

Pressure Reducing Valve SCADA Upgrades

South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150

Lynn Nolan, Project Manager
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150
lnolan@stpub.dst.ca.us
(530) 543-6215 office
(530) 541-4306 fax

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Pressure Reducing Valve SCADA Upgrades
South Tahoe Public Utility District
Executive Summary

February 17, 2017

South Tahoe Public Utility District
1275 Meadow Crest Dr.
South Lake Tahoe, CA 96150
El Dorado County

This project proposes the installation of metering and instrumentation at a remote pressure reducing valve station to improve system reliability by improving “real time” monitoring capabilities: The project consists of the following:

- Completion of project planning documents and permitting;
- Installation of a digital flow meter.
- Installation of digital suction and discharge pressure gauges.
- Installation of off-the-grid power supply and storage.
- Modification of existing vault structures, piping and valving to accommodate new instruments.
- Integration of data, status and alarm signals into the District’s existing SCADA system.
- Development of reporting tools for tracking system performance using the data gathered.

Total Project Cost: \$75,000 BofR grant \$75,000 STPUD Match

The length of time to complete this project is approximately 18 months with a project completion date of November 2018.

The project is not located on a Federal facility.

Background Data
South Tahoe Public Utility District
Pressure Reducing Valve SCADA Improvements

Background:

South Tahoe Public Utility District (STPUD) is a special district that supplies approximately 14,000 drinking water services and 17,000 sewer services to the City of South Lake Tahoe and portions of El Dorado County. All water supply sources are from 12 wells, with an average water supply of 9528 AFY (2015 STPUD Urban Water Management Plan). 260 miles of water main lines deliver drinking water to the commercial and residential services provided. The District does not have any industrial or agricultural water users in El Dorado County, although we do provide treated effluent for agricultural users in neighboring Alpine County.

STPUD operates within the delicate environment of Lake Tahoe and is subject to a high level of regulatory and environmental agencies and their mandates. In addition, STPUD must meet the California State Drinking Water and Sewer Treatment requirements, some of the most stringent in the country. As STPUD provides services in designated disadvantaged communities (U.S. Census Bureau), staff must also be more mindful of the financial impacts of all capital projects on the ratepayers it serves.

The District's Water Distribution System is divided into 31 pressure zones. Many of these zones are fed by remote PRV Stations; the system has a total of 19 remote PRV Stations. The remote PRV Stations are generally located in buried vaults either in or adjacent to a roadway. None of these stations have any power source, and so they do not currently have any instrumentation that can be monitored remotely. For the 15 zones that are fed by one or more remote PRVs (with no other facilities feeding the zone) the District is completely "blind." There is no flow meter to monitor water delivery into the zone for distribution. There are no pressure gauges to monitor damaging pressure transients (which are common in pressure-regulated zones) or to monitor breaks in the system for emergency response.

Without utility power, the options for instrumentation and data transmission from remote PRV Stations are limited. Further, transmission of data to District Headquarters is complicated by numerous factors: limited cellular network availability, severe weather, extreme topography and extensive tree cover. The District is currently evaluating options for powering instruments at and transmitting data from these remote sites.

The proposed project will improve system reliability by improving "real-time" monitoring capabilities at a single remote PRV Station. Project activities are expected to include the following:

