<td>2.0</td>
<td>2.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Log inactivation determination for the Res A WTP is complicated because the plant flow splits in three directions after the last chemical addition point and compliance needs to be met for each of the three flows. Due to volume limitations at the plant, chlorine is added to the raw water and is maintained throughout the entire treatment plant and into each of the three flows. CT calculations are then carried out through the plant and then through each flow branch up to the first connection on each portion. Table 3.2 summarizes the actual volumes, baffling factors, and effective volumes for the portions of the plant and the various components of the three flow directions used in the disinfection calculation. These values were based on the CT calculation spreadsheet provided by the District.
Table 3.2 – Effective Disinfection Volume Calculations for the Res A WTP

<table>
<thead>
<tr>
<th>Section</th>
<th>Part</th>
<th>Actual Volume, gallons</th>
<th>Baffling Factor</th>
<th>Effective Volume, gallons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant</td>
<td>Inlet Pipe</td>
<td>50,732</td>
<td>1.0</td>
<td>50,732</td>
</tr>
<tr>
<td></td>
<td>Filters</td>
<td>359,399</td>
<td>0.7</td>
<td>251,579</td>
</tr>
<tr>
<td>Sly Park Hills Line</td>
<td>Pipe to Tank</td>
<td>34,218</td>
<td>1.0</td>
<td>34,218</td>
</tr>
<tr>
<td></td>
<td>Sly Park Hills Tank</td>
<td>525,000</td>
<td>0.1</td>
<td>52,500</td>
</tr>
<tr>
<td></td>
<td>Pipe to 1st Connection</td>
<td>3,513</td>
<td>1.0</td>
<td>3,513</td>
</tr>
<tr>
<td>Camino Conduit to Rancho Del Sol.</td>
<td>Res A</td>
<td>1,580,000</td>
<td>0.5</td>
<td>790,000</td>
</tr>
<tr>
<td></td>
<td>Pipe to 1st Connection</td>
<td>1,050,993</td>
<td>1.0</td>
<td>1,050,993</td>
</tr>
<tr>
<td>Pleasant Oak Main to Reservoir B</td>
<td>Res A</td>
<td>1,580,000</td>
<td>0.5</td>
<td>790,000</td>
</tr>
<tr>
<td></td>
<td>Pipe to 1st Connection</td>
<td>986,652</td>
<td>1.0</td>
<td>986,652</td>
</tr>
<tr>
<td></td>
<td>Reservoir B</td>
<td>1,400,000</td>
<td>0.1</td>
<td>140,000</td>
</tr>
</tbody>
</table>

NOTE: effective volume is calculated as the product of the actual volume and the baffling factor.

Using the values in Table 3.2, an analysis was conducted to determine the CT ratios achieved at the Res A WTP under two scenarios: 1) with chlorine maintained throughout the plant and to the first customer at a concentration of 1 mg/L and 2) chlorine addition only after filtration and then maintained at 1 mg/L to the first customer on each line. As a conservative measure, the water pH was assumed to be as high as 8.0 everywhere and the water temperature was assumed to be 5 °C. The flowrate through the plant was set at 48 MGD and then divided between the three zones as follows: 750 gpm to Sky Park Hills, 27.5 MGD to Camino Conduit, and 19.4 MGD to Pleasant Oak Main. These values were selected based on information provided by the District regarding the maximum flow to each zone.

The results of the analysis are presented in Figure 3.19 as individual graphs of cumulative CT ratio, expressed as percent, beginning at the inlet pipe and ending at the first customer. The analysis includes the same components currently used by the District and identified in Table 3.2 above. The top two graphs in Figure 3.19 are for Sky Park Hills, while the middle graphs are for the Camino Conduit and the bottom graphs are for the Pleasant Oak Main. For each pair of graphs, the left graph includes chlorine addition at the raw water and maintaining it through the entire plant, which is the current practice at Res A WTP. The right graph assumes chlorine addition only after the media filters at the plant. The red line on each graph identifies the minimum CT ratio required (i.e., CT ratio of 1.0).
**Figure 3.19 – *Giardia* CT Compliance at the Res A WTP under a total flowrate of 48 MGD.** Top graphs are for the Sky Park Hills line (@ 750 gpm), middle graphs are for the Camino Conduit flow (@ 27.5 MGD), and the bottom graphs are for the Pleasant Oak Main flow (@ 19.4 MGD). Left graphs include prechlorination, while the right graphs are with chlorine added only after the filters.
The analysis summarized in Figure 3.19 demonstrates that the minimum disinfection requirements at the Res A WTP can be met without the contact time through the inlet pipe or the filter, and therefore can be met without prechlorination. While this analysis was limited to a maximum flowrate of 48 MGD, the flowrate through the plant has not exceeded 48 MGD for more than 10 years. It is also noted that the water temperature was assumed to be only 5 °C, which is far lower than the water temperature during the high-demand summer months. Therefore, under warmer temperatures, the plant should be able to meet its disinfection requirements downstream of the filters at the full rated capacity of 56 MGD.

However, the challenge remains that the raw water treated by Res A WTP contains moderate levels of manganese ranging from 20 to 25 µg/L, which requires some level of pre-oxidation upstream of filtration. Without pre-oxidation, dissolved manganese will pass through the filters and precipitate in the reservoir after chlorine addition causing a rise in turbidity and water discoloration. Therefore, some level of pre-oxidation will be necessary, and chlorine is the readily available oxidant at the plant. Nonetheless, the District may be able to achieve the same level of manganese oxidation with a significantly lower chlorine dose. Alternatively, since manganese oxidation with chlorine is more efficient at higher pH values, the District may benefit from moving the caustic feed to the raw water, which in turn will allow for a reduction in the chlorine dose and/or contact time while maintaining efficient manganese oxidation.
4.1 – PLANT DESCRIPTION

Res 1 WTP is a 26 MGD conventional filtration plant that treats water from Forebay Reservoir received via the El Dorado Canal, and discharges the treated water into Reservoir 1. Figure 4.1 presents a schematic line diagram of the treatment plant unit processes. The raw water passes through a mechanical bar screen before it is dosed with coagulant(s), at the flash mix process. The District also adds chlorine to the flash mix. The water then flows through flocculation, a non-ionic floc-aid is added at the inlet to the last flocculation chamber, and a concrete lined sedimentation basin before it passes through the media filters. Chlorine is added to the settled water upstream of the filters and then to the filtered water before the water is discharged to Reservoir 1. The filtered water is also dosed with soda ash for alkalinity adjustment and with orthophosphate for corrosion control.

Figure 4.1 – Schematic Line Diagram of Reservoir 1 Water Treatment Plant

4.2 – PLANT OPERATION & PERFORMANCE

Figure 4.2 presents a profile of the daily flowrate through Res 1 WTP since January 2006, while Figure 4.3 focuses on the daily flowrate over the last five years. Unlike Res A WTP, Res 1 WTP is operated intermittently, where it is turned off for seasonal project 184 canal maintenance (Oct 1 to Mid December). Depending on the water demand, Res 1 WTP may be shut off for two months to more than 6 months of the year. Figures 4.2 and 4.3 also show that as of January 2009, the flowrate through the Res 1 WTP hasn’t exceeded 20 MGD except for few days during the summer of 2013, and it was only up to 20.6 MGD.
Figure 4.4 and 4.5 present the profiles of the pH and alkalinity, respectively, in the raw water entering Res 1 WTP since January 2009. The raw water has a relatively stable neutral pH of 7.0 to 7.5, with a low alkalinity of only 10 to 15 mg/L as CaCO$_3$. These levels have implications to the coagulation process due to the difficulty of using metal coagulants (i.e., alum or ferric) to achieve coagulation in low-alkalinity water. Figure 4.6 shows the profile of the primary coagulant concentration used at the plant. Between 2006 and 2009, alum was used as the primary coagulant at the Res 1 WTP. In 2009, alum was replaced with NTU 911, which is a coagulant blend of aluminum chlorohydrate (ACH) and cationic polymer. Alum coagulation consumes alkalinity, while ACH does not. To meet the alum’s alkalinity demand, the District added lime to the raw water when alum was used as a coagulant (see Figure 4.7), but was terminated when the District switched from alum to NTU 911.
Figure 4.6 – Profile of Coagulant Doses Applied at the Res 1 WTP (2006 – 2016)

Figure 4.7 – Profile of Lime Dose Applied to the Raw Water at the Res 1 WTP (2006 – 2016)

Figure 4.8 presents the TOC concentration profiles in the raw water and treated water from Res 1 WTP from 2008 through 2016. The raw water TOC concentration has ranged from 1.0 mg/L to as high as 4.0 mg/L. The treated water TOC has also ranged from 0.6 mg/L to 3.5 mg/L. However, the average treated-water TOC has been approximately 1.0 mg/L, which is quite a low concentration when evaluated within the context of DBP formation. Figure 4.9 presents the calculated TOC removal, which has generated been between 30 and 40%.

Figure 4.8 – Profiles of the TOC Concentration in the Raw and Treated Waters from the Res 1 WTP (2008 – 2016)

Figure 4.9 – Profiles of the Percent TOC Removal Achieved at the Res 1 WTP (2008 – 2016)

As shown in Figure 4.1, chlorine is added at three locations at Res 1 WTP: raw water, filter influent (pre-filter), and filtered water (post-filter). Figure 4.10 shows a profile of the raw-water chlorine dose, while Figure 4.11 shows profiles of the chlorine doses added to the filter influent (blue circles) and the filter effluent (yellow squares). Over the last five years, chlorine has been added to the raw water a dose range from 0.5 to 1.0 mg/L. Through the first quarter of 2014, chlorine was also added to the settled water at a dose of approximately 1.0 mg/L and then to the filtered water at
a similar dose of approximately 1.0 mg/L. However, since then, the pre-filter chlorine dose was increased to an average of 2.0 mg/L and post-chlorination was terminated. The resulting chlorine residuals measured at various locations in the treatment plant are presented in Figures 4.12 and 4.13. The results show that the raw water chlorine dose results in a chlorine of up to 0.25 mg/L in the settled water. The pre-filter chlorine dose has resulted in a free chlorine residual of approximately 0.5 mg/L in the filter effluent through the first quarter of 2014, and then approximately 1.0 mg/L chlorine after the pre-filter dose was increased to 2.0 mg/L.

Finally, Figure 4.14 presents the chlorine residual measured in Res 1 outlet since January 2012. On average, the chlorine residual was maintained at approximately 1.0 mg/L. Figure 4.15 also shows that the water pH has been maintained between 7.5 and 8.0. While not shown, since 2012, the Districts has been adding approximately 2.5 mg/L of soda ash to the filtered water.
4.3 – DISINFECTION BY-PRODUCTS

In discussions with District staff, it was determined that two Stage 2 DBP sites are likely to receive blended water from Res A WTP and Res 1 WTP water. These are the McGuire & Rock Creek Rd. site, and the 4801 Luneman Rd. site. The locations of these two sites were noted in Figure 2.1 in Section 2. Figure 4.16 and 4.17 present the TTHM and HAA5 results at the first site, while Figure 4.18 and 4.19 present the TTHM and HAA5 results at the second site. Each figure includes the quarterly sampling results (blue circles), as well as the calculated LRAA values (red triangles) at the site starting in the fourth quarter of 2012.

The TTHM levels at the McGuire Ct. & Rock Creek Rd. fluctuated between approximately 40 and 85 µg/L, with the LRAA TTHM averaging between 60 and 75 µg/L. Similarly, the HAA5 levels ranged between 25 µg/L and 70 µg/L, while the LRAA HAA5 averaged 35 µg/L to 50 µg/L.
For the Luneman Rd. site, Figure 4.18 shows that the quarterly TTHMs ranged from 30 µg/L to 75 µg/L, while the LRAA TTHMs averaged 40 to 50 µg/L. On the other hand, Figure 4.19 shows that the HAA5 levels ranged from 30 µg/L to as high as 84 µg/L resulting in an LRAA HAA5 of 40 to 62 µg/L. The LRAA of 62 µg/L during the first quarter of 2016 translates into a violation of the primary HAA5 MCL, and it occurred because of the unusually high HAA5 of 84 µg/L measured during that quarter. A close examination of the data from that quarter shows that the Res 1 WTP was actually off-line during that quarter, which suggests that this sampling site was receiving water from Res A WTP when it registered this high HAA5 level. This is consistent with the high value measured at the McGuire Ct. & Rock Creek Rd. site (Figure 4.17) during that quarter, as well as the HAA5 levels measured at the 4771 Sly Park Rd. and 5170 Highcrest Dr. sites as presented in Figure 3.16.

4.4 – DISINFECTION COMPLIANCE

As a conventional filtration plant, the Res 1 WTP is required to meet the minimum disinfection requirements listed in Table 4.1 below. The key target organism for the plant is *Giardia* cysts. The plant must achieve a minimum of 0.5 logs of *giardia* inactivation with chlorine before the water is served to the first customer.

<table>
<thead>
<tr>
<th>Target Organism</th>
<th>Min. Total Log Removal Required</th>
<th>Conventional Filtration Log Removal Credit</th>
<th>Min. Required Log Inactivation</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Giardia</em> cysts</td>
<td>3.0</td>
<td>2.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Virus</td>
<td>4.0</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td><em>Cryptosporidium</em> oocysts</td>
<td>2.0</td>
<td>2.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>
The District meets its Log inactivation requirements at the Res 1 WTP by calculating the CT value across the entire plant and through Res 1. Table 4.2 presents the actual volumes, baffling factors, and effective volumes for the various plant components used in the disinfection calculation. These values were obtained from the CT calculation spreadsheet provided by the District.

Table 4.2 – Effective Disinfection Volume Calculations for the Res 1 WTP

<table>
<thead>
<tr>
<th>Plant Section</th>
<th>Actual Volume, gallons</th>
<th>Baffling Factor</th>
<th>Effective Volume, gallons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floc Basin</td>
<td>3,010,070</td>
<td>0.7</td>
<td>210,749</td>
</tr>
<tr>
<td>Sedimentation Basin</td>
<td>1,400,000</td>
<td>0.3</td>
<td>420,000</td>
</tr>
<tr>
<td>Filters</td>
<td>164,934</td>
<td>0.7</td>
<td>115,454</td>
</tr>
<tr>
<td>Pipes to Reservoir 1</td>
<td>26,423</td>
<td>1.0</td>
<td>26,423</td>
</tr>
<tr>
<td>Reservoir 1</td>
<td>1,890,000</td>
<td>0.1</td>
<td>189,000</td>
</tr>
</tbody>
</table>

Using the values in Table 4.2, an analysis was conducted to determine the CT compliance ratios at the maximum flowrate of 26 MGD through the Res 1 WTP with and without prechlorination. For the pre-chlorination scenario, the chlorine residual was assumed to be 0.5 mg/L in the floc basin effluent, and 0.25 mg/L in the sedimentation basin effluent. The chlorine residual was then assumed to be 1.0 mg/L in all downstream processes and through Res 1 outlet. For the no pre-chlorine scenario, the chlorine residual was assumed to be zero in the flocculation and sedimentation basins, and then 1 mg/L through Res 1 outlet. As a conservative measure, the water pH was assumed to be as high as 8.0 at all locations, and the water temperature was assumed to be as low as 0.5 °C based on historical values.

The results of the analysis are presented in Figure 4.20 as individual graphs of cumulative CT ratio, expressed as percent, beginning at the flocculation basin and ending at the Res 1 outlet. The analysis includes the same components currently used by the District and identified in Table 4.2 above. The left graph includes chlorine addition at the raw water as discussed above, which is the current practice at Res 1 WTP. The right graph assumes no raw water chlorination and the first chlorine addition taking place at the filter influent at a dose resulting in a chlorine residual of 1.0 mg/L in the filter effluent. The red line on each graph identifies the minimum CT ratio required (i.e., CT ratio of 1.0).

The analysis presented in Figure 4.20 shows that the Res 1 WTP cannot meet the disinfection requirements at 26 MGD and 0.5 °C with or without prechlorination. In reality, the flowrate through the plant is much lower than 26 MGD at this low temperature, and is at higher levels only during the warm summer months when the demand is high. Figure 4.21 shows the seasonal variation in the influent water temperature (circles) and flowrate (triangles) at Res 1 WTP over the last five years. The relationship between flowrate and water temperature is clearly demonstrated by this graph. Figure 4.22 shows a plot of the maximum flowrate (red line) that can be treated through the plant at various water temperatures while meeting the giardia inactivation goals.
without prechlorination. Also plotted in Figure 4.22 is the flowrate and temperature for each operating day during the last 5 years. The plot shows that the flowrate through the plant was below the maximum flowrate at all times. This suggests that the Res 1 WTP could have met its inactivation requirements without prechlorination on any day during the last five years.

![Figure 4.20 – Giardia CT Compliance at the Res 1 WTP under a total flowrate of 26 MGD. Left graph includes prechlorination, while the right graph is with chlorine added only after sedimentation. Water Temperature was conservatively assumed at 0.5 °C](image)

Figure 4.20 – Giardia CT Compliance at the Res 1 WTP under a total flowrate of 26 MGD. Left graph includes prechlorination, while the right graph is with chlorine added only after sedimentation. Water Temperature was conservatively assumed at 0.5 °C

![Figure 4.21 – Temperature and flowrate profiles at the Res 1 WTP (2012 – 2016)](image)

Figure 4.21 – Temperature and flowrate profiles at the Res 1 WTP (2012 – 2016)

![Figure 4.22 – Analysis of Maximum Flowrate v. Temperature at Res 1 WTP while Achieving a CT Ratio ≥1.0 without Prechlorination](image)

Figure 4.22 – Analysis of Maximum Flowrate v. Temperature at Res 1 WTP while Achieving a CT Ratio ≥1.0 without Prechlorination

It is noted that the State was going through a drought period over the last five years and the water demand was lower that it could have been otherwise. This suggests that the Res 1 WTP may be challenged to meet its disinfection requirements under more typical conditions of high(er) demand during colder periods.
5.1 – PLANT DESCRIPTION

The EDHWTP is a 19.3 MGD conventional filtration plant that treats water from Folsom Lake. Figure 5.1 presents a schematic line diagram of the treatment plant unit processes. The raw water pumped from the lake is discharged into a raw-water equalization tank after which it flows by gravity through the rest of the plant. The water first passes through a flash mixer where it is dosed with a coagulant, a polymer, and chlorine. The water then flows through six flocculation and clarification package units. The filtered water from all the units then flows into a baffled chlorine contact basin and chlorine is added to the water as it enters the basin. Water is then pumped from the end of the chlorine contact basin to the 820 and 960 zones.

![Figure 5.1 – Schematic Line Diagram of the El Dorado Hills Water Treatment Plant](image)

5.2 – PLANT OPERATION & PERFORMANCE

Figure 5.2 presents a profile of the daily flowrate through the EHDWTP since January 2006, while Figure 5.3 focuses on the daily flowrate over the last five years. The plant is permitted at 19.3 MGD. Peak daily demand has been around 16 MGD over the past 5 years. However, the plant is operated at the maximum flow of 19.3 during peak flow months in order to participate in PG&E electrical load-shedding peak day power incentive programs. In addition, the District typically turns off the plant during low demand winter months to conduct heavy maintenance, but for shorter durations than Res 1 WTP. However, during the winter months of 2015 and 2016, the District continued to operate the plant, but at an average production as low as 2.5 MGD.
Figures 5.4 and 5.5 present profiles of the pH and alkalinity, respectively, of the raw water entering the EDHWTP. The pH fluctuates seasonally from a low of approximately 6.8 during the late summer months to a high 7.9 during the early January of each year. This is likely due to high runoff into Folsom Lake. Over the last five years, the raw water alkalinity varied from approximately 15 mg/L as CaCO₃ to a high of 29 mg/L as CaCO₃.

Figure 5.6 shows the raw water temperature entering the plant. During the last five years, the influent water temperature ranged from a low of 8 °C during the cold winter months to a high of 22.5 °C during the summer months. Figure 5.7 shows a profile of the TOC concentration in the raw water over the last five years. The TOC concentration ranged between 1.0 and 2.0 mg/L up through 2013, but has steadily increased since then. The TOC concentration in 2016 was virtually all above 2.0 mg/L.
Figure 5.8 shows the profile of the primary coagulant used in the EDHWTP over the last five years. For at least the last five years, the District has been using SWT 8809 or NTU 925 as the primary coagulant. This is the same ACH-Polymer blend that the District uses at Res A WTP. The typical dose has been less than 5 mg/L, with seasonal excursions to approximately 11 mg/L during the cold winter months. Contrary to alum, these coagulant blends have little effect on the pH of the water as shown by Figure 5.9 where the pH profile is virtually identical to that of the raw water pH presented earlier in Figure 5.4.

Unfortunately, the coagulant blends can only achieve moderate removal of TOC as shown in Figures 5.10 and 5.11, which include the profiles of the raw and treated water TOC (Figure 5.10) and a profile of the percent TOC removal (Figure 5.11). On average, the coagulants used at the EDHWTP during the last five years have achieved about 20 percent removal of TOC from the raw water. Under the most recent conditions, the TOC removal has increased to an average of 30 percent.
Figures 5.12 and 5.13 present the profiles of the pre-chlorine dose and post-chlorine dose, respectively, applied at the EDHWTP. Over the last five years, the pre-chlorine dose ranged from approximately 1.0 mg/L to greater than 4 mg/L during the winter of 2015. However, in general, the typical pre-chlorine dose is between 1.0 and 2.0 mg/L. Figure 5.13 shows that the post-chlorine dose has also ranged from approximately 1.0 mg/L to about 2.0 mg/L with few excursions to 3 mg/L and higher.

Figures 5.14 and 5.15 present the chlorine residual profiles in the filter effluent and the chlorine contact basin effluent, respectively. The pre-chlorine dose profiled in Figure 5.12 results in an average chlorine residual of 0.5 mg/L in the filter effluent. The high dose applied during the winter of 2015 resulted in a chlorine residual higher than 1.0 mg/L in the filter effluent. Figure 5.15 presents the residual profile in the chlorine contact basin effluent, which has been maintained at an average of approximately 1.0 mg/L over the last five years.
5.3 – DISINFECTION BY-PRODUCTS

In reviewing the system map and after discussion with District staff, three Stage 2 DBP sites were selected to represent the DBP formation in the water produced by the EDHWTP. These sites are:

1. 4625 Latrobe Rd. (ST1-550)
2. 3704 Aliso Dr. (ST2-16)
3. Chateau Montelena Rd. & Salmon Falls Rd. (ST2-13)

These three sites are currently used for determining compliance with the Stage 2 D/DBP Rule. The quarterly TTHMs and HAA5 levels measured at these three sites, along with the calculated LRAA at each site, are presented in Figure 5.16 for TTHMs and Figure 5.17 for HAA5.

Figure 5.16 shows that the LRAA for TTHMs at all three sites have all increased gradually over the last five years. For example the LRAA at the Aliso Dr. site (middle graph) increased from about 42 µg/L in early 2013 to about 55 µg/L by the third quarter of 2016. Similarly, the LRAA at the Chateau Montelena & Salmon Falls site increased from 60 µg/L in early 2013 to about 75 µg/L in early 2016 before it decreased back down to 60 µg/L by the third quarter of 2016.

The same increase in HAA5 was experienced at these two sites. The most dramatic increase took place at the Chateau Montelena Rd. & Samon Falls Rd. site as the quarterly levels fluctuated widely between 20 and 100 µg/L. This resulted in an increase in the HAA5 LRAA from approximately 30 µg/L to exceeding the MCL in February 2015. It is worth noting that this is the quarter when the pre-chlorine dose at the EDHWTP was raised well above historical levels.
5.4 – DISINFECTION COMPLIANCE

At the EDHWTP, the District calculates its disinfection credit only through the chlorine contact basin. This basin has an actual water volume of 472,207 gallons, and is assigned a baffling factor of 0.7 due to its serpentine baffle configuration, resulting in an effective disinfection volume of 330,545 gallons. Assuming a chlorine residual of 1.0 mg/L and a pH of 8.0, an analysis was conducted to determine the maximum flow rate that the plant can operate under at different water temperatures and still meet its log-inactivation requirements. Figure 5.16 shows the fluctuations in water temperature in the influent to the EDHWTP. Over the last five years, the water temperature ranged from a low of 8.0 °C and a high of 22.5 °C.
The outcome of the analysis is presented in Figure 5.17. The data points shown in this figure represent the historical daily flowrate values recorded vs. the water temperature measured on those days. The red line shown represents the maximum flowrate allowed through the contact basin at a specific temperature while still achieving a CT ratio of ≥1.0. For example, if the water temperature is 5 °C, the maximum flowrate that can be produced by the EHDWTP is 7.5 MGD. However, at a water temperature of 10 °C, the flowrate can be as high as 17.5 MGD. It is noted that all the historical daily flowrates are below the red line, which suggests that the *giardia* disinfection targets can be met under all actual plant operating conditions (assuming a chlorine residual of 1.0 mg/L and a pH of 8.0 in the contact basin effluent).

The analysis discussed above emphasizes the fact that the EDHWTP meets its disinfection requirements through the contact basin, and does not rely on the CT through the pretreatment unit processes or the filters. Therefore, the District should be able to reduce its pre-chlorine dose to the level required for treatment performance only, if any.
6.1 – PLANT DESCRIPTION

The Strawberry WTP serves drinking water to the Strawberry System, which is a small water system with approximately 150 service connections. The system is located approximately 40 miles east of Placerville along Highway 50. The Strawberry WTP draws water from the Upper South Fork American River.

A schematic of the Strawberry WTP is shown in Figure 6.1. Water enters a break tank before it is pumped into a membrane filtration unit with a production capacity of approximately 100 gpm. Filtered water is dosed with Soda Ash for pH and alkalinity adjustment and with chlorine for meeting the surface water disinfection requirements before it enters a 1,500-gallon clearwell. Water is then pumped from the clearwell to an off-site 200,000-gallon tank. Water then flows by gravity from this tank into the system.

Figure 6.1 – Schematic of the Strawberry Water Treatment Plant

6.2 – PLANT OPERATION & PERFORMANCE

The Strawberry WTP is operated intermittently due to the significantly low system demand. Figure 6.2 is a profile of the average daily production per month, expressed in 1,000 gallons, or kgal. This profile also represents the average daily demand in the system. The profile shows that the average day production (or demand) during the cold winter months can be as low as 10,000 gallon/day (GPD), while that during the warm summer months can be slightly above 40,000 GPD. As shown in Figure 6.3, the water temperature can fluctuate from just above freezing during the cold months to as high as 22 °C during the warm summer months.

Figures 6.4 and 6.5 show the profiles of the water pH and alkalinity, respectively, measured in the raw water treated by the Strawberry WTP between 2008 and 2016. The influent water pH fluctuated between 6.2 and 7.8, while the alkalinity was almost always below 10 mg/L as CaCO₃, which is a very low alkalinity value.
As noted earlier, only two chemicals are added at the Strawberry WTP: soda ash and chlorine. The soda ash dose is commonly less than 5 mg/L, which adds about an equal amount of alkalinity to the water. Figure 6.6 shows a profile of the treated water pH compared to that of the raw water pH showing that soda ash addition raised the pH of the water by up to 1.0 pH units resulting in an average treated water pH of 7.5 compared to an average raw water pH of 7.0.

Figure 6.7 shows the profile of the chlorine residual in the treated water from the Strawberry WTP between 2010 and 2016. Since these values were obtained with an online chlorine analyzer, the high spikes are likely a result of erroneous SCADA signal. In general, the chlorine residual leaving the Strawberry WTP is mostly between 1.0 and 2.0 mg/L.
Figure 6.8 shows the profiles of the raw water and treated water TOC concentrations at the Strawberry WTP between 2008 and 2016. Since no coagulant is added at the plant, no significant TOC removal is expected, which is demonstrated by the overlap between the two TOC profiles in Figure 6.8. Using the data presented in Figure 6.8, the average raw water TOC was calculated at 1.9 mg/L while that of treated water was calculated at 1.7 mg/L. The calculated percent TOC removal achieved is presented in Figure 6.9. Over the last five years, the TOC removal has ranged mostly between 0% and 20%. Since no coagulant is added at the plant, this reduction in TOC mostly represents the removal of particulate organic matter present in the raw water by the membrane filter.

### 6.3 – Disinfection By-Products

As a small system, the Strawberry system conducts DBP monitoring at one location in the system. The total THMs and HAA5 levels measured in the samples collected since 2011 were analyzed and are presented in Figure 6.10 and 6.11, respectively. The profiles in Figure 6.10 show that the total THM levels gradually declined over the last five years resulting in an reduction in the LRAA from
approximately 75 µg/L in mid 2012 to about 40 µg/L in mid 2016. However, such decline was not experienced with HAA5 levels as shown in Figure 6.11. Over the last five years, the HAA5 LRAA level hovered around the MCL of 60 µg/L with exceedances occurring in multiple quarters.

The formation of high DBP levels in a water containing TOC at an average concentration of only 1.7 mg/L is unusual. However, the water demand in the Strawberry system is quite low, which results in excessive contact between the free chlorine and the natural organic matter present in the water. At an average daily demand ranging from 10,000 GPD to 40,000 GPD, the average water storage time in the 80,000-gallon tank is calculated between two and eight days, which is an excessively long contact time.
7.1 – PLANT DESCRIPTION

The Outingdale WTP serves drinking water to the Outingdale System, which is a small water system with approximately 190 service connections. The system is located approximately 15 miles southeast of Placerville. The Outingdale WTP draws water from the Middle Fork of the Consumnes River.

A schematic of the Outingdale WTP is shown in Figure 7.1. Raw water is dosed with soda ash and a coagulant in a static mixer to promote rapid mixing. Chlorine could be added at the static mixer, and the District has done that in the past as discussed later in this section. The water is then treated through a 100-gpm Tri-Mite® package treatment unit that includes an upflow buoyant beads flocculation chamber, followed by a downflow granular media filter. Filtered water is dosed with chlorine for meeting the surface water disinfection requirements before it enters a 60,000-gallon onsite tank. Water is then served to the system.

Figure 7.1 – Schematic of the Outingdale Water Treatment Plant

7.2 – PLANT OPERATION & PERFORMANCE

Figures 7.2 through 7.5 present profiles of pH, alkalinity, turbidity, and TOC concentrations, respectively, in the raw water treated by the Outingdale WTP since 2012. The pH of the water averages approximately 7.5 and ranges from 7.0 to 8.0. The raw water alkalinity ranged from a low of approximately 15 mg/L as CaCO₃ and peaked at 46 mg/L as CaCO₃. However, on average, the raw water alkalinity was between 20 and 25 mg/L as CaCO₃. As shown in Figure 7.4, the raw water turbidity is generally low remaining below 5 NTU. However, turbidity spikes above 25 NTU have occurred in past years mainly during high runoff periods. Finally, the raw water TOC has ranged between 1 and 2 mg/L for most of the last five years with occasional spikes as high as 5 mg/L such as that experienced during the late fall of 2012 (Figure 7.5).
The soda ash dose added at the Outindale WTP is between 3 and 5 mg/L, and results in only a small increase in the pH and alkalinity of the water. Figure 7.6 shows profiles of the raw and treated water pH values at the Outindale WTP. While the raw water pH averaged about 7.5, the addition of soda ash increases it by less than 0.5 pH units.

The coagulant used at the Outindale WTP is either NTU 925 or SWT 8809, and is added at a dose between 2 and 5 mg/L with excursions as high as 10 mg/L depending on raw water conditions. The impact of this coagulant addition on TOC removal is presented in Figure 7.7 and 7.8. Figure 7.7 shows the profiles of the
raw water and treated water TOC at the Outingdale WTP between 2012 and 2016, while Figure 7.8 shows a profile of the percent TOC removal achieved. In 2012, the TOC removal averaged approximately 20%, but then increased in 2013 to approximately 40%, and has fluctuated between 20% and 50% since then.

The District has the ability to add chlorine both to the raw water at the rapid mix (pre-chlorine) and to the filtered water (post-chlorine) as shown in Figure 7.1. Figure 7.9 shows profiles of the pre-chlorine and post-chlorine doses applied over the last five years. In 2012, the chlorine dose was equally split between the two locations. However, in early 2013, the District stopped adding chlorine to the rapid mix and added 100% of the chlorine to the filtered water. There were two brief periods in the winter of 2014 and the fall of 2015 when pre-chlorination was practiced, but for the most part, post-chlorination was exclusively practiced since the beginning of 2013. Figure 7.10 presents the chlorine residual profile in the treated water over the last five years. In general, the chlorine residual is maintained between 1 and 2 mg/L in the treated water from the Outingdale WTP.
7.3 – DISINFECTION BY-PRODUCTS

As a small system, the Outingdale System is required to collect annual samples for THM and HAA5 analyses from specific locations in the distribution system. Figures 7.11 and 7.12 present the profiles of Total THMs and HAA5 levels, respectively, measured at the two locations between 2012 and 2016.

![Figure 7.11 – Total THMs Measured at two Locations in the Outingdale System (2012 – 2016)](image1)

![Figure 7.12 – HAA5 Levels Measured at two Locations in the Outingdale System (2012 – 2016)](image2)

The profiles shown in Figures 7.11 and 7.12 show that the DBP levels in the Outingdale system decreased dramatically between 2012 and 2013 and remained well below their respective MCL levels since then. Comparing the profiles in Figures 7.11 and 7.12 to those in Figure 7.9 shows that the drop in DBP levels closely coincided with terminating pre-chlorine addition at the plant. No other change in water quality or plant operation between 2012 and subsequent years explains this decrease in DBP formation. This is a clear indication of the potential benefit of delaying chlorine addition till after TOC removal at the District’s plants.
A thorough analysis of the formation of disinfection by-products (DBPs) in the District’s three systems was conducted and correlated with the raw and treated water qualities and with the operational conditions of the District’s five water treatment plants. The analysis focused on identifying potential causes for the elevated DBP levels in the District’s system with the goal of identifying potential remedies that can be evaluated. This section includes a summary of the observations and conclusions made based on the analysis conducted for each system, and makes recommendations for subsequent work.

8.1 – Main System

The Main System includes three treatment plants: Reservoir A WTP (Res A WTP), Reservoir 1 WTP (Res 1 WTP), and the El Dorado Hills WTP (EDHWTP), and represents 95% of the District’s water delivery. For the Main system, the analysis presented in this report resulted in the following observations:

1. The seasonal variability in the water demand in the EID system is quite high. An analysis of the daily water demand over the last 10 years shows that the daily water demand ranges from a low of about 10 MGD to a high of 87 MGD. In the last three years, the demand has fluctuated from 10 MGD to 60 MGD. This means that the water age in the winter months is vastly higher than that in the summer months, which explains why the DBP levels are actually higher during the cold winter months than the warm summer months in spite of the fact that the water temperature is significantly lower.

2. The annual average water demand has decreased significantly over the last 10 years. Specifically, the annual water demand in 2008 was 45,000 AF/yr, while it was as low as 29,000 AF/yr in 2016. This 35% reduction in annual water demand translates into a corresponding 50% to 60% increase in the average water age in the distribution system.

3. Since 2010, the seasonal variability in DBP levels formed seems to be substantially higher than that measured in prior years. The cause for this change in variability is unclear, and may be worth investigating. Specifically, was there any change in the operational philosophy that may have resulted in these large seasonal swings in DBP levels?

