March 4, 2020

City of Banning

Pressure Zone Separation & Water Loss Reduction Project

PREPARED FOR:
Bureau of Reclamation
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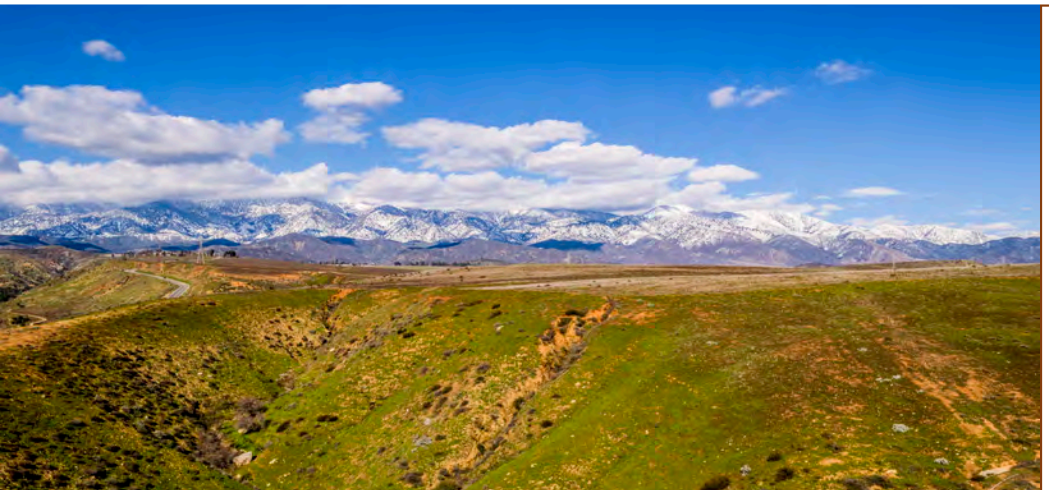


TECHNICAL PROPOSAL

Section 1. Executive Summary

Date	**March 4, 2020**
Applicant Name	**City of Banning**
City, County, State	**Banning, Riverside County, California**
Project Name	**Pressure Zone Separation & Water Loss Reduction Project**
Project Length	**24 months**
Estimated Completion Date	**October 1, 2022**

Project Summary. The City of Banning (population 31,253) requests $75,000 in federal funding assistance from the Bureau of Reclamation (BOR) WaterSMART Small-Scale Water Efficiency Projects (Fiscal Year 2020 Funding Opportunity Announcement No. NO-DO-20-F006) for a Pressure Zone Separation & Water Loss Reduction Project. **Proposed Work.** If awarded, the City will utilize funds to equip Well C6 with a variable speed drive (VSD) unit that includes pressure sensors and water level monitoring controls via an upgraded telemetry system to more accurately control and monitor water use and fluctuations. Additionally, the project will rehabilitate previously installed pressure regulating valves (PRVs) to make them operational and split the City's Main Pressure Zone into an "Upper Main Zone" and "Lower Main Zone" to mitigate high pressures and reduce background water losses occurring in the lower zone. The proposed project has been identified by annual water loss audits conducted by the City as the most cost-effective measure to decrease water losses and reduce high pressures occurring within the City's water infrastructure. Audit findings confirmed that reducing water pressure in the City's Main Pressure Zone can reduce water losses by 47%, saving an estimated 107 AFY in the Lower Main Zone area. **FOA Goals.** The project accomplishes the goals of the FOA by conserving and improving management of vital water resources.

Project Timeline. The City estimates the project will take approximately 24 months to complete and foresees no obstacles in successfully completing the project on time and within budget.

The project is not located on a Federal Facility.

Section 2. Background Data

Source of Water Supply. Banning's primary potable water supply is extracted from groundwater wells at the Banning Bench Storage Unit, Banning Bench Storage Unit, Cabazon Storage Unit, Beaumont Basin, and Banning Canyon Storage unit. These basins are recharged from the State Water Project (SWP). The average annual water supply between 2012 and 2014 was 8,595 AFY, which equates to an average day demand (ADD) of 7.7 million gallons per day (MGD). The average maximum month demand (MMD) for this same time period was 10.1 MGD, while the maximum day demand (MDD) was calculated to be approximately 13.3 MGD.

The City purchases imported water from the San Gorgonio Pass Water Agency (SGPWA) to recharge the Beaumont Basin. The City recharged approximately 694 AF in 2015. SGPWA receives water from the State Water Project (SWP), a Reclamation Facility, via the California Aqueduct East Branch Extension pipeline to the Beaumont Basin. Although the City purchases imported water, the imported water supply connection is only used for recharge.

Water Rights Involved. The Beaumont Basin is an adjudicated basin which regulates pumping rights among various agencies, including the City of Banning, and provides for the use of available storage capacity. The water allocation from the Beaumont Basin is the responsibility of Beaumont Basin Watermaster, a five-member committee consisting of representatives from the City of Banning, the City of Beaumont, the Beaumont-Cherry Valley Water District, the Yucaipa Valley Water District, and South Mesa Water Company. The use of groundwater and available storage space in the Beaumont Basin is subject to the terms of a court adjudication referred to as the Beaumont Basin Judgment that gives Banning the right to store up to 80,000 AF of water in the Beaumont Basin for later use.

Groundwater rights in the Banning, Banning Bench, Banning Canyon, and Cabazon Basins have not been adjudicated and no groundwater management plan has been adopted by any agency with proper authority. Thus, these four basins are currently unregulated. Over half of the City's supply (62%) is from two sources, the Banning Water Canyon (38%) and the Beaumont Basin (24%). The Banning Basin and Banning Bench supply approximately 15 percent each. The Cabazon Basin is located east of the City's service area boundary and serves approximately eight percent of the City's supply.[1]

Current Water Uses. The City of Banning categorizes its water users into seven classifications shown in Figure 1. Between 2012-2015, single-family residential demands accounted for the majority (58%) of the City's demand. Commercial and irrigation were the two next largest consumers, representing 29% and 7%, respectively. Apartments/multi-family residential demands, wholesale, public facilities, and industrial demands represent 1 percent, 3 percent, 1 percent, and 1 percent, respectively.