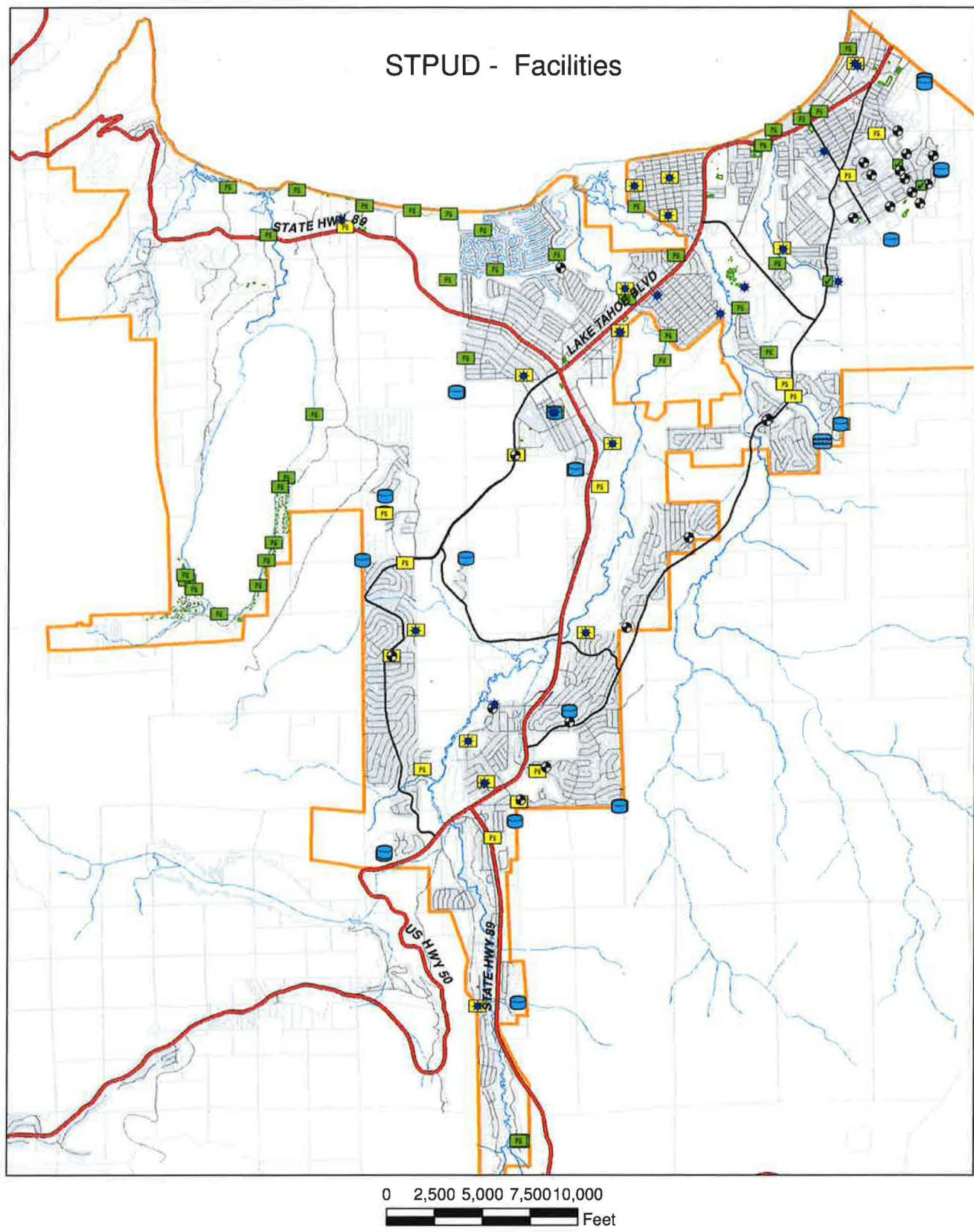
- Completion of project planning documents and permitting;
- Installation of a digital flow meter.

- Installation of digital suction and discharge pressure gauges.
- Installation of off-the-grid power supply and storage.
- Modification of existing vault structures, piping and valving to accommodate new instruments.
- Integration of data, status and alarm signals into the District's existing SCADA system.
- Development of reporting tools for tracking system performance using the data gathered.

Various power supply and storage options are being considered, and may include battery operated transmitters and in-line power generating units. The PRV Station selected for implementation of these improvements will be determined based on an evaluation of several criteria, including, but not limited to the following:

- site accessibility,
- condition of existing infrastructure,
- suitability of proposed improvements at location,
- individual service metering within the zone, and
- station criticality.