4. The TOC concentration in the District’s treated water is mostly between 1.0 and 2.0 mg/L, which is low by most standards, and should not be forming high levels of DBPs. It is possible that the type of organic material in the District’s water is more reactive than organic material in most typical waters. This would need to be explored with bench-scale testing.

5. The District used to rely on alum as its primary coagulant in past years. It appears that the District has switched to ACH/Polymer blend over the last several years. The benefit of this change are understandable since ACH generates less sludge than alum, and it does not depress the water pH as does alum, which reduces the need to feed lime or caustic to the raw water.
However, ACH may not be as effective as metal coagulants (i.e., alum or ferric) at removing natural organic matter from water.

6. The District practices raw water chlorination at all three plants in the Main system, and maintains chlorine through each plant. Bench scale testing conducted by the District has shown that the DBP levels in the treated water from at least one of the plants is already too high. Adding chlorine upstream of TOC removal greatly reduces the benefit of TOC removal. It would be desirable to delay chlorine addition until after the majority of the TOC removal is achieved at each plant.

7. Based on the analysis presented in this report, it appears that the District can meet its disinfection requirements without prechlorination. If chlorine addition is delayed until after sedimentation (at Res 1 WTP) or after filtration at Res A WTP and EDHWTP, there is a possibility that DBP formation could be greatly reduced. This statement is based on the observation from the Outingdale WTP, which experienced significant reduction in DBP formation after it stopped prechlorination in early 2012.

8. It is unclear how much reduction in DBP formation will be achieved by delaying chlorine addition at each of the three plants. It is likely that the impact will be greater at Res 1 WTP, which achieves higher TOC removal than Res A WTP or EDHWTP. This is due to the availability of a large sedimentation basin at the Res 1 WTP, which is not the case at the two other plants.

Based on the observations listed above, EID may want to consider the following recommendations:

**Recommendation #1 – Utilize Res 1 WTP to meet system demand instead of Res A WTP.** The District currently turns off Res 1 WTP during the cold winter months and serves the majority of the Main system from Res A WTP. However, Res A WTP is a direct filtration plant with very limited TOC removal capabilities. This means that during the period of longest water age in the system, the plant serving the system has the least capability to reduce TOC levels compared to the two other plants. Alternatively, Res 1 WTP has a sedimentation process which allows the District to maximize its TOC removal during periods of elevated DBP formation (i.e., winter months). For this reason, the District may want to rely on Res 1 WTP to meet the Main system water demand during the low-demand winter months.

**Recommendation #2 – Eliminate (or minimize) prechlorination at all plants.** There are many benefits to preoxidation in water treatment. For example, preoxidation typically improves coagulation and filtration performance for removal of particulate matter. In plants that treat water with elevated manganese levels, sufficient oxidation prior to filtration is necessary to achieve manganese oxidation and removal. However, in the face of high DBP formation, the use of chlorine for preoxidation cannot continue. Figure 6.1 presents a “decision tree” to help with the decision on whether to continue or terminate the practice of pre-chlorination.
Figure 8.1 – Decision Tree on whether Pre-Chlorination should or could be eliminated

The decision process presented schematically in Figure 8.1 is a series of questions to be answered, and are presented in a narrative form as follows:

1. *Would the elimination of raw water chlorination at each plant have a significant impact on the DBP levels that would form in the distribution system after several days of contact?* This question is important to ask because there is the possibility that the short contact time through the plant pales in comparison to that through the distribution system resulting in an insignificant effect on DBP formation by the time the water reaches the regulatory sampling locations in the system. This question can be answered with bench-scale testing that simulates the treatment plants performance with and without prechlorination. A more detailed recommendation for bench-scale testing is presented below.

2. If the answer to Question 1 is “no”, then there is no need to change the prechlorination practice. However, if the answer to Question 1 is “yes”, then the next question should
be: "Is preoxidation necessary at each plant to meet operational and water quality goals?". Unfortunately, this question can only be answered by either pilot-scale testing or full-scale testing, as long as the quality of the water served to the system is not compromised during testing.

3. If the answer to Question 2 is "yes", then the next question should be: "Would the use of an alternative preoxidant achieve the same treatment benefits of prechlorination?" Such preoxidants may include chlorine dioxide, ClO₂, or potassium permanganate, KMnO₄. Answering this question also requires either pilot-scale testing or full-scale testing.

4. If the answer to Question 3 is "yes", then the District should consider switching to an alternate preoxidant at each plant.

5. If the answer to Question 3 is "no", then a more drastic DBP control strategy will need to be considered, such as GAC adsorption or chloramine conversion.

6. If the answer to Question 2 is "no", then prechlorination is not necessary for treatment performance, and the next question would be “Is prechlorination needed for meeting the disinfection requirements?” If the answer to this question is "no", then prechlorination can be stopped with no negative consequences. However, if the answer is "yes", then prechlorination could still be terminated, but will require the construction of a chlorine contactor or a UV disinfection process.

**Recommendation #3 – Conduct Bench-Scale Testing.** Bench-scale testing is an excellent tool to answer questions about DBP formation under varying pre-treatment conditions. Specifically, bench-scale testing can identify the potential type and doses of alternative coagulants that can improve TOC removal, it can quantify the potential reduction in DBP formation without prechlorination, and it can identify chemical needs to meet alternative treatment goals. However, it is noted that bench-scale testing cannot determine the impact of eliminating pre-chlorination, or substituting it with an alternative preoxidant, on the performance and operation of the media filters, which is a critical deciding factor. That question will have to be answered either with pilot-scale or full-scale testing.

**Recommendation #4 – Conduct a Facilities Master Plan.** WQTS believes that the District can benefit from a Facilities Master Plan (FMP) for the Main system’s three treatment plants. The FMP would include a thorough evaluation of the Plants’ structural, mechanical, and electrical components; chemical feed systems; and the plant’s overall performance for meeting current and potential future treatment goals. The outcome of the FMP will provide valuable information that feeds into the District’s CIP plan, budget, and schedule.

**8.2 – STRAWBERRY SYSTEM**

The Strawberry system is challenged with elevated HAA5 levels. Unfortunately, the Strawberry system has two limitations: First, the Strawberry WTP is a membrane filtration plant, and membrane filtration processes are greatly limited in their ability to remove natural organic matter.
(NOM). Second, the water demand in the system is quite low compared to the storage volume required for fire fighting. This results in long water age in the storage tanks, which translate into increased DBP formation as the water stays in contact with free chlorine.

Based on our evaluation of the Strawberry system, there are two potential alternatives to reducing DBP formation:

Option 1 – Construct an NOM removal process that reduces the TOC concentration in the water before chlorine addition. The two options are chemical pretreatment upstream of membrane filtration, or adsorption on Granular Activated Carbon (GAC) after membrane filtration but before chlorine addition. Considering the remote location of this system, a static GAC adsorption system is likely to be more feasible than the operation of a chemical pre-treatment process that results in increased sludge generation requiring handling and disposal.

Option 2 – Convert the Strawberry system from free chlorine to chloramine. This is achieved by adding ammonia to the water after the chlorine contactor. Chloramine does not form THMs or HAA5, and thus should result in substantial reduction in DBP levels in the system. Systems operating with chloramine in the distribution system could experience higher incidences of biological nitrification in the storage tanks. However, considering the low water temperature and low NOM concentration, the potential for nitrification are likely to be significantly low. At a minimum, the small-size Strawberry system may prove to be an ideal place for District staff to evaluate the operation and maintenance of a chloraminated system, which would greatly help in the District’s evaluation of solutions for the larger Main system.

Recommendation – WQTS recommends that bench-scale testing be conducted to evaluate the applicability of GAC adsorption or chloramine conversion for DBP reduction in the Strawberry system.
El Dorado Irrigation District (EID) retained the services of Water Quality and Treatment Solutions, Inc. (WQTS) to analyze the operational and water quality data from EID’s water treatment plants and identify viable options for lowering the formation of disinfection by-products (DBPs) in the distribution system. A technical report summarizing the findings and recommendations of the analysis was submitted to EID on August 25, 2017. One of the recommendations included eliminating or minimizing the use of pre-chlorination at the Reservoir A Water Treatment Plant (Res A WTP). For many water treatment plants, pre-chlorination improves coagulation and filtration performance for particulate matter removal and is necessary upstream of filtration for successful manganese removal. However, pre-chlorination may also contribute to the formation of DBPs even before the water enters the distribution system.

In an attempt to better understand the effect of pre-chlorination on the formation of DBPs, bench-scale testing was conducted. The objective of the bench-scale testing was to determine if eliminating or reducing raw water chlorination would significantly decrease the overall DBP formation level in the distribution system. This technical memorandum (TM) summarizes the approach and results of the bench-scale testing.

SOURCE WATER QUALITY AND TESTING METHODS

Res A WTP source water samples were collected by EID staff on December 5, 2017 and shipped overnighted on ice to the WQTS facility in Los Angeles. Once received, the water was refrigerated until testing was conducted. Table 1 lists a few water quality parameters that the water was analyzed for. The water was analyzed by EID staff upon collection, by WQTS staff once received on December 6, 2017, and by Eurofins Eaton Analytical (EEA) Laboratories (Monrovia, CA) shortly after receipt by WQTS staff. It is worthwhile to note that the water quality slightly changed from collection to the next day with the turbidity spiking from 0.51 NTU as measured by EID staff to 4.24 NTU as measured by...
WQTS staff. The pH also decreased minimally from 6.89 to 6.62, while the temperature decreased from 8.6 °C to 4.8 °C because of shipping on ice.

Table 1 – Quality of Res A WTP Raw Water Sample Collected on December 5, 2017

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Unit</th>
<th>Result</th>
<th>Analysis by</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>-</td>
<td>6.89</td>
<td>EID</td>
</tr>
<tr>
<td>Turbidity</td>
<td>NTU</td>
<td>0.51</td>
<td>EID</td>
</tr>
<tr>
<td>Temperature</td>
<td>°C</td>
<td>8.6</td>
<td>EID</td>
</tr>
<tr>
<td>pH</td>
<td>-</td>
<td>6.62</td>
<td>WQTS</td>
</tr>
<tr>
<td>Turbidity</td>
<td>NTU</td>
<td>4.24</td>
<td>WQTS</td>
</tr>
<tr>
<td>Temperature</td>
<td>°C</td>
<td>4.8</td>
<td>WQTS</td>
</tr>
<tr>
<td>Total Alkalinity</td>
<td>mg/L as CaCO₃</td>
<td>13.7</td>
<td>WQTS</td>
</tr>
<tr>
<td>Total Hardness</td>
<td>mg/L as CaCO₃</td>
<td>14.2</td>
<td>WQTS</td>
</tr>
<tr>
<td>Conductivity</td>
<td>µS/cm</td>
<td>36.6</td>
<td>WQTS</td>
</tr>
<tr>
<td>Dissolved Oxygen</td>
<td>mg/L</td>
<td>10.25</td>
<td>WQTS</td>
</tr>
<tr>
<td>UV₂₅₄ (unfiltered)</td>
<td>cm⁻¹</td>
<td>0.082</td>
<td>WQTS</td>
</tr>
<tr>
<td>UV₂₅₄ (0.45 μm filtered)</td>
<td>cm⁻¹</td>
<td>0.037</td>
<td>WQTS</td>
</tr>
<tr>
<td>Bromide</td>
<td>µg/L</td>
<td>&lt;2.25</td>
<td>EEA</td>
</tr>
<tr>
<td>Total Organic Carbon (TOC)</td>
<td>mg/L</td>
<td>1.4</td>
<td>EEA</td>
</tr>
<tr>
<td>Total Dissolved Solids (TDS)</td>
<td>mg/L</td>
<td>31</td>
<td>EEA</td>
</tr>
<tr>
<td>Calcium</td>
<td>mg/L</td>
<td>3.3</td>
<td>EEA</td>
</tr>
<tr>
<td>Magnesium</td>
<td>mg/L</td>
<td>1.2</td>
<td>EEA</td>
</tr>
<tr>
<td>Iron</td>
<td>mg/L</td>
<td>0.75</td>
<td>EEA</td>
</tr>
<tr>
<td>Manganese</td>
<td>mg/L</td>
<td>0.078</td>
<td>EEA</td>
</tr>
<tr>
<td>Haloacetic Acids (HAAs)</td>
<td>µg/L</td>
<td>&lt;2.00</td>
<td>EEA</td>
</tr>
<tr>
<td>Trihalomethanes (THMs)</td>
<td>µg/L</td>
<td>&lt;0.062</td>
<td>EEA</td>
</tr>
</tbody>
</table>

Table 2 specifies the methods used to analyze each parameter in the source water, their corresponding minimum reporting limit (MRL), and which laboratory carried out the analysis.
Table 2 – Water Quality Methods and Minimum Reporting Level

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Lab</th>
<th>Method</th>
<th>MRL</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>WQTS/EID</td>
<td>EPA 150.1/SM4500H</td>
<td>--</td>
</tr>
<tr>
<td>Turbidity</td>
<td>WQTS/EID</td>
<td>EPA 180.1</td>
<td>0.1 NTU</td>
</tr>
<tr>
<td>Alkalinity, Total</td>
<td>WQTS</td>
<td>SM 2320-B</td>
<td>2 mg/L as CaCO₃</td>
</tr>
<tr>
<td>Hardness, Total</td>
<td>WQTS</td>
<td>Hach 8213, EDTA Titrimetric</td>
<td>10 mg/L as CaCO₃</td>
</tr>
<tr>
<td>Conductivity</td>
<td>WQTS</td>
<td>SM 2510-B</td>
<td>4 µmho/cm</td>
</tr>
<tr>
<td>Dissolved Oxygen</td>
<td>WQTS</td>
<td>HACH 10360, LDO Probe</td>
<td>0.1 mg/L</td>
</tr>
<tr>
<td>Chlorine</td>
<td>WQTS</td>
<td>HACH DR890, DPD Method</td>
<td>0.1 mg/L</td>
</tr>
<tr>
<td>UV₂₅₄</td>
<td>WQTS</td>
<td>SM 5910-B</td>
<td>0.005 cm⁻¹</td>
</tr>
<tr>
<td>Bromide</td>
<td>EEA</td>
<td>EPA 300.0</td>
<td>5 µg/L</td>
</tr>
<tr>
<td>Total Organic Carbon (TOC)</td>
<td>EEA</td>
<td>SM 5310-C</td>
<td>0.3 mg/L</td>
</tr>
<tr>
<td>Total Dissolved Solids (TDS)</td>
<td>EEA</td>
<td>SM 2540-C</td>
<td>10 mg/L</td>
</tr>
<tr>
<td>Calcium</td>
<td>EEA</td>
<td>EPA 200.7</td>
<td>1 mg/L</td>
</tr>
<tr>
<td>Magnesium</td>
<td>EEA</td>
<td>EPA 200.7</td>
<td>0.1 mg/L</td>
</tr>
<tr>
<td>Iron</td>
<td>EEA</td>
<td>EPA 200.7</td>
<td>20 µg/L</td>
</tr>
<tr>
<td>Manganese</td>
<td>EEA</td>
<td>EPA 200.7</td>
<td>2 µg/L</td>
</tr>
<tr>
<td>Haloacetic Acids (HAAs)</td>
<td>EEA</td>
<td>SM 6251B</td>
<td>2 µg/L</td>
</tr>
<tr>
<td>Trihalomethanes (THMs)</td>
<td>EEA</td>
<td>EPA 551.1</td>
<td>0.5 µg/L</td>
</tr>
</tbody>
</table>

**TEST DESCRIPTION**

Figure 1 presents a schematic line diagram of Res A WTP. The bench testing procedure roughly followed the treatment process at Res A WTP. Briefly, chlorine is added to the raw water pipeline approximately 50 yards upstream of a static mixer, at which point the coagulant is added. The coagulated water flow then splits between 12 filters, collects in a common filtered water channel, and overflows into a clearwell where chlorine, caustic soda, and orthophosphate are added. The water is either pumped to the Sly Park Hills pressure zone or flows by gravity into Reservoir A before entering the distribution system.

Figure 1 – Schematic Line Diagram of Reservoir A Water Treatment Plant
Table 3 presents the experimental matrix tested in this study. The study included four different chlorine doses, two coagulant types, two coagulant doses, a single pH target a single cold water temperature, and a single chlorine residual in the jars for a total of sixteen (16) conditions.

**Table 3 – Experimental Matrix Used for Jar Testing**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>No. of Conditions</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-chlorination</td>
<td>4</td>
<td>0, 0.5, 1.0, and 1.5 mg/L as Cl₂</td>
</tr>
<tr>
<td>Coagulant Type</td>
<td>2</td>
<td>NTU 925 and Sterling 8809</td>
</tr>
<tr>
<td>Coagulant Dose</td>
<td>2</td>
<td>1.5 and 3.0 mg/L</td>
</tr>
<tr>
<td>pH Target</td>
<td>1</td>
<td>ambient</td>
</tr>
<tr>
<td>Temperature</td>
<td>1</td>
<td>6 - 9 °C</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16</strong></td>
<td></td>
</tr>
</tbody>
</table>

The current average prechlorination dose added at Res A WTP is 2.0 mg/L as Cl₂. However, the chlorine demand was measured during preliminary testing and found to be, on average, 0.55 mg/L as Cl₂. Therefore, to get to a maximum chlorine residual of 1.0 mg/L as Cl₂ at the highest prechlorine dose, the maximum prechlorination dose was set at 1.5 mg/L as Cl₂. Two reduced prechlorination doses were included to test the effects of reducing prechlorination (0.5 and 1.0 mg/L as Cl₂) or completely eliminating it (0 mg/L as Cl₂). It is noted that all chlorine addition during testing was achieved using a sodium hypochlorite (NaOCl) solution.

Since 2014, the coagulant NTU925 (NTU Technologies, Inc., Davis, CA) has been applied at Res A WTP at doses ranging from approximately 2.0 mg/L to 5.5 mg/L, with an average of 2.5-3.0 mg/L. From 2006 through 2013, SWT8809 (Sterling Water Technologies, LLC, Columbia, TN) was used at a dose ranging from approximately 1.0 mg/L to 4.0 mg/L calculated as 100% product. Changing the prechlorine dose may alter the operational performance involving the coagulants. Thus, both the NTU925 and SWT8809 coagulants were tested at two doses, 1.5 mg/L and 3.0 mg/L, both of which were within their historical ranges.

The prechlorination and coagulation jar tests were conducted at a cold water temperature ranging from 6 to 9 °C, which is the typical water temperature during the month of December. EID staff also measured the water temperature at 8.6 °C when the water sample was collected. It was important to capture the effect of temperature on the prechlorination and coagulation testing results.

After filtration of each jar-tested water, caustic soda was added to the water (described later) at a dose required to adjust the water pH to the range of 7.5 to 7.8, which is similar to the current operation at the Res A WTP. Finally, a chlorine dose was added to raise the chlorine residual in the treated water to 1.0 mg/L as Cl₂, matching the current operating conditions at Res A WTP. The
chlorinated water was then held in an incubator set at 10 °C for 14 days, and was sampled at days 0, 3, 7, and 14 to assess DBP formation over time in the distribution system.

**JAR TESTING PROCEDURE**

Res A WTP is an inline filtration plant. To represent the treatment process depicted in Figure 1, each jar test followed the procedure described in Table 4. Jar testing was conducted with a Phipps and Bird™ programmable jar test apparatus (Series PB-700).

<table>
<thead>
<tr>
<th>Stage</th>
<th>Mixing Speed, rpm</th>
<th>Mixing Duration, minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rapid Mix</td>
<td>150</td>
<td>1</td>
</tr>
<tr>
<td>Flocculation</td>
<td>25</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 4 – Jar Testing Procedure

Each jar contained 2-L of Res A WTP source water. During the rapid mix, each jar received a chlorine dose of either 0, 0.5, 1.0, or 1.5 mg/L as Cl₂, followed by the addition of a 1.5 or 3.0 mg/L dose of one of the two coagulant types. The mixing speed and time were selected to closely emulate the approximate time and turbulence of the static mixer at the Res A WTP. The jars then underwent a 5-minute flocculation period. Although there is no flocculation basin in the Res A WTP, this step represents the water flowing through the pipe following the rapid mix prior to entering the filters. Finally, the water was pumped through an inline filter setup (1.0 µm glass microfiber), which simulated the media filter at Res A WTP, before being collected in a trace-clean 2.5-L amber bottle. The total time for filtration was 10-12 minutes for all jar tests. Though jar testing was carried out at room temperature, the source water was kept refrigerated until it was needed for testing. From the time the rapid mixing began till the time the flocculated water samples were filtered, the water temperature remained between 6.0 and 9.5 °C.

The filtered water samples were analyzed for pH, chlorine residual, TOC, HAAs, and THMs. Next, the filtered water samples were expeditiously dosed with caustic soda to raise the pH to 7.6 ± 0.1 and enough chlorine to raise the chlorine residual to 1.0 mg/L. Finally, each water sample was split into three (3) 500-mL amber bottles for simulated distribution system (SDS) testing.

**SIMULATED DISTRIBUTION SYSTEM (SDS) TESTING PROCEDURE**

To quantify the potential formation of HAAs and THMs in the treated water samples, each of the filtered waters from the 16 testing conditions was split into three 500-mL trace-clean amber bottles that were filled with no head space to minimize the volatilization of THMs. The bottles were then kept at 10 °C ± 2 °C for 3, 7, and 14 days to represent travel time through the distribution system. After reaching the designated time, the samples were analyzed for pH, temperature, chlorine residual, THMs, and HAAs.
TESTING RESULTS

Coagulant Jar Testing Results

Figures 2 and 3 present the TOC concentrations measured in the coagulated and filtered waters as a function of the coagulant doses added under all prechlorination conditions. Figure 2 shows the results for coagulation with NTU925 and Figure 3 shows the results for that with SWT8809. Figures 4 and 5 present the calculated percent TOC removal achieved under the same coagulation conditions presented in Figures 2 and 3.

The raw water TOC concentration measured on the day of testing was 1.56 mg/L. Simply filtering the raw water through a 1 µm filter paper, without the addition of any coagulant or prechlorine, reduced the TOC from 1.56 mg/L to 1.42 mg/L (9% TOC reduction). In general, Figures 2 and 4 show that NTU925 doses up to 3 mg/L achieved no measurable TOC removal, while Figures 3 and 5 show that an additional 0.2 mg/L TOC was removed with the doses applied amounting to an additional percent...
TOC removal of approximately 10%. However, it is noted that prechlorination did not appear to improve or hinder TOC removal by either coagulant as the TOC profiles remained steady with the various prechlorine doses applied, including no prechlorination.

For reference, TOC removal at the Res A WTP was typically at or below 20% from 2008 through 2016, as presented previously in the technical report *Analysis of DBP Formation and Control in EID’s Water Systems* submitted on August 25, 2017. The TOC removals in this study are similar to those achieved at Res A WTP.

Figures 6 and 7 present the pH and chlorine residual concentrations, respectively, measured in the filtered water from all 16 jar testing conditions. In general, the filtered water pH levels were about 7.0 to 7.1 with only few exceptions. As expected, the free chlorine concentration in the filtered water increased with increasing prechlorine dose. At a dose of 0.5 mg/L, the chlorine residual was measurable, but below 0.15 mg/L under all four coagulation conditions. The residual increased to a range of 0.58 to 0.95 mg/L with a prechlorine dose of 1.5 mg/L.

Figures 8 and 9 present the THMs and HAA5 levels, respectively, measured in the filtered water after each jar test. With a prechlorine dose of 1.5 mg/L, the THM levels formed in the filtered water were as high as 11 µg/L, while the HAA5 levels were as high as 14 µg/L. As expected, lower prechlorine doses resulted in the formation of lower levels of THMs and HAA5 in the filtered water. It is interesting to note that the THM and HAA5 levels in the filtered water after coagulation with 1.5 mg/L of either coagulant were consistently lower than those formed after coagulation with 3 mg/L of the same coagulant. This was an unexpected outcome since a higher coagulant dose is supposed to lower the formation of DBPs. It is possible that the coagulants themselves react with chlorine to form THMs and HAA5. While this is merely a speculation at this time, it is possible these coagulants contain organic carbon that may react with chlorine to form DBPs.
Impact of Prechlorination on DBP Formation

Bench-Scale Testing Results

**SDS DBP Formation Testing Results**

Figures 10 through 13 present the chlorine residual measured over the 14-day SDS testing. As a reminder, the chlorine residuals were raised to 1.0 mg/L as Cl₂ following jar testing in all waters, as is done at Res A WTP. The black diamonds represent the condition with no perchlorine dose, red circles present the 0.5 mg/L perchlorine dose, green squares present the 1.0 mg/L perchlorine dose, while the blue triangles present the 1.5 mg/L perchlorine dose applied.
As expected, the chlorine decayed in all waters over the course of 14 days, either due to natural decay of the chlorine and/or due to consumption of the chlorine by water constituents, such as TOC. The largest decay was seen in the water that did not receive a prechlorine dose (black diamonds), most likely due to an unsatisfied chlorine demand in the water. For the conditions with the same coagulant dose and type, the chlorine decay in waters dosed with 0.5, 1.0, and 1.5 mg/L as Cl₂ was similar.

Figures 14 through 17 present the pH measured over the 14-day SDS testing period. The pH was raised in all waters from approximately 6.9-7.1 following jar testing to 7.6 prior to the start of SDS testing, similar to the pH adjustments done at Res A WTP. The black diamonds represent the conditions with no perchlorine dose, red circles a 0.5 mg/L prechlorine dose, green squares a 1.0 mg/L prechlorine dose, and blue triangles a 1.5 mg/L prechlorine dose.
The pH dropped in all waters from 7.6 to approximately 7.2-7.4 after the 14-day holding time. The source water for Res A WTP had a low alkalinity of 13.7 mg/L as CaCO₃ (see Table 1). As such, small reactions between any of the water constituents (such as chlorine and TOC) would have a larger impact on the pH of the poorly buffered water. There was no discernable difference in the pH reduction between waters initially treated with different coagulants, coagulant doses, or prechlorine doses.

Figures 18 through 21 present the THMs concentrations measured over the 14-day SDS testing period. The THMs increased progressively in all waters, increasing the most over the first 3 days, then less so between days 3 and 14. While the THMs were generally lower in the no prechlorine dose water, the THMs in waters with prechlorine doses 0.5, 1.0, and 1.5 mg/L as Cl₂ were generally similar for the same coagulant type and coagulant dose. The THMs were higher for waters coagulated with 3.0 mg/L NTU925 and 3.0 mg/L SWT8809, most likely due to the slightly higher TOC in the filtered water (Figure 2) and possible reactions between chlorine and the coagulants.

Figure 16 – pH measured during SDS testing of water treated with 1.5 mg/L SWT8809

Figure 17 – pH measured during SDS testing of water treated with 3.0 mg/L SWT8809

Figure 18 – THMs formed during SDS testing of water initially treated with 1.5 mg/L NTU925

Figure 19 – THMs formed during SDS testing of water initially treated with 3.0 mg/L NTU925
The highest THM concentration measured was 49 μg/L for the sample collected on Day 14 from the water treated with 3.0 mg/L SWT8809. The THMs measured at sites predominantly impacted by Res A WTP (Sly Park Rd. & Jenkinson Cr., 5170 Highcrest Dr., 7944 Crystal Blvd.), as presented in the technical report *Analysis of DBP Formation and Control in EID’s Water Systems* submitted on August 25, 2017, ranged from approximately 18 μg/L to 100 μg/L. Therefore, the results from this SDS test fell within the range measured in the EID distribution system, albeit on the low end. The THMs measured during SDS testing conducted by EID staff on February 16, 2017 resulted in the formation of 54 μg/L on Day 0 and then 60 to 75 μg/L in the 14 days following. The THM results from this SDS test fell below those measured results, despite having similar effluent TOC (1.4 mg/L for the EID study, 1.1-1.5 mg/L for this study). At the Res A WTP, higher THM formation occurred within the WTP (54 μg/L) prior to the start of SDS testing, whereas much less initial THM formation (<11 μg/L) occurred within these tests. The reasons for the discrepancy could be the limitations of the bench-scale experimental setup. In the jar testing (prior to SDS testing), each perchlorinated water was filtered via an inline, 1 μm glass fiber filter, while at the full scale the perchlorinated water passes through a media filter. The media filter may contain precursor material (such as TOC) with which the perchlorinated water could react to form THMs. Unfortunately, the dynamic reactions that occur within a media filter cannot be replicated at the bench scale.

Figures 22 through 25 present the HAA5 levels measured over the 14-day SDS testing period. Similar to the THM results, the HAA5 levels increased progressively in all waters, increasing the most during the first 3 days, then less so between days 3 and 14. While the HAA5 levels were generally lower without prechlorination, their levels in waters with prechlorine doses 0.5, 1.0, and 1.5 mg/L as Cl₂ were generally similar for the same coagulant type and dose. Similar to THMs, the HAA5 levels were higher for waters dosed with the higher coagulant doses (3.0 mg/L) than the lower doses (1.5 mg/L).
The highest HAA5 concentration measured was 42 to 46 μg/L after 14 days of exposure. The HAA5 levels measured at sites predominantly impacted by Res A WTP (Sly Park Rd. & Jenkinson Cr., 5170 Highcrest Dr., 7944 Crystal Blvd.), as presented in the technical report *Analysis of DBP Formation and Control in EID’s Water Systems*, ranged from approximately 8 μg/L to 82 μg/L. The results from this SDS test fell within the range measured in the EID distribution system. The HAA5 level measured during SDS testing conducted by EID staff on February 16, 2017 contained 48 μg/L in the plant effluent, and increased up to 73 μg/L over the 14-day test period. The HAA5 results from this SDS test fell below those measured results. As noted earlier, it is possible that additional DBP formation may form at the full scale plant as a result of reactions between the added chlorine and any accumulated organic material in the media filter, which unfortunately cannot be replicated at bench-scale.
SUMMARY OF TESTING PROCEDURE AND RESULTS

Below is a summary of the bench-scale testing:

**Water Quality**: The water sample used in this study was collected from the influent to the Res A WTP. The water had a low TOC level of 1.4 mg/L and a low alkalinity of 14 mg/L as CaCO₃. The water temperature at the time of sample collection was approximately 8.6 °C, which was used as the basis for setting the target water temperature during testing.

**Testing Procedure**: Jar testing was conducted with 4 prechlorine doses (0, 0.5, 1.0, and 1.5 mg/L as Cl₂), 2 types of coagulants (NTU925 and SWT8809), and 2 coagulant doses (1.5 and 3.0 mg/L) for a total of 16 testing conditions. The water temperature during jar testing was maintained between 6.0 and 9.5 °C. Following jar testing, the pH was adjusted to 7.6, the chlorine residual raised to 1.0 mg/L as Cl₂ and the water was held in amber bottles for simulated distribution system contact for 14 days. The water temperature during the 14-day period was set at approximately 10 °C.

**Effect of Coagulant on TOC Removal**: A slightly higher TOC removal was achieved with SWT8809 (~20%) compared to that achieved with NTU925 (~10%). However, the actual amount removed was minimal (<0.2 mg/L) since the starting concentration is only 1.4 mg/L. Nonetheless, the results showed that prechlorination had no measurable effect on the TOC removal achieved by either coagulant.

**Effect of Prechlorine Dose and Coagulant Type on Filtered Water DBP Levels**: The THM and HAA5 levels in the filtered jar-testing water increased with increasing prechlorine dose. However, an observation worth noting was that the THM and HAA5 levels formed with a coagulant dose of 1.5 mg/L were consistently lower than those formed with a coagulant dose of 3.0 mg/L under all prechlorination conditions. This observation may suggest that a reaction may be taking place between the coagulant itself and the added chlorine resulting in the formation of additional THM and HAA5.

The DBP levels measured in the filtered water from the jar tests were no greater than 15 µg/L, while previous sampling conducted by EID staff at the full-scale plant in 2017 showed that the THM and HAA5 levels were as high as 54 and 48 µg/L, respectively. It is possible that additional DBP formation forms when the added chlorine reacts with the accumulated material in the media filters. Unfortunately, this could not be replicated with jar testing since the samples are filtered through a filter paper.

**Effect of Filtered Water TOC and Coagulant Type on SDSDBP Formation**: Because the TOC reduction with coagulation was minimal, the impact of coagulation on the levels of THMs and HAA5 formed after 14 days of contact was also minimal. However, two observations are worth noting:
1. Eliminating prechlorination did result in slightly lower 14-day DBP levels

2. Higher DBP levels were formed after coagulation with 3.0 mg/L than with 1.5 mg/L, which reflects the suggestion that there may have been a reaction between chlorine and the added coagulant to form additional DBPs.

RECOMMENDATIONS

The objective of the bench-scale testing was to determine if eliminating or reducing raw water chlorination would significantly decrease the overall DBP levels in the distribution system. While the effect of reducing the prechlorine dose was not as significant as desired, eliminating prechlorination did notably reduce DBP levels in the filtered water and the 14-day SDS test. If the high filtered water DBP levels measured in 2017 were also due to the reaction between the added chlorine and the material accumulated on the filter media, then eliminating prechlorination would even have a greater impact on DBP reduction in the system than that measured with the jar testing reported herein.

Had it been for the occasional need to oxidize manganese prior to filtration, WQTS would recommend eliminating prechlorination at Res A WTP. However, since some level of peroxidation is required for manganese control, WQTS makes the following recommendations for the path forward:

1. Develop and implement a plan to gradually reduce the prechlorine dose and monitor its impact on the plant operation, performance, treated water quality, CT compliance, and DBP formation. As long as prechlorination is maintained at some level, this action would not be a deviation from the current operating permit from DDW. However, if prechlorination were to be terminated, then DDW should be notified in advance of such action.

2. One of the water quality parameters that greatly affects manganese oxidation and removal with media filtration is the water pH. Specifically, manganese oxidation with chlorine is more efficient at a higher pH. At this time, caustic soda is added to the filtered water at the Res A WTP. If possible, EID may want to re-route the caustic feed to the static mixer at the influent of the plant and take advantage of the slightly elevated pH to improve manganese oxidation and removal at a lower prechlorine dose.

3. Based on the testing results, EID may want to take a closer look at the formation of DBPs caused by the reaction between chlorine and material in the media filters, including the coagulant material itself. This can be achieved with a specific monitoring plan focused on answering this question. If the results show a significant contribution to DBP formation caused by the type of coagulant used, then an alternative metal coagulant such as alum or ferric could be considered.
Full-Scale Implementation of DBP Mitigation Strategy at the Res A Water Treatment Plant

Proposal for Supplemental Services

March 27, 2018

Water Quality & Treatment Solutions, Inc. (WQTS) was contracted by the El Dorado Irrigation District (EID) to evaluate the challenge it faces in meeting the regulatory limits for Disinfection By-Products (DBPs), including trihalomethanes (THMs) and five haloacetic acids (HAA5), primarily in the main system. In August 2017, WQTS completed a thorough desktop evaluation of the operational and water quality data from its treatment plants and distribution system, and provided recommendations for reducing DBP formation. This was followed by a bench-scale study focused on evaluating DBP reduction by minimizing prechlorination at the Res A Water Treatment Plant (WTP). The study also evaluated two different coagulants at different doses. The bench-scale testing results, which were presented in a Technical Memorandum dated March 24, 2018, demonstrated the potential to reduce DBP formation at the plant and in the distribution system by modifying the chemical treatment at the Res A WTP.

As a follow-up to the desktop and bench-scale studies, EID is interested in conducting a full-scale study aimed at implementing the treatment modifications proposed and monitoring their DBP reduction potential. This proposal includes a proposed scope of work for the full-scale study.