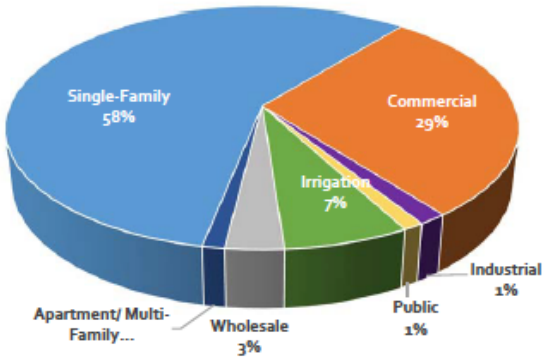


Fig. 1: Water Classifications – Percentage of Use

Number of Water Users Served.
The City operates a single public water system that serves a population of 31,253. The demographic breakdown of the City of Banning is as follows: White (67.9%), Hispanic (46.6%), Black (8.7%), Asian (5.1%), and American Indian and Native Alaskan (2.3%).[2] The City's median household income is $41,038 with 23.2% of the

[1] City of Banning: 2018 Integrated Master Plan, Table 3.2 Historical Annual Supply.
[2] US Census, 2018 (https://www.census.gov/quickfacts/banningcitycalifornia)

population living below the poverty level.[3] The Department of Water Resources Disadvantaged Communities Mapping Tool, used to determine low-income and a disadvantaged communities status for multiple grants, deems the City as disadvantaged with a median household income of $40,627 (Reference Fig. 2). The population of the Morongo Band of Mission Indians is 954.[4] Since Banning shares water reserves, increased reliability for Banning's water supply also means increased reliability for the tribe.

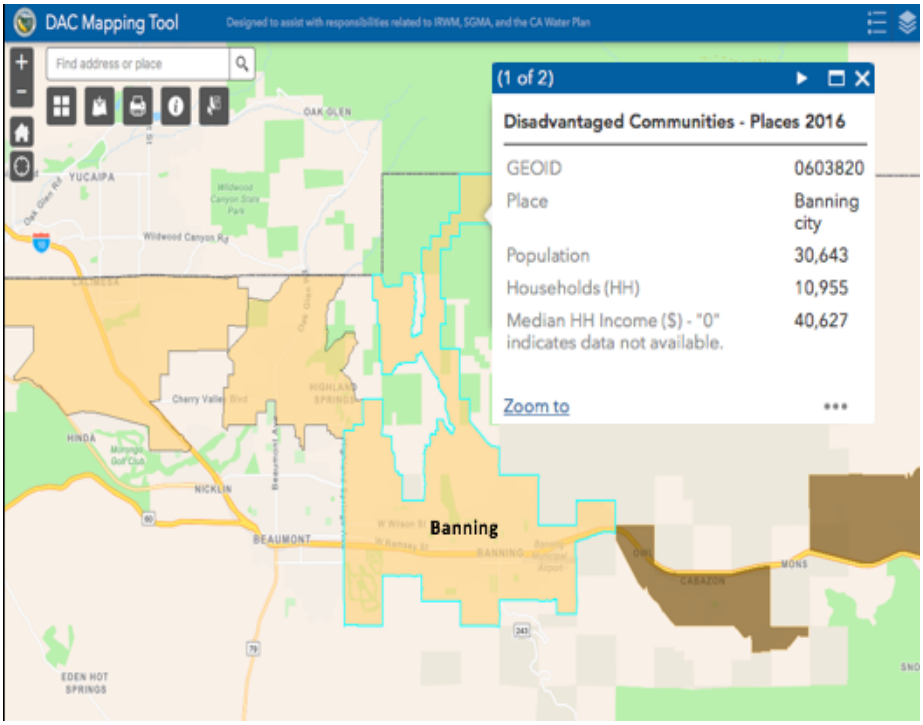


Fig. 2 Light tan areas represent disadvantaged communities (DACs). The entire City limits of Banning are identified DACs.

Current and Projected Water Demand. Based on development currently proposed within the City's water service area, the population is estimated to grow between 37,000 and 60,000 people added to the City's service area by 2040 (See Table 1). The City has plans for six master planned communities, six residential developments, and three commercial/industrial developments. These developments are identified as either near-term (anticipated completion by year 2025) or long-term (anticipated completion by year 2040). The City's priority is improving water management efficiency and preventing water losses to ensure reliability for current users. However, a more efficient water delivery system will also help Banning prepare for potential growth and future water needs.

TABLE 1
POPULATION CURRENT AND PROJECTED

	2020	2025	2030	2035	2040
Population within the City's Water Service Area (without proposed specific plan developments)	31,913	33,335	34,757	36,179	37,700
Population within the City's Water Service Area (with proposed specific plan developments)	34,955	41,300	50,934	56,347	60,988

[3] US Census, 2018 (https://www.census.gov/quickfacts/banningcitycalifornia)
[4] www.ballotpedia.org; Morongo Band of Mission Indians

Future demands were estimated and grouped into three categories: 1) existing customers, 2) known developments, and 3) infill development. The forecasted water demands are summarized in Table 2, demonstrating that the City's future water demands are expected to increase from 8,552 AFY to 11,319 by the year 2025, and to 13,628 AFY by the year 2040. The majority of this water demand increase is attributed to new planned housing developments.

TABLE 2
WATER DEMAND PROJECTIONS

Year	City Population Projections**	Demand*** (AFY
Existing*	30,316	8,552
2020	34,955	10,514
2025	41,300	11,319
2030	50,934	12,046
2035	56,347	12,836
2040	60,988	13,628

Notes:
*Existing is representative as the average years 2012 through 2014.
**City population includes master planned development communities
***Existing and projected demand includes 13% water loss.

Potential Shortfalls in Supply. The City indirectly receives its imported water from the SWP, which is dependent on dwindling snowpack and subject to the dire conditions of California drought. As allocations decline each year, it is imperative that Banning reduces water losses and sustains groundwater supplies.

Water Delivery System. The City's potable water is primarily supplied from groundwater wells. The City overlies the Coachella Valley Groundwater Basin, which is underlain by several large sub-basins. The City overlies the San Gorgonio Pass (SGP) sub-basin, which is divided into water storage units. As previously mentioned, the City extracts groundwater from Banning Bench Storage Unit, Cabazon Storage Unit, Beaumont Basin, and Banning Canyon Storage unit. The water delivery system, which was built between 1913 and present, consists of 165 miles of pipeline, 19 groundwater wells, eight storage reservoirs, two booster pumping stations, five pressure reducing valve stations, and six pressure zones.