The map below shows the entire STPUD water system, as well as the location of each Pressure Reducing Valve in that system. Once a viable PRV station has been chosen for the communication modifications, the remaining PRV stations can be brought into the communication network by replicating the original PRV project.



0 2,500 5,000 7,500 10,000
Feet

Legend

- | | | |
|---------------------------|----|-------------------|
| • wProduction_Wells | PS | Booster Station |
| • PressureReducingValve | ■ | StorageBasin |
| ■ SimpleCheck | ■ | PumpStation |
| ■ EnclosedStorageFacility | □ | District Boundary |



Technical Project Description
South Tahoe Public Utility District
Pressure Reducing Valve SCADA Upgrades

The District's Water Distribution System is divided into 31 pressure zones. Many of these zones are fed by remote PRV Stations; the system has a total of 22 remote PRV Stations. The remote PRV Stations are generally located in buried vaults either in or adjacent to a roadway. None of these stations have any power source, and so they do not currently have any instrumentation that can be monitored remotely. For the 15 zones that are fed by one or more remote PRVs (with no other facilities feeding the zone) the District is completely "blind." There is no flow meter to monitor water delivery into the zone for distribution. There are no pressure gauges to monitor damaging pressure transients (which are common in pressure-regulated zones) or to monitor breaks in the system for emergency response.

Without utility power, the options for instrumentation and data transmission from remote PRV Stations are limited. Further, transmission of data to District Headquarters is complicated by numerous factors: limited cellular network availability, severe weather, extreme topography and extensive tree cover. The District is currently evaluating options for powering instruments at and transmitting data from these remote sites.

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- site accessibility,
- condition of existing infrastructure,
- suitability of proposed improvements at location,
- individual service metering within the zone, and
- station criticality

The following outline breaks this project into the major tasks and the deliverables:

Task 1. Project/Grant Administration

- 1.1 Provide all technical and administrative services as needed for Agreement completion; review all work performed; and coordinate budgeting and scheduling to assure that the Agreement is completed within budget, on schedule, and in accordance with approved procedures, applicable laws, and regulations.
- 1.2 Ensure that the Agreement requirements are met through completion of progress

reports submitted to the Contract Manager when timely and through regular communication with the Contract Manager. The progress reports shall describe activities undertaken and accomplishments of each task during the reporting period, milestones achieved, and any problems encountered in the performance of the work under this Agreement. The description of activities and accomplishments of each task during the reporting period shall be in sufficient detail to provide a basis for payment of invoices and shall be translated into percent of task work completed for the purpose of calculating invoice amounts.

- 1.3 At the completion of this project and prior to final payment, the Project Director shall fill out and provide a draft and a final report to the Contract Manager.

Deliverables: 1.1 Contract Agreement, 1.2 Progress Reports, 1.3, Draft and Final Report

Task 2: Project Planning/Design

2.1 In 2014, the District established the SCADA Steering Committee and SCADA Executive Committee to develop an integrated plan for standardizing and prioritizing upgrades to system instrumentation, remote control, and data collection capabilities across the District's service areas. The Committees have to date prepared (1) a technical memorandum identifying the District's priorities for SCADA system improvements, and (2) a catalogue of existing functionality available at each ancillary water and sewer station. The Committees continue their scheduled meetings to provide oversight of the planning and design of system upgrades.

2.2 Water System Monitoring and SCADA Communications Upgrades consulting services for engineering, design and programming services is currently under a Request for Proposal process with the expectation that complete plans and specifications for the upgrades will be submitted by September 29, 2017.

2.3 Pressure Reducing Valve station evaluation and planning documents consulting services will be an appendix to the communications upgrades consulting services; contracting advertising and contract award documents

Deliverables: 2.1 SCADA Committee Technical Memorandum; 2.1 SCADA Committee catalog of existing functionality; 2.2 100% Plans and Specification documents for SCADA Communication Systems upgrades; 2.3 Appendix to Communications Upgrades documentation for Pressure Reducing Valve station with 100% plans and specifications; 2.3 Contract award documents

Task 3. Environmental Documentation/Compliance

3.1 Environmental Documentation: The Project has been determined to be CEQA exempt

and an NOE is expected to be filed for this project. In addition, a NEPA environmental checklist to include a cultural and biological survey will be performed, although it is expected that this project will have very little to no soil excavation.