Background & General Approach

The current treatment approach at the Res A WTP is depicted in Figure 1. Chlorine is added at the raw water coming into the plant. The dose is set at a high level in order to maintain a measurable chlorine residual in the filter effluent. The need for the measurable chlorine residual in the filtered water is driven by the current approach of meeting the disinfection CT requirements through the filters.

Figure 1 – Schematic Line Diagram of the Current Process Train at Res A WTP
While prechlorination is necessary due to the need to remove manganese, which requires preoxidation upstream of filtration, every effort should be made to minimize the chlorine dose upstream of filtration in order to lower the levels of DBPs formed in the system. This will require that the disinfection CT credit be achieved downstream of filtration, which was shown to be possible in the Desktop Study report of August 2017. In addition, in order to improve the manganese removal efficiency through the filters with a lower prechlorine dose, the caustic soda dose currently added at the filtered water channel could be moved to a location at or upstream of the static mixer. The reason for this change is that the oxidation of manganese to its insoluble form is more efficient at a higher water pH.

In order to minimize the prechlorine dose and eliminate the need to maintain chlorine through the filters, the following modifications will need to be implemented at the Res A WTP:

1. Utilize existing chemical feed lines or install a new line that can be used to add caustic soda to the raw water entering the plant. It is possible that only part of the caustic feed will be added to the raw water, and thus two independent caustic feed systems should be available: one to the raw water and one to the filtered water.

2. Ensure that the chlorine feed system to the raw water can dose a low chlorine dose (e.g., 0.5 mg/L at the minimum flowrate through the plant), and that the chlorine feed system to the filtered water can increase the chlorine dose to the typical maximum total chlorine dose added to the plant under maximum flow conditions.

3. Confirm that operating online chlorine residual monitors are available at the outlet of Reservoir A and at the appropriate locations upstream of the first customer connections on the Sly Park Hills line, Camino Conduit, and Pleasant Oaks Main that can be used to meet the disinfection CT requirements under all flowrates and water quality conditions.

Once the above three modifications are confirmed, the scope of work under this study can commence. The technical portion of the study will begin with baseline monitoring of the plant’s operational and water quality parameters under the current treatment strategy. The baseline monitoring will take place over a four-week period. The modifications will then be made, and a two week transition period will be used to fine-tune the treatment strategy and stabilize the plant performance. Once the plant is stabilized, a second four-week monitoring period will be initiated. WQTS develop the detailed monitoring plans for each phase, and will receive and analyze the results for reporting to the District. WQTS will also work with District staff on all communication with the Division of Drinking Water (DDW) to obtain permission for the full-scale study, to be followed by a permit amendment application at the end of the study, if the results are successful. In addition, bench-scale testing will be conducted to evaluate the potential for DBP formation due to the accumulation of coagulant flocs in the media filters.

**Scope of Work**

A total of six technical tasks are required under this study. They include:

1. Develop General Implementation Plan & Present it to DDW
2. Develop Full Scale Testing and Monitoring Plan
3. Receive, organize, and analyze results
4. Prepare Technical Memorandum & Meet with District
5. Assist in the preparation of a permit amendment application to DDW
6. Bench-Scale Testing of DBP Formation through Media Filters

The following are brief descriptions of the activities envisioned under each task.

**Task 1 – Develop General Implementation Plan.** WQTS will begin with the development of a brief implementation plan to be reviewed and approved by the District, and then submitted to DDW so they have a clear understanding of the goal of the full-scale study, its scope, and what data will be collected and analyzed. After submittal of the Implementation Plan to DDW, if requested by DDW, WQTS will join District staff in a meeting with DDW to discuss the details of the planned modifications to the Res A WTP, and the planned operational changes and monitoring to be conducted during this study.

**Task 2 – Develop Full Scale Testing and Monitoring Plan.** After the District receives concurrence from DDW to move forward with the study, WQTS will develop a detailed full-scale operation and monitoring plan that covers the initial baseline monitoring period, the transition period, and subsequent monitoring period after the changes are made. During this period, District staff will work on changes necessary to implement this study at the Res A WTP. If requested by DDW, the Plan will be submitted to DDW for their review prior to implementation.

**Task 3 – Receive, Organize, and Analyze Results.** Once the Plan developed under Task 2 is approved by DDW, it will be implemented under this Task. As discussed earlier, the plan will include three phases: Phase 1 represents baseline conditions, Phase 2 is a transition period, and Phase 3 represents the modified treatment conditions. District staff will collect the water quality samples and submit them to the District's commercial laboratory for analysis. Once the results are obtained from the laboratory, they will be transmitted to WQTS where they will be organized and analyzed for the purpose of delineating the effect of treatment change on both the performance of the treatment plant and the formation of DBPs.

**Task 4 – Prepare Technical Memorandum & Meet with District.** After completion of the study, WQTS will prepare a Technical Memorandum (TM) detailing the study results, with recommendations for the future operational conditions. After submittal of the draft TM and its review by District staff, WQTS will meet with District staff to discuss the details of the study and discuss whether the plant should implement the modified treatment strategy on a permanent basis. This decision will determine whether or not Task 5 will proceed.

**Task 5 – Assist in the Preparation of a Permit Amendment Application.** If the decision is made to implement the treatment changes on a permanent basis, the District will need to submit an application for a Permit Amendment for the Res A WTP. WQTS will assist the District in the preparation of the application and its submittal to DDW. Under this task, WQTS will participate in one meeting with DDW to present the study outcome, and answer any questions that the DDW engineer may have regarding the study and its results.
Task 6 – Bench Testing of DBP Formation through Filter Media. One of the observations made during the bench-scale DBP formation testing was that the exposure of higher concentrations of coagulant to chlorine resulted in a slight increase in DBP formation. To test this hypothesis, WQTS prepared four solutions of SWT8809 solutions in distilled water. The coagulant doses were 0, 3, 10, and 20 mg/L. The solutions were analyzed for TOC concentrations, and the results showed that the coagulant contained approximately 5% TOC by wt. The solutions were also exposed to chlorine for 30 minutes and then analyzed for THMs. The results showed that the THM levels increased by a slight amount with increasing coagulant dose. While the TOC content and the THM formation were very low, it is noted that the coagulant added at the Res A WTP is retained in the media filters for the entire filter runtime. For example, if 3 mg/L are added to a filter operating at 5 gpm/sf, then the filter will accumulate approximately 80,000 mg of coagulant per square foot of filter area every 24 hrs. That translates into 400 mg of TOC per square foot of filter area every day. There is a good likelihood that this accumulated TOC results in a significant formation of THMs as the District aims to maintain chlorine through the filters.

To investigate this matter further, WQTS proposes to obtain two samples of the media from one of the filters at the Res A WTP: One sample just before backwashing, and one sample after backwashing. The samples can be collected using a dip sampler or a similar device that can collect approximately one (1) liter of filter media. A sample of raw water and a sample of waste backwash water will also be collected and sent to WQTS along with the filter media. Once received at our facility, testing will be conducted to evaluate the THM formation potential of the samples received and help determine whether the above hypothesis is supported with full-scale testing work.

Budget

The anticipated cost of this effort is projected at $74,710, and is broken down below on a task-by-task basis, and by individual. The only non-labor costs incurred are for sample shipping and analytical services under Task 6.

<table>
<thead>
<tr>
<th>Task</th>
<th>Najm, I. ($225/hr)</th>
<th>Askenaizer, D. ($190/hr)</th>
<th>Maraccini, P. ($135/hr)</th>
<th>Non-Labor Cost</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>22</td>
<td>16</td>
<td></td>
<td></td>
<td>$7,110</td>
</tr>
<tr>
<td>2.</td>
<td>16</td>
<td>44</td>
<td></td>
<td></td>
<td>$9,540</td>
</tr>
<tr>
<td>3.</td>
<td>39</td>
<td>78</td>
<td></td>
<td></td>
<td>$19,305</td>
</tr>
<tr>
<td>4.</td>
<td>30</td>
<td>56</td>
<td></td>
<td></td>
<td>$14,310</td>
</tr>
<tr>
<td>5.</td>
<td>4</td>
<td>24</td>
<td>24</td>
<td></td>
<td>$9,600</td>
</tr>
<tr>
<td>6.</td>
<td>7</td>
<td>72</td>
<td></td>
<td>$4,450</td>
<td>$15,745</td>
</tr>
<tr>
<td>TOTAL</td>
<td>118</td>
<td>24</td>
<td>290</td>
<td>$4,450</td>
<td>$74,710</td>
</tr>
</tbody>
</table>
April 13, 2018

Mr. Dana Strahan  
Division Manager – Drinking Water Operations  
El Dorado Irrigation District  
2890 Mosquito Road  
Placerville, CA 95667

Subject: Proposal – Technical Support for Tracer Testing of Reservoir A

Dear Mr. Strahan:

On behalf of Water Quality & Treatment Solutions, Inc. (WQTS), I am pleased to submit to the El Dorado Irrigation District this proposal to provide technical support services for Tracer Testing of Reservoir A.

A tracer test is required to identify the baffling factor (BF) of a disinfection contactor. This factor is then used to calculate the disinfection credit received by the contactor, which is a key component of the Res A WTP operation. A tracer test involves the addition of a tracer chemical at a constant dose to the inlet of the contactor for a set period of time, and then the monitoring of the chemical concentration at the outlet of the contactor during that period. During this time, the flowrate through the reservoir should be held within no more than 10% of the maximum permitted operating flowrate through the reservoir.

While the test will be conducted by District staff, WQTS will provide technical support in the form of the following tasks:

1. WQTS will prepare the testing plan with specific guidance on how to conduct the test
2. WQTS will support the District’s effort in coordinating with the Division of Drinking Water (DDW) to receive permission for the test.
3. WQTS will receive the testing results from the District and analyze them for the purpose of determining the BF value for Res A.
4. WQTS will present the results and the proposed BF value in a Technical Memorandum (TM) to be submitted to DDW.
5. WQTS will participate in two meetings with the District and DDW (one at the beginning and one after the results are analyzed)

Assuming that the District will purchase the Lithium Chloride salt to be used in the test, and will cover the analytical costs separately, WQTS’ cost is projected at $13,500, and is limited to labor cost to complete the above tasks.

We hope this proposal is acceptable to you, and we look forward to working with the District on this effort. In the meantime, if you have any questions, please contact me at (818) 366-8340 or at issam.najm@wqts.com.

Regards,

Water Quality & Treatment Solutions, Inc.

Issam Najm, Ph.D., P.E.  
President
EL DORADO IRRIGATION DISTRICT

Subject: Consideration to agendize an action item for the May 14, 2018 regular Board meeting to consider delaying the implementation of the low-income assistance program for District residential wastewater customers.

Previous Board Action
June 27, 2016 – Information item to review feasibility of implementing a low-income assistance program for District customers.

January 23, 2017 – Board considered a low-income assistance program for District single family residential wastewater customers and established a Board-directed discretionary revenue fund to, among other things, fund a low-income ratepayer assistance program.

November 13, 2017 – Board gave direction to staff, during a workshop, to bring back an option for a low-income assistance program for residential wastewater customers only.

December 11, 2017 – Board authorized staff to implement a low-income assistance program for up to 1,500 qualifying residential wastewater customers utilizing funds as directed by the Board commencing April 1, 2018 through December 31, 2019, at which time staff will bring this program back to the Board for further review and consideration.

January 8, 2018 – Staff was directed to bring back an item to discuss changing the funding for the low-income assistance program for residential wastewater customers.

January 22, 2018 – Board voted to agendize an action item for the February 12, 2018 regular Board meeting to consider a funding change for the low-income assistance program for District residential wastewater customers only.

February 12, 2018 – Board authorized staff to change funding for low-income rate assistance program for sewer customers from property taxes to first use Board wastewater discretionary revenue funds and then property taxes when those funds are exhausted.

Board Policies (BP), Administrative Regulations (AR) and Board Authority
BP 3010 states the Board is committed to promoting the most efficient and effective use of the District’s financial resources that will accomplish the goals of the District, support facilities and programs, and provide quality services to District customers. It is the responsibility of the General Manager to inform the Board about financial operations of the District so the Board can make informed decisions and fully discharge its legal responsibilities in a fiscally sound manner.

BP 9010 states the District strives to meet or exceed customers’ reasonable expectations for service through innovative thinking, effective issue resolution, and execution of strategic plans.

BP 9050 states the District’s Board of Directors establishes charges and rates for water, recycled water, and wastewater services.
BP 12050 states in exercising their oversight, and in order to maintain accountability for the performance of their duties and responsibilities, the Board shall provide for ongoing review and evaluation of current programs, services, and activities of the District. The Board recognizes that this includes regular reports to the public on qualitative and quantitative assessments.

The General Manager shall establish and conduct regular assessments of the services and activities of the District. This may include oral or written reports presented at meetings of the Board.

BP 12080 states in part that no matter upon which “action is taken” may be reagendized or reconsidered for a period of six (6) months except by the following process: The Board of Directors may, upon any member’s agendizing the matter, vote to reconsider any action previously taken, and if a majority of the Board votes to reconsider, the matter shall be placed on the agenda for reconsideration at a subsequent meeting.

**Summary of Issue**

On December 11, 2017, the Board approved a low-income assistance program for residential wastewater customers and directed staff to use property tax revenues to fund the program. The Board subsequently directed staff to first use Board wastewater discretionary revenue funds and then property taxes when those funds are exhausted.

Shortly after the Board approved the low-income assistance program, however, District water customer, Darwin Throne, filed a lawsuit against the District alleging that the District’s water rates violate Proposition 218.

On March 30, 2018, the District received an email from a ratepayer criticizing the newly-implemented low-income program for wastewater customers by “shifting cost burdens from one group to another…” The customer additionally stated “If there is excess money in EID budget & or your revenue has been higher than anticipated, you should lower rates for all EID users for the services we pay for or rebate all EID customers. IF there is a social policy that needs to be addressed it should be addressed by the State Authorities thru State funded programs.

You recently asked for help from the voting public to address an unfair and illegitimate Bill that would attempt two add fees to districts (EID included) that would be used to subsidize other ‘underprivileged’ California State districts in their cost subsidies. I agreed with this position and called and wrote my representatives as EID recommended. This ill-conceived EID “Low-Income” Program, is essentially the SAME THING/Policy/Philosophy—using Utility funds to subside social/political policies that should be owned and executed by the State from State Budgets and taxes—NOT from utilities customers, fees and revenues generated from Waste water bills or Water Revenue.

To comply with BP 12080 (above), Director Coco has requested that this item be placed on the agenda for consideration.
**Board Discussion/Options**

**Option 1:** Agendize an action item for the May 14, 2018 regular Board meeting to consider delaying the implementation of the low-income assistance program for District residential wastewater customers.

**Option 2:** Take other action as directed by the Board.

**Option 3:** Take no action.

**Director Recommendation**

Option 1

**Support Documents Attached**

None

Jennifer Sullivan  
Clerk to the Board

[Signature] for  
Dale Coco, MD  
Board Director
EL DORADO IRRIGATION DISTRICT

Subject: Status of the El Dorado Forebay Dam Modification, Project No. 17013H.

Previous Board Actions
August 14, 2017 – The Board awarded contracts and authorized funding for the El Dorado Forebay Dam Modification Project:

- Approved a construction contract with Shimmick Construction Co. in the not-to-exceed amount of $19,147,500
- Approved a professional services agreement with GEI Consultants, Inc. in the not-to-exceed amount of $2,026,600
- Authorized the General Manager to sign the NFWF Credit Transfer Agreement and pay the compensatory mitigation fee of $753,300 for impacts to waters of the U.S.
- Approved a professional services agreement with Youngdahl Consulting Group, Inc. in the not-to-exceed amount of $91,440
- Approved a professional services agreement with Burleson Consulting, Inc. in the not-to-exceed amount of $159,852
- Approved funding in the amount of $25,155,336

Board Policies (BP), Administrative Regulations (AR), and Board Authority
BP 5010: The Board is committed to provide a water supply based on the principles of reliability, high quality, and affordability in a cost-effective manner with accountability to the public. It is the General Manager’s responsibility to ensure that the tenets of this policy are carried out in an open, transparent manner through sound planning, to assure preparedness under varying conditions, and effective management.

BP 8010: The District maintains and operates its hydroelectric generating facilities in a safe, efficient, and environmentally responsible manner, and in compliance with all applicable federal and state permits and regulations, the terms of the Federal Energy Regulatory Commission license, and all related agreements. Hydroelectric power generation shall be compatible with the District’s consumptive water supply operations.

AR 8014: Priority of the Dam Safety Program: The District shall maintain a dam safety program to safeguard the public, the environment, and its hydroelectric facilities. This will be facilitated through the Owner’s Dam Safety Program (ODSP), as required by the Federal Energy Regulatory Commission; applicable to the District’s high and significant hazard potential dams.

The ODSP shall assure that dam safety is of the highest priority within the District’s organization through: acknowledging dam safety responsibilities; promoting internal communication throughout the organization; clearly designating responsibility for maintaining dam safety; allocating adequate resources to dam safety; and continual learning in dam safety.

Summary of Issue
This information item is to report progress of the El Dorado Forebay Modification project for which the primary purpose is to correct deficiencies with current dam safety requirements as mandated by the California Department of Water Resources - Division of Safety of Dams (DSOD) and the Federal Energy Regulatory Commission (FERC). This report includes a
summary of FERC’s authorization to construct, 2017 timber harvest activities, environmental compliance, construction contract costs vs. budget status, and 2018 construction plans and schedule.

FERC’s Authorization to Construct
At the time of the Board’s August 14, 2017 approval of contracts and funding for the Project, FERC had issued a limited authorization to proceed with the 2017 timber harvest. FERC was unable to authorize the construction phase due to staff changes and resources required for the Oroville spillway incident.

FERC provided comments on August 11, 2017, and staff filed a comprehensive response (679 pages) to FERC’s comments on September 13, 2017. Staff’s filing satisfied FERC’s information request and FERC issued its full authorization to construct on January 17, 2018.

2017 Timber Harvest Activities
Timber harvest and site clearing began on September 27, 2017. Weather conditions allowed timber harvest operations to continue through December 22, 2017, well beyond the planned winter-shutdown period of mid-November. This allowed for the harvesting of an additional 15 acres of timber, for a total 45 acres logged in the primary borrow area. Under current estimates, sufficient earth-fill material may be available from the primary borrow area to meet all soil stability berm, embankment and backfill needs for the project.

A total of 54 acres was harvested during 2017, including the borrow area. If no additional borrow area is needed, the balance of timber harvesting to be conducted in 2018 is estimated at about 6 acres near the spillway and around the perimeter of the reservoir.

Environmental Compliance
Work in 2017 was completed in compliance with all mitigation and permit requirements including the following:

- SWRCB CWA Sec. 401 Water Quality Certification
- CalFire Timberland Conversion Permit & Timber Harvest Plan
- FERC License Amendment
- USFWS Biological Opinion
- USACE CWA Sec. 404 Nationwide Permit
- FERC’s Authorization to Construct

Construction Contract Costs vs. Budget
Contract Amount with Shimmick Construction = $19.2 M
Shimmick’s 2017 Costs = $1.7 M
Balance = $17.5 M

- 2017 timber harvesting proceeded as planned and costs were within budget
- Approximate $48K savings in SWPPP maintenance costs thru winter 2017/2018
- No significant additional costs are currently known for 2018 work, which resumed in April
- However, 2018 work begins with two of the most critical activities, dewatering and foundation excavation, where existing foundation conditions will be determined and contingencies for variability are available if needed
**2018 Construction Plans and Schedule**

2018 construction is proceeding and planned as follows:

<table>
<thead>
<tr>
<th>Schedule</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>April - June</td>
<td>Mobilization, access improvements, stump and slash removal</td>
</tr>
<tr>
<td>April - May</td>
<td>Dewater surface and groundwater at toe of dam; Drill wells</td>
</tr>
<tr>
<td>May - June</td>
<td>Stockpile borrow area soil at toe of dam and excavate for stability berm</td>
</tr>
<tr>
<td>June</td>
<td>Develop foundation for stability berm &amp; begin placement of fill</td>
</tr>
<tr>
<td>June - September</td>
<td>Continue soil and filter material placement for buttress up to penstock</td>
</tr>
<tr>
<td>August - September</td>
<td>Timber harvesting approximately 6 acres around reservoir &amp; spillway</td>
</tr>
<tr>
<td>October - December</td>
<td>Drain reservoir during normal fall outage</td>
</tr>
<tr>
<td>October - December</td>
<td>Install penstock &amp; water supply intake gates, other penstock improvements</td>
</tr>
<tr>
<td>October - December</td>
<td>Conduct improvements to water supply controls and seepage return system</td>
</tr>
<tr>
<td>October - December</td>
<td>Install concrete box culvert and backfill at reservoir inlet</td>
</tr>
</tbody>
</table>

Please also refer to Attachment B.

**Board Decision/Options**

Information Item - No action required.

**Supporting Documents Attached**

Attachment A: EID Forebay Conversion Project (Timber Harvest) Completion Map

Attachment B: 2018 Planned Activities and Schedule for the El Dorado Forebay Modification Project
John Kessler, P.E.
Chief Dam Safety Engineer

Brian Deason
Hydroelectric Compliance Analyst

Elizabeth D. Wells, P.E.
Engineering Manager

Brian Mueller
Engineering Director

Margaret P. Washko, P.E.
Operations Director

Brian Poulsen
General Counsel

Jim Abercrombie
General Manager
Soil Removal - April to September
Timber Harvest - August to November
(including haul road usage to Forebay Road and Dam)

Soil excavation & placement on dam
April to September

Reservoir Draining and
Power & Water Supply
Intake Structure
Improvements
October to December

Timber harvesting around
reservoir perimeter
August to November

Tunnel extension & soil
backfill at reservoir inlet
October to December

Source: EID 2013, adapted by AECOM in 2013

Exhibit 2-1

Major Project Elements
Status of El Dorado Forebay Dam Modification Project

April 23, 2018
Status Report Agenda

- Review of Project Objectives & Benefits
- Status of FERC Authorization to Construct
- 2017 Timber Harvest Activities
- Construction Budget vs. Costs
- Public Outreach
- 2018 Construction Plans and Schedule
Project Objectives

• Maintain & improve public safety
  – Comply with FERC & DSOD dam safety mandates
• Restore reservoir operating flexibility
  – Current 3’ restriction
• Maintain & enhance water supply & power benefits of Forebay
• Increase freeboard from 4 to 10 feet
• Increase factor of safety for stability of the downstream face
• Add filter and drain provisions to prevent embankment fill migration (piping)
• Armor upstream dam face to prevent wave-induced erosion
• Add power and water supply intake gates
• Extend concrete encasement of outlets
Project Benefits

- Improve water supply reliability from Forebay during an outage from < 1 day to 6 days
- Increase average annual power generation revenues by $330K
- Eliminate FERC and DSOD imposed 3-foot operating level restriction
  - Restoring 63 acre-feet of usable capacity in Forebay Reservoir
Project Benefits

Recover approximately 170 AF of storage capacity lost by long-term sedimentation.
FERC Construction Approval Status

• FERC’s Authorization to Construct
  – Delayed due to FERC staff changes ... needing to restart review and Oroville event

• FERC provided comments on 8/11/2017
  – Authorizing first season timber harvest
  – Deferring construction authorization until FERC’s comments were addressed

• Staff filed response to FERC’s comments on 9/13/2017 (679 pages)

• FERC issued full authorization to construct on 1/17/2018
2017 Timber Harvest - Public Safety and Facility Closure
Timber Harvest - Establishing Access Roads
Timber Harvest – Tree Falling
Timber Harvest – Visual Buffer at Blair Road
2017 Timber Harvest – Completed ~ 54 Acres

- 45 acres total logged in borrow area
- Extended harvest work from mid-Nov. to Dec. 22, 2017
- 15 additional acres logged

~ 6 acres of logging planned for 2018 near spillway and reservoir perimeter
2017 Contractor Costs vs. Budget

Contract Amount with Shimmick Construction = $19.2 M

Shimmick’s 2017 Costs = $1.7 M

Balance = $17.5 M

- 2017 timber harvesting proceeded as planned; costs were within budget
- ~ $48K Savings in SWPPP maintenance costs thru winter 2017/2018
2017 & 2018 Public Notices - Announcing Start of Construction

- Informed neighbors of activities, locations & schedule
- Updated website materials
- Advised how to stay informed ... eNotifications, Facebook
- Provided Email address & phone # for access to project staff
- Installed project signage on Forebay Rd. & Polaris St.
- Distributing Info. cards for personal contacts

2018 Planned Activities and Schedule for the El Dorado Forebay Modification Project

- Soil Removal - April to September
- Timber Harvest - August to November (including haul road usage to Forebay Road and Dam)
- Reservoir Draining and Power & Water Supply Intake Structure Improvements October to December
- Soil excavation & placement on dam April to September
- Timber harvesting around reservoir perimeter August to November
- Tunnel extension & soil backfill at reservoir inlet October to December
Spring 2018 – Access Improvements & Stump/Slash Removal
Spring 2018 – Dewatering while maintaining normal operations

Notes:
Groundwater elevations on 5-10-13 most borings
Groundwater elevations for B-305, P-4, B-303 from 5-25-11
P-4 elevation in project spreadsheet was 3716.52 May 10, 2013, possible datum discrepancy
Summer 2018 Work – Stability Berm & Lower Buttress

- Dewater & excavate to competent material
- Add stability berm and buttress
- Add filter and drain provisions to prevent embankment fill migration (piping)
- Target Level of Fill – Upper Butterfly Valve House
Soil Haul Plan from Borrow Area to Dam

PHASE 1
Stability Berm Fill to Elev 3703
Qty Required: 20,000 CY Banked Fill
Unit A3 Sections: 1, 2, 4, 5, 10, 11, 17, 18, 24
Total CL/ML Qty: 20,000 CY Banked Fill

Legend:
- Timber Harvest Boundary Completed During 2017 Season
- Phase Work Area
- Phase Topsoil Stockpile
- Phase Stump & Slash Stockpile
- Phase Haul Route

Forester's Co-Op
Professional Forestry & GIS Services
(319) 272-8920
www.forco-ic.com
Spring 2018 Excavation
Summer 2018 Soil Fill Placement

EMBANKMENT - ELEV 3703
Summer 2018 Soil Fill Placement

EMBANKMENT - ELEV 3730
Summer 2018 Soil Fill Placement – Target to Upper BFV
October thru mid-December 2018 – Reservoir Dewatering
Work to be Completed During Normal Outage
October thru mid-December 2018 – Penstock Work

- Replace lining inside service penstock (TBD)
- Concrete-encase service penstock
- Backfill and grout two unused penstocks
October thru mid-December 2018 – In-Reservoir Work

- Add reservoir slide gates to power and water supply intakes
- Replace water supply intake access platform
- Remove ~ 9,000 CY of sediment
October thru mid-December 2018
Reservoir Inlet Channel Restoration & 14 Mile Tunnel Repairs
Discussion
EL DORADO IRRIGATION DISTRICT

Subject: Consideration to ratify the General Manager’s award of a contract to Doug Veerkamp General Engineering, Inc. in the not-to-exceed amount of $75,000 and approve a contract change order for an additional $17,569.39 for the emergency repair and replacement of a failed sewer lateral connection and associated segment of mainline located on Cambridge Road in Cameron Park.

Previous Board Actions
None

Board Policies (BP), Administrative Regulations (AR) and Board Authority
The District’s mission is to provide high quality water, wastewater treatment, recycled water, hydropower, and recreation services in an environmentally and fiscally responsible manner.

BP 3060 provides “Except during emergencies, the Board of Directors shall approve all contracts or procurements with values greater than $50,000, and construction contract change orders with values greater than $100,000. In the event of an emergency requiring immediate contract or procurement action, the General Manager is hereby authorized to approve any and all contracts necessary to abate the emergency after first informing the President of the Board of Directors and scheduling an emergency meeting of the Board of Directors at the earliest possible opportunity. The General Manager shall bring any and all contracts or procurements with values exceeding the levels set forth above, but approved during an emergency, to the Board of Directors for ratification at the first meeting of the Board immediately following the emergency.”

AR 6020.2: The District owns and is responsible for clearing stoppages and for inspecting, maintaining, and repairing the lower lateral.

Summary of Issue
On Wednesday, March 28, 2018, EID received a service call from a customer whose residence is located near the intersection of Cambridge Road and La Canada Drive in Cameron Park. Responding staff found that the lower sewer service lateral was completely blocked, offset, or broken, which rendered the home uninhabitable due to a lack of sewer service. In order to respond immediately, the General Manager awarded a contract to Doug Veerkamp General Engineering, Inc. in the not-to-exceed amount of $75,000 to conduct the repair. This item seeks Board ratification of that contract award, along with the approval of a change order for an additional $17,569.39.

Staff Analysis/Evaluation
Background
Wastewater service laterals are comprised of an upper and lower portion. The upper lateral is defined as that portion of the wastewater lateral that exists from building plumbing to the cleanout located at or near the utility easement line. The lower lateral is defined as that portion of the wastewater lateral from the mainline to the downstream end of the upper lateral, including the cleanout. The District owns and is responsible for clearing stoppages and for inspecting, maintaining, and repairing the lower lateral.
Emergency Situation
On March 28, 2018, a 4-inch residential lower lateral service for a residence located on Cambridge Road, in Cameron Park, failed at the point of connection to the District’s 6-inch sewer main servicing the area. District staff worked diligently for several hours trying to free the obstruction but was unable to make any progress. Closed Circuit Television (CCTV) equipment was used in an effort to get a visual assessment. The video revealed that, while the main was in good condition, the service lateral was clearly obstructed, offset, and likely broken near the connection to the main. The failure was located in the right of way, near the fog line (the white line that designates the shoulder of the road lane) of south-bound Cambridge Road approximately twenty-two feet below the ground surface. A private service located at a depth of twenty-two feet is rare within the District and would not be allowed under the District’s current design standards.

The failed sewer lateral rendered the residence uninhabitable due to a lack of sewer service and District staff determined that emergency repairs were therefore necessary. District Operations and Engineering staff conferred and agreed that excavation and repair was the most prudent course of action. In order to excavate to this depth, the use of larger more specialized equipment is required. Also, all excavations over twenty feet must have engineered and stamped shoring systems in order to meet OSHA safety regulations. Additionally, due to the depth of the excavation, larger equipment, and the location of the repair near the fog-line of the road, Cambridge Road needed to be closed for the duration of the project and detours were coordinated with the El Dorado County Department of Transportation.

Contracting and Repair
Due to the need for emergency repairs, District staff determined that there was not sufficient time to conduct formal bidding for this work. In an attempt to facilitate an expedited emergency repair at minimal cost to the District, staff contacted three contractors that have completed work with a similar level of complexity and urgency. Of the three contractors contacted, Doug Veerkamp General Engineering, Inc. responded with the lowest estimated cost proposal of $75,000.

The estimated amount of $75,000 for the Veerkamp contract exceeded the $50,000 threshold that generally triggers the requirement that the contract be approved by the Board of Directors. However, Board Policy 3060 authorizes the General Manager, in the event of an emergency requiring immediate contract or procurement action, to approve any and all contracts necessary to abate the emergency, and then seek ratification at the next Board meeting. Due to the need for emergency repairs to restore sewer service at this residence, the General Manager exercised his authority to approve the Veerkamp contract, to allow for emergency repairs to be performed, and informed the Board President, and subsequently, the entire Board of this action.

The contractor began work on Monday April 2, 2018, using two straight time shifts working for a total of 16-hours each day. The repair was completed on April 6, 2018. To expedite the repair and save on cost, the contractor and District staff worked collaboratively using the District’s combination sewer cleaner/vacuum truck to remove material around the pipeline and manage groundwater as well as CCTV equipment to assure accurate alignment of the connection and unobstructed flow through the sewer mainline.

The final cost of the repair, which under the contract is to be determined on a time and materials basis, requires the approval of an additional $17,569.39. The change order results from additional work associated with the replacement of a segment of sewer main-line that was found to be damaged while performing the repair. The discovery of the defective sewer main-line section increased the footprint of the excavation to facilitate the replacement. The larger and
deeper excavation required changes to the engineered shoring plan and resulted in additional paving obligations that were not included in the initial contract. These unforeseen conditions led to additional time and materials needed to complete the repair including doubling the area that required paving restoration.

**Funding and Ratification**

The project will be funded from the wastewater operating budget. District staff requests that the Board ratify the General Manager’s award of a construction contract to Doug Veerkamp General Engineering, Inc. in the not-to-exceed amount of $75,000, and approve a contract change order for an additional $17,569.39 for the emergency repair and replacement of a failed lateral connection and associated segment of sewer mainline located on Cambridge Road in Cameron Park.

**Board Decisions/Options**

**Option 1:** Ratify the General Manager’s award of a contract to Doug Veerkamp General Engineering, Inc. in the not-to-exceed amount of $75,000 and approve a contract change order for an additional $17,569.39 for the emergency repair and replacement of a failed sewer lateral connection and associated segment of mainline located on Cambridge Road in Cameron Park.

**Option 2:** Take other action as directed by the Board.

**Option 3:** Take no action.

**Staff/General Manager’s Recommendation**

Option 1

**Supporting Documents Attached**

Attachment A: Executed Services Agreement
Tracy Crane
Wastewater and Recycled Water Manager

Dan Corcoran
Environmental and Water Resources Manager

Margaret P. Washko, P.E.
Operations Director

Brian Mueller, P.E.
Engineering Director

Mark Price
Finance Director

Brian Poulsen
General Counsel

Jim Abercrombie
General Manager
EL DORADO IRRIGATION DISTRICT
2890 Mosquito Road
Placerville, CA 95667

Services Agreement

VENDOR: Doug Veerkamp General Engineering Inc.

I. SCOPE OF THE SERVICES

The Services to be rendered ("Services") consist of:

1. Vendor shall perform the Services to reestablish a crushed (not serviceable) repair 4" Service Lateral Break adjacent to the 6" main line (Emergency Service) at 2740 Cambridge Rd., Cameron Park, CA 95682 in accordance with all terms and conditions of this Agreement and all attachments hereto. The Services shall be performed in accordance with all applicable and the most current codes, laws, regulations and professional standards. Vendor shall be responsible for obtaining all permits necessary for the Services to be rendered.

2. Unless otherwise permitted in writing by District, Vendor shall not propose or recommend any service that has the effect of shifting responsibilities from Vendor to a third party through performance specifications or any other means. Performance specifications will be allowed only when necessary to preclude single vendor sources or when specifically requested by District.

II. COMPENSATION FOR SERVICES

Vendor's total compensation for Services performed under this Contract is $75,000 to be paid as costs are incurred for Time and Material. All invoices shall be approved by EID project manager Jon Money. The scope shall be deemed complete once project manager has approved all work and determined that the service line has been completely restored. Total cost not to exceed $75,000.

III. SCHEDULE OF PERFORMANCE

Vendor shall commence the Services by TBD as directed by project manager and complete the Services within 60 days of commencement of the Services.

IV. TERMS AND CONDITIONS

1. Vendor shall perform the Services in accordance with the terms and conditions of this Agreement, INCLUDING THE GENERAL TERMS AND CONDITIONS ATTACHED HERE TO AND INCORPORATED HEREBY BY THIS REFERENCE.
2. Purchase order number must appear on all invoices and correspondence. Send invoices to ATTN Purchasing, EL DORADO IRRIGATION DISTRICT, 2890 MOSQUITO RD, PLACERVILLE CA 95667, immediately upon performance.
3. Changes made to printed Terms and Conditions on this Agreement are null and void unless approved in writing by the District's Office of the General Counsel.
4. Vendor must comply with Appendix A and Appendix B of this Agreement.
5. Vendor has read, negotiated (if desired) and expressly accepts all terms incorporated herein, including Section 5 relating to indemnity and liability.