Past Working Relationship with the Reclamation. The City of Banning purchases imported water from the San Gorgonio Pass Water Agency (SGPWA) to recharge to the Beaumont Basin. SGPWA receives deliveries from the State Water Project (SWP), a U.S. Department of the Interior Bureau of Reclamation facility, through the East Branch of the California Aqueduct. Additionally, Banning was awarded a $300,000 grant from the BOR WaterSMART Water and Energy Efficiency Grant for an AMI Metering project, which is currently underway. The AMI Metering project will mitigate water losses and complement the proposed project.

Section 3. Project Location

Location (including map)

The City of Banning is located in northern Riverside County in Southern California, approximately 25 miles east of downtown Riverside and 85 miles east of downtown Los Angeles. The City encompasses 23.2 square miles astride Interstate 10 in the San Gorgonio Pass and is bounded by the City of Beaumont to the west, the Morongo Band of Mission Indians to the east, the San Bernardino Mountains to the north, and the San Jacinto Mountains to the south.

As of 2018, the total existing population within the City's boundaries was estimated at 31,253 people. The City, through its Public Works Department and Water Division, provides municipal water to its service area, which includes the area within the City's boundary as well as some unincorporated areas of Riverside County. The City of Banning's Water Service Area comprises approximately 16,908 acres.

The proposed VSD unit will be installed at Well C6, which is located at Latitude: 33°55'16"N; and Longitude: 116°52'33"W.

Fig. 3: Location Map

Section 4. Technical Project Description and Milestones

Project Need. The City currently operates its Main Pressure Zone with water pressure as high as 225 psi at its peak. In comparison, the current City-wide average is 109 psi as shown in the 2018 AWWA Audit. After dividing the Main Pressure Zone, the new Main Lower Zone will have a dramatic pressure reduction to 79.5 psi. The Main Pressure Zone encompasses 70% of the City's system (See Attachment A – Existing Pressure Zones) and is currently operating the two largest pressure zones as a single pressure zone. Banning's overall service area ranges in ground elevation from approximately 2,106 feet above sea level (ft-msl) to 2,796 ft-msl. Water produced at well sites in one zone must be moved through the City's distribution infrastructure to supply demands in the other zone. Gravity flows from the San Gorgonio tanks create high pressure in the Main Pressure Zone. Currently, Well C6 must pump water up to high elevation levels to reach the hydraulic grade line (HGL) of reservoirs on the hills (See Fig. 4). The City's 2018 AWWA Water Audit, along will the calculations by City engineers, estimate 229 AFY (24%) of real losses in the area will be eliminated after the proposed rezoning.

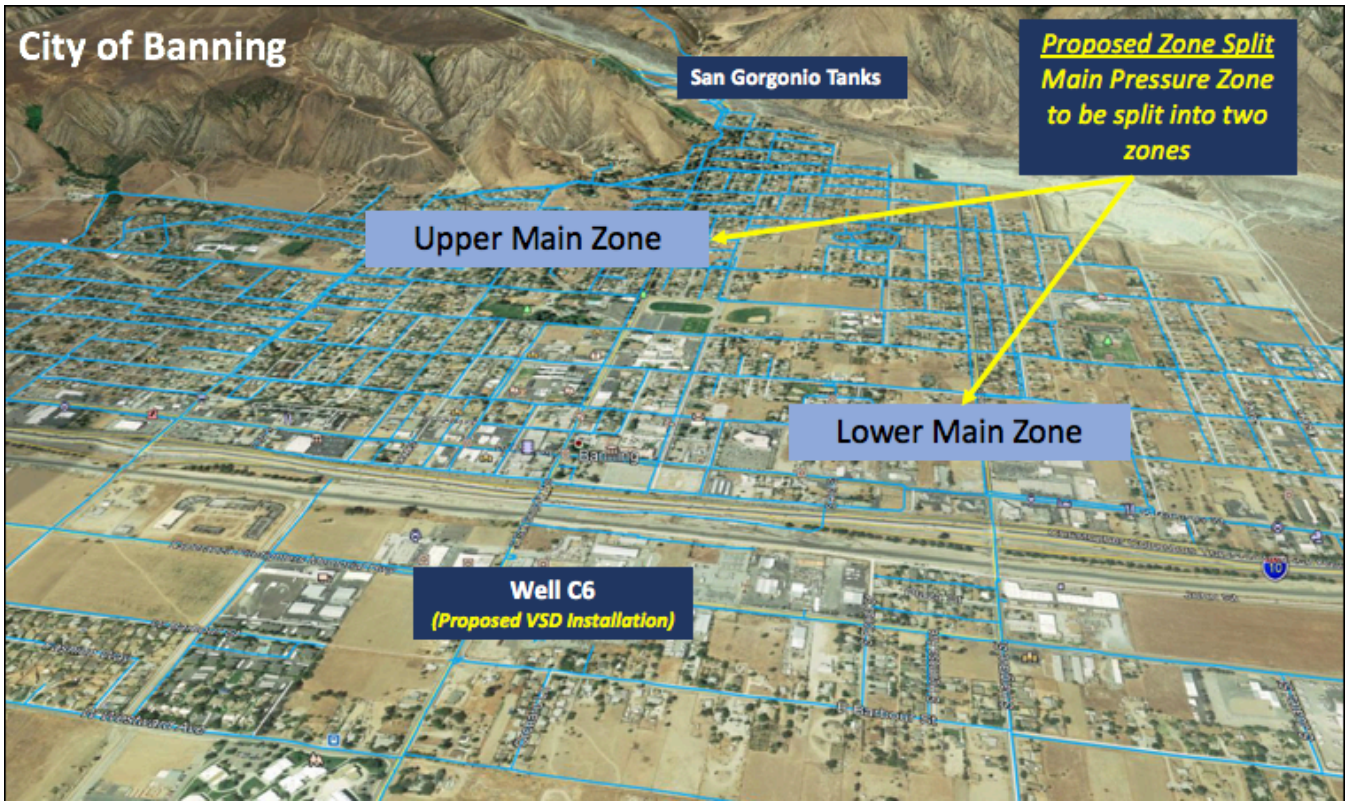


Fig. 4: To reduce high pressure, the project will allow the City of Banning to split the Main Pressure Zone into a Lower

The City has conducted annual water audits validating high pressures cause leakages throughout the Main Pressure Zone. Fig. 5 demonstrates the normalized rate of real and apparent losses submitted to the State in 2016, 2017, and 2018. The City's normalized performance indicators show the rate of real and apparent loss, as reported in prior water audits, is significantly greater than the statewide median values. The cost of water losses experienced by the City are estimated to be $157,691 per the 2018 AWWA Water Audit.