Deliverable: 3.1 CEQA notice of determination filed with El Dorado County and the California State Clearinghouse; NEPA environmental checklist to include cultural and biological survey reports.

Task 4: Project Implementation

After completion of project planning documents and permitting, project bidding and contract award, when the most appropriate Pressure Reducing Valve site has been established, the following activities will occur on site:

- 4.1 Installation of digital flow meter
- 4.2 Installation of digital suction and discharge pressure gauges
- 4.3 Installation of off-the-grid power supply and storage
- 4.4 Modification of existing vault structure, piping and valving to accommodate new instruments
- 4.5 Integration of data, status and alarm signals into the existing SCADA system
- 4.6 Development of reporting tools for tracking system performance utilizing the data gathered at the site.

Deliverable: 4.6 Annual reporting data from the SCADA/Automated Meter Installation water management reports (reports can be calculated for quarterly data if requested).

Task 5: Project Management/Monitoring

- 5.1 Inspection services will be performed by STPUD engineering staff, however, the communications consultant will also be contracted during the project implementation period to provide assistance when needed. The Consultant will provide the following services:
 - Attend the mandatory pre-bid meeting.
 - Provide as-needed support to the District to address questions and develop any necessary addenda during the bid period. The District intends to bid the project on the District's Planet Bids online bidding system.
 - Provide as-needed support to the District during construction to respond to Requests for Information and to address unanticipated conditions.

- Provide as-needed support to the District during construction to review contractor submittals.
- Compile As-Built project drawings at the completion of construction.

5.2 STPUD Engineering staff will provide project management services to include oversight of the construction contractor and the communications consultant; review of all bidding documents to ensure compliance with federal regulations; payroll evaluation and consistency with appropriate DOL requirements; processing of pay estimates, process final project certification, etc.

Deliverables: 5.1 Daily inspection reports; 5.2 pay estimates; 5.2 engineer final project certification

PROJECT TIMELINE

(*Deliverables)

TASK	SUB- TASK	TASK/DELIVERABLE	Start Date	End Date
1.0		PROJECT ADMINISTRATION		
	1.1	*Contract/Grant agreement	10/01/2017	2/28/2019
	1.2	*Progress Reports/Invoices	Ongoing	
	1.3	*Draft/Final Reports	12/01/2018	2/30/2019

2.0		PROJECT DESIGN		
	2.1	Develop an integrated plan for standardizing and prioritizing upgrades to system instrumentation, remote control, and data collection capabilities across the District's service areas. *Deliverables: Technical Memorandum and Catalog of Existing Functionality	7/1/2014	12/15/2016
	2.2	Water System Monitoring and SCADA Communications Upgrades planning and design. *Deliverable: 100% Plans and Specifications	1/1/2017	9/30/2017
	2.3	PRV Station site evaluation; planning and design of activity implementation; bid project; award project. *Deliverables: 100% plans and specifications and contract award documents	4/1/2017	12/31/2017
3.0		ENVIRONMENTAL COMPLIANCE		

	3.1	Complete and File CEQA; NEPA Compliance *Deliverables: CEQA NOE and environmental documents	9/1/2017	12/31/2017
4.0		PROJECT IMPLEMENTATION		
	4.1	Installation of new or testing/replacement of old flow meters	5/1/2018	6/30/2018
	4.2	Installation of power meters	5/1/2018	6/30/2018
	4.3	Installation of pressure gauges	5/1/2018	6/30/2018
	4.4	Replacement of radio transmitters	7/1/2018	8/30/2018
	4.5	Installation of Ethernet antennas	7/1/2018	8/30/2018
	4.6	VFD Installation	7/1/2018	8/30/2018
	4.7	SCADA Programming * Deliverable: Water use annual reports	9/1/2018	11/30/2018
5.0		PROJECT MANAGEMENT/Monitoring		
	5.1	Inspection Services *Deliverable: Daily inspection logs	5/1/2018	9/1/2018
	5.2	Project Management/STPUD Staff *Deliverables: Pay estimates and final project engineering certification	10/01/2017	12/31/2018