Doug Veerkamp General Engineering Inc.EL DORADO IRRIGATION DISTRICT ("District")

\[Signature\] \[Signature\]
Sign here Date

Print Name & Title

Tracy Crane - Wastewater Manager
Margaret C. Washko - Operations Manager
Jim Abercrombie - General Manager

Approved as to form:
By:
Office of the General Counsel

3-30-18
11/30/18
11/30/18
3-30-18

Page 1 of 7
Doug Veerkamp Engineering, Emergency Repair
EL DORADO IRRIGATION DISTRICT
2890 Mosquito Road
Placerville, CA 95667

Services Agreement

VENDOR: Doug Veerkamp General Engineering Inc.

I. SCOPE OF THE SERVICES

The Services to be rendered ("Services") consist of:

1. Vendor shall perform the Services to reestablish a crushed (not serviceable) repair 4" Service Lateral Break adjacent to the 6" main line (Emergency Service) at 2740 Cambridge Rd. Cameron Park, CA 95682 in accordance with all terms and conditions of this Agreement and all attachments hereto. The Services shall be performed in accordance with all applicable and the most current codes, laws, regulations and professional standards. Vendor shall be responsible for obtaining all permits necessary for the Services to be rendered.

2. Unless otherwise permitted in writing by District, Vendor shall not propose or recommend any service that has the effect of shifting responsibilities from Vendor to a third party through performance specifications or any other means. Performance specifications will be allowed only when necessary to preclude single vendor sources or when specifically requested by District.

II. COMPENSATION FOR SERVICES

Vendor’s total compensation for Services performed under this Contract is $75,000 to be paid as costs are incurred for Time and Material. All invoices shall be approved by EID project manager Jon Money. The scope shall be deemed complete once project manager has approved all work and determined that the service line has been completely restored. Total cost not to exceed $75,000.

III. SCHEDULE OF PERFORMANCE

Vendor shall commence the Services by TBD as directed by project manager and complete the Services within 60 days of commencement of the Services.

IV. TERMS AND CONDITIONS

1. Vendor shall perform the Services in accordance with the terms and conditions of this Agreement, INCLUDING THE GENERAL TERMS AND CONDITIONS ATTACHED HERETO AND INCORPORATED HEREBY BY THIS REFERENCE.

2. Purchase order number must appear on all invoices and correspondence. Send invoices to ATTN Purchasing, EL DORADO IRRIGATION DISTRICT, 2890 MOSQUITO Rd, PLACERVILLE CA 95667, immediately upon performance.

3. Changes made to printed Terms and Conditions on this Agreement are null and void unless approved in writing by the District’s Office of the General Counsel.

4. Vendor must comply with Appendix A and Appendix B of this Agreement.

5. Vendor has read, negotiated (if desired) and expressly accepts all terms incorporated herein, including Section 5 relating to indemnity and liability.

Doug Veerkamp General Engineering Inc.

EL DORADO IRRIGATION DISTRICT ("District")

Sign here

Date

Print Name & Title

Tracy Crapo - Wastewater Manager

Margaret Washko - Operations Manager

Jim Abercrombie - General Manager

Approved as to form:

By: Angela Lee

Page 1 of 7
Doug Veerkamp Engineering, Emergency Repair
GENERAL TERMS AND CONDITIONS

1. Service Agreement ("Service") Force and Effect. El Dorado Irrigation District ("District") is not responsible for services rendered without the authority of a agreement on this form. This Agreement shall supersede and control over all inconsistent provisions in any proposal. The provisions of this Agreement (which may include attachments) constitute the entire agreement between the Vendor and District regarding the work and services described herein. No representation, term or covenant not expressly specified in this Agreement shall, whether oral or written, be a part of this agreement. No modification of this Agreement shall be effective unless it is in writing. This Agreement shall supersede all other prior purchase agreements and agreements between Vendor and District with respect to the work and services described herein. This Agreement may not be modified, nor may compliance with any of its terms be waived, except by written instrument executed and approved by fully authorized representatives of District and Vendor. The headings in this Agreement are for convenience only and do not affect the construction of this Agreement.

2. Performance of Services/No Assignment. Time is of the essence in the performance of the Services. Vendor represents that it is skilled in the professional discipline necessary to perform the services ("Services") under this Agreement. Vendor will perform its Services in a skillful manner, comply fully with criteria established by District, and with applicable laws, codes, and all applicable professional standards. Vendor shall not contract any portion of the Services or otherwise assigns this Agreement without prior written approval of District. (Vendor shall remain responsible for compliance with all terms of this Agreement, regardless of the terms of any such assignment.) Vendor's authorized representative is the individual signing this Agreement unless Vendor otherwise informs District in writing. The granting of any payment, and any inspections, reviews, approvals or oral statements by any District representative, or certification by any governmental entity, shall in no way limit Vendor's obligations under this Agreement.

3. Records and Payment Requests. Vendor shall submit all billings with all necessary invoices or other appropriate evidence of performance, after which District shall make payment within thirty (30) days. District shall have the right to audit the Vendor's work records. Vendor shall make available to District, its authorized agents, officers, or employees, any and all ledgers, books of accounts, invoices, vouchers, cancelled checks, and other records or documents evidencing or relating to the expenditures and disbursement charged to District, for examination. Vendor shall furnish to District, its authorized agents, officers, or employees, such other evidence or information as District may require with regard to any such expenditure or disbursement charged by Vendor. Vendor shall maintain all documents and records prepared by or furnished to Vendor during the course of performing the services for at least three (3) years following completion of the Services, except that all such items pertaining to hazardous materials shall be maintained for at least thirty (30) years. Such records include, but are not limited to, correspondence, internal memoranda, calculations, books and accounts, accounting records documenting its work under its Agreement, and invoices, payrolls, records and all other data related to matters covered by this Agreement. Vendor shall permit District to audit, examine and make copies, excerpts and transcripts from such records. The State of California or any federal agency having an interest in the subject of Agreement shall have the same rights conferred to District by this section. Such rights shall be specifically enforceable.

4. Independent Contractor. Vendor is an independent contractor and does not act as District's agent in any capacity whatsoever. Vendor is not entitled to any benefits that District provides to District employees, including, without limitation, worker's compensation benefits or payments, pension benefits, health benefits or insurance benefits. Terms within this Agreement regarding direction apply to and concern the result of the Vendor's provision of Services not the means, methods, or scheduling of the Vendor's work. Vendor shall be solely responsible for the means, methods, techniques, sequences and procedures with respect to its provision of Services under this Agreement. Vendor shall pay all payroll taxes imposed by any governmental entity and will pay all other taxes not specifically identified in this Agreement as District's responsibility.

5. Indemnity/Liability. To the fullest extent permitted by law (including, without limitation, California Civil Code Section 2882), Vendor shall defend (with legal counsel reasonably acceptable to El Dorado Irrigation District ("District")), indemnify and hold harmless District and its officers, agents, departments, officials, representatives and employees (collectively "Indemnitees") from and against any and all claims, loss, cost, damage, injury (including, without limitation, injury to or death of an employee of Vendor or its sub-vendors), expense and liability of every kind, nature and description (including, without limitation, incidental and consequential damages, court costs, attorneys' fees, litigation expenses and fees of expert vendors and/or expert witnesses incurred in connection therewith and costs of investigation) that arises from or relate to, directly or indirectly, in whole or in part, but only to the extent that any of the above are actually caused by, any negligent or reckless act or omission, or willful misconduct, of Vendor, any sub-vendor, anyone directly or indirectly employed by them, or anyone that they control (collectively "Liabilities"). Such obligations to defend, hold harmless and indemnify any Indemnitee shall not apply to the extent that such Liabilities are caused in whole or in part by the sole negligence, active negligence, or willful misconduct of any Indemnitee.

6. Conflict of Interest. Vendor represents and warrants that it presently has no interest, and shall not have any interest, direct or indirect, which would conflict in any manner with the performance of work and services required under this Agreement. Without limitation, Vendor represents to and agrees with District that Vendor has no present, and will have no future conflict of interest between providing District services hereunder and any interest Vendor may presently have, or will have in the future, with respect to any other person or entity (including but not limited to any federal or state wildlife, environmental or regulatory agency) which has any interest adverse or potentially adverse to District, as determined in the reasonable judgment of District.

7. Confidentiality. Any information, whether proprietary or not, made known to or discovered by Vendor during the performance of or in connection with this Agreement for District, will be kept confidential and not be disclosed to any other person. Vendor will immediately notify District in writing if it is requested to disclose any information made known to or discovered by during the performance of or in connection with this Agreement. These conflict of interest, confidentiality and future service provisions and limitations shall remain fully effective indefinitely after termination of services to District hereunder.
8. **Ownership of Results.** Any interest (including copyright interests) of Vendor or its subvendors (together, "Subvendors"), in studies, reports, memoranda, computational sheets, drawings, plans or any other documents (including electronic media) prepared by Vendor or its Subvendors in connection with the Services, shall become the property of District. To the extent permitted by Title 17 of the United States Code, work product produced under this Agreement shall be deemed works for hire and all copyrights in such works shall be the property of District. In the event that it is ever determined that any works created by Vendor or its Subvendors under this Agreement are not works for hire under U.S. law, Vendor hereby assigns to District all copyrights to such works. With District’s prior written approval, Vendor may retain and use copies of such works for reference and as documentation of experience and capabilities.

9. **Non-Discrimination Policy.** Vendor shall not discriminate against any employee or applicant for employment, nor against any Subvendor or applicant for a subcontract, because of race, color, religious creed, age, sex, actual or perceived sexual orientation, national origin, disability as defined by the ADA or veteran’s status. To the extent applicable, Vendor shall comply with all federal, state and local laws (including, without limitation, all District rules and regulations) regarding non-discrimination, equal employment opportunity, affirmative action and occupational-safety-health concerns, shall comply with all applicable rules and regulations thereunder, and shall comply with same as each may be amended from time to time. Vendor shall provide all information reasonably requested by District to verify compliance with such matters. Vendor stipulates, acknowledges and agrees that District has the right to monitor Vendor’s compliance with all applicable non-discrimination requirements, and may impose sanctions upon a finding of a willful, knowing or bad faith noncompliance or submission of information known or suspected to be false or misleading.

10. **Termination and Suspension.** District may direct Vendor to terminate, suspend, delay or interrupt Services, in whole or in part, for such periods of time as District may determine in its sole discretion. District may issue such directives without cause. District will issue such directives in writing, and compensate Vendor for services satisfactorily rendered, subject to District’s reasonable approval, through the date of termination. Vendor may recover no other cost, damage, or expense. Suspension of Services shall be treated as an excusable delay. District may terminate performance of the Services under this Agreement in whole, or from time to time in part, for default, should Vendor commit a material breach of the Agreement, or part thereof, and not cure such breach within ten (10) calendar days of the date of District’s written notice to Vendor demanding such cure. In the event District terminates the Agreement for default, Vendor shall be liable to District for all loss, cost, expense, damage and liability resulting from such breach and termination. Vendor shall continue its work throughout the course of any dispute, and Vendor’s failure to continue work during a dispute shall be a material breach of this Agreement. Either party’s waiver of any breach, or the omission or failure of either party, at any time, to enforce any right reserved to it, or to enforce strict compliance of any provision of this Agreement, shall not be a waiver of any other right to which any party is entitled, and shall not in any way affect, limit, modify or waive that party’s right thereafter to enforce or compel strict compliance with every provision hereof.

11. **Public Records Act.** Both parties understand and agree that District must comply with the California Public Records Act ("Act"). If Vendor believes that any document or information furnished to District in connection with Vendor’s performance of services is exempt from public disclosure under the Act, it shall so advise District in writing at the time the document or information is furnished.

12. **Survival.** Without limiting any of the parties’ other rights or obligations arising from this Agreement, and in addition to all other provisions indicated as surviving the termination or expiration of this Agreement, the following provisions will survive any termination or expiration hereunder: 3, 4, 5, 7, 8, 10, 11, 12 and 13.

13. **Execution; Venue; Limitations; Miscellaneous.** This Agreement shall be deemed to have been executed in the City of Placerville, County of El Dorado, California. Enforcement of this Agreement shall be governed by the laws of the State of California, excluding its conflict of laws rules. The exclusive venue for all litigation arising from or relating to this Agreement shall be in the County of El Dorado. Except as expressly provided in this Agreement, nothing in this Agreement shall operate to confer rights or benefits on persons or entities not party to this Agreement. As between the parties to this Agreement, any applicable statute of limitations for any act or failure to act shall commence to run on the date of District’s issuance of the final Certificate for Payment, or termination of this Agreement, whichever is earlier, except for latent defects, for which the statute of limitation shall begin running upon discovery of the defect and its cause. Captions to sections and subsections are for the convenience of the parties, and are not to be considered when construing this Agreement. The agreements contained herein shall not be construed n favor of or against any party, but shall be construed as if all parties prepared this Agreement. All terms not otherwise defined in this Agreement shall have the meanings provided in the Appendices or, if applicable, in the construction contract with the general contractor on the project.

14. **Attorneys’ Fees.** If either party institutes or is required to defend any legal proceeding, action or motion to enforce or interpret the terms of this Agreement, the prevailing party shall be entitled to recover all costs and expenses, specifically including, but not limited to, reasonable attorneys’ fees.

15. **Prevailing Wage Laws.** When applicable, the Vendor must comply with all prevailing wage laws applicable to public works projects and related requirements contained in this Agreement. Copies of the general prevailing rates of per diem wages for each craft, classification, or type of worker needed to execute this Agreement, as determined by the Director of the State of California Department of Industrial Relations, are on file at the District’s office and are deemed included in this Agreement. Upon request, District will make available copies to any interested party. Also, Vendor shall post the applicable prevailing wage rates at the Site. The California Department of Industrial Relations website is www.dir.ca.gov.

16. **ADA Compliance.** If, in the course of conducting the Services subject to this Agreement, Vendor offers a public program, service, or meeting on behalf of the District, Vendor shall, in accordance with the Americans with Disabilities Act and California law, offer its public programs, services and meetings in a manner that is readily accessible to everyone, including individuals with disabilities and shall, upon reasonable request provide reasonable accommodations for persons with disabilities including information or materials in appropriate alternative formats.
Appendix A to Services Agreement

INSURANCE

A. Commercial General Liability Insurance, written on an “occurrence” basis, which shall provide coverage for bodily injury, death and property damage resulting from operations, liability for slander, false arrest and invasion of privacy, blanket contractual liability, broad form endorsement, and completed operations, personal and advertising liability, with limits of not less than $1,000,000 each occurrence and $2,000,000 general aggregate, subject to a deductible of not more than $25,000 payable by Vendor.

B. Commercial automobile liability insurance with limits of not less than $1,000,000 each occurrence including coverage for owned, scheduled, hired and non-owned autos.

C. Workers’ Compensation Employers’ Liability insurance in at least such amounts as are required by law. Vendor’s Workers’ Compensation Insurance policy shall, by endorsement, contain a Waiver of Subrogation as to each named and additional insured.

In the event Vendor is self-insured, Vendor shall furnish a Certificate of Permission to Self-Insure, signed by Department of Industrial Relations Administration of Self-Insurance, State of California.

In the event the Vendor does not have any employees as defined under the State of California Workers’ Compensation laws, Vendor shall sign the District’s “Workers’ Compensation Certificate for Independent Contractors”, which states:

Contractor hereby certifies that he/she is aware of the provisions of Section 3700 of the Labor Code of the State of California, which requires every employer to be insured against liability for workers compensation or to undertake self-insurance in accordance with the provisions of that code, and will comply with such provisions before commencing the performance of the work of this contract.

In addition, Contractor represents that he/she does not presently employ anyone in the manner subject to the workers’ compensation laws of the State of California and that if Contractor does employ any such person during the time Contractor is performing this contract, Contractor will promptly provide the District with proof of workers’ compensation insurance in the amount required by law.

D. Professional Liability Insurance (if applicable), either (a) with limits not less than $1,000,000 each claim, or (b) limits of not less than $1,000,000 each claim and aggregate, all with respect to negligent acts, errors or omissions in connection with services to be provided under this Agreement, and any deductible not to exceed $25,000 for each claim, with no exclusion for claims of one insured against another insured. Vendor shall maintain said insurance coverage for a period of five (5) years after the completion of the Services and shall, upon request of District, provide certificates of insurance evidencing Vendor has maintained said coverage.

E. Certificate(s) of Liability Insurance:

1. Acceptability of Insurers – Insurance is to be placed with insurers authorized to do business in the State of California and have a current A.M. Best rating of no less than A-:VII or equivalent or as otherwise approved by the District. Certificate(s) of Liability Insurance shall include the A.M. Best or NAIC number for each insurer.

2. A notation of “All Operations” or the Bid Number and/or Job Title must be included on the certificate(s) and on all endorsements. (Note: “All Operations” covers all current and future operations with the District. Minimum coverage must be in accordance with bid or contract specifications.)

3. The Certificate Holder shall read as follows:

   El Dorado Irrigation District
   2890 Mosquito Road
   Placerville, CA 95667

4. Written notice of cancellation, non-renewal or of any material change in the policies shall be mailed to District thirty (30) days in advance of the effective date thereof.

5. The authorized Insurance Agency Representative’s original signature is required on the Certificate of Liability Insurance.
F. Endorsements - Insurance policies shall contain an endorsement containing the following terms:

1. Additional Insured endorsements: Provide separate additional insured endorsements for the Commercial General Liability and Commercial Auto Liability policies that contain the following terms:

   EL DORADO IRRIGATION DISTRICT, its Board of Directors, officers, employees, representatives, vendors (including without limitation Engineer) and agents, shall be named as additional insureds, but only with respect to liability arising out of the activities of the named insured.

   A Statement of Additional Insured Endorsement on the Acord Certificate of Liability Insurance form is insufficient and will be rejected as proof of the additional insured requirement.

2. Primary / Non-contributory endorsement - Insurance shall be primary insurance and no other insurance or self-insured retention carried or held by any named or additional insureds other than Vendor shall be called upon to contribute to a loss covered by insurance for the named insured.

3. Waiver of Subrogation – Vendor’s Workers’ Compensation Insurance policy shall contain, by endorsement, a Waiver of Subrogation as to each named and additional insured.

G. Deductibles and Self-Insured Retentions - Any deductible or self-insured retention must be declared to and approved by the District prior to commencement of work.

H. The policies shall apply separately to each insured against whom claim is made or suit is brought except with respect to the limits of the insurer’s liability.

I. Vendor shall ensure all sub-vendors and any other person or entity assisting with provisions of this work shall maintain the same level of coverages specified in these insurance requirements at all times during performance hereunder.

J. Vendor shall, upon request of District, deliver to District such policy or policies of insurance and the receipts for payment of premiums thereon.

K. Continuation of Coverage – All said insurance shall be maintained by the Vendor in full force and effect during the entire period of performance.

L. Renewal certificates must be received by the District’s Insurance/Risk Administrator at least ten (10) days prior to the expiration date in agreement to ensure continuation of contract.

M. Renewal certificates may be e-mailed to joel@eid.org or faxed to (530) 642-4572 and original certificates should be mailed to:

   El Dorado Irrigation District
   Insurance / Risk Administrator
   2890 Mosquito Road
   Placerville, CA 95667

N. Other than Professional Liability, any insurance policy written on a claims-made basis is subject to the approval of the District.

O. If Vendor needs additional information regarding these insurance requirements, contact the District’s Insurance / Risk Administrator at (530) 642-4172.
Appendix B to Services Agreement

01340 - SAFETY REQUISITES

The District’s service provider shall be responsible for the effective management, preparation, and coordination associated with the following health and safety program and work practice elements as identified and referenced herein.

Service provider shall follow Federal, State, and local regulatory requirements, and in addition is advised to maintain responsibility for the following safety programs and safe work practices in accordance with Title 8 of the California Code of Regulations and District requirements and elements listed as follows (Item 1 is required by all service providers).

1. Injury and Illness Prevention Program (§3203 et seq.)
   a. Maintain Cal-OSHA compliant written safety programs.
   b. Control health and safety hazards anticipated in performing the work.
   c. Ensure measures are taken to reduce those hazards and to protect employees, other employer employees, and the public.
   d. Maintain procedures for identifying and reporting identified hazards.
   e. Provide necessary safety and hazard control training.
   f. Conduct periodic safety inspections to identify unsafe conditions.

2. Hazard Communication Program (§§5194 et seq.)
   a. Establish methods to provide affected District staff, and other employers access to SDS’s, and provide coordination on protective measures.
   b. Ensure employees are trained to know the location of material safety data sheets.
   c. Require respiratory protection and other personal protective equipment as indicated in a SDS.
   d. Ensure Safety Data Sheets (SDS’s) are readily available to employees, other employer employees.
   e. Ensure product containers containing hazardous chemicals are properly labeled.

3. Heat Illness Prevention Program (§§3395 et seq.)
   a. Provide shade at temperatures exceeding 85 degrees Fahrenheit accommodating 25% of employees.
   b. Implement a high-heat procedure at temperatures exceeding 95 degrees Fahrenheit.
   c. Require supervisor and employee training.

4. Electrical Safety Program (§§2299–2589) and National Fire Protection Association 70E
   a. Designate and authorize Qualified Person(s) to perform work on or near exposed energized parts greater than 50 volts.
   b. Implement procedures for establishing and working in the Limited Approach Boundary.
   c. Require an energized electrical work permitting procedure including notification requirement of the District management prior to all energized electrical work.

5. Lock-out/Tag-out/Block-out Program (§§ 2320.4-5, 3314 et seq.)
   a. Coordination and pre-planning with District management is required.
   b. Designate and authorize Authorized Employee(s) with responsibilities for preparation, notification, sequence, and restoration of lockout/tagout processes.
   c. Preplan and coordinate to ensure safe and effective lockout/tagout processes.
   d. Document equipment/process-specific energy control procedure for to all shutdowns, isolations, blockings and securing of equipment or processes.
   e. Require the use of suitable padlocks, devices, and tags by all Authorized Employees.

6. Confined Space Program (§§5156 et seq.)
   a. Preplan and coordinate with District management, and other employers to ensure safe confined space entry tasks including rescue procedures.
   b. Implement entry roles and responsibilities.
   c. Conduct and evaluate atmospheric conditions and engulfment hazards.
   d. Require at least one individual to have current Red Cross-equivalent first aid and CPR training and be present for the duration of the entry.
   e. Provide for either a non-entry rescue or self-rescue procedure.
   f. Note: Entry rescue shall not be permitted. Entry operations shall cease and require the immediate notification of the District management whenever the need for entry rescue becomes apparent or required.
   g. Note: Calling 911 shall be an unacceptable means of rescue. The El Dorado county fire districts do not provide confined space entry rescue services.

7. Fall Protection (§1670 et seq.)
   a. Require the use of approved personal fall arrest, personal fall restraint or positioning systems by those employees whose work exposes them to falling in excess of 7 1/2 feet from the unprotected sides and edges,
leading edges, through shaftways and openings, sloped roof surfaces steeper than 7:12, or other sloped surfaces steeper than 40 degrees not otherwise adequately protected.

b. Require a competent person to inspect fall arrest equipment not less than twice annually.

9. Ladders (§3276 et seq.)
   a. Maintain ladders in good condition at all times.
   b. Require the inspection of ladders for visible defects frequently and after any occurrence that could affect their safe use.
   c. When it is not practical for an employee to work with the body near the middle of the step or rung, a personal fall protection system shall be required to secure the ladder to a top support.
   d. Require users to face the ladder and maintain contact with the ladder at three-points at all times when ascending or descending a ladder.
   e. Prohibit users from standing and working on the top 3 rungs of a single or extension ladder unless there are members of the structure that provide a firm handhold or protection is provided by a personal fall protection system.

11. Emergency Medical Services (§§ 1512, 3400, 2320.10)
   a. Make available compliant first aid supplies inspected at least once annually to ensure expended items are replaced.
   b. Make available timely emergency services and prompt transportation.
   c. Make available a suitable number of first aid and CPR trained individuals on-site to provide 4-minute response.

12. Industrial Trucks, Tractors, Haulage Vehicles, and Earthmoving Equipment (§§3649 et seq.)
   a. Provide training certificates and documentation for employees authorized to operate equipment.

END OF DOCUMENT
Consideration

To ratify the General Manager’s award of a contract and approve a contract change order for emergency repair of a sewer lateral

April 23, 2018
Board Policies

- BP 3060 provides “Except during emergencies, the Board of Directors shall approve all contracts or procurements with values greater than $50,000, and construction contract change orders with values greater than $100,000. In the event of an emergency requiring immediate contract or procurement action, the General Manager is hereby authorized to approve any and all contracts necessary to abate the emergency after first informing the President of the Board of Directors and scheduling an emergency meeting of the Board of Directors at the earliest possible opportunity.”

- AR 6020.2: The District owns and is responsible for clearing stoppages and for inspecting, maintaining, and repairing the lower lateral.
Background

- Customer call 6 AM March 28
- Staff found obstruction
  - Lower lateral
  - Crew worked 10 hours
Emergency Situation

- Video inspection
  - Blockage in the lower lateral
  - ≈22 ft. deep
  - Near the connection to the sewer mainline.

- Residence uninhabitable
  - Lack of sewer service
Contracting

- Staff conferred with engineering
  - Excavation and repair was the most prudent course of action.

- Repair approach
  - Road closure
  - Large excavation equipment
  - Engineered shoring (> 20 Feet)

- Contacted three contractors
  - Doug Veerkamp General Engineering, Inc.
  - Lowest cost proposal
  - Time and Material
Repair Activities

- Construction April 1\textsuperscript{st} - April 5\textsuperscript{th}
- District staff
  - Controlling flow in mainline
  - CCTV video proper alignment
  - Hydro-excavation
  - EID inspection during tie in
- Broken Tee and an offset joint at connection.
Repair Activities
Repair Activities
Repair Activities

- **Sewer Mainline**
  - Damaged at lateral connection
  - Additional Inspection
    - Root intrusion
    - Other Concerns
Repair Activities
Board
Decision/Options

- **Option 1:** Ratify the General Manager’s award of a construction contract to Doug Veerkamp General Engineering, Inc. in the not-to-exceed amount of $75,000 and a contract changer order for an additional $17,569.39 for the emergency repair and replacement of a failed sewer lateral and associated segment of mainline.

- **Option 2:** Take other action as directed by the Board.

- **Option 3:** Take no action.
Staff Recommendation

Option 1
Questions
EL DORADO IRRIGATION DISTRICT

Subject: Request that the Board make a determination that the use of recycled water for the irrigation of front and backyards of single family homes within the Serrano Village J6 and Village J7 developments is not economically feasible.

Previous Board Actions
September 25, 2006 – The Board adopted Board Policy 7010 – Authorized and Mandated Use of Recycled Water

May 28, 2013 – The Board adopted the 2013 Wastewater Facilities Master Plan

May 12, 2014 – The Board determined that the use of recycled water for the irrigation of front and backyards of single family homes within the Carson Creek development is not economically feasible, and authorized the General Manager to execute a new or amended agreement revising the 2007 Agreement for the Carson Creek development.

Board Policies (BP), Administrative Regulations (AR) and Board Authority
Board Policy 7010 – Authorized and Mandated Use of Recycled Water states that the District mandates the future use of recycled water, wherever economically and physically feasible, as determined by the Board, for non-domestic purposes when such water is of adequate quality and quantity, available at a reasonable cost, not detrimental to public health, and not injurious to plant life, fish or wildlife. The type of use is defined in Title 22 of the California Code of Regulations. In general, the lands subject to mandatory recycled water use are defined in the most current version of the District’s Master Plans.

The District shall have the authority to monitor and inspect the entire recycled water system, including onsite facilities, to ensure and enforce compliance with all applicable requirements and standards. The District shall have the right to access customer’s premises as required for these purposes. The District may impose fines and require corrective actions for misuse of recycled water.

Summary of Issue
Proposed Serrano Village J6 consists of 153 residential single family lots and Village J7 includes 61 single family lots. These developments are located in an area that is subject to mandatory recycled water use. In reviewing this planned development, Serrano and District staff are recommending the development not be required to utilize recycled water for front and backyards of single family homes due to the cost of the infrastructure and unique recycled water infrastructure limitations in this area, in addition to the current overall deficit in recycled water supply. Per Board Policy 7010, the developer can be excused from mandatory recycled water use if the Board makes a determination that supplying recycled water to the project is not economically or physically feasible.

Staff Analysis/Evaluation
Currently recycled water demands exceed recycled water supply, thus requiring supplementation with potable water. Residential lots are getting smaller and landscaping more drought-tolerant, therefore reducing the benefit of irrigating them with recycled water.
Per Board Policy 7010, the lands subject to mandatory recycled water use are defined by the current Master Plans. Figure ES-2 of the 2013 Wastewater Facilities Master Plan shows the proposed recycled water service area (Attachment B). Serrano’s proposed Village J6 and J7 development is within the eastern-most area of the boundary subject to mandatory recycled water use.

Serrano J6 includes 153 residential lots and J7 includes 61 lots. The lots are smaller than typical residential lots in Serrano. The typical lot size in J6 is 50 ft x 100 ft (5,000 sf) and in J7 lot sizes are smaller at 45 ft x 80 ft (3,600 sf). The small size of the lots combined with the requirement to meet the State’s Model Water Efficient Landscape Ordinance will result in very low irrigation demand.

The District’s 2015 Urban Water Management Plan estimated a conservative total water demand for new single family homes of 0.43 acre-feet per year given existing water efficiency standards for indoor infrastructure and outdoor landscapes. If applied to Serrano Village J6 and J7, that would equate to approximately 92 acre-feet per year of total demand and with the smaller size of these lots, outdoor residential irrigation demand that could be served with recycled water is estimated to be half of the total demand or 45 acre-feet.

Given the small lot frontages and narrow roads, it is also very difficult to install sanitary sewer, potable water, dry utilities and recycled waterlines, and meet EID’s and State Water Resources Control Board’s separation requirements. However, there are approximately 4.2 acres of common areas along Bass Lake Road and Sienna Ridge in Village J6 where it is feasible to extend recycled water to irrigate; therefore the common area of Village J6 is proposed to be served with recycled water. The common areas are where most of the irrigation demand will occur, and will provide the most benefit using recycled water.

Infrastructure Limitations
The Deer Creek Wastewater Treatment Plant (DCWWTP) feeds the Bridlewood recycled water tank, which is located at the top of the distribution system in Cameron Park. Recycled water can also be pumped into the Bridlewood tank from El Dorado Hills Wastewater Treatment Plant (EDHWWTP) during low demand periods. The majority of the potable water supplementation occurs at the Bridlewood tank. Below the Bridlewood tank is a regional Bass Lake recycled water booster station that adds pressure to the recycled water distribution system below it. To boost water pressure in the system, the booster station runs 8 to 10 hours per day when irrigation demands are high.

The proposed Serrano J6 and J7 residential developments are located south of Bass Lake Road, near Bass Lake (Attachment C). These sites are located below the Bridlewood tank, and above the Bass Lake booster station. Since future homes would be located above the booster station, these sites would be subject to low water pressure during peak demands when the booster station is on. To remedy this situation, another booster pump station, specifically to serve Village J6 and J7, would be required at a significant cost to the developer. The District would also be responsible for ongoing long-term maintenance and replacement costs of the booster pump station.

Adding additional dual plumbed homes also adds to the District’s annual recycled water compliance and inspection costs. Recycled water compliance costs are recovered through recycled water rates, however the District currently must contract with outside backflow testing and inspection companies to supplement current staff.
Recycled Water Supply and Demand
The District does not have the recycled water supply available to meet overall recycled water irrigation demands. If the project utilizes recycled water, the District would have to increase potable water supplementation. In 2017, total recycled water production was 897 million gallons (MG) and total potable water supplementation into the recycled water system was 166 MG. Therefore, in 2017 about 16 percent of water delivered as recycled water was actually potable water. In 2016, total recycled water production was 728 MG, and potable supplementation was 185 MG (over 20% supplementation). At some point in the future, recycled water supply may be able to fully meet recycled water demands as more wastewater customers are brought online (assuming they are not dual plumbed), however the timing for when annual recycled water demand and supply will reach equilibrium is difficult to project and potable water supplementation will likely continue for many years to come.

Conservation charge
Staff also reviewed the possibility of imposing a conservation charge for Serrano Village J6 and J7, similar to what was implemented for the Carson Creek development. Carson Creek’s justification for not dual plumbing homes was primarily to avoid construction of a large recycled water storage tank. That tank was included in previous master plans and was a known component required for expansion of recycled water south of Hwy 50. Therefore imposing a conservation charge to avoid that long-planned cost was reasonable mitigation for Carson Creek. Conversely the infrastructure required to serve the Village J6 and J7 development, including a new booster pump station and its ongoing costs to avoid low pressure issues, is not something that the District would advocate being built. The average lot size in Village J6 and J7 is smaller than the average lot size in Carson Creek. Staff is not recommending a conservation charge be imposed for those reasons.

Based on the current status of recycled water availability, the increased amount of potable water supplementation and the unique infrastructure costs and long term maintenance costs associated with these small lot developments, it is staff’s recommendation that Serrano Village J6 and J7 not be mandated to use recycled water for residential irrigation. However, the common area of Village J6 will be required to utilize recycled water.

<table>
<thead>
<tr>
<th>Board Decisions/Options</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Option 1:</strong> Make a determination that the use of recycled water for the irrigation of front and backyards of single family homes within Serrano Village J6 and Village J7 is not economically feasible.</td>
</tr>
<tr>
<td><strong>Option 2:</strong> Take other action as directed by the Board.</td>
</tr>
<tr>
<td><strong>Option 3:</strong> Take no action.</td>
</tr>
</tbody>
</table>

Staff/General Manager’s Recommendation
Option 1

Supporting Documents Attached
Attachment A: Board Policy 7010
Attachment B: Figure ES-2 of the 2013 Wastewater Facilities Master Plans
Attachment C: Detail of Recycle Water System at Serrano J6/J7
Attachment D: Serrano J6/J7 Concept Exhibit
BP 7010  Authorized and Mandated Use of Recycled Water

Adopted:    September 25, 2006
Supersedes: Regulation No. 31
Revised:    November 12, 2013

The District mandates the future use of recycled water, wherever economically and physically feasible, as determined by the Board, for non-domestic purposes when such water is of adequate quality and quantity, available at a reasonable cost, not detrimental to public health, and not injurious to plant life, fish, and wildlife. The type of use is defined in Title 22 of the California Code of Regulations. In general, the lands subject to mandatory recycled water use are defined in the most current version of the District’s Master Plans.

The District shall have authority to monitor and inspect the entire recycled water system, including on-site facilities, to ensure and enforce compliance with all applicable requirements and standards. The District shall have the right to access customers’ premises as required for these purposes. The District may impose penalties and fines and require corrective action for misuse of recycled water.
Request that the Board make a determination that the use of recycled water for the irrigation of front and backyards of single family homes within the Serrano Village J6 and Village J7 developments is not economically feasible.
Previous Board Actions

- September 25, 2006 - The Board adopted Board Policy 7010 – Authorized and Mandated Use of Recycled Water

- May 28, 2013 – The Board adopted the 2013 Wastewater Facilities Master Plan

- May 12, 2014 – The Board determined that the use of recycled water for the irrigation of front and backyards of single family homes within the Carson Creek development was not economically feasible
Proposed Serrano Village J6 consists of 153 residential single family lots and Village J7 includes 61 single family lots.