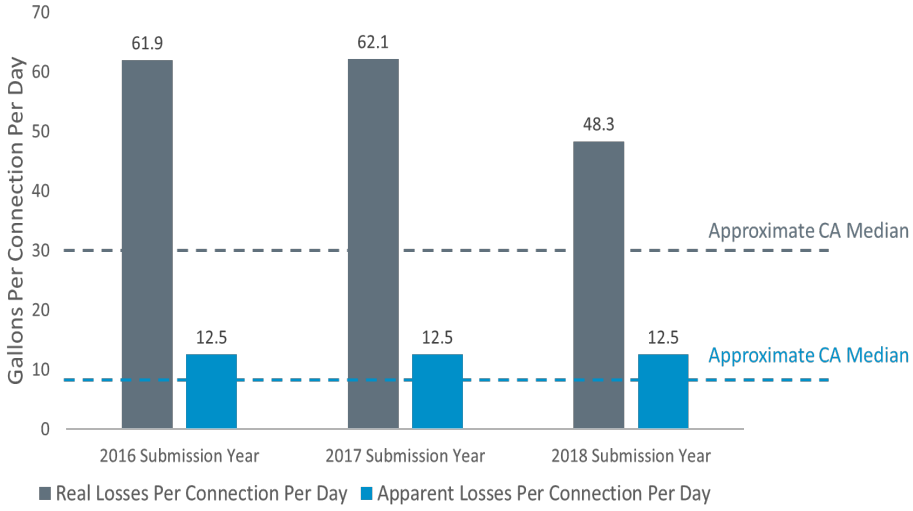


Figure 5: Normalized Volumetric Performance Indicators

Using GIS software, City staff extracted the pipes and hydrants located within the proposed future Lower Main Zone (post rezoning split) to estimate current water losses attributable to high pressures in the Lower Main Zone. Table 3 below summarizes the percent of total assets within the Lower Main Zone to indirectly quantify the existing losses within that zone.

TABLE 3
Current Water Loss Attributable to Lower Main Zone

	Hydrants	Pipe Footage
Lower Main Zone	340	216,392
Citywide	1,394	898,682
% of Lower Main Zone Water Losses	**24.4%**	**24.1%**

Addressing the Need. To mitigate ongoing high pressures, the City will rezone the Main Pressure Zone by dividing it into two zones to create an "Upper Main Zone" and "Lower Main Zone" (See Attachment A – Proposed Water System Improvements). Rezoning will include rehabilitation of seven (7) pressure regulating valves (PRVs) along the new pressure boundary, which were previously constructed in anticipation of rezoning, but are not currently operational. The City will split the Main Pressure Zone into two zones to reduce high pressures. A variable speed drive (VSD) unit with a telemetry system for better pressure management will be installed at Well C6 to allow water from Well C6 to be distributed throughout the new Lower Main Zone. Currently, the water from Well C6 is pumped to the San Gorgonio tanks and distributed with high pressure gravity flow to the entire main zone.

The proposed VSD unit will resolve high pressures and excessive pressure swings with improved pressure management for the proposed Lower Main Zone. Rehabilitation of seven (7) PRVs and splitting the Main Pressure Zone to create an Upper and Lower Main Zone will mitigate high pressures by increasing the number of pressure zones from six (6) to seven (7) pressure zones. This rezoning will achieve future pressure zone hydraulic grade line (HGLs). Demand within each of the zones will have a more leveled demand distribution (See Table 4 for Future Demand Distribution) over the current zoning, where 70% of the City's system lies within one pressure zone.

TABLE 4
Future (2040) Pressure Zones HGLs and Future Demand Distribution

Name	HGL (ft)	Future ADD (gpm)	Future MDD (gpm)**	Percent (%)
Foothill East	2,810	73	124	0.9%
Foothill West	2,822	1,607	2,733	17.1%
Mountain North	2,932	415	705	6.9%
Mountain South	2,546	38	65	0.5%
Upper Main*	2,721	3,499	5,948	41.6%
Lower Main*	2,560	2,208	3,754	26.3%
Lower I	2,450	570	968	6.7%
Total	**N/A**	**8,411**	**14,298**	**100%**

Notes:
*Upper and Lower Main Split dependent on locations of the existing PRVs
**MDD PF is assumed to be 1.7

Expected Outcomes. The City of Banning has identified that its water pumping sites, particularly Well C6, would vastly benefit from the installation of a variable speed drive (VSD) unit to mitigate high pressures. Splitting the Main Pressure Zone into two separate zones will reduce excessive pressures in the proposed Lower Main Zone from 149 psi to 79 psi, resulting in an estimated 47% reduction in pressure and 107 AFY in water savings (See Table 5 below for a detailed chart of expected outcomes.

TABLE 5
Water Savings in Lower Main Zone

Data	Description
142.2	Average psi in Lower Main Zone (existing)
79.5	Average psi in Lower Main Zone (after zone split)
47%	Percent decrease in pressure
47%	Percent decrease in real losses
107.1158438	AF per year in water savings due to decrease in water loss

As part of the efficiency upgrade, the new telemetry control system along with new pressure and water level sensing devices, will allow City staff the ability to control and monitor new components remotely and efficiently. Upon project completion, the City will be able to control and regulate the water supply based on system needs and aquifer water levels. Reducing water pressure will also significantly reduce wear and tear on residential plumbing fixtures, saving residents money. This is especially advantageous to Banning, which is a State-identified disadvantaged community (Ref. Fig 2).

The City anticipates a reduction in water losses within the Lower Main Zone, due primarily to the decrease in average pressures. Empirical studies have shown an approximate 1:1 ratio of decreases in pressure (%) to decreases in leakage (%).[5] Upon completion, the project will not only provide an estimated 107 AFY in water savings in the Lower Main Zone, but will also provide an estimated 12% energy savings that will save the City approximately $23,000 per year (See Table 6 below for Proposed Energy Savings). The project meets the small-scale goals of effectively improving water management.