Evaluation Criteria
South Tahoe Public Utility District
Pressure Reducing Valve SCADA Improvements

Evaluation Criterion A—Planning Efforts Supporting the Project

Describe how your project is supported by an existing planning effort.

- *Does the proposed project implement a goal or address a need or problem identified in the existing planning effort?*

Yes, this project implements a solution to a problem identified by several different planning efforts. The first is the SCADA Steering Committee and the SCADA Executive Committee, established in 2014. The committees were tasked with developing an integrated plan for standardizing and prioritizing upgrades to system instrumentation, remote control and data collection capabilities across the District's service areas. The committees have to date prepared (1) a technical memorandum identifying the District's priorities for SCADA system improvements, and (2) a catalog of existing functionality available at each ancillary water and sewer station. In the Technical Memorandum, communication has been identified as a critical path item for implementing SCADA operational and data collection improvements. Second priority functions of the STPUD SCADA system, as identified by the Committee, are: (1) to provide remote control of equipment and (2) to collect data for system optimization, asset management and design (page 2 of the October 2014 technical memorandum).

In the same Memorandum, the committee identifies the following project:

"5. Pressure and Flow Measurement for Water System Subzones: The District operates 17 subzones within the water system that are blind to SCADA because they are fed solely by uninstrumented pressure reducing valves (PRVs). The committee recommends that the District add pressure and flow instruments (with related alarms and data acquisition) at these PRVs to improve reliability of water delivery, to inform the maintenance of the PRVs and to provide data for tracking water usage within these zones."

Due to the fact that many of the District's water facilities are not set up to meet either of the two goals as listed above, STPUD has a Request for Proposal currently advertised for a consulting firm to provide an evaluation and comprehensive approach to improving its SCADA communication infrastructure with regards to volume, reach and reliability. However, the PRV stations serving the water services are currently "blind" and would need communication access in order to add them to

the SCADA communications system. This project would help to bridge that gap in communication and allow STPUD to add the PRV stations as a part of the larger communications network.

Another planning document that addresses the need for better water data is the Water System Optimization Plan, completed by West Yost and Associates and Kennedy Jenks Consultants in July 2016. In the Executive Summary for this document, on page ES-22, PRV Replacements and Reliability Improvements are listed as a High Priority Project. (This document is available for review at www.stpud.us)

- *Explain how the proposed project has been determined as a priority in the existing planning effort as opposed to other potential projects/measures.*

The proposed project has been determined a priority in the existing planning effort not in opposition to other planning efforts, but as part of an overall system-wide upgrade in water delivery communications. STPUD is not completely metered on the customer side. Until zones are completely metered, the District cannot calculate water loss, and depends on industry estimates. Without water loss computations, the District cannot pinpoint problem areas to prioritize O&M and to better track distribution system losses. To this end, the District intends to complete installation of customer meters by 2020. To allow real-time access to customer consumption data, the District will install advanced metering infrastructure (AMI) in 2017. Once these elements are in place, the District will have a complete picture of the consumption side of the equation. With the proposed project, the District will be able to add to the water production data, making progress toward the production side of the equation. This project is an integral part of an overall water delivery system communications system.

Evaluation Criterion B—Project Benefits

- *Describe the expected benefits and outcomes of implementing the proposed project.*
- *What are the benefits to the applicant's water supply delivery system?*

The proposed project will improve the reliability of the water supply delivery system by providing “real-time” alarms to notify the District of excessive water hammer and pressure loss in the system, improving notification and response times.