These developments are located in an area that is subject to mandatory recycled water use.

Serrano and District staff are recommending the development not be required to utilize recycled water for front and backyards of single family homes due to the cost of the infrastructure and unique recycled water infrastructure limitations in this area, in addition to the current overall deficit in recycled water supply.
Per Board Policy 7010, the developer can be excused from mandatory recycled water use if the Board makes a determination that supplying recycled water to the project is not economically or physically feasible.
Recycled Water System / BP 7010

- Currently recycled water demands exceed recycled water supply, thus requiring supplementation with potable water.
- Residential lots are getting smaller and landscaping more drought-tolerant, therefore reducing the benefit of irrigating them with recycled water.
- Per Board Policy 7010, the lands subject to mandatory recycled water use are defined by the current Master Plans.
- Figure ES-2 of the 2013 Wastewater Facilities Master Plan shows the proposed recycled water service area.
Serrano J6 and J7 Development

- Serrano J6 includes 153 residential lots and J7 includes 61 lots.
- The lots are smaller than typical residential lots in Serrano. The typical lot size in J6 is 5,000 sf and in J7 lot sizes are smaller at 3,600 sf.
- The small size of the lots combined with the requirement to meet the State’s Model Water Efficient Landscape Ordinance will result in very low irrigation demand.
- Given the small lot frontages and narrow roads, it is also difficult to install sanitary sewer, potable water, dry utilities and recycled waterlines, and meet EID’s and State Water Resources Control Board’s separation requirements.
Estimated J6/J7 Water Usage

- The District’s 2015 Urban Water Management Plan estimated a conservative total water demand for new single family homes of 0.43 acre-feet per year given existing water efficiency standards for indoor infrastructure and outdoor landscape.

- Applied to Serrano Village J6 and J7, that would equate to approximately 92 acre-feet per year of total demand.

- Given the size of these lots, outdoor residential irrigation demand that could be served with recycled water is estimated to be half of the total demand, or 45 acre-feet.
Infrastructure Limitations

- The DCWWTP feeds the Bridlewood recycled water tank, which is located at the top of the distribution system.
- Below the Bridlewood tank is a regional Bass Lake recycled water booster station that adds pressure to the recycled water distribution system below it.
- To boost water pressure in the system, the booster station runs 8 to 10 hours per day when irrigation demands are high.
Serrano J6/J7 and RW facilities
Infrastructure Limitations

- When the existing booster station is on, cannot move water from EDHWWTP into Bridlewood Tank.
- The proposed Serrano J6 and J7 residential developments are located below the Bridlewood tank, and above the Bass Lake booster station.
- Developments would be subject to low pressure due to proximity to Bridlewood tank, especially when existing booster station is on.
- A new booster station would be required for the higher lots, resulting in additional O&M costs to EID.
Supplementation and Compliance

- Potable Water Supplementation:
  - 2016 – 20% supplementation
  - 2017 – 16% supplementation
- At some point in the future, recycled water supply may be able to fully meet recycled water demands as more wastewater customers are brought online.
- Adding additional dual plumbed homes adds to the District’s annual recycled water compliance and inspection costs:
  - compliance costs are recovered through recycled water rates
  - currently must contract with outside backflow testing and inspection companies to supplement current staff
Proposed J6 RW Irrigation Area

- Common Areas of J6:
  - Approximately 4.2 acres of common area landscaping
  - Located next to existing recycled water infrastructure
  - Located at lower elevation, less impacted by the operation of the existing booster station
  - Additional booster station not required – reduces future O&M costs
  - Unlike residential dual-plumbed, not subject to annual inspection
Serrano J6 Common Area Landscape
Conservation Charge

- The Board approved recycled water irrigation in the common areas only of the Carson Creek Development
- A conservation charge was applied to Carson Creek
  - Avoided cost of a new recycled water tank and related infrastructure that was included in Master Plans
- Staff does not recommend a Conservation Charge be applied to Serrano J6 and J7
  - Small lots – little benefit to plumbed irrigation
  - Avoid long term costs of operating and replacing an additional booster station that would be required
  - Avoid additional compliance costs, with little revenue generated
Recommendation

- Based on the current status of recycled water availability, the increased amount of potable water supplementation and the unique infrastructure and long term maintenance costs associated with these small lot developments, it is staff’s recommendation that Serrano Village J6 and J7 not be mandated to use recycled water for residential irrigation.

- However, the common area of Village J6 shall be required to utilize recycled water.
Board Decisions/Options

**Option 1:** Make a determination that the use of recycled water for the irrigation of front and backyards of single family homes within Serrano Village J6 and Village J7 is not economically feasible.

**Option 2:** Take other action as directed by the Board.

**Option 3:** Take no action.
Staff / General Managers
Recommendation

Option 1
Questions
EL DORADO IRRIGATION DISTRICT

Subject: Consideration to award a professional services contract to Frisch Engineering in the not-to-exceed amount of $93,550 for design of the Deer Creek Wastewater Treatment Plant Main Circuit Breaker Project, and authorize funding of $178,550 for Project No. 18001.

Previous Board Actions
November 13, 2017 – The Board adopted the 2018-2022 CIP, which included this project subject to funding availability.

Board Policies (BP), Administrative Regulations (AR) and Board Authority
BP 3060, AR 3061.04: contracts greater than $50,000 must be approved by the Board.

Summary of Issue
The U.S. Occupational Health and Safety Administration (OSHA) requires that Arc Flash Risk Assessment is performed and incident energy (electrical arc hazard potential) is calculated and posted on all electrical equipment. EID has performed those calculations on the Deer Creek Wastewater Treatment Plant (DCWWTP) and the results at both main switchboard circuit breakers were so high, that it prohibits the ability to maintain the automatic transfer switch (ATS) and main circuit breaker. This problem is critical to the operation of the facility as failures in the transfer switch or main circuit breaker could render the plant off-line until temporary power can be arranged and tied into the bus. This agenda item requests Board approval to award a professional services contract and authorize funding to proceed with the design and environmental review for the DCWWTP Main Circuit Breaker Project.

Staff Analysis/Evaluation
Arc flash is the intense light and extreme heat (35,000°F) produced as part of an arcing fault, a type of electrical explosion (arc blast) that results from a low impedance connection through air to ground. Arc flash warning labels list the hazards, personal protective equipment (PPE) and working distance from which the electrician can safely work.

In 2011, the District contracted with Eaton Electrical Services and Systems (Eaton) to conduct an arc flash study at DCWWTP. This study was done to bring DCWWTP up to current codes which required arc flash studies be conducted on all three phase electrical equipment. From this study, the arc flash values were determined and posted on all three phase equipment at DCWWTP.

Arc flash is measured in calories per centimeter squared (cal/cm²) and also a distance is given to the safe zone where PPE are not required. The arc flash boundary distance of 25 feet for the two main circuit breakers at DCWWTP places the electrician outside of the building. For the calorie portion of the label, electricians are able to put on PPE’s to protect them from fatal injuries up to 40 cal/cm². However, it does not protect them from harm. At 40 cal/cm² the electrician wearing proper PPE will still suffer from second degree burns in the event of an arc flash incident and unknown damage due to arc blast. Currently the DCWWTP main circuit breakers and ATS are one unit making it necessary to de-energize the equipment to work on the ATS. The Eaton study identified the main breaker at a 120 cal/cm² potential, thus making PPE’s ineffective. By adjusting the breakers, the arc flash incident energy was reduced to around 80 cal/cm². Even
with the adjustments, in the event of an arc flash the percussion from the blast will be fatal; especially in an enclosed room. This project will separate the ATS from the main circuit breaker and place the main circuit breaker outside. In addition, the new panel for the main circuit breaker will direct the blast from an arc flash incident upward and away from the electrician on ground level.

In 2016 the District contracted with Frisch Engineering (Frisch) to conduct an electrical study of the two main electrical services that feed the DCWWTP and the two automatic transfer switches (ATS) were also evaluated due to reliability issues and the ability for staff to maintain and service them. Additionally, Frisch looked at the 2011 Eaton study to verify the arc flash results. A technical memorandum was issued detailing the results and recommendations of the Frisch study.

From the Frisch study, three recommendations were made regarding what could be done to improve the electrical issues and safety concerns with the ATS and main circuit breaker at the DCWWTP. The first recommendation included resetting the breakers and checking for nuisance trips. The breakers are adjustable and able to be set at levels that ensure safety, while still allowing for proper function of equipment. This helps in lowering the arc flash incident energy by reducing the clearance time and lowering the amount of current. This recommendation was completed by in-house staff last year.

The next recommendation was to relocate the two main circuit breakers from the existing buildings to a new location just outside of the building, and to install new ATS’s in the existing locations. The new ATS’s are needed because currently they are beyond their useful life. A failure has already occurred that required one of the generators to run for two months until an interim repair was made. This recommendation will be satisfied with the design and construction of this project.

The final recommendation from Frisch was to install new medium voltage metering and main circuit breaker on new utility poles outside of the fence line and install new transformers. This recommendation was suggested, but will not be required to lower the arc flash need for the main circuit breakers, so it is not included with the project and staff feels that it is not necessary at this time.

Request for Proposals
A Request for Proposals (RFP) was released on January 8, 2018, and also emailed to the Engineering On-Call list. The following two proposals were received:

<table>
<thead>
<tr>
<th>Engineering Firm</th>
<th>Fee Proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frisch Engineering</td>
<td>$93,550</td>
</tr>
<tr>
<td>Sage Engineering</td>
<td>$108,468</td>
</tr>
</tbody>
</table>

Proposal Evaluation and Ranking
The proposals were measured against the following criteria established in the RFP:

- Responsiveness to RFP
- Experience and expertise on similar projects
- Project team makeup and capabilities
• Rates and charges, affordability and reasonableness of cost for expertise required to meet project needs
• Client references

Frisch’s proposal received the highest overall score. Reference checks confirm other agencies have had satisfactory experiences with Frisch Engineering. Frisch has also been involved in numerous electrical designs for District projects. Based on relevant experience, a strong team and reasonable rates, staff is recommending the Board award a professional services contract to Frisch.

**Environmental Review**
The District is evaluating California Environmental Quality Act (CEQA) review and regulatory permitting requirements for the Project. The appropriate level of CEQA review and regulatory permitting requirements will continue to be evaluated as the design of the Project is further developed.

**Funding**
Funding for the project will be 35% from FCC’s and 65% from wastewater rates based on the ratio of existing and future connections at the DCWWTP. Staff is requesting funding in the amount of $178,550 for the DCWWTP Main Circuit Breaker Project as summarized below:

<table>
<thead>
<tr>
<th>DCWWTP Main Circuit Breaker Funding Requirements</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frisch Engineering – Design</td>
<td>$93,550</td>
</tr>
<tr>
<td>Capitalized Labor – Engineering, environmental staff support</td>
<td>85,000</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$178,550</td>
</tr>
</tbody>
</table>

**Board Decisions/Options**

**Option 1:** Award a professional services contract to Frisch Engineering in the not-to-exceed amount of $93,550 for design of the Deer Creek Wastewater Treatment Plant Main Circuit Breaker Project, and approve funding of $178,550; Project No. 18001.

**Option 2:** Take other action as directed by the Board.

**Option 3:** Take no action.

**Staff/General Manager’s Recommendation**
Option 1

**Supporting Documents Attached**
Attachment A: Frisch proposal
Attachment B: CIP summary
DCWWTP MAIN CIRCUIT BREAKER PROJECT

Engineering Design and Construction Services

Frisch Engineering, Inc.
Consulting Electrical Engineers

February 26, 2018
Mr. Cary Mutschler  
El Dorado Irrigation District  
2890 Mosquito Rd.  
Placerville, CA 95667 

Subject: Request for Proposal 18-02 – DCWWTP Main Circuit Breaker Project 

Dear Mr. Mutschler, 

Thank you for inviting Frisch Engineering to respond to this RFP and submit our proposal. Frisch Engineering has extensive experience in the planning, design and construction of many similar sized and complex projects. We are familiar with the needs and requirements of water and wastewater operators as it pertains to electrical and control systems. 

We have teamed with Domenichelli and Associates to perform the Civil portion of the work. EID is very familiar with D&A and their staff as they are also on the on-call agreement with EID. 

Along with providing the design to improve the utility metering, ATS, and disconnection, we realize that a large portion of the project is in constructability. A viable strategy to provide temporary power to the plant necessary systems during construction is required. 

Our goal is to provide a system that meets your needs. In the process we will respond to your questions, identify and assist in selection of alternatives, and perform changes as needed. 

Frisch Engineering is pleased to offer this proposal for your consideration. Please feel free to contact me at tfrisch@frischengineering.com or (916) 353-1025. 

Sincerely, 

[Signature]

Thomas P. Frisch, P.E.  
Electrical Engineer
**Section 1 – Scope of Work**

Two utility systems at the plant are prohibitively dangerous to maintain due to arc flash concerns. This project will include design for a system that will reduce the incident energy available at the transfer switch and provide disconnection means.

The PDR is a direct result of our efforts and remains our best solution to this problem. Installing a new utility meter and disconnect outside with new ATS indoors.

Our design will include the following drawings:

1. Electrical Design of 2 utility services including utility coordination and application for engineering services. Utility fees by EID.
2. Design and revisions to interior spaces to remove existing switchboard and main breaker ATS replace it with a conventional ATS.
3. Preliminary Arc Flash Calculations to confirm that new ATS section will have expected reduction in incident energy calculations.
4. Electrical Site Plans for each site to include:
   a. Scaled drawings showing equipment locations and conduit routing.
   b. Conduit and wire schedule.
   c. Installation notes and detail callouts.
5. Temporary Power Plans for each site to include:
   a. Cable routing and connection locations.
   b. Generator quantity and sizing.
   c. Operating equipment and controls
   d. Installation notes and details.
6. Electrical Safety plan per California Code of Regulations (§2299 et seq)

Our design will include the following specifications:

7. Scope of work for each site with shutdown limitations.
8. General electrical materials and methods.
9. Electrical Switchboard components
10. Automatic Transfer Switch
11. Quality Control and Testing Specifications and forms.
13. Other specifications as needed.

Construction cost estimates for each site.

Frisch Engineering shall meet and coordinate with District operations and maintenance staff during design to insure that District needs and requirements are being met. At minimum, we will visit each site with staff and gather information, and meet with staff at each design deliverable. We will take notes and furnish
them as an itemized list of comments or requirements for each site and for the temporary operations during construction.

Engineering services during construction will be provided to meet the project construction needs and as desired by EID. Frisch Engineering routinely performs construction management, on-site inspection, on-site testing, and project closeout. We are very familiar with Construction Services work and can work with the Construction Administrators or perform some of the on-site work ourselves. Not all of our available construction services have been requested in the RFP.

Section 2 – Relevant Experience and Expertise

With more than a combined 130 years in the water/wastewater industry, Frisch Engineering has the technical knowledge and experience to serve your needs. Frisch Engineering is committed to providing the highest level of quality and performance to assure the project’s success from concept to completion.

Frisch Engineering has extensive experience in the planning, design and construction of many similar sized SCADA projects. We are familiar to the needs and requirements of water and wastewater operators as it pertains to electrical and control systems.

Our experience and primary business function is electrical and control system engineering consulting services. This includes Electrical and Controls Design, SCADA design and programming services - PLC programming, and communications. Frisch Engineering has completed hundreds of projects over the past 15 years.

Frisch Engineering is a full service engineering and programming firm able to complete all tasks required under this RFP and in timely fashion.

Our clients include small municipal and water districts such as Harbor View, and RD784, up to very large regional operators such as Regional San, and Sacramento County. Please see section 5 for references.

Section 3 – Project Team

Thomas Frisch, PE will be project manager and lead Electrical Design Engineer. Martin Yarbrough will perform electrical design and Arc Flash Calculations, and Nik Contant will assist in autocad drafting tasks. Others such as Michael Frisch, PE. or Mike Rogers will be brought in for QC or other tasks as needed. Each of these personnel has many years of experience and has worked on many EID projects in the past.

Our staff consists of 2 Electrical Engineers with PE registration, 3 Associate Engineers and 4 support staff. In terms of Electrical Consultants, we are one of the largest in the Sacramento area and are looking to expand when appropriate. Our SCADA and PLC engineers are:

- Thomas Frisch, PE 24 years
- Michael Frisch, PE 21 years
- Design Engineer, plan review, oversight, project design interpretation, submittal review, RFI response
- Project Manager, Quality Control, PLC and SCADA programmer, Construction Engineer, inspection, start-up, design review, interpretation, RFI response, dispute resolution, design
All engineers and staff assigned to this project are located in our office in Folsom, California. No sub-consultants will be needed for this project. Please see resumes at end of proposal for description of their abilities, qualifications and experience.

Section 4 – Quality Assurance and Control; Conflicts

Frisch Engineering has multiple qualified staff that can perform quality control review from a dis-interested perspective. The plan for this project, as is similar for most others, is for peer review by qualified staff in our office.

Additionally, we plan on presenting the drawings to EID staff such that the ideas and concepts are explained during review. We will welcome EID staff comments and will correct the plans and specs to meet EID requirements.

There are not any foreseeable actual or potential professional conflicts that could hinder the provision of the requested services.

Section 5 – Client References

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Name</th>
<th>Company</th>
<th>Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>County Project Engineer</td>
<td>Michael Cook</td>
<td>Sacramento County</td>
<td>916-874-8546 <a href="mailto:cookmi@saccounty.net">cookmi@saccounty.net</a></td>
</tr>
<tr>
<td>Project Engineer</td>
<td>John Jacobs</td>
<td>City of Vacaville</td>
<td>707 469 6414 <a href="mailto:jjacobs@cityofvacaville.com">jjacobs@cityofvacaville.com</a></td>
</tr>
<tr>
<td>Utility Superintendent</td>
<td>John Sparkes</td>
<td>Lake County Special Dist.</td>
<td>(707) 245-8135 <a href="mailto:John.sparkes@lakecountyca.gov">John.sparkes@lakecountyca.gov</a></td>
</tr>
<tr>
<td>Operations Manager</td>
<td>John Fossa</td>
<td>Rivera West Water District</td>
<td>707-349-1181 <a href="mailto:rivierawestwater@gmail.com">rivierawestwater@gmail.com</a></td>
</tr>
</tbody>
</table>
Section 6 – Contract and Insurance Requirements

Frisch Engineering is willing to execute a contract based on the form shown in Exhibit C of the RFP and is able to meet the insurance requirements detailed in Exhibit C of the RFP.

Section 7 -- Addenda

We can acknowledge receipt of three addendums.

Section 8 -- Quote

Please see attached quote further defining our scope or work.
Mr. Cary Mutschler  
El Dorado Irrigation District  
2890 Mosquito Rd.  
Placerville, CA 95667

Location: El Dorado Irrigation District, WW SCADA Reliability  
Subject: Quotation: Electrical Engineering Design and Construction Services

Mr. Mutschler,

Frisch Electrical Engineering Inc. is pleased to submit this proposal to perform the electric power and control system design and construction services for this project. The following detail is provided in defining our proposed scope of work.

**Task 1  Meetings and Site Visits**

Project progress/coordination meetings will be held to coincide with the following meetings.

- Prepare agendas for and lead three (3) project design review meetings, at the EID main office in Placerville, California. They will include project kickoff, 50%, and 75% design submittal review meetings. Assume 3 hours per meeting.

- Two (2) field meetings for site reconnaissance and design review.

  **Deliverables:**
  1) Meeting agendas in PDF format.
  2) Meeting notes with action items.

**Task 2.1 Monthly Progress Reports**

We will submit monthly progress reports accompanying our invoice. At a minimum, these reports will include progress-to-date, schedule updates, action items, and status of deliverables.

  **Deliverables:**
  1) Monthly progress reports submitted with monthly invoice.

**Task 2.2 Prepare and Update Project Schedule**

We will provide, within 15 days of receipt of the Notice-to-Proceed, an initial Project Schedule. This schedule shall integrate the schedules for final design, bid assistance and construction of the Project.

  **Deliverables:**
  1) Initial Project Schedule.
  2) Updated Project Schedule to be submitted with each monthly invoice.
**TASK 3 Design**

We will provide complete design documents, including plans and specifications suitable for public bidding and construction of the Work.

Our design and bid documents shall:

- Be designed to meet all applicable and current codes, laws, regulations, and professional standards.
- Comply with current District Design and Construction Standards, except as approved by the District.
- Be in conformance with the sixteen or forty-eight division format of the Construction Specification Institute and the District's Standard Specifications. Consultant shall cooperate with District in coordinating the plans and technical specifications with the District supplied standard Division 0 and Division 1 specifications. We will provide work descriptions for inclusion in District's standard specifications and will provide whatever Division 1 construction contract specifications are necessary for the Project and not supplied in District's standard specifications. District Technical Specifications will be used and supplemented as needed.
- Comply with the applicable standard of care when preparing Plans and Specifications to comply with applicable building codes, ordinances, statutes, laws, standards, governmental regulations, private restrictions, environmental and other authorities having jurisdiction over the Project, applicable to the Services. We will comply with any other requirements of authorities with jurisdiction over the Project or the Plans and Specifications.
- Clearly identify and describe all necessary quality levels and quality control procedures such as inspections, tests, submittals or other measures that the Contractor must satisfy, meet or perform.
- Include the requirements for the tests, controls, performances and certifications needed to verify the specified quality level of Work for that specification section. Arc Flash calculations will be specified.
- Include a dedicated subsection within each work-related specification section to identify and list required Contractor submittals along with testing and inspection requirements.
- Incorporate the District's comments at each design review phase.
- Cost estimates will take into consideration the current bidding environment.

**Task 3.1 50% Design Submittal**

This Task includes the preparation of a 50% design submittal which will identify all project components, schedule and cost including:

- Preliminary drawings
- Outline of all necessary Civil design components including but not limited to Pad and building power entrance modifications.
- Temporary construction, power, and staging area requirements
- Other necessary criteria required to proceed with final design
- 50% design level of confidence cost estimate
- Design, bidding, and construction schedule
- Prior to making the 50% design submittal, We will perform an in-house QA/QC review of the documents

**Deliverables:**
1) Electronic file of 50% drawings in full and half sizes in PDF and AutoCAD format.

**Task 3.2 75% Design Submittal**
We will advance the design and design documents from the 50% design level to the 75% level of design including:

- Previous drawings and specifications from the 50% delivery with updates and refinements.
- Draft technical specification including PLC and HMI programming
- Prior to making the 75% design submittal, We will perform a detailed in-house QA/QC review of the documents.

**Deliverables:**
1) Electronic file of 75% technical drawings in full and half sizes in PDF and AutoCAD format.
2) Electronic file of draft technical specifications containing a list of submittals in WORD format
3) Updated schedule
4) Updated cost estimate commensurate with level of design

**Task 3.3 90% Design Submittal**
We will advance the design and design documents from the 75% design level to the 90% level of design including:

- Respond to all comments resulting from the District's 75% submittal review.
- Previous drawings and specifications from the 75% delivery with updates and refinements.
- Prior to making the draft 90% design submittal, We will perform a detailed in-house QA/QC team review of the documents including but not be limited to the following:
  - Verify adequacy of design.
  - Verify completeness and consistency of all details.
  - Verify adequacy and completeness of bid forms.
  - Verify all details compliant with District standard details.
o Verify all permit conditions are incorporated in the construction documents.

o The 90% submittal shall be, in the opinion of Frisch Engineering, biddable withstanding final review comments from EID.

**Deliverables:**

1) Electronic file of 90% technical drawings in full and half sizes in PDF and AutoCAD format. All drawing sheets shall be included in the set and each sheet submitted shall be essentially complete, with all details, numbering and notes included.

2) Contract Specifications: All contractual and technical specification sections shall be essentially complete and included in the submittal. Specifications shall include a list of submittals.

3) Final cost estimate.

4) Final construction schedule.

5) Design calculations.

**Task 3.4 Final 100% Design Submittal**

We will advance the design and design documents from the draft to final 100% design level, incorporating all comments from the 90% submittal review. The 100% design submittal shall be a turnkey design suitable for public bidding.

**Deliverable:**

1) CD or e-mail containing contract documents in Word and PDF format, and contract drawings in PDF and AutoCAD appropriate for bidding website posting. The AutoCAD files shall include layout sheets using the AutoCAD Sheet Set Manager with an attributed title block tied to the Sheet Set. Provide all Sheet Set Files, Cross References and related files.

**TASK 4 Regulatory / Legal Descriptions**

We will assist with project Regulatory issues including the following:

- The District will obtain the regulatory and environmental permits required for the work. It is anticipated that the 50% design drawings will be used to obtain the regulatory permits as needed. We will prepare supporting documents, including drawings and details, as needed for the approvals and respond to comments received.

**Deliverable:**

1) Details as required.

**TASK 5 Design Service During Construction**

We will assist the District during bidding and construction of the Project including:

- Clarifications about the drawings and specifications
- Assistance in the preparation of addenda
- Making addenda changes to the drawings
• Participation in the pre-bid site visit – Assume 1 pre-bid site visit 4 hours.
• Assistance with the evaluation of bids

Assumptions
• We have assumed one bid package, and one project site for construction.
• Our standard insurance coverage limits for general liability and E&O liability at $2,000,000 per occurrence and $2,000,000 aggregate are sufficient.
• Drawings and specifications can be completed by using our standards and templates created in AutoCad and MS Word using CSI format.
• The project construction budget includes 10% minimum contingency such that changes can be designed and implemented as deemed necessary by the Engineer or Owner during construction. This quotation does not include cost for contract changes regardless of initiating source.
• This quotation does not include Arc-Flash analysis (unless specifically stated) as required by the NFPA 70 electrical code. That analysis and associated equipment labeling can be provided for an additional fee and will be specified in the deliverables.
• Surveying is not required.
• Hourly rates include overhead costs such as telephone, photocopies, computer costs, copying, and insurance. The field hourly rates include travel costs (owned vehicle) for on-site work.
• Hourly rates do not include expenses such as rental equipment, airline tickets, rental vehicles, lodging, non-incidental photocopying and materials. Miscellaneous expenses will be billed at cost + 10%.

Deliverables
• Plans, specifications, and cost estimate, delivered PDF, at 75%, 90% and 100% design stages.
• Submittal reviews, RFI and change order responses, as-builts.

Terms
• This is a time and materials quotation with anticipated budget of hours and costs. We anticipate that we can perform the scope as described within our budget. If the Client’s needs or project circumstances cause us to exceed our anticipated budget, we will make every effort to inform the Client in advance of work for authorization.
• Client will be invoiced monthly based on project progress.
• Changes to project scope may result in increased or reduced costs.
Electrical Engineering Costs

See attached Quotation

Frisch Engineering is pleased to offer this quotation for your consideration. Please give me a call or email if you have any questions or require further information.

Sincerely,

Thomas P. Frisch, P.E.
Electrical Engineer

tfrisch@frischengineering.com
## Professional Engineering Services Cost Estimate

**JOB TITLE:** EID Deer Creek Switchgear Replacement  
**CLIENT:** EID  
**DATE:** 2/26/2018

### Design and ESDC Services

<table>
<thead>
<tr>
<th>Task</th>
<th>Description</th>
<th>Field Engineer</th>
<th>Office Engineer</th>
<th>Technical Assistant</th>
<th>Total hours</th>
<th>cost per task</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Meetings and Site Visits</td>
<td>20</td>
<td>4</td>
<td>12</td>
<td>36</td>
<td>$5,100.00</td>
</tr>
<tr>
<td>2</td>
<td>Progress Reports and Schedule</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>$870.00</td>
</tr>
<tr>
<td>3a</td>
<td>50% design PS&amp;E</td>
<td>4</td>
<td>90</td>
<td>188</td>
<td>282</td>
<td>$34,370.00</td>
</tr>
<tr>
<td>3b</td>
<td>75% design PS&amp;E</td>
<td>4</td>
<td>45</td>
<td>89</td>
<td>138</td>
<td>$16,955.00</td>
</tr>
<tr>
<td>3c</td>
<td>90% design PS&amp;E</td>
<td>4</td>
<td>27</td>
<td>62</td>
<td>93</td>
<td>$11,375.00</td>
</tr>
<tr>
<td>3d</td>
<td>100% design PS&amp;E</td>
<td>3</td>
<td>18</td>
<td>17</td>
<td>38</td>
<td>$4,960.00</td>
</tr>
<tr>
<td>3e</td>
<td>Civil Design</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$12,800.00</td>
</tr>
<tr>
<td>4</td>
<td>Regulatory Legal Descriptions</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td>6</td>
<td>$800.00</td>
</tr>
<tr>
<td>5</td>
<td>Design Services During Construction</td>
<td>5</td>
<td>32</td>
<td>8</td>
<td>45</td>
<td>$6,320.00</td>
</tr>
</tbody>
</table>

### Subtotal Hours

<table>
<thead>
<tr>
<th>Field Engineer</th>
<th>Office Engineer</th>
<th>Technical Assistant</th>
<th>Total hours</th>
<th>cost per task</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>226</td>
<td>378</td>
<td>644</td>
<td></td>
</tr>
</tbody>
</table>

### Hourly Rate per Discipline

- Field Engineer: $160
- Office Engineer: $145
- Technical Assistant: $110

### Subtotal Costs

- Field Engineer: $6,400
- Office Engineer: $32,770
- Technical Assistant: $41,580

### Total Costs

- $93,550.00

Individual tasks cost are approximate and some cost shifting between tasks may be necessary.
Thomas P. Frisch, P.E.

**Experience Summary**

Mr. Thomas Frisch has worked in the water/wastewater/power/landfill industry since 1991 and has developed skills in power, controls, instrumentation and communications. He has become very familiar with most practices and processes used in this industry. His experience is diverse since he has worked as a Contractor and Consultant in various capacities. As a Contractor, he brought contract drawings to completion by designing the final details, making submittals and managing production. As a Consultant, he has designed over 250 water and wastewater projects ranging from small pump stations to large scale treatment plants. Consequently he has a high degree of product knowledge that enables him to minimize design exposure to unproven materials or practices. He knows the challenges that Contractors face in taking plans to construction and knows when to assist on behalf on the Owner. His designs for electrical, instrumentation, and telemetry systems have been very successful with near-zero change orders due to design flaws. His designs include complex PLC motor controls for booster pump stations, lift stations and motor operated valves and SCADA telemetry between pump stations and tanks. He has performed electrical studies such as a damage assessment or to determine system capacity and cost comparisons to determine electrical operational costs of VFDs vs. throttled fixed speed motors.

**Education**

B.S. Electrical Engineering, University California Los Angeles, 1991

**Registration**

Professional Electrical Engineer Reg. CA E15761, AZ, NM, NV, OR, and WA

**Work Experience**

**Electrical Engineer (23 years)**

Mr. Frisch obtained his Professional Engineering License 1998, and shortly thereafter, began working as a consultant in Electrical Design. Thomas has designed over 250 projects ranging from small sewage lift stations to large (2000 HP total medium voltage) pump stations and treatment plants. During this time, Mr. Frisch has become proficient as a designer, obtained the respect of his peers, and now operates a successful Electrical Engineering design and construction services business.

Prior to consulting, Mr. Frisch worked for Tesco Controls as a Field Service Engineer (4 years), Sales Engineer (1 year), and Project Engineer (3 years). While working for Tesco, He became very familiar with design philosophies of HDR, Montgomery Watson, Brown and Caldwell, Black and Veatch, Carollo and others. He engineered and coordinated many projects including full treatment plants at El Dorado Hills, City of Davis, City of Corona, and City of Sanger. He became very familiar with many manufacturers of instrumentation, PLCs and SCADA systems. He developed and defined many of the standards still in use today at Tesco Controls concerning drafting, testing and manufacturing.
Michael J. Frisch, P.E.

Experience Summary
Mr. Michael Frisch has worked in the water/wastewater industry since 1994 and is familiar with most processes used in this industry. His experience is well rounded as he has worked as a Consultant and a Contractor. This experience has provided Michael additional perspectives of a project or problem. As a Consultant he is capable of providing information and expertise to the Owner and to assist the Contractor with suggestions that can expedite the project without compromising contractual requirements. His experiences as a Contractor have provided knowledge in all areas in the water/wastewater industry. This experience has provided him the expertise to assist clients with product selection, application, implementation, and process control. He is diverse in PLC and SCADA automation that include motor and process control with instrumentation. His experience with telemetry application and testing has proven invaluable.

Education
B.S. Electrical Engineering, University California Los Angeles, 1994

Registration
California State Professional Electrical Engineer Reg. E17155

Work Experience
Mr. Frisch obtained his Professional Engineering License in 2003, and began working as a consultant in Electrical Design and Construction Support in 1999. Michael has designed projects but his primary focus has been Construction Support. He has managed over one hundred projects ranging from small sewage lift stations and pump stations to water and wastewater treatment plants. During this time, Michael has become proficient as a Construction Manager, Designer and PLC programmer and has obtained the respect of his peers. He has experience with Allen Bradley, Modicon and GE products. His expertise has been invaluable to the Owner, project managing team and Contractor. He has a “hands-on” approach to implementing and completing a job which helps to assure the job is completed correctly and per plans and specifications. He now operates a successful Electrical Engineering design and construction services business.

Mr. Frisch has extensive experience with electrical, instrumentation and power design, constructability reviews, project management, submittal reviews, RFI responses, clarifications, design modifications, change order management and review, field inspection, field startup, punchlist inspection and project closeout. His PLC, Operator Interface and SCADA programming has proved invaluable in the inspection and implementation process.
Martin Yarbrough

Experience Summary
Mr. Martin Yarbrough has worked in the water/wastewater industry since 1995 and offers an excellent combination of manufacturing, project management and electrical engineering experience. His past experience as a systems integrator provides a solid basis and broad understanding required to be a successful Electrical Consultant. He has a proven ability to diagnose customer requests, translate them to action and deliver with the highest customer satisfaction. Mr. Yarbrough is a hardworking employee with a strong work ethic who works efficiently in a professional environment by using keen organizational, time-management, and prioritizing skills to consistently meet deadlines. He maintains effective and thorough working relationships with customers in a positive, professional and timely manner.

Mr. Yarbrough is skilled at analyzing complex functions, procedures and problems to find creative, logical and effective solutions. He is experienced with numerous facets of engineering concepts, products, control processes, instrumentation, practices, and procedures within the industry. Mr. Yarbrough offers the meticulous, professional and thorough communications that ensure successfully managed projects and satisfied customers.

Education
Associate of Applied Science, Computer Aided Design, ITT Technical Institute, 1993

Project Experience

Waste Water
Redding Clear Creek WWTP Dewatering Project
Redding Stillwater WWTP Electrical Design & Construction Services
Hawaii Water Service Pukalani WWTP Electrical Design & Construction Services
Clayton Regency, Wastewater Treatment Plant
City of Galt, WWTP Construction Services
City of Atwater, WWTP Electrical Design
Russian Gulch Sewer Lift Station Electrical Design & Construction Services

Storm Water
City of Yountville, Flood Barrier Project Construction Services
Reclamation District 784 Pump Station 2 & 3 Electrical Design & C.S.