TABLE 6
Proposed Energy Savings

Name	Existing Pumping Conditions	Future Pumping Conditions
Pump Hours/Day	24	24
Pump Days/Year	300	300
Flow – GMP	800	800
Depth to Water (pumping level)	680	680
Discharge Pressure	**180**	**110**
Estimated Pump Head (without friction losses)	**1095.8**	**934.1**
Pump Efficiency	85%	85%
Motor Efficiency	95%	95%
Energy Costs in $/kWh	0.13	0.13
BHP	274.15	233.69
Annual Pumping (gal)	345,600,000	345,600,000
Annual Energy Consumption	**1,471,906**	**1,254,707**
3% additional energy use		37,641.20
Adjusted Energy Consumption		1,292,347.87
kWh Annual Savings		**179,558**
Annual Energy Cost Savings		**$23,242.58**
Percentage of Energy Savings		**12%**

[5] Lambert, Allan. *"What Do We Know About Pressure: Leakage Relationships in Distribution Systems,"* International Water Data Comparisons Ltd., LL30, UK (email: allanolambert@cs.com).

Section 5. Evaluation Criteria

Evaluation Criterion A: Project Benefits (35 points)

Variable frequency drive (VFD) units, also known as Variable Speed Drive (VSD) units, are a type of motor controller unit that varies the frequency and speed of the voltage supplied to the motor, which allows for variable speed pumping operation. In conjunction with the proposed telemetry system, the VSD unit will help to eliminate pump-induced pressure surges, and control suction-pressure pump speed and discharge-pressure pump speed. Together, the equipment and technology will work cohesively to more efficiently meet varied water demands. Additionally, the proposed zone split of the City's Main Pressure Zone, which currently occupies 70% of the water system, will mitigate high pressure within the City's current water system by splitting the Main Pressure Zone into two zones (Upper Main Zone and Lower Main Zone).

Upon completion of the proposed project, the City will have made the following improvements to its water infrastructure system:

- Installation of Variable Speed Drive (VSD) unit in Well C6 and replacing outdated starter equipment. The VSD unit will allow City staff to monitor and control water pressure at Well C6 depending on system requirements and water demand. Water operators will be able to regulate the production of the well according to the current water level in the aquifer. Benefits include the ability to operate the well without the possibility of over pumping, as well as cutting down on electrical costs while lengthening the life of the motor and pressure regulators.
- Installation of an upgraded telemetry system, enabling City staff or water operators to make adjustments or implement changes remotely, thereby reducing costly site visits.
- Rehabilitation of seven (7) pressure regulating valves (PRVs) that will be set to open at a predetermined set pressure to protect pressure vessels and other equipment from being subjected to pressures that exceed their design limits.
- Zone split the City's Main Pressure Zone into two separate zones (Upper Main Zone and Lower Main Zone) to reduce high pressures in the lower zone due to high elevation levels water must travel to reach the City's gravity storage reservoirs.

Overall, the project will reduce high pressure, resulting in a 47% reduction in water losses (107 AFY water savings) in the Lower Main Pressure Zone and a 12% reduction in energy use, estimated to save the City $23,000 per year.

Evaluation Criterion B—Planning Efforts Supporting the Project (35 points)

The proposed project is supported by the City's 2018 Integrated Master Plan. Replacement of PRVs and installation of a VFD unit at Well C6 are specifically called out as recommended projects on Page 11 of the IMP under Water System Recommendations and are part of the CIP planning effort. Key goals of the IMP are to identify and develop capital improvement projects to ensure the City's water system facilities can meet system performance criteria for existing and future customers, as well as support anticipated growth through the year 2040.

Empirical data supports that lower pressure results in reduced water losses. This is validated by Banning's 2018 Water Loss Audit. As water loss control has gained attention from state regulators, the City recognizes the importance of optimizing its distribution system efficiency as a potential cost-effective water conservation measure. The City reached out to Water Systems Optimization (WSO) to complete a thorough review of water loss control initiatives. WSO provided a Water Loss Control Gap Assessment that identified water loss control activities. Pressure management was identified as a viable intervention strategy to reduce real losses. The Assessment recommended splitting the City's Main Pressure Zone to reduce pressure and help to conserve water resources (See Attachment C – 4.3 Pressure Management).

Evaluation Criterion C—Project Implementation (10 points)

The proposed project includes the following tasks:

Task 1. Project Grant Administration

Banning staff will provide administrative oversight for the project. Activities will include attending meetings with the BOR, executing the grant agreement, preparing requests for reimbursements, submitting interim performance reports and a final performance report, coordinating any audit requests by BOR, and maintaining records for at least three years after the project is closed out.

Deliverables: Meeting agendas/minutes, Executed grant agreement, Reimbursement requests, Interim/Final performance reports, Audit report (if applicable)

Task 2. Electrical Engineering & Design

The City of Banning will hire an electrical design firm to evaluate the existing system to determine design specs for project implementation.

Deliverables: Design specs

Task 3. Procurement of a Qualified Contractor

A contractor will be selected through a formal bid process. The contractor will be responsible for purchasing and installing new equipment, troubleshooting faulty equipment or replacing, at no additional cost, any components found to be defective. The City will hold a kick-off meeting with the selected contactor to review the schedule, cost estimate, and expected milestones for the 12-month project.

Deliverables: Meeting minutes, Contractor agreement, Project schedule, Final cost estimate

Task 4. Environmental Documentation & Permitting

The City of Banning determined the proposed project qualifies for a California Environmental Quality Act (CEQA) Categorical Exemption. Environmental documentation has been filed (See Attachment B for documentation). The City will obtain a Permit-to-Construct from Banning Electric Utility for the proposed project. No other permits or approvals are expected to be required for the proposed project, as project components will be installed on existing facilities.

Deliverables: Permit-to-Construct from Banning Electric Utility

Task 5. Install VSD & Telemetry System, Rehab of Pressure Regulating Valves, Rezone Split
The contractor shall install all new equipment (VSD unit and telemetry system) in accordance with City codes and regulations, and will be expected to follow the schematic design drawings provided by the electrical design firm. The City will contract with Cla-Val for the rehabilitation of the PRVs. Rehabilitation work will include removal of the valve top, replacement of the rubber composite diaphragm, and removal of any corrosion in the copper plumbing. The City has adequate staff to provide labor for the rezoning process of the Main Pressure Zone, which will also include closing some existing in-line valves.

Deliverables: Installation schedule, VSD and PRV installation inspection checklists, Automated installation process for upgraded telemetry system, Contractor invoices

Task 5.1. Test and Launch Systems
The contractor will ensure the new VSD and telemetry system are installed and integrated with the City's system. Preliminary software testing will be completed to ensure functionality and compatibility with the City's system. The contractor will provide City staff with a handbook for the new system.