If other benefits are expected explain those as well. Consider the following:

- *Extent to which the proposed project improves overall water supply reliability*

While the proposed project will improve the reliability of water service into only a single zone, it is the District's intent to evaluate and prioritize similar improvements at the remote PRV Stations serving the other 14 blind pressure zones in the system. The District has established Level of Service criteria for "number of services affected by an emergency outage" (<50), and "maximum allowable pressure on the system" (120 psi). When considering "station criticality" in selecting the PRV Station for implementation, the District will consider these criteria so that it is sure to select a high impact station.

Collecting zone pressure and flow data will allow the District to calibrate its water model, which is the primary tool used by the District to identify and prioritize capital projects to improve system reliability.

By allowing the District to track water production into system zones on a "real-time" basis, the District will be better able to identify and correct the sources of unaccounted water. The District is on track to have the water services within its service area to be fully metered by 2020. Because the system is not yet fully instrumented, the District currently estimates its system losses at 10% based on industry standard. In an effort to better track distribution system water losses, for the past six months, the District has been conducting a water loss pilot study in a small sub-zone of its system. District staff has been collecting, manually on a bi-weekly basis, flow meter reads at the water main feeding the zone, and at each of the individual services. This study of nearly 200 services identified approximately 100,000 gallons in lost water each week. This is significantly higher than the industry standard water loss factor of 10%. District Staff was mobilized to the area to search out potential leaks on the system. Two leaks were identified and repaired, and the lost water was cut in half. Automating the collection of distribution data at remote PRV Stations will allow the District to expand the water loss study.

- *The expected scope of positive impact from the proposed project (e.g., local, sub-basin, basin)*

The proposed project will have a positive impact on a single zone within the District's system, but will provide a planning and implementation template for future projects that can be implemented within an additional 15 of the District's blind pressure zones. The final costs and operational capacity of this project will allow STPUD to budget capital funding and staff resources more efficiently for implementation of the additional 15 PRV stations.

- *Extent to which the proposed project will increase collaboration and information sharing among water managers in the region*

Although this project is a stand-alone project, STPUD is already engaged in collaboration and information sharing among water managers in the region and acts as the lead agency for two vital workgroups: Tahoe Valley South

Groundwater Sustainability Partnership (STPUD is the Groundwater Sustainability Agency as identified by the California Department of Water Resources); and the Tahoe Sierra Integrated Regional Water Management Planning partnership. Through these two partnerships, STPUD engages with other water agencies, regulatory agencies, non-profit agencies, community stakeholders, and tribal representatives within the region. Regional water planning and implementation projects are evaluated by these groups and rated and ranked based on criteria developed by the stakeholders. Information, resources, funding awards and opportunities are shared within both partnerships. As described above, this project is part of a water delivery system communication update program to provide more accurate water delivery loss data that can be brought to the stakeholders when evaluating projects for implementation within the region.

- *Any anticipated positive impacts/benefits to local sectors and economies (e.g., agriculture, environment, recreation, tourism)*

All water delivery system increases in efficiency result in a water and energy savings for the water consumer. This project is a part of a system-wide water delivery system communication upgrade that is expected to result in increased efficiency, less water use and less energy use. All local sectors and economies would benefit.

Evaluation Criterion C—Project Implementation

- *Describe the implementation plan for the proposed project. Please include an estimated project schedule that shows the stages and duration of the proposed work, including major tasks, milestones, and dates.*

PROJECT TIMELINE

(*Deliverables)