Water
City of Folsom, Water Treatment Plant Drinking Water Improvement Project
California Water Service, Dominguez 275 and 294 WTPs
El Dorado Irrigation District, Reservoir 12 Tank Conversion Project
Russian Gulch WTP Electrical Design and Construction Services
Vacaville WTP Generator Replacement Electrical Design & C.S.
Michael Rogers

**Experience Summary**
Mr. Michael Rogers has worked since 1990 on many diverse projects, most of them involving the design from initial concept all the way through installation, training and service. Many of these projects involved large and complex process equipment for the semiconductor industry. He has extensive experience in all aspects of equipment design, fabrication, assembly, programming, functional testing, installation, customer training and after sale service. He is proficient with many software packages including AutoCAD, Solid Works, and many PLC, OIT and SCADA packages.

**Education**
- B.S. Geology & Physics, Dalhouse University, Halifax N.S., Canada 1983
- Master of Science, Geophysics & Space Physics, University California, Los Angeles 1985

**Work Experience**

**SCADA and PLC Programmer**
Mr. Rogers has performed SCADA and PLC programming services on various projects, as noted under project experience, in the water and waste water industry over the last few years.

Prior to his experience in water and wastewater, Mr. Rogers was involved with numerous projects in the semiconductor industry. These projects involved designing, building, programming, installing and service. He worked on many projects with NEC electronics in Roseville, CA, IBM Corporation, and Dow Corning Corp.

**Project Experience**

**SCADA**
- City of Lathrop, SCADA (Ignition) for wastewater, stormwater and recycled water
- City of Yountville, Wastewater Lift Station, Micrologix PLC – AB and OIT – Maples
- City of Sacramento, waste biogas expansion projects, PLC5-AB
- Oakwood Lakes recycled water irrigation system, Modicon M340 and Magelis OIT
- Oakwood Lakes Water Filtration system upgrade, Magelis OIT
- Port Costa Wastewater treatment facility, Modicon momentum
- Santa Rosa Suter Hospital Water Supply for new hospital, Micrologix PLC-AB, Cmore OIT and Ignition SCADA
- Redding Stillwater WWTP, GE Quickpanel OIT
- St. Helena WWTP, Modicon M340 and momentum, iFIX SCADA, Wonderware OIT
- Port of Oakland Shore to ship power systems, Schweitzer PLCs
Nik Conant

Experience Summary
Mr. Nik Conant has worked in the water/wastewater industry since 2001 and is familiar with most processes used in this industry. His experience is diverse since he has worked for a small consulting firm and has had to perform many different tasks as required. His major focus work is CAD station operator. Many other proficiencies include information technology, and radio studies.

Education
High School Diploma, 2 years College.

Registration
None

Proficiencies
Autocad all versions, lisp routines, programming
Microstation
Word, Excel, Photoshop, Adobe, etc., computer hardware

Work Experience
CAD Station Operator (13 years)
Mr. Conant has performed drafting and drafting support for over 100 projects ranging from small sewage lift stations to large (2000 HP total medium voltage) pump stations and treatment plants. During this time, Mr. Contant has become proficient as a drafter/technician and obtained the respect of his peers.

Project Experience

Water
City of Galt, Industrial Park Reservoir and BPS, March 2002
Pebble Beach CSD, Forest Lake Treatment Plant, November 2003

Wells
City of Mountain View, Well 22, July 2003
City of Vacaville, Well 15, April 2003
PCWA Laird Road Pump Station, July 2003

Storm Water
Bureau of Reclamation RD784, Pump Station #2, April 2003

Dams
Contra Costa Water District, Contra Loma Reservoir Seismic Monitoring, April 2004

Waste Water
EID Highland Hills Sewage Lift Station, August 2002
Yuba City Lift Station 1, May 2003
Yuba City Harter Road Lift Station, March 2004
Sac County Excelsior Road SLS S131, May 2003
Brian Woodin

Experience Summary
Mr. Brian Woodin has worked for Frisch Engineering since 2007 and has been exposed to most tasks required in the engineering field. His experience is diverse since he has worked for a small consulting firm and has had to perform many different tasks as required. His major focus work is on programming, communications, radio networking, and CAD station operator.

Education
High School Diploma.

Registration
None

Proficiencies
- Autocad all versions, lisp routines, programming, add-ons, etc.
- SCADA programming, Wonderware, GE Proficy, Intellution, SCADAAlarm, Win 911.
- Operator interface programming
- Word, Excel, Photoshop, Topo!, Adobe, etc.

Work Experience
Engineering Assistant (6 years)
Mr. Woodin has performed drafting and various other technical support services for over 30 projects ranging from small sewage lift stations to full waste water treatment plants. During this time, Mr. Woodin has become proficient as a drafter/technician and obtained the respect of his peers. Brian’s strengths are his diligence in finding the right answers and attention to detail. He is very conscientious about his work and has been a valuable engineering assistant to our firm.

Project Experience

SCADA
- San Juan Water District SCADA System
- SMUD Carson Power Plant
- City of Galt WWTP Tertiary Improvements
- Coastside County SCADA System

Water
- Trinity Center WTP
- Lewiston Pump System
- Lucerne WTP

Wells
- Rio Linda Water District Well 14 and Well 15

Waste Water
- City of Atwater Wastewater Treatment Plant

Landfill
- Redding Stillwater WWTP Expansion
- Altamont Landfill, Permeate Storage and Recycle system
Pacheco Pass Lechate Return Pump System

**Power**
- SMUD Carson Power Plant
- CCWD Los Vaqueros Hydroelectric Energy Recovery
- City of Atwater WWTP
Mr. Heigher has 22 years of experience in pump station design, structural design, cost estimating, construction inspection, and shop drawing review. He has served as project engineer for the design of water and wastewater treatment plants, pipelines and pump stations. His experience includes pump and equipment selection, facility layout, analysis of existing structures, design of new structures (including reinforced concrete, steel, aluminum, fiberglass and timber) and site layout.

Education
B.S., Civil Engineering, California State University, Sacramento, 1995

Registration
Professional Civil Engineer, 2001 California No. 62011

RELEVANT PROJECT EXPERIENCE

El Dorado Irrigation District, Deer Creek Wastewater Treatment Plant, 1996 Expansion. Project role, Project Engineer for the 1996 Expansion and Upgrade to the Deer Creek Wastewater Treatment Plant. Responsibilities included site planning, pipeline layout, structural design, construction cost estimates, shop drawing review and construction inspection.

El Dorado Irrigation District, Deer Creek Wastewater Treatment Plant, 3.6 MGD Expansion. Provided design services for the further renovation and expansion to the DCWWTP. The Expansion extended the capacity of the Plant from 2.5 MGD to 3.6 MGD (ADWF), to comply with requirements of the current discharge permit. The improvements consisted of secondary clarifier, gravity sludge thickeners, sludge storage facility improvements, sludge dewatering, belt press installation, installation of lime sludge stabilization equipment, metal building, tertiary filtration plant, related pumps and equipment, disinfection basins, instrumentation and controls and electrical power installations. Specifications and estimates were prepared for pre-purchasing eight major pieces of equipment as well as for the construction work.

City of Placerville, California, Hangtown Creek Water Reclamation Facility 2005 Facility Improvements project. Project role, Project Engineer responsible for structural design, mechanical design, equipment selection and construction engineering for the Hangtown Creek Water Reclamation Facility 2005 Facility Improvements project, which involved construction of a $39 million upgrade to existing wastewater treatment facilities. Facility improvements include a new headworks with fine screening; primary clarifier system modifications, including increased depth of existing structures; aeration system modifications, including added biologic nutrient removal and conversion of two inefficient rectangular secondary clarifiers into aeration basins; new secondary clarifiers; effluent cooling towers; tertiary filters built over existing basins; ultraviolet disinfection; new sludge handling facilities (WAS Thickener, anaerobic digester, belt filter press and gravity belt thickener); and maintenance building. Responsibilities included site layout, pipe layout, construction cost estimates, detail design, equipment selection, drawing coordination, periodic onsite inspection, and shop drawing review.
<table>
<thead>
<tr>
<th>PROFESSIONAL ENDEAVORS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Domenichelli &amp; Associates</td>
<td>2012 to present</td>
</tr>
<tr>
<td>Psomas</td>
<td>2010-2012</td>
</tr>
<tr>
<td>Owen Psomas</td>
<td>2007-2010</td>
</tr>
<tr>
<td>Owen Engineering</td>
<td>1995-2007</td>
</tr>
<tr>
<td>Caltrans, Intern</td>
<td>1994-1995</td>
</tr>
</tbody>
</table>

**Placer County, Dept. of Facility Services, Sewer Maintenance District 3 WWTP.** This 50 year-old facility serves the upscale, residential community of Granite Bay, California. The existing trickling filter presents operational problems – particularly during cold weather. The SMD 3 WWTP is scheduled to be ultimately abandoned with the wastewater conveyed to a regional WWTP. In the interim, the plant could not reliably meet standards and the County would have been subject to mandatory minimum penalties for lack of compliance with nitrate effluent limits if not repaired. This project was particularly difficult because the County could not justify spending large amounts of money on a facility that is planned to be abandoned in the near future. Yet costs for ongoing non-compliance are high. The design consists of installation of Severn Trent denitrification filters and related chemical feed equipment. The filters will denitrify the effluent and provide polishing for turbidity.

**Nevada Irrigation District, Elizabeth George WTP.** Responsible for structural and mechanical design of the Elizabeth George Water Treatment Plant Expansions project. The project includes preparation of a pre-design report and plans and specifications for improvements needed to expand the capacity of the Elizabeth George Water Treatment Plant (WTP) from 10 to 24 mgd. The project also includes preparation of a Filtration Study that presents an evaluation of alternatives for expanding the filtration capacity at the Loma Rica WTP from 6.4 to 12 mgd. The source of raw water supply for the plant is surface water delivered by canal. The raw water is of excellent quality, and is low in turbidity, total organic carbon, and minerals. However, to meet standards, additional screening filtering and a modified treatment process were required.

**San Gabriel Water Company, Sand Hill WTP Hydroelectric Station.**—D&A provided design services for an In-Conduit Hydroelectric project, located at the Sandhill Water Treatment Plant (Sandhill) in Rialto, California. The hydroelectric station houses two pump-turbine type turbine-generators and has a combined nameplate rating of 310 kilowatts (kW). D&A also provided services during construction. The project was commissioned in 2013.

**Amador County Water Agency, Hydroelectric Station.**—D&A provided design for two hydroelectric projects for Amador County Water Agency. The Tanner Water Treatment Plant project includes design for inflow pipeline modifications and an in-line pumps as turbines hydroelectric plant. Construction has been completed for this facility. The Ione Project includes design of high pressure waterline into the station and new Pelton Wheel hydroelectric station and new outflow pipelines to an existing reservoir. This project is currently under design.
**Project Number:** Planned  
**Project Name:** Deer Creek Main Circuit Breaker  
**Project Category:** Reliability & Service Level Improvements  
**Priority:** 1  
**PM:** Mutschler  
**Board Approval:** 11/13/17

### Project Description:

Electrical Code now requires that incident energy (or electrical arc hazard potential) be calculated and posted on every piece of 3 phase equipment. EID has performed those calculations on the Deer Creek WWTP and the results at the main circuit breakers were so high, that it virtually prohibits the ability to maintain the automatic transfer switch and main circuit breaker. This problem is critical to the operation of the facility as failures in the transfer switch or main circuit breaker could render the plant completely off-line until temporary power can be arranged and tied into the buss. Even if all safety precautions are taken, working on this piece of equipment would still be very hazardous to maintenance personnel.

The purpose of this project is research and present methods and steps toward reducing the arc flash hazard and improve maintenance access to the critical main breaker and backup power components.

### Basis for Priority:

Failures in the transfer switch or main circuit breaker could render the plant completely off-line until temporary power can be arranged and tied into the buss.

### Project Financial Summary:

<table>
<thead>
<tr>
<th>Description of Work</th>
<th>Funded to Date</th>
<th>Expenditures through end of year</th>
<th>Spent to Date</th>
<th>2018 - 2022 Planned Expenditures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study/Planning</td>
<td>$</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Design</td>
<td>$ 100,000</td>
<td>$</td>
<td>$</td>
<td>$ 100,000</td>
</tr>
<tr>
<td>Construction</td>
<td>$ 200,000</td>
<td>$ 900,000</td>
<td>$</td>
<td>$ 1,100,000</td>
</tr>
<tr>
<td>Cash flow through end of year</td>
<td>$</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Project Balance</td>
<td>$</td>
<td>$</td>
<td>$</td>
<td>$ 1,200,000</td>
</tr>
<tr>
<td>Total</td>
<td>$ 300,000</td>
<td>$ 900,000</td>
<td>$</td>
<td>$ 1,200,000</td>
</tr>
</tbody>
</table>

### Estimated Annual Expenditures:

<table>
<thead>
<tr>
<th>Description of Work</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study/Planning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>Design</td>
<td></td>
<td>$ 100,000</td>
<td></td>
<td></td>
<td></td>
<td>$ 100,000</td>
</tr>
<tr>
<td>Construction</td>
<td></td>
<td>$ 200,000</td>
<td>$ 900,000</td>
<td></td>
<td></td>
<td>$ 1,100,000</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$ 300,000</td>
<td>$ 900,000</td>
<td></td>
<td></td>
<td></td>
<td>$ 1,200,000</td>
</tr>
</tbody>
</table>

### Funding Sources:

<table>
<thead>
<tr>
<th>Percentage</th>
<th>2018</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wastewater Rates</td>
<td>100%</td>
<td>$300,000</td>
</tr>
</tbody>
</table>

**Funding Comments:**

L:\18001 - Deer Creek Main Circuit Breaker\Board Items\PLANNED Deer Creek Main Circuit Breaker.xlsx
Consideration to Award a Professional Services Contract to Frisch Engineering for the DCWWTP Main Circuit Breaker Project

April 23, 2018

By: Cary Mutschler
Senior Civil Engineer
Previous Board Actions

- November 13, 2017 – The Board adopted the 2018-2022 CIP, which included this project subject to funding availability
Project Site

Cambridge Road Exit

HWY 50

DCWWTP
Definitions

• Arc Flash - Intense light and extreme heat (35,000°F) produced as part of an arcing fault, a type of electrical explosion (arc blast)
  – Arc Flash is measured in calories/cm²
  – 1.2 cal/cm² is a second degree burn

• Arc Flash personal protective equipment (PPE) rated 1 through 4 (4 cal/cm² to 40 cal/cm²)
  – PPE does not prevent injury, it minimizes the injury to no more than a second degree burn
  – Does not protect against blast or shrapnel
Arc Flash Boundaries
## Arc Flash PPE

<table>
<thead>
<tr>
<th>Hazard/Risk Category</th>
<th>Arc-rated long-sleeve shirt</th>
<th>Arc-rated pants or overall</th>
<th>Arc-rated face shield with hard hat</th>
<th>Safety glasses</th>
<th>Hearing protection</th>
<th>Leather &amp; voltage rated gloves (as needed)</th>
<th>Leather work shoes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Arc-rated long-sleeve shirt</td>
<td>Arc-rated pants or overall</td>
<td>Arc-rated face shield with hard hat</td>
<td>Safety glasses</td>
<td>Hearing protection</td>
<td>Leather &amp; voltage rated gloves (as needed)</td>
<td>Leather work shoes</td>
</tr>
<tr>
<td>2</td>
<td>Arc-rated long-sleeve shirt</td>
<td>Arc-rated pants or overall</td>
<td>Arc-rated face shield &amp; balaclava or Arc flash suit with hard hat</td>
<td>Safety glasses, Hearing protection</td>
<td>Leather &amp; voltage rated gloves (as needed)</td>
<td>Leather work shoes</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Arc-rated long-sleeve jacket</td>
<td>Arc-rated pants</td>
<td>Arc-rated flash hood with hard hat</td>
<td>Safety glasses, Hearing protection</td>
<td>Leather &amp; voltage rated gloves (as needed)</td>
<td>Leather work shoes</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Arc-rated long-sleeve jacket</td>
<td>Arc-rated pants</td>
<td>Arc-rated flash hood with hard hat</td>
<td>Safety glasses, Hearing protection</td>
<td>Leather &amp; voltage rated gloves (as needed)</td>
<td>Leather work shoes</td>
<td></td>
</tr>
</tbody>
</table>
Summary of Issues

• Electrical Code requires arc flash potential be calculated and posted
• Main circuit breaker arc flash safe working distance is outside of the building for both sites
• Not enough PPE available to work on automatic transfer switch (ATS) (Switch moves power from line to generator)
• Currently ATS and Main Breaker are the same unit
• Unable to shut down without PG&E
• ATS and main circuit breaker cabinets are no longer up to current design standards
Lower Main Breaker Building
Upper Main Breaker Building
Upper Main Breaker
Challenges for Design

• Location of the Main Circuit Breakers
• Modification of the ATS
• Coordination with PG&E on shutdowns and tying into new equipment
## Proposals

<table>
<thead>
<tr>
<th>Proposer</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frisch Engineering</td>
<td>$93,550</td>
</tr>
<tr>
<td>Sage Engineering</td>
<td>$108,468</td>
</tr>
</tbody>
</table>

### Proposal Evaluation and Ranking
- Responsiveness to RFP
- Experience and expertise on similar projects
- Project team makeup and capabilities
- Rates and charges, affordability and reasonableness of cost for expertise required to meet project needs
- Client references
Cost Breakdown

<table>
<thead>
<tr>
<th>DCWWTP Main Circuit Breaker Funding Requirements</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frisch Engineering – Design</td>
<td>$93,550</td>
</tr>
<tr>
<td>Capitalized Labor – Engineering, project management bidding, operations staff support</td>
<td>85,000</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$178,550</td>
</tr>
</tbody>
</table>

Scheduled to be constructed in the Fall 2018 to Summer 2019 October
Board Decision/Options

- **Option 1:** Award contract to Frisch Engineering in the not-to-exceed amount of $93,550 and approve project funding of $178,550 for Project No. 18001.

- **Option 2:** Take other action as directed by the Board.

- **Option 3:** Take no action.
Staff and General Manager
Recommendation

• Option 1
Questions?
EL DORADO IRRIGATION DISTRICT

Subject: Consideration to award a professional services contract to Frisch Engineering in the not-to-exceed amount of $193,388 for design of the Wastewater Communication Upgrade Project, and authorize funding of $298,388; Project No. 18003.

Previous Board Actions
November 13, 2017 – The Board adopted the 2018-2022 CIP, which included this project subject to funding availability.

Board Policies (BP), Administrative Regulations (AR) and Board Authority
BP 3060, AR 3061.04: contracts greater than $50,000 must be approved by the Board.

Summary of Issue
At twenty-one of the sanitary sewer lift stations, the existing process logic controllers (PLC) are now approximately 30 years old and 10 years beyond their expected useful life. Additionally, these PLCs only provide 10-20% of the monitoring capabilities compared to current standard PLCs (3 to 5 monitoring points versus 30) meaning these facilities have no ability to report pump failures or incrementally report on wet well levels before reaching the high water limit. Also, the existing PLC’s can go up to 24 hours before alerting of a communications or control issue, while current standard PLCs will alert within 5 minutes (a 288% increase in time to detect issues). Due to the age of the existing PLCs, locating replacement parts and technical support for the old PLCs is nearly impossible. Additionally, this project will improve the prevention of sanitary sewer overflows (SSO) by allowing more functions to be monitored at the lift stations and by improving the reporting and communications frequency.

Staff Analysis/Evaluation
A PLC is a computer that is used to monitor the sanitary sewer lift stations and report any problems that may occur via the supervisory control and data acquisition (SCADA) system.

In 2013 and 2014, staff went through an extensive process to define a standardized PLC system setup for all lift stations. Two PLCs were installed in late 2013 and 2014 by staff to work out the process for planning future installations. The Wastewater Communications Upgrade Project will utilize the developed standard and will address the deferred upgrades of existing out-of-date PLCs used extensively for process control in the collection systems.

This project consists of designing the communication upgrades, necessary hardware and programming at each of the 21 wastewater lift stations listed below. Additionally, the consultant in conjunction with staff will prioritize the replacement timing of the obsolete PLCs such that construction timing considers lift station operations.

The following lift stations are included in the scope of work and require a complete replacement of the hardware and software monitoring systems:
1. Arlette  
2. Bar J  
3. Bass Lake Village  
4. Browns Ravine 1  
5. Browns Ravine 2  
6. Buckeye  
7. Deer Park  
8. Diamond Industrial  
9. Indian Creek  
10. Marina Hills  
11. Motherlode  
12. North Uplands  
13. Oakridge  
14. Starbuck  
15. Summit 2  
16. Summit 5  
17. Summit View 1  
18. Thunderhead  
19. Waterford 8  
20. Waterford 9  
21. St. Andrews

The District is also requiring all 60 lift stations radio paths to move to their designated wastewater treatment plant. Currently, the lift stations report to a transmitter at the Bass Lake tanks site and then from the tanks to the either the El Dorado Hills or Deer Creek Wastewater Treatment Plant. Therefore, in this current configuration, if the transmitter goes down at the Bass Lake tanks site, the District loses communication at all 60 stations and is unable to receive data. Redirecting the lift station communication to transmit directly to their respective plants will eliminate this weakness in the SCADA system.

Request for Proposals
A Request for Proposals (RFP) was released on January 29, 2018 and also emailed to the Engineering On-Call list. The following three proposals were received:

<table>
<thead>
<tr>
<th>Engineering Firm</th>
<th>Fee Proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frisch Engineering</td>
<td>$184,106</td>
</tr>
<tr>
<td>Control Point Engineering</td>
<td>$188,000</td>
</tr>
<tr>
<td>A TEEM Electrical</td>
<td>$217,050</td>
</tr>
</tbody>
</table>

Proposal Evaluation and Ranking
The proposals were measured against the following criteria established in the RFP:

- Responsiveness to RFP
- Experience and expertise on similar projects
- Project team makeup and capabilities
- Rates and charges, affordability and reasonableness of cost for expertise required to meet project needs
- Client references

Frisch’s proposal received the highest overall score. Reference checks confirm other agencies have had satisfactory experiences with Frisch Engineering. Based on relevant experience, a strong team and reasonable rates, staff is recommending the Board award a professional services contract to Frisch.

Frisch Engineering also proposed an option to the contract that will improve the radio survey. The proposal included the following:

- Utilize radio analysis software to determine theoretical path propagation and losses for the 60 remote sites and two radio central locations.
• Provide theoretical results to EID so that additional measures can be considered prior to
  the physical radio survey.
• Meet with EID to discuss results and develop a preliminary plan for alternative routes
  and/or repeater sites. This meeting will be used to develop the scope of work required to
  design repeaters, or modify routes

The District has reviewed this option and feels that it would improve the success rate of
installation of the project.

**Environmental Review**
The District is evaluating California Environmental Quality Act (CEQA) review and regulatory
permitting requirements for the Project. The appropriate level of CEQA review and regulatory
permitting requirements will continue to be evaluated as the design of the Project is further
developed.

**Funding**
Funding for the project will be 100% from wastewater rates. Staff is requesting funding in the
amount of $298,388 for the Wastewater Communications Upgrade Project as summarized below:

**WW Communications Upgrade Funding Requirements**

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frisch Engineering – Design</td>
<td>$184,106</td>
</tr>
<tr>
<td>Frisch Engineering – Optional component</td>
<td>9,282</td>
</tr>
<tr>
<td>Capitalized Labor – Engineering, environmental staff support</td>
<td>105,000</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$298,388</strong></td>
</tr>
</tbody>
</table>

**Board Decisions/Options**

**Option 1:** Award a professional services contract to Frisch Engineering in the not-to-exceed
amount of $193,388 for design of the Wastewater Communication Upgrade
Project, and approve funding of $298,388; Project No. 18003.

**Option 2:** Take other action as directed by the Board.

**Option 3:** Take no action.

**Staff/General Manager’s Recommendation**

Option 1

**Supporting Documents Attached**

Attachment A: Frisch proposal
Attachment B: CIP summary
WASTEWATER COMMUNICATIONS UPGRADE PROJECT PROFESSIONAL SERVICE

Electrical Engineering Professional Services

Frisch Engineering, Inc.
Consulting Electrical Engineers

April 09, 2018
Mr. Cary Mutschler  
El Dorado Irrigation District  
2890 Mosquito Rd.  
Placerville, CA 95667  

Subject: Request for Proposal 18-04 – Wastewater Communications Upgrade  
Project Professional Services  

Dear Mr. Mutschler,

Thank you for inviting Frisch Engineering to respond to this RFP and submit our proposal. Frisch Engineering has extensive experience in the planning, design and construction of many similar sized SCADA Communications projects. We are familiar to the needs and requirements of water and wastewater operators as it pertains to electrical and control systems.

We have done a number of similar projects where we have designed and implemented standardized RTUs into multiple sites. We designed the standardized RTUs with sub-models suited for various applications and implemented into the design of each site. We have done this for water, wastewater, tanks, boosters, wells, lift stations, and mini-treatment plants.

Our goal is to provide a system that meets your needs. In the process we will respond to your questions, identify and assist in selection of alternatives, and perform changes as needed.

This proposal is based on the schedule provided in the RFP. This schedule is not reiterated in this proposal and can be assumed. The radio survey will be conducted in parallel with the first phase of design with results delivered at the 50% submittal.

Frisch Engineering is pleased to offer this proposal for your consideration. Please feel free to contact me at tfrisch@frischengineering.com or (916) 353-1025.

Sincerely,

Thomas P. Frisch, P.E.  
Electrical Engineer
**Section 1 – Scope of Work**

The 23 listed sites in the RFP are sewer pump stations – many of which we are familiar with. Two reclaim sites were added by addendum. The Engineers and staff at Frisch Engineering have been working with EID for over 20 years and have designed a number of your lift stations and reclaim sites during that time.

We understand the need to maintain uniformity and standards across multiple stations. There is a certain beauty in creating a project that has the forethought to be compatible with all sites with only necessary modifications. If a standard design including components, details, multiple panel types, descriptions, notes, etc. can be applied uniformly, then the design and construction can be well understood and implemented quickly and accurately.

Our design will include the following design elements:

1. RTU design (as adopted from EID) and modified for indoor and outdoor installation location. At least two designs will be provided including wall mount indoor and pad mount outdoor.

2. P&IDs for each site detailing I/O to be connected with notations for modifications to equipment to make I/O points as needed. If instrumentation is to remain or be replaced, the P&ID will help delineate the work required.

3. Design panel installation style, location, conduit schedule, antenna mast and site I/O integration, cut over and downtime requirements, MCC wiring integration.

4. We will work with EID staff to determine the priority and allowable downtime of each of the stations and develop a specification for the contractor.

5. We will write a specification for the contractor to develop PLC programming using EID’s PLC template. Specification will define changes to be made per site.

6. We will write a specification for the contractor to develop SCADA programming using EID’s HMI template. Specification will define changes to be made per site.

7. We will create Panel testing specification that requires contractors to test panels in the factory and field and fill out quality control test forms for each control panel and site.

8. We will write a specification for electrical contractor to perform Arc Flash Risk Assessment using incident energy method for lift stations per latest NFPA70E.

9. Design for all equipment being replaced with industry best practices to meet PPE Category 2 or below on arc flash per the latest NFPA70E.

10. Develop implementation steps and quality control measures.

11. Provide an engineer’s cost estimate.

12. Clearly identify required generator signals/control conduit and wires for sites with generators.

13. At minimum design drawings for each site will include:
a. P&ID  
b. Electrical site plan  
c. Conduit schedule and routing  
d. I/O List  
e. Demo/Installation details  

14. Provide communication overview diagram for each of the two collection basins.  
15. General electrical materials and methods specifications.  
16. Control panel component specifications.  
17. Instrument Specifications.  
18. Construction cost estimates for each site.  

Frisch Engineering shall meet and coordinate with District operations and maintenance staff during design to insure that District needs and requirements are being met. At minimum, we will visit each site with staff and gather information, and meet with staff at each design deliverable. We will take notes and furnish them as an itemized list of comments or requirements for each site.  

Engineering services during construction will be provided to meet the project construction needs and as desired by EID. Frisch Engineering routinely performs construction management, on-site inspection, on-site testing, and project closeout. We are very familiar with Construction Services work and can work with the Construction Administrators or perform some of the on-site work ourselves. Not all of our available construction services have been requested in the RFP.  

Additional Scope definition is provided in Section 8, Quotation.  

**Section 2 – Relevant Experience and Expertise**  

With more than a combined 130 years in the water/wastewater industry, Frisch Engineering has the technical knowledge and experience to serve your needs. Frisch Engineering is committed to providing the highest level of quality and performance to assure the project’s success from concept to completion.  

Frisch Engineering has extensive experience in the planning, design and construction of many similar sized SCADA projects. We are familiar to the needs and requirements of water and wastewater operators as it pertains to electrical and control systems.  

Our experience and primary business function is electrical and control system engineering consulting services. This includes Electrical and Controls Design, SCADA design and programming services - PLC programming, and communications. Frisch Engineering has completed hundreds of projects over the past 15 years.  

We have performed many multi-site SCADA system designs where new RTUs were designed and installed into various and dis-similar sites. Additionally, we have done many electrical rehabilitation designs for large and small pump station sites.  

Thomas Frisch, PE will be project manager and lead Electrical Design Engineer. Martin Yarbrough will perform electrical design, and Nik Conant will assist in autocad drafting tasks. Others such as Michael Frisch, PE. or Mike Rogers will be
brought in for QC or other tasks as needed. Each of these personnel has many years of experience and has worked on many EID projects in the past.

Frisch Engineering is a full service engineering and programming firm able to complete all tasks required under this RFP and in timely fashion.

Our clients include small municipal and water districts such as Harbor View, and RD784, up to very large regional operators such as Regional San, and Sacramento County. Please see section 5 for references.

Please also see Qualifications Section 6 for more information on relevant experience and expertise.

Section 3 – Project Team

Thomas Frisch, PE will be project manager and lead Electrical Design Engineer. Martin Yarbrough will perform electrical design, and Nik Conant will assist in autocad drafting tasks. Others such as Michael Frisch, PE. or Mike Rogers will be brought in for QC or other tasks as needed. Each of these personnel has many years of experience and has worked on many EID projects in the past.

ATG Wireless (a professional radio communications company) will be performing the radio survey. They have a crew that performs radio surveys routinely and are very efficient at getting the results documented. They have a van specifically outfitted for radio surveys with a built in telescoping mast. The test setup can be deployed very quickly. This enables more sites to be done each day.

Frisch Engineering staff consists of 2 Electrical Engineers with PE registration, 3 Associate Engineers and 4 support staff. In terms of Electrical Consultants, we are one of the largest in the Sacramento area and are looking to expand when appropriate. Engineering team is as follows:

<table>
<thead>
<tr>
<th>Name</th>
<th>Years</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thomas Frisch, PE</td>
<td>24</td>
<td>Design Engineer, plan review, oversight, project design interpretation, submittal review, RFI response</td>
</tr>
<tr>
<td>Michael Frisch, PE</td>
<td>21</td>
<td>Project Manager, Quality Control, PLC and SCADA programmer, Construction Engineer, inspection, start-up, design review, interpretation, RFI response, dispute resolution, design changes.</td>
</tr>
<tr>
<td>Martin Yarbrough</td>
<td>21</td>
<td>Associate Design Engineer, design review, submittal review, RFI response, design clarification.</td>
</tr>
<tr>
<td>Mike Rogers</td>
<td>24</td>
<td>PLC and SCADA Programmer, Associate Engineer, inspection, start-up, design review, submittal review, RFI response, design clarification.</td>
</tr>
<tr>
<td>Nik Conant</td>
<td>15</td>
<td>Technical Assistant, Drafting, Computer work, Radio Survey, Electrical Design.</td>
</tr>
<tr>
<td>2 additional support staff</td>
<td></td>
<td>Office tasks, design related tasks, product research, radio surveys, computer and network testing and configuration.</td>
</tr>
</tbody>
</table>
Chuck Hoyt  ATG Wireless Radio expert  
30 Years

Ron Fox  ATG Wireless Radio expert, Radio Survey Manager 
10 Years

Support staff  ATG Wireless Radio Survey

All Frisch Engineering staff assigned to this project are located in our office in Folsom, California. ATG wireless is based in Bakersfield. Please see resumes at end of proposal for description of their abilities, qualifications and experience.

Section 4 – Quality Assurance and Control; Conflicts

Frisch Engineering has multiple qualified staff that can perform quality control review from a disinterested perspective. The plan for this project, as is similar for most others, is for peer review by qualified staff in our office.

Additionally, we plan on presenting the drawings to EID staff such that the ideas and concepts are explained during review. We will welcome EID staff comments and will correct the plans and specs to meet EID requirements.

Communication to EID staff during design will also be very important. We have recently performed projects for EID and have utilized frequent and directed communications to get questions answered and selections made. With a project with as many stations and details as this, we feel that open dialog will be important.

There are not any foreseeable actual or potential professional conflicts that could hinder the provision of the requested services.

Section 5 – Client References

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Name</th>
<th>Company</th>
<th>Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>County Civil Engineer</td>
<td>Dave Bolen</td>
<td>Sacramento County</td>
<td>916-874-8546</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><a href="mailto:dbolen@saccounty.net">dbolen@saccounty.net</a></td>
</tr>
<tr>
<td>Project Engineer</td>
<td>John Jacobs</td>
<td>City of Vacaville</td>
<td>707 469 6414</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><a href="mailto:jjacobs@cityofvacaville.com">jjacobs@cityofvacaville.com</a></td>
</tr>
<tr>
<td>Utility Superintendent</td>
<td>John Sparkes</td>
<td>Lake County Special Dist.</td>
<td>(707) 245-8135</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><a href="mailto:John.sparkes@lakecountyca.gov">John.sparkes@lakecountyca.gov</a></td>
</tr>
<tr>
<td>Operations Manager</td>
<td>John Fossa</td>
<td>Rivera West Water District</td>
<td>707-349-1181</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><a href="mailto:rivierawestwater@gmail.com">rivierawestwater@gmail.com</a></td>
</tr>
</tbody>
</table>
Section 6 – Contract and Insurance Requirements

Frisch Engineering is willing to execute a contract based on the form shown in Exhibit C of the RFP and is able to meet the insurance requirements detailed in Exhibit C of the RFP.

Section 7 -- Addenda

We can acknowledge receipt of two addendums.

Section 8 – Scope of work

Please also see attached quote further defining our scope or work.

TASK 1 – Meetings and Site Visits

Kickoff meeting, Design review meetings at 50%, 75%, 90% and 100%. Each meeting will discuss the design deliverables such that we can get as many comments as possible within the time allotted.

Conduct site visits to get photos and measurements of sites. The design engineer and drafters will be on site getting necessary information to document site measurements, electrical one-lines, conduit layouts, locations, and free space for new equipment.

During site visits we will review and record site conditions and constraints for each site. While on site we will create or confirm a P&ID sketch and determine the available PLC I/O that exists from existing controls, equipment, and instruments. We will compare that to the desired I/O list and during design will determine how to complete the remaining I/O. We will create a site plan and locate the new RTU panel and show where the I/O is coming from. This project is repetitive for all of the sites. One key to design will be how to consolidate similar problems into identical solutions. That will create an elegant solution that will maintain consistency to the extent possible.

TASK 2 – Progress Reports and Schedules

A monthly progress report will be provided with the monthly invoice to the EID project manager. In it, we will discuss the work completed for the month, the plan for next month, and any items that need the attention of EID.