Deliverables: IT Support, Installation of account data, Contractor invoices, System handbooks

Task 5.2. Staff Training
The contractor will provide onsite training to City staff, to include installation, operation and maintenance of the VSD unit and an overview and operation of the telemetry system.

Deliverables: Vendor invoices, Training agenda and participant list, Photographs of the installed VSD and PRVs, Installation completion report

Schedule
Please see the anticipated project schedule below.

City of Banning Project Schedule									
Task No.	**Timeline Major Project Tasks**	***2020***	***2021***				***2022***		
		Q4	*Q1*	*Q2*	*Q3*	*Q4*	*Q1*	*Q2*	*Q3*
0	**BOR Awards Announced August 2020**								
1	**Project Grant Administration**								
2	**Electrical Engineering & Design**								
3	**Procurement of a Qualified Contractor**								
4	**Environmental Documentation & Permitting**								
5	**Install VSD System, PRV Rehab, Rezone Split**								
5.1	**Test and Launch System**								
5.2	**Staff Training**								
Project Start: October 1, 2020 --- Project Completion: October 30, 2022 (24 months)									

Evaluation Criterion D—Nexus to Reclamation (10 points)

- **Is the proposed project connected to Reclamation project activities? If so, how?**

Yes. The proposed project is connected to Reclamation project activities, because it benefits the State Water Project (SWP), a water facility project managed in tandem with the Bureau of Reclamation, as mandated in the 1986 Coordinated Operations Agreement between the United States of America and the Department of Water Resources for the State of California. SWP water is provided to the City of Banning via the San Gorgonio Pass Water Agency for groundwater recharge. The project will conserve 107 AFY of potable water, meaning the City can rely less on imported water for recharge and keep the water in the local basins, without the need to pump or treat for potable use. This will benefit all SWP water recipients, as it decreases the need to draw on this imported water source.

- **Please consider the following:**
  - **Does the applicant receive Reclamation project water?**

Yes, as stated above, the City receives SWP water via the San Gorgonio Pass Water Agency.

  - **Is the project on Reclamation project lands or involving Reclamation facilities?**

The project is not located on Reclamation lands, but involves the SWP, a facility jointly managed by Reclamation and the State of California.

  - **Is the project in the same basin as a Reclamation project or activity?**

No.

  - **Will the proposed work contribute water to a basin where a Reclamation project is located?**

The proposed project will contribute water by reducing background losses (water leaks) to a basin that receives Reclamation water for recharge.

- **Will the project benefit any tribe(s)?**

Yes, the project will benefit the Morongo Band of Mission Indians. The project will allow 107 AFY of water to remain in the Cabazon and surrounding groundwater basins, which are shared between the City of Banning and the Morongo tribe. The project will increase water sustainability for the tribe by reducing potable water waste, contributing to a healthier water basin.

Evaluation Criterion E—Department of the Interior and Bureau of Reclamation Priorities (10 points)

The proposed project aligns with the following Department of the Interior priorities:

1. **Creating a conservation stewardship legacy second only to Teddy Roosevelt**
   a. **Utilize science to identify best practices to manage land and water resources and adapt to changes in the environment**

The project mitigates the effects of climate change, which creates critical challenges for California water resources management.

The Safeguarding California Plan: 2018 Update is the State's roadmap for projects to protect communities, infrastructure, services, and the natural environment from climate change impacts. In the Water Sector Plan section, dozens of actions are listed as underway for California to prepare for climate change impacts on the water sector. These actions utilize science to identify best practices that span the different areas of the water sector including: (1) surface water and groundwater, (2) drinking and environmental water supplies, (3) wastewater, (4) flood flows and storm water, and (5) recycled water. The actions focus on safeguarding State- and locally-managed infrastructure and resources by supporting current actions and incentivizing local water managers to plan for future actions to address climate change impacts on local and regional water resources.

Several best practices are listed that are reflected in the proposed project. These include reducing losses and increasing water use efficiency. Increasing regional self-reliance and diversification of local water supplies and maximizing water conservation and water use efficiency, which will enable Californians to better respond to changing economic and climatic conditions while ensuring a reliable water supply for the State's water needs. The proposed project allows the City of Banning to be proactive in implementing its own strategy to assist with the greater California goal of water conservation while addressing climate change.

b. Foster relationships with conservation organizations advocating for balanced stewardship and use of public lands

Several partners and conservation agencies are lending their support to the City of Banning for this project and they include the San Gorgonio Pass Water Alliance (SGPWA) and the Riverside County Flood Control and Water Conservation District. All share a goal to conserve water by implementing a modernized infrastructure to achieve greater efficiency and effectiveness in delivering water supplies. The proposed project will save approximately 107 AFY of water by reducing background losses caused by high pressure leaks.

2. Utilizing our natural resources

a. Ensure American Energy is available to meet our security and economic needs

Over the last two decades, the water-energy nexus has gained attention due to local, regional, national, and global concerns regarding energy security, water scarcity, and the impacts of global climate change. For example, the historic 2012-2015 North American Drought impacted electricity generation capacity by restricting surface water withdrawals used for power plant cooling, as well as drastically reducing hydropower resource availability. Situations such as this highlight how water and energy systems are inextricably linked and the potential vulnerabilities this creates.

The energy needed for providing water can be a significant portion of all energy use, with a California Energy Commission report estimating that five percent of energy consumption in California can be attributed to the conveyance, distribution, and treatment of water. Mitigating high pressures via the installation of a VSD unit will reduce water loss, allowing water to remain in local groundwater basins; and save energy by altering the pump speeds.

3. **Restoring trust with local communities**
    a. **Be a better neighbor with those closest to our resources by improving dialogue and relationships with persons and entities bordering our lands;**

The City is a member of the San Gorgonio Pass Regional Water Alliance, which seeks to improve coordination, collaboration, and communication among local, state, and federal governments and water purveyors and other water resource stakeholders in the San Gorgonio Pass region to achieve greater efficiency and effectiveness in delivering water supplies. The project aligns with Alliance goals that, in effect, include being a better neighbor by improving dialogue and relationships with one another, and working toward conservation projects that benefit the entire region and entities from all over California that receive SWP water.