TASK	SUB- TASK	TASK/DELIVERABLE	Start Date	End Date
1.0		PROJECT ADMINISTRATION		
	1.1	*Contract/Grant agreement	10/01/2017	2/28/2019
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3.0		ENVIRONMENTAL COMPLIANCE		
	3.1	Complete and File CEQA; NEPA Compliance *Deliverables: CEQA NOE and environmental documents	9/1/2017	12/31/2017
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	4.3	Installation of pressure gauges	5/1/2018	6/30/2018
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	4.7	SCADA Programming * Deliverable: Water use annual reports	9/1/2018	11/30/2018
5.0		PROJECT MANAGEMENT/Monitoring		
	5.1	Inspection Services *Deliverable: Daily inspection logs	5/1/2018	9/1/2018
	5.2	Project Management/STPUD Staff *Deliverables: Pay estimates and final project engineering certification	10/01/2017	12/31/2018

- *Describe any permits that will be required, along with the process for obtaining such permits.*

Because the proposed project will not affect the capacity of the District system, the District will seek a Categorical Exemption / Categorical Exclusion for this project. The application will be submitted 30 days prior to mobilization.

Because the proposed project involves only minimal ground disturbance under existing pavement or compacted road shoulder, it will be performed as an Exempt Activity under the District's Memorandum of Understanding with the Tahoe Regional Planning Agency (TRPA). TRPA will be notified of the exempt activity in writing in advance of mobilization.

- *Identify and describe any engineering or design work performed specifically in support of the proposed project.*

STPUD currently has a Request for Proposal advertised for consultant planning and design work on a system-wide communications improvement project. (RFP is available on the District's website: www.stpud.us) Once this consultant has been hired, (estimated April 2017) additional planning and design work specific to the Pressure Reducing Valve Station designated as the most optimal station for implementation of this project will be conducted as an addenda to the overall communications plan.

- *Describe any new policies or administrative actions required to implement the project.*

There are no new policies or administrative actions required to implement this project. However, STPUD Board of Directors have approved not only the opportunity to apply for funding for the project, but the implementation of the project as well.

1 **RESOLUTION NO. 3048-17**

2 **A RESOLUTION BY THE BOARD OF DIRECTORS**
3 **OF THE SOUTH TAHOE PUBLIC UTILITY DISTRICT**
4 **BUREAU OF RECLAMATION WaterSMART:**
5 **SMALL-SCALE WATER EFFICIENCY GRANT 2017**

6
7 **BE IT RESOLVED** by the South Tahoe Public Utility District (STPUD) Board of
8 Directors that the General Manager, Assistant General Manager and/or the Chief
9 Financial Officer is hereby authorized and directed to sign and file, for and on behalf of
10 the STPUD, a Financial Assistance Application for a financing agreement from the
11 Bureau of Reclamation for the planning, design, and construction of the following
12 project: Pressure Reducing Valve Program; and

13
14 **BE IT FURTHER RESOLVED** that the STPUD hereby agrees and further does
15 authorize the aforementioned representative or his/her designee to certify that the
16 Agency has and will comply with all applicable state and federal statutory and regulatory
17 requirements related to any financing or financial assistance received from the Bureau
18 of Reclamation; and

19
20 **BE IT FURTHER RESOLVED** that the STPUD Board of Directors supports the
21 submission of an application under the Bureau of Reclamation WaterSMART Grant
22 Program and certifies that STPUD is capable of providing the amount of funding and
in-kind contributions specified in the funding application; and

23
24 **BE IT FURTHER RESOLVED** that STPUD will work with Reclamation to meet
established deadlines for entering into a grant or cooperative agreement;

25
26 **WE, THE UNDERSIGNED**, do hereby certify that the above and foregoing
Resolution No. 3048-17 was duly and regularly adopted and passed by the Board of
27 Directors of the South Tahoe Public Utility District at a regular meeting held on the 19th
28 day of January, 2017, by the following vote:

29

30

1 AYES: VOGELGESANG, SHEEHAN, WALLACE

2 NOES: NONE

3 ABSENT: CEFALU, JONES

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ATTEST:

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Melonie Guttry
Melonie Guttry, Clerk of the Board
South Tahoe Public Utility District

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Resolution No. 3048-17

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January 19, 2017

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Randy Vogelgesang, Board President
South Tahoe Public Utility District