A project schedule will be developed at the very beginning of the project and will be based on the requirements of the RFP. Each month, it will be updated as needed to meet scheduled progress and deliverables.

TASK 3 – Project Design and Design Documents

We will provide complete design documents, including plans and specifications suitable for public bidding and construction of the Work.

We will review and record site conditions and constraints for each site. While on site we will create or confirm a P&ID sketch and determine the available PLC I/O that exists. We will compare that to the desired I/O list and during design will determine how to complete the remaining I/O. We will create a site plan and locate the new RTU panel and show where the I/O is coming from. This project is repetitive for all of the sites. One key to design will be how to consolidate similar problems into identical solutions. That will create an elegant solution that will
maintain consistency to the extent possible.

Previous designs have included outdoor pedestals with motor controls, sump termination panels for motors, ultrasonic level transmitters. We are very familiar with those requirements and those are included in this proposal.

Our design and bid documents shall:

- Be designed to meet all applicable and current codes, laws, regulations, and professional standards.
- Comply with current District Design and Construction Standards, except as approved by the District.
- Be in conformance with the sixteen division format of the Construction Specification Institute and the District's Standard Specifications. Consultant shall cooperate with District in coordinating the plans and technical specifications with the District supplied standard Division 0 and Division 1 specifications. We will provide work descriptions for inclusion in District's standard specifications and will provide whatever Division 1 construction contract specifications are necessary for the Project and not supplied in District's standard specifications. District Technical Specifications will be used and supplemented as needed.
- Comply with the applicable standard of care when preparing Plans and Specifications to comply with applicable building codes, ordinances, statutes, laws, standards, governmental regulations, private restrictions, environmental and other authorities having jurisdiction over the Project, applicable to the Services. We will comply with any other requirements of authorities with jurisdiction over the Project or the Plans and Specifications.
- Clearly identify and describe all necessary quality levels and quality control procedures such as inspections, tests, submittals or other measures that the Contractor must satisfy, meet or perform.
- Include the requirements for the tests, controls, performances and certifications needed to verify the specified quality level of Work for that specification section. Arc Flash calculations will be specified.
- Include a dedicated subsection within each work-related specification section to identify and list required Contractor submittals along with testing and inspection requirements.
- Incorporate the District's comments at each design review phase.
- Cost estimates will take into consideration the current bidding environment.

**Task 3.1 – 50% Design Submittal**

This Task includes the preparation of a 50% design submittal which will identify all project components, schedule and cost including:

- 50% level drawings including P&IDs for each site.
- 50% design level of confidence cost estimate
- Design, bidding, permitting, agency approvals, construction schedule
- Prior to making the 50% design submittal, We will perform an in-house
QA/QC review of the documents

**Deliverables:**
1) Electronic file of 50% drawings in full and half sizes in PDF and AutoCAD format.

**Task 3.2 – 75% Design Submittal**
We will advance the design and design documents from the 50% design level to the 75% level of design including:

- Previous drawings and specifications from the 50% delivery with updates and refinements.
- 75% level technical specifications.
- Prior to making the 75% design submittal, We will perform a detailed in-house QA/QC review of the documents.
- Design, bidding, permitting, agency approvals, construction schedule

**Deliverables:**
1) Electronic file of 75% technical drawings in full and half sizes in PDF and AutoCAD format.
2) Electronic file of draft technical specifications containing a list of submittals in WORD format
3) Updated schedule
4) Updated cost estimate commensurate with level of design

**Task 3.3 – 90% Design Submittal**
We will advance the design and design documents from the 75% design level to the 90% level of design including:

- Respond to all comments resulting from the District's 75% submittal review.
- Previous drawings and specifications from the 75% delivery with updates and refinements.
- Prior to making the draft 90% design submittal, We will perform a detailed in-house QA/QC team review of the documents including but not be limited to the following:
  - Verify adequacy of design.
  - Verify completeness and consistency of all details.
  - Verify adequacy and completeness of bid forms.
  - Verify all details compliant with District standard details.
  - Verify all permit conditions are incorporated in the construction documents.
  - The 90% submittal shall be, in the opinion of Frisch Engineering, biddable withstanding final review comments from EID.
Deliverables:
1) Electronic file of 90% technical drawings in full and half sizes in PDF and AutoCAD format. All drawing sheets shall be included in the set and each sheet submitted shall be essentially complete, with all details, numbering and notes included.
2) Contract Specifications: All contractual and technical specification sections shall be essentially complete and included in the submittal. Specifications shall include a list of submittals.
3) Plan sets, 24x36, qty 4.
4) Updated schedule
5) Updated cost estimate commensurate with level of design

Task 3.4 – Final 100% Design Submittal
We will advance the design and design documents from the draft to final 100% design level, incorporating all comments from the 90% submittal review. The 100% design submittal shall be a turnkey design suitable for public bidding.

Deliverable:
1) CD or e-mail containing contract documents in Word and PDF format, and contract drawings in PDF and AutoCAD appropriate for bidding website posting. The AutoCAD files shall include layout sheets using the AutoCAD Sheet Set Manager with an attributed title block tied to the Sheet Set. Provide all Sheet Set Files, Cross References and related files.
2) Plan sets, 24x36, qty 8.
4) Final cost estimate.
5) Final construction schedule.

Task 4 – Regulatory / Legal Descriptions
We will assist with project Regulatory issues including the following:

- The District will obtain the regulatory and environmental permits required for the work. It is anticipated that the 50% design drawings will be used to obtain the regulatory permits as needed. We will prepare supporting documents, including drawings and details, as needed for the approvals and respond to comments received

Deliverable:
1) Details as required.

Task 5 – Design Service During Construction
We will assist the District during bidding and construction of the Project including:

- Clarifications about the drawings and specifications
- Assistance in the preparation of addenda
- Making addenda changes to the drawings
- Participation in the pre-bid site visit – Assume 1 pre-bid site visit 6 hours.
• Assistance with the evaluation of bids

Section 6 – Qualifications

Four of our staff have more than 20 years experience and 2 have more than 10 years experience all working in this industry. Frisch Engineering has the technical knowledge and experience to serve your needs. Frisch Engineering is committed to providing the highest level of quality and performance to assure the project’s success from concept to completion.

We have two engineers on staff with Electrical PE licenses in California.

Thomas Frisch, PE will be project manager and lead Electrical Design Engineer. Martin Yarbrough will perform electrical design, and Nik Conant will assist in autocad drafting tasks. Others such as Michael Frisch, PE or Mike Rogers will be brought in for QC or other tasks as needed. Each of these personnel has many years of experience and has worked on many EID projects in the past.

We have been working with serial communications since the early 1990s and consider ourselves experts at it. Lately, the push has been to get away from serial communications, however, it still has its place in control systems and we can implement it correctly. Radios utilize nearly all of the pins in a communications cable including CTS, RTS, DTR, DSR, TX, RX, and GND. We know what they are all used for. We advise and service multiple clients still using serial radio systems in Folsom, Lincoln, Reclamation District 784, and others.

We have deployed and are ongoing in deployments of Wonderware in Galt, Three Valleys, Lake County, Spring Valley, and others. We have even done some Wonderware work in EID. We have Wonderware programmers on staff and are very familiar with System Platform.

Frisch Engineering started in 2001 with over half of our business doing inspection for large projects. Over the years, we have been lead Electrical and Controls inspectors on many projects that exceeded 40 million in construction value. Those projects typically require very regimented and organized quality control inspection programs during construction with proper documentation as a result.

Replacing PLC controls is a typical project for us. The first thing to wear out at facilities is the technology which requires new RTUs controls and instrumentation. We do this very thing on about 30% of our projects and have about 5 of them are currently active in design.

The schedule is tight but can be performed with the proper dedication to project. EID will be working with Frisch Engineering principal and senior staff. It is our business to get projects done on time and that is what we do. The easiest way for us to loose customers is to be late, that is why it is our #1 priority to get jobs done on time – what ever it takes.

Frisch Engineering is located within 30 minutes of all of the project sites and about 25 minutes from the EID HQ. If we are needed at any EID site either during design or construction, it will not be a problem for us to take the time required to get to the site and complete the needed work. We have been doing this exact thing for EID on many past projects.

Example Projects:

Frisch Engineering Inc
**County of Sacramento, Department of Water Resources, April 2015**

**Kadema Storm Pump Station and Mayhew Storm Pump Station.**

The projects were mostly electrical in nature so we acted in prime engineer role. The two pump stations were built in the mid 1950s and had not been upgraded since that time. We designed complete replacements of the electrical controls and instrumentation systems.

Each project had multiple 100 through 300 hp pumps that operated on wetwell level. With storm projects, many redundancies are required since while they are not needed for months at a time, they need to be ready when called. We designed redundant monitoring systems for wetwell level, motor controls, power backup systems, and bar screens.

Each station required a new block building with motor controls and PLC control panel. We coordinated with Civil and Mechanical engineers to design buildings for specific electrical use. Outdoor utility metering panels with distribution and generator controls provided power to the buildings. The projects were competitively bid and came in within 5% of anticipated costs and budget.

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Name</th>
<th>Company</th>
<th>Phone #</th>
</tr>
</thead>
<tbody>
<tr>
<td>County Civil Engineer</td>
<td>Dave Bolen</td>
<td>County of Sacramento</td>
<td><a href="mailto:dbolen@saccounty.net">dbolen@saccounty.net</a></td>
</tr>
<tr>
<td>Mechanical Engineer</td>
<td>Eddie Gosse</td>
<td>Wood Rodgers</td>
<td><a href="mailto:egosse@woodrodgers.com">egosse@woodrodgers.com</a></td>
</tr>
</tbody>
</table>

Frisch Engineers on Project:
Thomas Frisch, Martin Yarbrough, Brian Woodin

**Contra Costa Water District, Contra Loma Electrical and April 2012 Controls Upgrade**

The project called for upgrades to the reservoir filling pumps, motor controls, and outlet works valves. An existing substation dead end structure and 21kv transformer was installed in the 1940s and also was subject to replacement. The design was for a complete replacement of the main switchgear, power distribution, and control system for the pump station. The power distribution system powered the new larger 300hp pump motor controls and refed the two reservoir control buildings and new valve operators for the dam outlet. The control panel controlled the new pumps and valve operators and connected to the existing Modicon Momentum processors and radio system. The design included new instrumentation to monitor the hydraulic gate valves and pump station flow.

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Name</th>
<th>Company</th>
<th>Phone #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civil Designer</td>
<td>Bill Rettberg</td>
<td>GEI Consulting</td>
<td><a href="mailto:wrettberg@geiconsultants.com">wrettberg@geiconsultants.com</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>510 835 9838</td>
</tr>
</tbody>
</table>
City of Roseville, Multiple Sewer Lift Stations Rehabilitation

October 2007

Nine of Roseville’s oldest lift stations were due for electrical upgrades to get them on the SCADA system and upgrade electrical controls. Frisch Engineering was prime consultant on this project and worked with the City of Roseville to prepare the technical and special provisions of the specifications.

Each lift station was to receive a new control panel and connect to utility power while remaining in service. We designed a transition plan for each station to define the general requirements and operational constraints.

The control panels were designed with a “standardized design” concept. A Tesco power pedestal is used to meter utility power and provide a feeder breaker to the pump panel. The pump panel contained the power distribution, generator connection, motor starters, PLC and radio. Two panels needed customized design due to fitment issues and three phase power availability.

Frisch Engineers on Project:
Thomas Frisch, Mike Frisch, Nik Conant

San Juan Water District, Flow Metering and SCADA upgrade

March 2010

The Water District sells water as wholesale and retail. The pipelines have turnouts to various adjacent cities and water districts. At those locations they needed to measure water accurately. The pipeline sizes ranged from 8” to 72”. Many of the largest flowmeters (40” and up) were located in the street. We recommended to the District to direct bury these flowmeters and they agreed to do so. So far, we have not had any issues with these installations.

At each of the 21 metering sites, we designed a new Allen Bradley micrologix 1400 RTU with Ethernet radio connectivity. In order to confirm our plan, we performed a radio survey and consequential radio design. The system has 5 repeater sites and 21 remotes connected to the system. The SCADA system is located at their water treatment plant and boasts 99+% communications and about a 2 second update time from each site.

The control panels were designed with a “standardized design” concept. We designed an outdoor pedestal and outdoor wall mount style panels. At each site we designed the installation of the RTU, connection to instrumentation, and new antenna.

Discipline Name Company Contact
Owner Project Engineer Tony Barela San Juan Water District tbarela@sjwd.org 916-791-6939
City of West Sacramento Multiple Sewage Lift Station  October 2007  SCADA

The project was to replace and existing Wonderware SCADA system that was a purely “monitoring only” type of system. The new SCADA system utilized an all new MDS Ethernet spread spectrum radio communication system and new remote PLC control panels. Each site was modified, tested, and brought into the SCADA system prior to it actually operating the lift station. Once all components were tested including the SCADA Screens, the pump motors were moved to the new control panels one-at-a-time until the station was completely switched over. The existing control panels were demolished.

All sewage lift stations were incorporated into the new system. We performed a radio survey to determine radio signal routes and showed antenna mast heights and antenna trajectories in the construction plans.

Frisch Engineering performed all Electrical and Instrumentation design work and performed specialty inspection work to complete the project. We performed hundreds of hours of work in inspection, project administration, submittal review, RFI response, testing and commissioning.

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Name</th>
<th>Company</th>
<th>Phone #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Manager</td>
<td>Mike Bessette</td>
<td>City of West Sac</td>
<td>916 617 4655</td>
</tr>
</tbody>
</table>

Frisch Engineers on Project:
Thomas Frisch, Mike Frisch, Martin Yarbrough, Brian Woodin, Nik Conant

**Section 6 – Contract and Insurance Requirements**

Frisch Engineering is willing to execute a contract based on the form shown in Exhibit C of the RFP and is able to meet the insurance requirements detailed in Exhibit C of the RFP.

**Section 7 -- Addenda**

Two addendums are acknowledged.

**Section 8 -- Quotation**

Please see following pages.
April 09, 2018

Mr. Cary Mutschler
El Dorado Irrigation District
2890 Mosquito Rd.
Placerville, CA 95667

Subject: Request for Proposal 18-04 – Wastewater Communications Upgrade Project Professional Services

Dear Mr. Mutschler,

Thank you for inviting Frisch Engineering to respond to this RFP and submit our proposal. Frisch Engineering has extensive experience in the planning, design and construction of many similar sized SCADA Communications projects. We are familiar to the needs and requirements of water and wastewater operators as it pertains to electrical and control systems.

We have done a number of similar projects where we have designed and implemented standardized RTUs into multiple sites. We designed the standardized RTUs with sub-models suited for various applications and implemented into the design of each site. We have done this for water, wastewater, tanks, boosters, wells, lift stations, and mini-treatment plants.

Our goal is to provide a system that meets your needs. In the process we will respond to your questions, identify and assist in selection of alternatives, and perform changes as needed.

Frisch Engineering is pleased to offer this proposal for your consideration. Please feel free to contact me at tfrisch@frischengineering.com or (916) 353-1025.

Sincerely,

[Signature]

Thomas P. Frisch, P.E.
Electrical Engineer
Section 1 – Scope of Work

The 23 listed sites in the RFP are sewer pump stations – many of which we are familiar with. Two reclaim sites were added by addendum. The Engineers and staff at Frisch Engineering have been working with EID for over 20 years and have designed a number of your lift stations and reclaim sites during that time.

We understand the need to maintain uniformity and standards across multiple stations. There is a certain beauty in creating a project that has the forethought to be compatible with all sites with only necessary modifications. If a standard design including components, details, multiple panel types, descriptions, notes, etc. can be applied uniformly, then the design and construction can be well understood and implemented quickly and accurately.

Our design will include the following design elements:

1. RTU design (as adopted from EID) and modified for indoor and outdoor installation location. At least two designs will be provided including wall mount indoor and pad mount outdoor.

2. P&IDs for each site detailing I/O to be connected with notations for modifications to equipment to make I/O points as needed. If instrumentation is to remain or be replaced, the P&ID will help delineate the work required.

3. Design panel installation style, location, conduit schedule, antenna mast and site I/O integration, cut over and downtime requirements, MCC wiring integration.

4. We will work with EID staff to determine the priority and allowable downtime of each of the stations and develop a specification for the contractor.

5. We will write a specification for the contractor to develop PLC programming using EID’s PLC template. Specification will define changes to be made per site.

6. We will write a specification for the contractor to develop SCADA programming using EID’s HMI template. Specification will define changes to be made per site.

7. We will create Panel testing specification that requires contractors to test panels in the factory and field and fill out quality control test forms for each control panel and site.

8. We will write a specification for electrical contractor to perform Arc Flash Risk Assessment using incident energy method for lift stations per latest NFPA70E.

9. Design for all equipment being replaced with industry best practices to meet PPE Category 2 or below on arc flash per the latest NFPA70E.

10. Develop implementation steps and quality control measures.

11. Provide an engineer’s cost estimate.

12. Clearly identify required generator signals/control conduit and wires for sites with generators.

13. At minimum design drawings for each site will include:
14. Provide communication overview diagram for each of the two collection basins.

15. General electrical materials and methods specifications.

16. Control panel component specifications.

17. Instrument Specifications

18. Construction cost estimates for each site.

Frisch Engineering shall meet and coordinate with District operations and maintenance staff during design to insure that District needs and requirements are being met. At minimum, we will visit each site with staff and gather information, and meet with staff at each design deliverable. We will take notes and furnish them as an itemized list of comments or requirements for each site.

Engineering services during construction will be provided to meet the project construction needs and as desired by EID. Frisch Engineering routinely performs construction management, on-site inspection, on-site testing, and project closeout. We are very familiar with Construction Services work and can work with the Construction Administrators or perform some of the on-site work ourselves. Not all of our available construction services have been requested in the RFP.

Additional Scope definition is provided in Section 8, Quotation.

Section 2 – Relevant Experience and Expertise

With more than a combined 130 years in the water/wastewater industry, Frisch Engineering has the technical knowledge and experience to serve your needs. Frisch Engineering is committed to providing the highest level of quality and performance to assure the project’s success from concept to completion.

Frisch Engineering has extensive experience in the planning, design and construction of many similar sized SCADA projects. We are familiar to the needs and requirements of water and wastewater operators as it pertains to electrical and control systems.

Our experience and primary business function is electrical and control system engineering consulting services. This includes Electrical and Controls Design, SCADA design and programming services - PLC programming, and communications. Frisch Engineering has completed hundreds of projects over the past 15 years.

We have performed many multi-site SCADA system designs where new RTUs were designed and installed into various and dis-similar sites. Additionally, we have done many electrical rehabilitation designs for large and small pump station sites.

Thomas Frisch, PE will be project manager and lead Electrical Design Engineer. Martin Yarbrough will perform electrical design, and Nik Conant will assist in autocad drafting tasks. Others such as Michael Frisch, PE. or Mike Rogers will be
brought in for QC or other tasks as needed. Each of these personnel has many
years of experience and has worked on many EID projects in the past.

Frisch Engineering is a full service engineering and programming firm able to
complete all tasks required under this RFP and in timely fashion.

Our clients include small municipal and water districts such as Harbor View, and
RD784, up to very large regional operators such as Regional San, and Sacramento
County. Please see section 5 for references.

Please also see Qualifications Section 6 for more information on relevant
experience and expertise.

Section 3 – Project Team

Thomas Frisch, PE will be project manager and lead Electrical Design Engineer.
Martin Yarbrough will perform electrical design, and Nik Conant will assist in
autocad drafting tasks. Others such as Michael Frisch, PE. or Mike Rogers will be
brought in for QC or other tasks as needed. Each of these personnel has many
years of experience and has worked on many EID projects in the past.

ATG Wireless (a professional radio communications company) will be performing
the radio survey. They have a crew that performs radio surveys routinely and are
very efficient at getting the results documented. They have a van specifically
outfitted for radio surveys with a built in telescoping mast. The test setup can be
deployed very quickly. This enables more sites to be done each day.

Frisch Engineering staff consists of 2 Electrical Engineers with PE registration, 3
Associate Engineers and 4 support staff. In terms of Electrical Consultants, we are
one of the largest in the Sacramento area and are looking to expand when
appropriate. Engineering team is as follows:

<table>
<thead>
<tr>
<th>Name</th>
<th>Experience</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thomas Frisch, PE</td>
<td>24 years</td>
<td>Design Engineer, plan review, oversight, project design interpretation, submittal review, RFI response</td>
</tr>
<tr>
<td>Michael Frisch, PE</td>
<td>21 years</td>
<td>Project Manager, Quality Control, PLC and SCADA programmer, Construction Engineer, inspection, start-up, design review, interpretation, RFI response, dispute resolution, design changes.</td>
</tr>
<tr>
<td>Martin Yarbrough</td>
<td>21 years</td>
<td>Associate Design Engineer, design review, submittal review, RFI response, design clarification.</td>
</tr>
<tr>
<td>Mike Rogers</td>
<td>24 years</td>
<td>PLC and SCADA Programmer, Associate Engineer, inspection, start-up, design review, submittal review, RFI response, design clarification.</td>
</tr>
<tr>
<td>Nik Conant</td>
<td>15 years</td>
<td>Technical Assistant, Drafting, Computer work, Radio Survey, Electrical Design.</td>
</tr>
<tr>
<td>Brian Woodin</td>
<td>11 years</td>
<td>Technical Assistant, Drafting, Control Panel Construction, Field Work, Radio Survey, Networking.</td>
</tr>
<tr>
<td>2 additional support staff</td>
<td></td>
<td>Office tasks, design related tasks, product research, radio surveys, computer and network testing and configuration.</td>
</tr>
</tbody>
</table>
Chuck Hoyt  
30 Years  
ATG Wireless Radio expert

Ron Fox  
10 Years  
ATG Wireless Radio expert, Radio Survey Manager

Support staff  
ATG Wireless Radio Survey

All Frisch Engineering staff assigned to this project are located in our office in Folsom, California. ATG wireless is based in Bakersfield. Please see resumes at end of proposal for description of their abilities, qualifications and experience.

**Section 4 – Quality Assurance and Control; Conflicts**

Frisch Engineering has multiple qualified staff that can perform quality control review from a dis-interested perspective. The plan for this project, as is similar for most others, is for peer review by qualified staff in our office.

Additionally, we plan on presenting the drawings to EID staff such that the ideas and concepts are explained during review. We will welcome EID staff comments and will correct the plans and specs to meet EID requirements.

Communication to EID staff during design will also be very important. We have recently performed projects for EID and have utilized frequent and directed communications to get questions answered and selections made. With a project with as many stations and details as this, we feel that open dialog will be important.

There are not any foreseeable actual or potential professional conflicts that could hinder the provision of the requested services.

**Section 5 – Client References**

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Name</th>
<th>Company</th>
<th>Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>County Civil Engineer</td>
<td>Dave Bolen</td>
<td>Sacramento County</td>
<td>916-874-8546</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><a href="mailto:dbolen@saccounty.net">dbolen@saccounty.net</a></td>
</tr>
<tr>
<td>Project Engineer</td>
<td>John Jacobs</td>
<td>City of Vacaville</td>
<td>707 469 6414</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><a href="mailto:jjacobs@cityofvacaville.com">jjacobs@cityofvacaville.com</a></td>
</tr>
<tr>
<td>Utility Superintendent</td>
<td>John Sparkes</td>
<td>Lake County Special Dist.</td>
<td>(707) 245-8135</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><a href="mailto:John.sparkes@lakecountyca.gov">John.sparkes@lakecountyca.gov</a></td>
</tr>
<tr>
<td>Operations Manager</td>
<td>John Fossa</td>
<td>Rivera West Water District</td>
<td>707-349-1181</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><a href="mailto:rivierawestwater@gmail.com">rivierawestwater@gmail.com</a></td>
</tr>
</tbody>
</table>
Section 6 – Contract and Insurance Requirements
Frisch Engineering is willing to execute a contract based on the form shown in Exhibit C of the RFP and is able to meet the insurance requirements detailed in Exhibit C of the RFP.

Section 7 -- Addenda
We can acknowledge receipt of two addendums.

Section 8 – Scope of work
Please also see attached quote further defining our scope of work.

TASK 1 – Meetings and Site Visits
Kickoff meeting, Design review meetings at 50%, 75%, 90% and 100%. Each meeting will discuss the design deliverables such that we can get as many comments as possible within the time allotted.

Conduct site visits to get photos and measurements of sites. The design engineer and drafters will be on site getting necessary information to document site measurements, electrical one-lines, conduit layouts, locations, and free space for new equipment.

During site visits we will review and record site conditions and constraints for each site. While on site we will create or confirm a P&ID sketch and determine the available PLC I/O that exists from existing controls, equipment, and instruments. We will compare that to the desired I/O list and during design will determine how to complete the remaining I/O. We will create a site plan and locate the new RTU panel and show where the I/O is coming from. This project is repetitive for all of the sites. One key to design will be how to consolidate similar problems into identical solutions. That will create an elegant solution that will maintain consistency to the extent possible.

TASK 2 – Progress Reports and Schedules
A monthly progress report will be provided with the monthly invoice to the EID project manager. In it, we will discuss the work completed for the month, the plan for next month, and any items that need the attention of EID.

A project schedule will be developed at the very beginning of the project and will be based on the requirements of the RFP. Each month, it will be updated as needed to meet scheduled progress and deliverables.

TASK 3 – Project Design and Design Documents
We will provide complete design documents, including plans and specifications suitable for public bidding and construction of the Work.

We will review and record site conditions and constraints for each site. While on site we will create or confirm a P&ID sketch and determine the available PLC I/O that exists. We will compare that to the desired I/O list and during design will determine how to complete the remaining I/O. We will create a site plan and locate the new RTU panel and show where the I/O is coming from. This project is repetitive for all of the sites. One key to design will be how to consolidate similar problems into identical solutions. That will create an elegant solution that will
maintain consistency to the extent possible. Previous designs have included outdoor pedestals with motor controls, sump termination panels for motors, ultrasonic level transmitters. We are very familiar with those requirements and those are included in this proposal. Our design and bid documents shall:

- Be designed to meet all applicable and current codes, laws, regulations, and professional standards.
- Comply with current District Design and Construction Standards, except as approved by the District.
- Be in conformance with the sixteen division format of the Construction Specification Institute and the District's Standard Specifications. Consultant shall cooperate with District in coordinating the plans and technical specifications with the District supplied standard Division 0 and Division 1 specifications. We will provide work descriptions for inclusion in District's standard specifications and will provide whatever Division 1 construction contract specifications are necessary for the Project and not supplied in District's standard specifications. District Technical Specifications will be used and supplemented as needed.
- Comply with the applicable standard of care when preparing Plans and Specifications to comply with applicable building codes, ordinances, statutes, laws, standards, governmental regulations, private restrictions, environmental and other authorities having jurisdiction over the Project, applicable to the Services. We will comply with any other requirements of authorities with jurisdiction over the Project or the Plans and Specifications.
- Clearly identify and describe all necessary quality levels and quality control procedures such as inspections, tests, submittals or other measures that the Contractor must satisfy, meet or perform.
- Include the requirements for the tests, controls, performances and certifications needed to verify the specified quality level of Work for that specification section. Arc Flash calculations will be specified.
- Include a dedicated subsection within each work-related specification section to identify and list required Contractor submittals along with testing and inspection requirements.
- Incorporate the District's comments at each design review phase.
- Cost estimates will take into consideration the current bidding environment.

**Task 3.1 – 50% Design Submittal**

This Task includes the preparation of a 50% design submittal which will identify all project components, schedule and cost including:

- 50% level drawings including P&IDs for each site.
- 50% design level of confidence cost estimate
- Design, bidding, permitting, agency approvals, construction schedule
- Prior to making the 50% design submittal, We will perform an in-house
QA/QC review of the documents

**Deliverables:**
1) Electronic file of 50% drawings in full and half sizes in PDF and AutoCAD format.

**Task 3.2 – 75% Design Submittal**
We will advance the design and design documents from the 50% design level to the 75% level of design including:

- Previous drawings and specifications from the 50% delivery with updates and refinements.
- 75% level technical specifications.
- Prior to making the 75% design submittal, We will perform a detailed in house QA/QC review of the documents.
- Design, bidding, permitting, agency approvals, construction schedule

**Deliverables:**
1) Electronic file of 75% technical drawings in full and half sizes in PDF and AutoCAD format.
2) Electronic file of draft technical specifications containing a list of submittals in WORD format
3) Updated schedule
4) Updated cost estimate commensurate with level of design

**Task 3.3 – 90% Design Submittal**
We will advance the design and design documents from the 75% design level to the 90% level of design including:

- Respond to all comments resulting from the District's 75% submittal review.
- Previous drawings and specifications from the 75% delivery with updates and refinements.
- Prior to making the draft 90% design submittal, We will perform a detailed in-house QA/QC team review of the documents including but not be limited to the following:
  - Verify adequacy of design.
  - Verify completeness and consistency of all details.
  - Verify adequacy and completeness of bid forms.
  - Verify all details compliant with District standard details.
  - Verify all permit conditions are incorporated in the construction documents.
  - The 90% submittal shall be, in the opinion of Frisch Engineering, biddable withstanding final review comments from EID.
Deliverables:
1) Electronic file of 90% technical drawings in full and half sizes in PDF and AutoCAD format. All drawing sheets shall be included in the set and each sheet submitted shall be essentially complete, with all details, numbering and notes included.
2) Contract Specifications: All contractual and technical specification sections shall be essentially complete and included in the submittal. Specifications shall include a list of submittals.
3) Plan sets, 24x36, qty 4.
4) Updated schedule
5) Updated cost estimate commensurate with level of design

Task 3.4 – Final 100% Design Submittal
We will advance the design and design documents from the draft to final 100% design level, incorporating all comments from the 90% submittal review. The 100% design submittal shall be a turnkey design suitable for public bidding.

Deliverable:
1) CD or e-mail containing contract documents in Word and PDF format, and contract drawings in PDF and AutoCAD appropriate for bidding website posting. The AutoCAD files shall include layout sheets using the AutoCAD Sheet Set Manager with an attributed title block tied to the Sheet Set. Provide all Sheet Set Files, Cross References and related files.
2) Plan sets, 24x36, qty 8.
4) Final cost estimate.
5) Final construction schedule.

Task 4 – Regulatory / Legal Descriptions
We will assist with project Regulatory issues including the following:

• The District will obtain the regulatory and environmental permits required for the work. It is anticipated that the 50% design drawings will be used to obtain the regulatory permits as needed. We will prepare supporting documents, including drawings and details, as needed for the approvals and respond to comments received

Deliverable:
1) Details as required.

Task 5 – Design Service During Construction
We will assist the District during bidding and construction of the Project including:

• Clarifications about the drawings and specifications
• Assistance in the preparation of addenda
• Making addenda changes to the drawings
• Participation in the pre-bid site visit – Assume 1 pre-bid site visit 6 hours.
• Assistance with the evaluation of bids

**Section 6 – Qualifications**

Four of our staff have more than 20 years experience and 2 have more than 10 years experience all working in this industry. Frisch Engineering has the technical knowledge and experience to serve your needs. Frisch Engineering is committed to providing the highest level of quality and performance to assure the project’s success from concept to completion.

We have two engineers on staff with Electrical PE licenses in California. Thomas Frisch, PE will be project manager and lead Electrical Design Engineer. Martin Yarbrough will perform electrical design, and Nik Conant will assist in autocad drafting tasks. Others such as Michael Frisch, PE. or Mike Rogers will be brought in for QC or other tasks as needed. Each of these personnel has many years of experience and has worked on many EID projects in the past.

We have been working with serial communications since the early 1990s and consider ourselves experts at it. Lately, the push has been to get away from serial communications, however, it still has its place in control systems and we can implement it correctly. Radios utilize nearly all of the pins in a communications cable including CTS, RTS, DTR, DSR, TX, RX, and GND. We know what they are all used for. We advise and service multiple clients still using serial radio systems in Folsom, Lincoln, Reclamation District 784, and others.

We have deployed and are ongoing in deployments of Wonderware in Galt, Three Valleys, Lake County, Spring Valley, and others. We have even done some Wonderware work in EID. We have Wonderware programmers on staff and are very familiar with System Platform.

Frisch Engineering started in 2001 with over half of our business doing inspection for large projects. Over the years, we have been lead Electrical and Controls inspectors on many projects that exceeded 40 million in construction value. Those projects typically require very regimented and organized quality control inspection programs during construction with proper documentation as a result.

Replacing PLC controls is a typical project for us. The first thing to wear out at facilities is the technology which requires new RTUs controls and instrumentation. We do this very thing on about 30% of our projects and have about 5 of them are currently active in design.

The schedule is tight but can be performed with the proper dedication to project. EID will be working with Frisch Engineering principal and senior staff. It is our business to get projects done on time and that is what we do. The easiest way for us to loose customers is to be late, that is why it is our #1 priority to get jobs done on time – what ever it takes.

Frisch Engineering is located within 30 minutes of all of the project sites and about 25 minutes from the EID HQ. If we are needed at any EID site either during design or construction, it will not be a problem for us to take the time required to get to the site and complete the needed work. We have been doing this exact thing for EID on many past projects.

**Example Projects:**
**County of Sacramento, Department of Water Resources, April 2015**  
**Kadema Storm Pump Station and Mayhew Storm Pump Station.**

The projects were mostly electrical in nature so we acted in prime engineer role. The two pump stations were built in the mid 1950s and had not been upgraded since that time. We designed complete replacements of the electrical controls and instrumentation systems.

Each project had multiple 100 through 300 hp pumps that operated on wetwell level. With storm projects, many redundancies are required since while they are not needed for months at a time, they need to be ready when called. We designed redundant monitoring systems for wetwell level, motor controls, power backup systems, and bar screens.

Each station required a new block building with motor controls and PLC control panel. We coordinated with Civil and Mechanical engineers to design buildings for specific electrical use. Outdoor utility metering panels with distribution and generator controls provided power to the buildings. The projects were competitively bid and came in within 5% of anticipated costs and budget.

**Discipline** | **Name** | **Company** | **Phone #**
--- | --- | --- | ---
County Civil Engineer | Dave Bolen | County of Sacramento | dbolen@saccounty.net
Mechanical Engineer | Eddie Gosse | Wood Rodgers | egosse@woodrodgers.com

Frisch Engineers on Project:  
Thomas Frisch, Martin Yarbrough, Brian Woodin

**Contra Costa Water District, Contra Loma Electrical and April 2012 Controls Upgrade**

The project called for upgrades to the reservoir filling pumps, motor controls, and outlet works valves. An existing substation dead end structure and 21kv transformer was installed in the 1940s and also was subject to replacement. The design was for a complete replacement of the main switchgear, power distribution, and control system for the pump station. The power distribution system powered the new larger 300hp pump motor controls and refed the two reservoir control buildings and new valve operators for the dam outlet. The control panel controlled the new pumps and valve operators and connected to the existing Modicon Momentum processors and radio system. The design included new instrumentation to monitor the hydraulic gate valves and pump station flow.

**Discipline** | **Name** | **Company** | **Phone #**
--- | --- | --- | ---
Civil Designer | Bill Rettberg | GEI Consulting | wrettberg@geiconsultants.com  
| | | 510 835 9838 |
City of Roseville, Multiple Sewer Lift Stations Rehabilitation

October 2007

Nine of Roseville’s oldest lift stations were due for electrical upgrades to get them on the SCADA system and upgrade electrical controls. Frisch Engineering was prime consultant on this project and worked with the City of Roseville to prepare the technical and special provisions of the specifications.