The City's project to lower high water pressures can serve as a model to other water systems for cost-effective solutions to reduce water losses. Project results will be dispersed among Alliance members (Banning Heights Mutual Water Company, the City of Beaumont, Beaumont Basin Watermaster, Beaumont Cherry Valley Water District, Cabazon Water District, City of Calimesa, County of Riverside, High Valleys Water District, Mission Springs Water District, Morongo Band of Mission Indians, San Gorgonio Pass Water Agency, South Mesa Mutual Water Company, and Yucaipa Valley Water District) to increase communication and demonstrate best practice projects.

4. **Modernizing our infrastructure**
    a. **Support the White House Public/Private Partnership Initiative to modernize U.S. infrastructure;**
    b. **Prioritize DOI infrastructure needs to highlight:**
        1. **Construction of infrastructure**

The proposed project directly aligns with the Department of the Interior's priority to modernize American infrastructure. Seeing as 65% of all electrical energy used in the United States operates flow loads such pumps, fans, and compressors – mostly powered by constant speed induction motors, the installation of a VSD unit represents using the advancements that technology offers in a faster and more cost-effective way to modernize infrastructure. Variable speed drive units provide an economically sound and operationally effective solution for speed control and reduced power consumption. The VSD component of the project, in addition to rezoning the City's Main Zone for improved water distribution, will modernize the City's water system and improve the reliability of the City's water resources.

~ End of 15-page limit for Technical Proposal~

PROJECT BUDGET

Funding Plan

The total project cost is $199,008. The City will provide non-federal matching funds in the amount of $124,008, or 62% of the total cost. The City's cost share will come from the City's Water Enterprise Fund, and is available as of March 4, 2020. The City anticipates no constraints with the availability of the City's match. The City respectfully requests $75,000, 38% of the total project cost, in Reclamation funding to complete the proposed project.

No funding will be, or has been, requested or received from other Federal partners; and there are no pending funding requests, outside if this BOR proposal, for the proposed project. No costs included in the proposed project budget that have been incurred before the anticipated project start date or will be incurred prior to the grant award.

Budget Proposal

Table 1 — Total Project Cost Tables

SOURCE	AMOUNT
Costs to be reimbursed with the required Federal funding	$ 75,000
Cost to be paid by the applicant	$ 124,008
Value of third-party contributions	$ -
TOTAL PROJECT COSTS	$ 199,008

Table 2—Proposed Budget

BUDGET ITEM DESCRIPTION	COMPUTATION			TOTAL COST
	$/Unit	Quantity Type	Quantity	
Salaries and Wages				
Senior Civil Engineer (PM), Luis Cardenas	$ 59.11	HR	40	$ 2,364
Management Analyst (Grants Admin), Jennifer Jackson	$ 35.96	HR	24	$ 863
Water Service Worker (Tech Operations)	$ 34.33	HR	40	$ 1,373
Fringe Benefits				
Senior Civil Engineer (PM), Luis Cardenas	$ 26.56	HR	40	$ 1,062
Management Analyst (Grants Admin), Jennifer Jackson	$ 19.78	HR	24	$ 475
Water Service Worker (Tech Operations)	$ 20.63	HR	40	$ 825
Travel				
Not Applicable	$ -		0	$ -
Equipment (Over $5,000)				
Variable Speed Drive (VSD)	$ 60,000	EA	1	$ 60,000
Electric Motor	$ 23,000	EA	1	$ 23,000
AC for VSD Panel	$ 5,000	EA	1	$ 5,000

Supplies/Materials (Under $5,000)				
Wire	$ 2,500	LS	1	$ 2,500
Pressure Transducer	$ 1,200	EA	1	$ 1,200
Level Sensor	$ 1,500	EA	1	$ 1,500
Contractual				
Electrical Design	$ 25,000	LS	1	$ 25,000
Rehabilitation of Pressure Regulating Valves - Cla-Val	$ 32,845	LS	1	$ 32,845
Construction				
Variable Speed Drive (VSD) Unit Installation	$ 40,000	LS	1	$ 40,000
Environmental Compliance				
Environmental & Regulatory Compliance - BOR Staff	$ 100	HR	10	$ 1,000
Total Indirect Costs				
Not Applicable	percentage			
TOTAL ESTIMATED PROJECT COSTS				**$ 199,008**

Budget Narrative

Salaries and Wages $4,600

Personnel costs (salaries and wages) for the Senior Civil Engineer, Management Analyst, and Water Service Worker are detailed below. Project management and training are not included in the grant request for ease of reporting. However, they are described below for a full understanding of project management.

Project Manager, Senior Civil Engineer ($2,364)

The City's Senior Civil Engineer, Luis Cardenas, will manage the project, be responsible for day-to-day project management and operations, and will serve as the project's primary contact. The Project Manager will oversee procurement of a qualified contractor, the project schedule, budget, key milestones, and will be responsible for managing all project staff, including the vendor agreement and development of all interim and final performance reports.

Mr. Luis Cardenas is the City Senior Civil Engineer. With over 15 years of experience in the field, Mr. Cardenas has been with the City of Banning for 3.5 years and has successfully managed multiple city projects, including Chromium VI Compliance, an Integrated Master Plan for Water, Wastewater, and Recycled Water, a 1.5-mile transmission main replacement project, sludge removal and digester dome repair project, and a potable reservoir cleaning and inspection project. Currently, Mr. Cardenas is managing a BOR WaterSMART Water and Energy Efficiency Grant for an AMI Metering project that is anticipated to be completed on time and within budget.

For the proposed project, Project Manager will spend 40 hours at a regular hourly rate of $59.11/hour = $2,364.

Grants Administrator, Management Analyst ($863)
The City's Management Analyst, Jennifer Jackson, will conduct all grant administration tasks, including data entry, reporting, verification of work orders, billing, warehouse administrative duties, information technology staff (IT), and reporting duties to ensure grant compliance during the two-year project period.

For the proposed project, the Grants Administrator will spend 24 hours at a regular hourly rate of $35.96/hour = $863.

Tech Operations, Water Service Worker ($1,373)
The City's Water Service Worker (staff) will be called upon for coordination with the installation of the VSD unit and telemetry system, and will complete all labor required for the rezoning process of the Main Pressure Zone, including closing some existing in-line valves. The Water Service Worker will be trained on the installation, collection of data, uploading reports, analyzing reports, and the integration of the upgraded telemetry system by the selected vendor.

For the proposed project, the Water Service Worker will spend 40 hours at a regular hourly rate of $34.33/hour = $1,373.