Each lift station was to receive a new control panel and connect to utility power while remaining in service. We designed a transition plan for each station to define the general requirements and operational constraints.

The control panels were designed with a “standardized design” concept. A Tesco power pedestal is used to meter utility power and provide a feeder breaker to the pump panel. The pump panel contained the power distribution, generator connection, motor starters, PLC and radio. Two panels needed customized design due to fitment issues and three phase power availability.

Discipline Name Company Contact
City Project Engineer Charles Aycock City of Roseville 916 746 1711 caycock@roseville.ca.us

Frisch Engineers on Project: Thomas Frisch, Mike Frisch, Nik Conant

San Juan Water District, Flow Metering and SCADA upgrade

March 2010

The Water District sells water as wholesale and retail. The pipelines have turnouts to various adjacent cities and water districts. At those locations they needed to measure water accurately. The pipeline sizes ranged from 8” to 72”. Many of the largest flowmeters (40” and up) were located in the street. We recommended to the District to direct bury these flowmeters and they agreed to do so. So far, we have not had any issues with these installations.

At each of the 21 metering sites, we designed a new Allen Bradley micrologix 1400 RTU with Ethernet radio connectivity. In order to confirm our plan, we performed a radio survey and consequential radio design. The system has 5 repeater sites and 21 remotes connected to the system. The SCADA system is located at their water treatment plant and boasts 99+% communications and about a 2 second update time from each site.

The control panels were designed with a “standardized design” concept. We designed an outdoor pedestal and outdoor wall mount style panels. At each site we designed the installation of the RTU, connection to instrumentation, and new antenna.

Discipline Name Company Contact
Owner Project Engineer Tony Barela San Juan Water District 916-791-6939 tbarela@sjwd.org
City of West Sacramento Multiple Sewage Lift Station  October 2007  
SCADA

The project was to replace and existing Wonderware SCADA system that was a purely “monitoring only” type of system. The new SCADA system utilized an all new MDS Ethernet spread spectrum radio communication system and new remote PLC control panels. Each site was modified, tested, and brought into the SCADA system prior to it actually operating the lift station. Once all components were tested including the SCADA Screens, the pump motors were moved to the new control panels one-at-a-time until the station was completely switched over. The existing control panels were demolished.

All sewage lift stations were incorporated into the new system. We performed a radio survey to determine radio signal routes and showed antenna mast heights and antenna trajectories in the construction plans.

Frisch Engineering performed all Electrical and Instrumentation design work and performed specialty inspection work to complete the project. We performed hundreds of hours of work in inspection, project administration, submittal review, RFI response, testing and commissioning.

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Name</th>
<th>Company</th>
<th>Phone #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Manager</td>
<td>Mike Bessette</td>
<td>City of West Sac</td>
<td>916 617 4655</td>
</tr>
</tbody>
</table>

Frisch Engineers on Project:
Thomas Frisch, Mike Frisch, Martin Yarbrough, Brian Woodin, Nik Conant

Section 6 – Contract and Insurance Requirements
Frisch Engineering is willing to execute a contract based on the form shown in Exhibit C of the RFP and is able to meet the insurance requirements detailed in Exhibit C of the RFP.

Section 7 -- Addenda
Two addendums are acknowledged.

Section 8 -- Quotation
Please see following pages.
Mr. Cary Mutschler  
El Dorado Irrigation District  
2890 Mosquito Rd.  
Placerville, CA 95667

Location: El Dorado Irrigation District, WW Communications Upgrade Project  
Subject: Quotation: Electrical Engineering Design and Construction Services

Mr. Mutschler,

Frisch Electrical Engineering Inc. is pleased to submit this proposal to perform the electric power and control system design and construction services for this project. The following detail is provided in defining our proposed scope of work.

**Design Services**

We will produce electrical drawings and specifications for 23 existing sites. I have classified the stations into four categories to aid in the scoping process. I understand that there will be some deviations per site and those will be accommodated in the design.

<table>
<thead>
<tr>
<th>Item</th>
<th>Site Name</th>
<th>Scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Arlette</td>
<td><strong>Outdoor MCP, CP, ULT</strong></td>
</tr>
<tr>
<td>2.</td>
<td>Bar J</td>
<td><strong>Indoor CP, ULT</strong></td>
</tr>
<tr>
<td>3.</td>
<td>Bass Lake Village</td>
<td><strong>Indoor CP</strong></td>
</tr>
<tr>
<td>4.</td>
<td>Browns Ravine 1</td>
<td><strong>Outdoor MCP, CP, ULT</strong></td>
</tr>
<tr>
<td>5.</td>
<td>Browns Ravine 2</td>
<td><strong>Outdoor MCP, CP, ULT</strong></td>
</tr>
<tr>
<td>6.</td>
<td>Buckeye</td>
<td><strong>Outdoor MCP, CP, ULT</strong></td>
</tr>
<tr>
<td>7.</td>
<td>Deer Park</td>
<td><strong>Indoor CP</strong></td>
</tr>
<tr>
<td>8.</td>
<td>Diamond Industrial</td>
<td><strong>Outdoor MCP, CP, ULT</strong></td>
</tr>
<tr>
<td>9.</td>
<td>Indian Creek</td>
<td><strong>Indoor CP, ULT</strong></td>
</tr>
<tr>
<td>10.</td>
<td>Marina Hills</td>
<td><strong>Indoor CP, Possible Outdoor CP</strong></td>
</tr>
<tr>
<td>11.</td>
<td>Motherlode</td>
<td><strong>Outdoor CP, ULT</strong></td>
</tr>
<tr>
<td>12.</td>
<td>North Uplands</td>
<td><strong>Indoor CP, ULT, Generator integration</strong></td>
</tr>
<tr>
<td>13.</td>
<td>Oakridge</td>
<td><strong>Outdoor MCP, CP, ULT</strong></td>
</tr>
<tr>
<td>14.</td>
<td>Starbuck</td>
<td><strong>Outdoor MCP, CP, ULT</strong></td>
</tr>
<tr>
<td>15.</td>
<td>Summit 2</td>
<td><strong>Indoor CP, ULT</strong></td>
</tr>
<tr>
<td>16.</td>
<td>Summit 5</td>
<td><strong>Indoor CP, ULT</strong></td>
</tr>
<tr>
<td>17.</td>
<td>Summit View 1</td>
<td><strong>Outdoor CP, ULT, Possible MCP</strong></td>
</tr>
<tr>
<td>18.</td>
<td>Thunderhead</td>
<td><strong>Indoor CP, ULT</strong></td>
</tr>
<tr>
<td>19.</td>
<td>Waterford 8</td>
<td><strong>Indoor CP</strong></td>
</tr>
<tr>
<td>20.</td>
<td>Waterford 9</td>
<td><strong>Indoor CP</strong></td>
</tr>
<tr>
<td>21.</td>
<td>St. Andrews</td>
<td><strong>Indoor CP, Expanded I/O, 5 VFDs</strong></td>
</tr>
<tr>
<td>22.</td>
<td>Old Bass Lake PS</td>
<td><strong>Indoor CP</strong></td>
</tr>
<tr>
<td>23.</td>
<td>New Bridlewood Tank</td>
<td><strong>Outdoor CP, ULT</strong></td>
</tr>
</tbody>
</table>

We have included time and travel for site investigations and meetings at design deliverable(s).

The following drawings and specifications will be included in the design.

1. Meetings and Site Visits
   A. Develop Electrical Safety plan prior to performing site visits.
   B. Site visits to observe and document current conditions
   C. Design Meetings at project deliverables

2. Design management
   A. Progress report to accompany the monthly invoice.
   B. Project schedule – updated at deliverables.
   C. Written response to comments
   D. Hard copy drawings and specs
   E. PDF deliverables of plans, specs, cost estimates.

3. Electrical and Instrumentation Design
   A. Electrical Design Drawings
      1. Electrical and instrumentation symbols and abbreviations.
      2. Process and instrumentation diagrams (P&IDs)
      3. Single line diagram of power distribution with load calculations for those sites getting new motor controls.
      4. Elevation layout drawing:
         a. Motor Control Pedestal
         b. Control Panel (indoor and outdoor)
      5. Control panel wiring diagrams
         a. Utilizing EID created design.
      6. Plan drawings:
         a. Building Control drawings
         b. Site plans for indoor and outdoor sites
      7. Detail drawings:
         a. Pad mounted electrical equipment.
         b. Instrumentation (flowmeters, pressure transmitters, etc.)
         c. Underground conduit
         d. Conduit transition through grade
         e. Pull box installation.
f. Pump motor connection.
g. Ground system installation.
h. Miscellaneous additional details

B. Electrical schedules:
   1. Conduit & wire
   2. Instrumentation

C. Electrical specifications:
   1. Assist in preparation of division 0 and 1 specifications
   2. General Electrical Materials
   3. Conduit, Boxes and Grounding
   4. Wire, Fuses and Terminal Blocks
   5. Pump Control Pedestal
   6. Communications System, (antenna, cable, radio, etc.)
   7. Factory and Field testing.
   8. Control Panel Components
   9. PLC an Operator Interface Applications Programming
      a. Adopt EID Standard Strategies
   10. SCADA System Programming Description
   11. Instrumentation
   12. Other electrical components.

D. Electrical and Instrumentation construction cost estimate at each design deliverable. Itemized by site.

E. Bid services and addenda.
   1. Attend prebid conference and site visit.
   2. Answer questions of bidders.
   3. Attend Preconstruction meeting

4. Radio Survey
   A. 60 Site Radio survey with two central locations Approximately 30 sites will be surveyed from each central location. Central locations will be located at the EDH WWTP and the Deer Creek WWTP.
   B. Central locations will be set up utilizing temporary antenna pole with EID furnished radio
   C. Remote locations will be surveyed utilizing telescoping antenna pole with EID furnished Radio.
   D. Survey results will be provided for each site (both ends) with data extracted from radio diagnostics.
**Construction Services**

We will perform the following services to the extent possible limited only by the budget of hours and costs. Please see spreadsheet for quoted budget quantities of the tasks as listed below. We have estimated the quantity of hours for each task based on the RFP. Occasionally, project circumstances require more attention than anticipated. If the project requires more effort than allocated, additional budget may be required.

5. **Design Services During Construction**
   A. Clarifications
   B. Addenda Preparation.
   C. Addenda Drawing Revisions.
   D. Prebid Site Visits and Meeting
   E. Evaluation of Bids.

**Optional Item**

6. **Theoretical Radio Propagation Survey**
   A. Utilize radio analysis software to determine theoretical path propagation and losses for the 60 remote sites and two radio central locations.
   B. Provide theoretical results to EID so that additional measures can be considered prior to the physical radio survey.
   C. Meet with EID to discuss results and develop a preliminary plan for alternative routes and/or repeater sites. This meeting will be used to develop the scope of work required to design repeaters, or modify routes.
Assumptions

• We have assumed one bid package, with multiple project sites for construction.
• Our standard insurance coverage limits for general liability and E&O liability at $2,000,000 per occurrence and $2,000,000 aggregate are sufficient.
• Drawings and specifications can be completed by using our standards and templates created in AutoCad and MS Word using CSI 16 division format.
• Reuse of Utility services at each site. Loads will remain similar to existing and utility services will not need upgrade.
• We are assuming that the Radios will communicate to the intended WWTP plants. Radio repeaters and towers above 30 feet are not included in this scope of work but can be added as determined needed.
• We have not included separate security systems (other than RTU intrusion monitoring) or video surveillance or automated access control systems.
• The project construction budget includes 10% minimum contingency such that changes can be designed and implemented as deemed necessary by the Engineer or Owner during construction. This quotation does not include cost for contract changes regardless of initiating source.
• This quotation does not include Arc-Flash analysis (unless specifically stated) as required by the NFPA 70 electrical code. That analysis and associated equipment labeling can be provided for an additional fee. In this project it will be specified to be performed by Contractor.
• Hourly rates include overhead costs such as telephone, photocopies, computer costs, copying, and insurance. The field hourly rates include travel costs (owned vehicle) for on-site work.
• Hourly rates do not include expenses such as rental equipment, airline tickets, rental vehicles, lodging, non-incidental photocopying and materials. Miscellaneous expenses will be billed at cost + 10%.

Deliverables

• Plans, specifications, and cost estimate, delivered PDF, at 50%, 75%, 90% and 100% design stages.
• Submittal reviews, RFI and change order responses, as-builts.

Terms

• This is a time and materials quotation with anticipated budget of hours and costs. We anticipate that we can perform the scope as described within our budget. If the Client’s needs or project circumstances cause us to exceed our anticipated budget, we will make every effort to inform the Client in advance of work for authorization.
• Client will be invoiced monthly based on project progress.
• Changes to project scope may result in increased or reduced costs.
Electrical Engineering Costs

See attached Quotation

Frisch Engineering is pleased to offer this quotation for your consideration. Please give me a call or email if you have any questions or require further information.

Sincerely,

Thomas P. Frisch, P.E.
Electrical Engineer
tfrisch@frischengineering.com
## PROFESSIONAL ENGINEERING SERVICES COST ESTIMATE

**JOB TITLE:** EID WW Communications Upgrade Project  
**CLIENT:** EID

### Design Services

<table>
<thead>
<tr>
<th>Task</th>
<th>Description</th>
<th>Field Engineer</th>
<th>Office Engineer</th>
<th>Technical Assistant</th>
<th>Total hours per task</th>
<th>cost per task</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Meetings and Site Visits</td>
<td>60</td>
<td>16</td>
<td>76</td>
<td>152</td>
<td>$22,180.00</td>
</tr>
<tr>
<td>2</td>
<td>Design Management</td>
<td>0</td>
<td>40</td>
<td>20</td>
<td>60</td>
<td>$8,900.00</td>
</tr>
<tr>
<td>3</td>
<td>50% design PS&amp;E</td>
<td>0</td>
<td>190</td>
<td>285</td>
<td>475</td>
<td>$64,125.00</td>
</tr>
<tr>
<td>3</td>
<td>75% design PS&amp;E</td>
<td>0</td>
<td>95</td>
<td>114</td>
<td>209</td>
<td>$28,785.00</td>
</tr>
<tr>
<td>3</td>
<td>90% design PS&amp;E</td>
<td>0</td>
<td>57</td>
<td>57</td>
<td>114</td>
<td>$15,960.00</td>
</tr>
<tr>
<td>3</td>
<td>100% design PS&amp;E</td>
<td>0</td>
<td>38</td>
<td>31</td>
<td>69</td>
<td>$9,835.00</td>
</tr>
<tr>
<td>3</td>
<td>Bid Services and Precon</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>24</td>
<td>$3,680.00</td>
</tr>
<tr>
<td>4</td>
<td>Radio Survey ATG</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>24</td>
<td>$3,680.00</td>
</tr>
</tbody>
</table>

Subtotal Hours: 68 444 591 1103  
Hourly rate per discipline: $180 $165 $115  
Total cost per discipline: $12,240 $73,260 $67,965 $168,026.40

### Design Services During Construction

<table>
<thead>
<tr>
<th>Task</th>
<th>Description</th>
<th>Field Engineer</th>
<th>Office Engineer</th>
<th>Technical Assistant</th>
<th>Total hours per task</th>
<th>cost per task</th>
</tr>
</thead>
<tbody>
<tr>
<td>5A</td>
<td>Clarifications</td>
<td>0</td>
<td>16</td>
<td>4</td>
<td>20</td>
<td>$3,100.00</td>
</tr>
<tr>
<td>5B</td>
<td>Addenda Preparation</td>
<td>0</td>
<td>16</td>
<td>0</td>
<td>16</td>
<td>$2,640.00</td>
</tr>
<tr>
<td>5C</td>
<td>Addenda Drawing Revisions</td>
<td>0</td>
<td>12</td>
<td>32</td>
<td>44</td>
<td>$5,660.00</td>
</tr>
<tr>
<td>5D</td>
<td>Prebid Site Visit Meeting</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>$720.00</td>
</tr>
<tr>
<td>5E</td>
<td>Evaluation of Bids</td>
<td>0</td>
<td>24</td>
<td>0</td>
<td>24</td>
<td>$3,960.00</td>
</tr>
</tbody>
</table>

Subtotal Hours: 4 68 36 108  
Hourly rate per discipline: $180 $165 $115  
Total cost per discipline: $720 $1,120 $4,140 $16,080.00

### Design Services (Optional Item)

<table>
<thead>
<tr>
<th>Task</th>
<th>Description</th>
<th>Field Engineer</th>
<th>Office Engineer</th>
<th>Technical Assistant</th>
<th>Total hours per task</th>
<th>cost per task</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Radio path analysis Frisch</td>
<td>4</td>
<td>8</td>
<td>6</td>
<td>18</td>
<td>$2,730.00</td>
</tr>
<tr>
<td>6</td>
<td>Radio path analysis ATG</td>
<td>4</td>
<td>8</td>
<td>6</td>
<td>18</td>
<td>$6,552.00</td>
</tr>
</tbody>
</table>

Subtotal Hours: 4 8 6 18  
Hourly rate per discipline: $180 $165 $115  
Total cost per discipline: $720 $1,320 $690 $9,282.00

### Total Costs

- **Total Costs (Base):** $184,106.40  
- **Total Costs (Optional):** $9,282.00

Individual tasks cost are approximate and some cost shifting between tasks may be necessary.
Thomas P. Frisch, P.E.

Experience Summary
Mr. Thomas Frisch has worked in the water/wastewater/power/landfill industry since 1991 and has developed skills in power, controls, instrumentation and communications. He has become very familiar with most practices and processes used in this industry. His experience is diverse since he has worked as a Contractor and Consultant in various capacities. As a Contractor, he brought contract drawings to completion by designing the final details, making submittals and managing production. As a Consultant, he has designed over 250 water and wastewater projects ranging from small pump stations to large scale treatment plants. Consequently he has a high degree of product knowledge that enables him to minimize design exposure to unproven materials or practices. He knows the challenges that Contractors face in taking plans to construction and knows when to assist on behalf on the Owner. His designs for electrical, instrumentation, and telemetry systems have been very successful with near-zero change orders due to design flaws. His designs include complex PLC motor controls for booster pump stations, lift stations and motor operated valves and SCADA telemetry between pump stations and tanks. He has performed electrical studies such as a damage assessment or to determine system capacity and cost comparisons to determine electrical operational costs of VFDs vs. throttled fixed speed motors.

Education
B.S. Electrical Engineering, University California Los Angeles, 1991

Registration
Professional Electrical Engineer Reg. CA E15761, AZ, NM, NV, OR, and WA

Work Experience
Electrical Engineer (23 years)
Mr. Frisch obtained his Professional Engineering License 1998, and shortly thereafter, began working as a consultant in Electrical Design. Thomas has designed over 250 projects ranging from small sewage lift stations to large (2000 HP total medium voltage) pump stations and treatment plants. During this time, Mr. Frisch has become proficient as a designer, obtained the respect of his peers, and now operates a successful Electrical Engineering design and construction services business.

Prior to consulting, Mr. Frisch worked for Tesco Controls as a Field Service Engineer (4 years), Sales Engineer (1 year), and Project Engineer (3 years). While working for Tesco, He became very familiar with design philosophies of HDR, Montgomery Watson, Brown and Caldwell, Black and Veatch, Carollo and others. He engineered and coordinated many projects including full treatment plants at El Dorado Hills, City of Davis, City of Corona, and City of Sanger. He became very familiar with many manufacturers of instrumentation, PLCs and SCADA systems. He developed and defined many of the standards still in use today at Tesco Controls concerning drafting, testing and manufacturing.
**Michael J. Frisch, P.E.**

<table>
<thead>
<tr>
<th><strong>Experience Summary</strong></th>
<th>Mr. Michael Frisch has worked in the water/wastewater industry since 1994 and is familiar with most processes used in this industry. His experience is well rounded as he has worked as a Consultant and a Contractor. This experience has provided Michael additional perspectives of a project or problem. As a Consultant he is capable of providing information and expertise to the Owner and to assist the Contractor with suggestions that can expedite the project without compromising contractual requirements. His experiences as a Contractor have provided knowledge in all areas in the water/wastewater industry. This experience has provided him the expertise to assist clients with product selection, application, implementation, and process control. He is diverse in PLC and SCADA automation that include motor and process control with instrumentation. His experience with telemetry application and testing has proven invaluable.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Education</strong></td>
<td>B.S. Electrical Engineering, University California Los Angeles, 1994</td>
</tr>
<tr>
<td><strong>Registration</strong></td>
<td>California State Professional Electrical Engineer Reg. E17155</td>
</tr>
<tr>
<td><strong>Work Experience</strong></td>
<td><strong>Electrical Engineer (20 years)</strong></td>
</tr>
<tr>
<td></td>
<td>Mr. Frisch obtained his Professional Engineering License in 2003, and began working as a consultant in Electrical Design and Construction Support in 1999. Michael has designed projects but his primary focus has been Construction Support. He has managed over one hundred projects ranging from small sewage lift stations and pump stations to water and wastewater treatment plants. During this time, Michael has become proficient as a Construction Manager, Designer and PLC programmer and has obtained the respect of his peers. He has experience with Allen Bradley, Modicon and GE products. His expertise has been invaluable to the Owner, project managing team and Contractor. He has a “hands-on” approach to implementing and completing a job which helps to assure the job is completed correctly and per plans and specifications. He now operates a successful Electrical Engineering design and construction services business. Mr. Frisch has extensive experience with electrical, instrumentation and power design, constructability reviews, project management, submittal reviews, RFI responses, clarifications, design modifications, change order management and review, field inspection, field startup, punchlist inspection and project closeout. His PLC, Operator Interface and SCADA programming has proved invaluable in the inspection and implementation process.</td>
</tr>
</tbody>
</table>
Martin Yarbrough

Experience Summary
Mr. Martin Yarbrough has worked in the water/wastewater industry since 1995 and offers an excellent combination of manufacturing, project management and electrical engineering experience. His past experience as a systems integrator provides a solid basis and broad understanding required to be a successful Electrical Consultant. He has a proven ability to diagnose customer requests, translate them to action and deliver with the highest customer satisfaction. Mr. Yarbrough is a hardworking employee with a strong work ethic who works efficiently in a professional environment by using keen organizational, time-management, and prioritizing skills to consistently meet deadlines. He maintains effective and thorough working relationships with customers in a positive, professional and timely manner.

Mr. Yarbrough is skilled at analyzing complex functions, procedures and problems to find creative, logical and effective solutions. He is experienced with numerous facets of engineering concepts, products, control processes, instrumentation, practices, and procedures within the industry. Mr. Yarbrough offers the meticulous, professional and thorough communications that ensure successfully managed projects and satisfied customers.

Education
Associate of Applied Science, Computer Aided Design, ITT Technical Institute, 1993

Project Experience

Waste

Water

Redding Clear Creek WWTP Dewatering Project
Redding Stillwater WWTP Electrical Design & Construction Services
Hawaii Water Service Pukalani WWTP Electrical Design & Construction Services
Clayton Regency, Wastewater Treatment Plant
City of Galt, WWTP Construction Services
City of Atwater, WWTP Electrical Design
Russian Gulch Sewer Lift Station Electrical Design & Construction Services

Storm

Water

City of Yountville, Flood Barrier Project Construction Services
Reclamation District 784 Pump Station 2 & 3 Electrical Design & C.S.

Water

City of Folsom, Water Treatment Plant Drinking Water Improvement Project
California Water Service, Dominguez 275 and 294 WTPs
El Dorado Irrigation District, Reservoir 12 Tank Conversion Project
Russian Gulch WTP Electrical Design and Construction Services
Vacaville WTP Generator Replacement Electrical Design & C.S.
Michael Rogers

Experience Summary

Mr. Michael Rogers has worked since 1990 on many diverse projects, most of them involving the design from initial concept all the way through installation, training and service. Many of these projects involved large and complex process equipment for the semiconductor industry. He has extensive experience in all aspects of equipment design, fabrication, assembly, programming, functional testing, installation, customer training and after sale service. He is proficient with many software packages including AutoCAD, Solid Works, and many PLC, OIT and SCADA packages.

Education

B.S. Geology & Physics, Dalhouse University, Halifax N.S., Canada 1983
Master of Science, Geophysics & Space Physics, University California, Los Angeles 1985

Work Experience

SCADA and PLC Programmer

Mr. Rogers has performed SCADA and PLC programming services on various projects, as noted under project experience, in the water and waste water industry over the last few years.

Prior to his experience in water and wastewater, Mr. Rogers was involved with numerous projects in the semiconductor industry. These projects involved designing, building, programming, installing and service. He worked on many projects with NEC electronics in Roseville, CA, IBM Corporation, and Dow Corning Corp.

Project Experience

SCADA

City of Lathrop, SCADA (Ignition) for wastewater, stormwater and recycled water
City of Yountville, Wastewater Lift Station, Micrologix PLC – AB and OIT – Maples
City of Sacramento, waste biogas expansion projects, PLC5-AB
Oakwood Lakes recycled water irrigation system, Modicon M340 and Magelis OIT
Oakwood Lakes Water Filtration system upgrade, Magelis OIT
Port Costa Wastewater treatment facility, Modicon momentum
Santa Rosa Suter Hospital Water Supply for new hospital, Micrologix PLC-AB, Cmore OIT and Ignition SCADA
Redding Stillwater WWTP, GE Quickpanel OIT
St. Helena WWTP, Modicon M340 and momentum, iFIX SCADA, Wonderware OIT
Port of Oakland Shore to ship power systems, Schweitzer PLCs
Nik Conant

Experience Summary
Mr. Nik Conant has worked in the water/wastewater industry since 2001 and is familiar with most processes used in this industry. His experience is diverse since he has worked for a small consulting firm and has had to perform many different tasks as required. His major focus work is CAD station operator. Many other proficiencies include information technology, and radio studies.

Education
High School Diploma, 2 years College.

Registration
None

Proficiencies
Autocad all versions, lisp routines, programming
Microstation
Word, Excel, Photoshop, Adobe, etc., computer hardware

Work Experience
CAD Station Operator (13 years)
Mr. Conant has performed drafting and drafting support for over 100 projects ranging from small sewage lift stations to large (2000 HP total medium voltage) pump stations and treatment plants. During this time, Mr. Contant has become proficient as a drafter/technician and obtained the respect of his peers.

Project Experience

Water
City of Galt, Industrial Park Reservoir and BPS, March 2002
Pebble Beach CSD, Forest Lake Treatment Plant, November 2003

Wells
City of Mountain View, Well 22, July 2003
City of Vacaville, Well 15, April 2003
PCWA Laird Road Pump Station, July 2003

Storm Water
Bureau of Reclamation RD784, Pump Station #2, April 2003

Dams
Contra Costa Water District, Contra Loma Reservoir Seismic Monitoring, April 2004

Waste Water
EID Highland Hills Sewage Lift Station, August 2002
Yuba City Lift Station 1, May 2003
Yuba City Harter Road Lift Station, March 2004
Sac County Excelsior Road SLS S131, May 2003
Brian Woodin

Experience Summary
Mr. Brian Woodin has worked for Frisch Engineering since 2007 and has been exposed to most tasks required in the engineering field. His experience is diverse since he has worked for a small consulting firm and has had to perform many different tasks as required. His major focus work is on programming, communications, radio networking, and CAD station operator.

Education
High School Diploma.

Registration
None

Proficiencies
Autocad all versions, lisp routines, programming, add-ons, etc.
SCADA programming, Wonderware, GE Proficy, Intellution, SCADAlarm, Win 911.
Operator interface programming
Word, Excel, Photoshop, Topo!, Adobe, etc.

Work Experience
Engineering Assistant (6 years)
Mr. Woodin has performed drafting and various other technical support services for over 30 projects ranging from small sewage lift stations to full waste water treatment plants. During this time, Mr. Woodin has become proficient as a drafter/technician and obtained the respect of his peers. Brian’s strengths are his diligence in finding the right answers and attention to detail. He is very conscientious about his work and has been a valuable engineering assistant to our firm.

Project Experience
SCADA
San Juan Water District SCADA System
SMUD Carson Power Plant
City of Galt WWTP Tertiary Improvements
Coastside County SCADA System

Water
Trinity Center WTP
Lewiston Pump System
Lucerne WTP

Wells
Rio Linda Water District Well 14 and Well 15

Waste
City of Atwater Wastewater Treatment Plant

Landfill
Altamont Landfill, Permeate Storage and Recycle system
Applied Technology Group, Inc. (ATG) is a full-service communications company specializing in the RF component of industrial SCADA systems. ATG is the authorized GE MDS Full Service Provider for all of California. We are also a Phoenix Contact Certified Wireless Distributor and we offer many other products too numerous to mention. We have partnered with many integrators and engineering firms over the last 30 years. Our primary focus is on the radio component of the system. As a consultant, ATG can assist your company in the design of the radio backbone. This may require site visits and interviews with the end user to achieve the desired goal. The most common functions that we perform with integrators/engineering firms are: RF equipment sales, basic system topology design, path studies, site surveys, bid specifications, training, and support.

Listed below are some of the functions that ATG can provide:

1. Attend preliminary design meetings with your company and the end user.
2. Perform preliminary site survey of existing infrastructure and system operation.
3. Recommend various solutions based on users requirements and constraints.
4. Perform RF site survey and provide report document, system layout, and map.
5. Perform RF propagation calculations.
6. Define required transceiver specifications.
7. Define antenna type, gain, elevation and environmental requirements.
8. Define all coax specifications, mounting structure requirements, lightning protection, and grounding requirements.
10. Assist end user with FCC licensing issues, if required
11. Provide system training.
12. Provide customer support.

Give us a call and let us assist you with all your SCADA radio needs.

Chuck Hoyt
Communications Specialist
Applied Technology Group, Inc.
4440 Easton Drive
Bakersfield, CA 93309
661-322-8650 x208
choyt@atginternet.com

Ron Fox
Systems Specialist
Applied Technology Group, Inc.
4440 Easton Drive
Bakersfield, CA 93309
661-322-8650 x242
rfox@atginternet.com

Gene Hanson
Systems Specialist
Applied Technology Group, Inc.
4440 Easton Drive
Bakersfield, CA 93309
661-322-8650 x242
ghanson@atginternet.com
CAPITAL IMPROVEMENT PLAN

Program: Wastewater

Project Number: PLANNED
Project Name: Wastewater Communication Upgrade
Project Category: Reliability & Service Level Improvements

Priority: 2
PM: Mutschler
Board Approval: 11/13/17

Project Description:
This project will first look at determining the communication feasibility at each wastewater pump station and then determine the priority of replacing the obsolete PLC/RTUs and add the required monitoring equipment (instrumentation) at the lift stations.

In 2013 and 2014 staff went through an extensive process to define a standardized PLC system setup for all lift stations. Two PLCs were installed in late 2013 and 2014 by staff to wring out the process for planning future installations. 2017-2018 will see a significant catch up effort to address deferred upgrades of existing out-of-date PLCs used extensively for process control in the collection systems. The existing PLCs are now about 30 years old and 10 years beyond their expected useful life. Additionally, these PLCs only provide 10-20% of the monitoring capabilities compared to current standard PLC’s (3 to 5 monitoring points versus 30) meaning these facilities have no ability to report pump failures or incrementally report on wet well levels before reaching the high water limit. Also, they can go up to 24 hours before alerting of a communications or control issue, while current standard PLCs will alert within 5 minutes (a 288% increase in time to detect issues proactively). Locating replacement parts and technical support for the old PLCs is nearly impossible.

This project also includes professional services funding to design the electrical and mechanical elements for installation and integration of the PLCs into the facilities and outside construction to install the new PLC systems.

Basis for Priority:
End of Life cycle replacement for PLCs / radios controlling wastewater collections. These units are 10 years beyond end of life (15 years in some cases) and require above normal maintenance attention. The District struggles with finding parts and keeping these units in service. The SCADA Group highly recommends immediate replacement to significantly reduce the risks of sanitary sewer overflows (SSO).

Project Financial Summary:

| Funded to Date: | $   | - | Expenditures through end of year: | $   |
| Spent to Date:  | $   | - | 2018 - 2022 Planned Expenditures: | $1,500,000 |
| Cash flow through end of year: | $   | - | Total Project Estimate: | $1,500,000 |
| Project Balance | $   | - | Additional Funding Required | $1,500,000 |

Description of Work

<table>
<thead>
<tr>
<th>Description of Work</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study/Planning</td>
<td>$250,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$250,000</td>
</tr>
<tr>
<td>Design</td>
<td>$250,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$250,000</td>
</tr>
<tr>
<td>Construction</td>
<td>$500,000</td>
<td>$500,000</td>
<td></td>
<td></td>
<td></td>
<td>$1,000,000</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$250,000</td>
<td>$250,000</td>
<td>$500,000</td>
<td>$500,000</td>
<td>$-</td>
<td>$1,500,000</td>
</tr>
</tbody>
</table>

Funding Sources

<table>
<thead>
<tr>
<th>Funding Sources</th>
<th>Percentage</th>
<th>2018</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wastewater Rates</td>
<td>100%</td>
<td></td>
<td>$250,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$0</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
<td>$250,000</td>
</tr>
</tbody>
</table>

Funding Comments:

H:\CIP\2018\Wastewater\PLANNED Wastewater Communication Upgrade.xlsx
Consideration to Award a Professional Services Contract to Frisch Engineering for the Wastewater Communications Upgrade Project

April 23, 2018

By: Cary Mutschler
Senior Civil Engineer
Previous Board Actions

• November 13, 2017 – The Board adopted the 2018-2022 CIP, which included this project subject to funding availability
Summary of Issues

• At twenty-one lift stations, the process logic controllers (PLC) are around 30 years old and 10 years beyond expected life

• Existing PLC’s have limited capabilities
  – Only 3 to 5 monitoring points
  – Reporting can take 24 hours

• All 60 lift station communications routed to the Bass Lake tanks site creating a single point of failure to lose all signals
Existing PLC Panel
New PLC Panel

PLC design will be standardized for the 21 lift stations
Challenges for Design

- Uniqueness of the lift stations
- Getting signals to the treatment plants due to the nature of geography
# Proposals

<table>
<thead>
<tr>
<th>Proposer</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frisch Engineering</td>
<td>$184,106</td>
</tr>
<tr>
<td>Control Point Engineering</td>
<td>$188,000</td>
</tr>
<tr>
<td>A TEEM Electrical</td>
<td>$217,050</td>
</tr>
</tbody>
</table>

Proposal Evaluation and Ranking
- Responsiveness to RFP
- Experience and expertise on similar projects
- Project team makeup and capabilities
- Rates and charges, affordability and reasonableness of cost for expertise required to meet project needs
- Client references
## Cost Breakdown

### WW Communication Upgrade Funding Requirements

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frisch Engineering – Design</td>
<td>$184,106</td>
</tr>
<tr>
<td>Frisch Engineering – Optional Radio Study</td>
<td>9,282</td>
</tr>
<tr>
<td>Capitalized Labor – Engineering, project management, bidding operational</td>
<td>105,000</td>
</tr>
<tr>
<td>staff support</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$298,388</strong></td>
</tr>
</tbody>
</table>
Board Decision/Options

• **Option 1:** Award contract to Frisch Engineering in the not-to-exceed amount of $193,388 and approve project funding of $298,388 for Project No. 18001.

• **Option 2:** Take other action as directed by the Board.

• **Option 3:** Take no action.
Staff and General Manager Recommendation

• Option 1
Questions?