Total Salaries and Wage: $2,364 + $863 + $1,373 = $4,600

Fringe Benefits $2,362
The City's fringe benefit rate includes Public Employees Retirement System (PERS), Medicare, Social Security, State Unemployment Insurance, Workers Compensation, Benefit allowance, and an Education Incentive.

The fringe rate applied to the Senior Civil Engineer (Project Manager) hourly rate of $59.11 is $26.56 per hour x 40 hours = $1,062.

The fringe rate applied to the Grant Administrator hourly rate of $35.96 is $19.78 per hour x 24 hours = $475

The fringe rate applied to the Water Service Worker hourly rate of $34.33 is $20.63 per hour x 40 hours = $825.

Total Fringe Benefits: $1,062 + $475 + $825 = $2,362

Travel - Not Applicable

Equipment (Over $5,000) - $88,000
Equipment for the proposed project include:

- 1 Variable Speed Drive (VSD) Unit for $60,000
- 1 Electric Motor for $23,000
- 1 AC for VSD Panel for $5,000

Supplies and Materials (Under $5,000) - $5,200

Materials for the proposed project include:

- Electrical Wire for a lump sum amount of $2,500
- 1 Pressure Transducer for $1,200
- 1 Level Sensor for $1,500

Contractual - $57,845

Electrical Design will be completed by a qualified engineering firm, who will conduct an initial field visit to evaluate the condition of the existing system (MCC, motor, conduit, and wiring) and prepare design plans and specs for a motor replacement, VSD unit installation, and all necessary ancillary improvements. Design plans and specs, along with a list of qualified vendors, will be provided to the City for their review and approval. The City issue a formal RFP and select a vendor/contractor for proposed construction work. ***A lump sum rate of $25,000 for contractual work performed by Webb Associates includes participation in project meetings with City staff.***

Cla-Val for Rehabilitation of Pressure Regulating Valves (PRVs): The City will contract with Cla-Val for the rehabilitation of seven pressure regulating valves. Work will include all supplies and materials, including labor for the removal of the valve top, replacement of the rubber composite diaphragms, converting ball valves, tubing, and fittings to stainless steel, and removal of any corrosion in the copper plumbing. ***A lump sum rate of $32,845 will cover all proposed work for this task.***

Construction - $40,000

Variable Speed Drive (VSD) Unit Installation: The selected contractor will install a MCC cabinet with the VSD unit and telemetry system, replace the existing motor, add a harmonic filter, and complete all conduit and wiring in accordance with all City codes and regulations following the design plans provided by the Webb Associates, the electrical design firm. The contractor will ensure the new VSD unit and telemetry system are properly installed and integrated with the City's system, complete proper testing to ensure functionality of the system, and provide training to City staff on the operation and maintenance of the VSD unit and operation of the new telemetry system. ***A lump sum rate of $40,000 will cover all proposed work for this task.***

Environmental and Regulatory Compliance Costs $1,000

The project is a Categorical Exemption for CEQA and a Categorical Exclusion for NEPA. The City has allocated 10 hours for BOR staff to review documentation at $100/hour, if needed.

Total Costs: $199,008

Federal Request from Bureau of Reclamation:	$ 75,000
Total Non-Federal (LOCAL) Cost Share:	$124,008
Total Project Cost:	**$199,008**

ENVIRONMENTAL AND CULTURAL RESOURCES COMPLIANCE

The City has evaluated the project for both CEQA compliance and determined the project qualifies for a Categorical Exemption for CEQA (See Attachment B) and a Categorical Exclusion for NEPA. The CEQA Categorical Exemption reference is Section 15301. Existing Facilities, part (b). The project is a Class I project which consists of the operation, repair, maintenance, permitting, leasing, licensing, or minor alteration of existing public and private structures, facilities, mechanical equipment, etc. The types of "existing facilities" is consistent with part (b) of Section 15301 which states "existing facilities of both investor and publicly-owned utilities used to provide electric power, natural gas, sewage, or other public utility services." For NEPA, we reviewed the list of Categorical Exclusions located in the Code of Federal Regulations for the Department of Interior and concluded that the project meets the following categorical exclusion definitions: "minor construction activities associated with authorized projects which...merely augment or supplement..." and "maintenance, rehabilitation, and replacement of existing facilities which may involve a minor change in size, location, and/or operation."

- **Will the proposed project impact the surrounding environment (e.g., soil [dust], air, water [quality and quantity], animal habitat)? Please briefly describe all earth-disturbing work and any work that will affect the air, water, or animal habitat in the project area. Please also explain the impacts of such work on the surrounding environment and any steps that could be taken to minimize the impacts.**

No. The proposed project will involve replacing equipment parts in sites that have been previously-disturbed and are regularly maintained. Technology upgrades to the City's network will be implemented with pressure sensors and water level monitoring controls via an upgraded telemetry system. No earth will be disturbed.

- **Are you aware of any species listed or proposed to be listed as a Federal threatened or endangered species, or designated critical habitat in the project area? If so, would they be affected by any activities associated with the proposed project?**

There are no Federal threatened/endangered species or critical habitat in the proposed project area. No species or habitat will be affected by any activities associated with the proposed project.

- **Are there wetlands or other surface waters inside the project boundaries that potentially fall under CWA jurisdiction as "Waters of the United States?" If so, please describe and estimate any impacts the proposed project may have.**

No.

- **When was the water delivery system constructed?**

The water delivery system was originally constructed in 1913, but additions have been constructed consistently since that time, with a large portion built in the 2000s.

- **Will the proposed project result in any modification of or effects to, individual features of an irrigation system (e.g., headgates, canals, or flumes)? If so, state when those features were constructed and describe the nature and timing of any extensive alterations or modifications to those features completed previously.**

No, the project will not result in any modification of or effects to individual features of an irrigation system.

- **Are any buildings, structures, or features in the irrigation district listed or eligible for listing on the National Register of Historic Places? A cultural resources specialist at your local Reclamation office or the State Historic Preservation Office can assist in answering this question.**

The original 1913 pipeline is eligible for listing on the National Register of Historic Places. However, it is no longer in use and is abandoned in place. It will not be affected by this project.

- **Are there any known archeological sites in the proposed project area?**

No.

- **Will the proposed project have a disproportionately high and adverse effect on low income or minority populations?**

No. The proposed project will have a benefit to low income and minority populations by increasing water sustainability and modernizing the City's water infrastructure. Reducing water losses will help the City maintain existing water rates since water will be managed more effectively upon project completion. The of Banning is a State-identified disadvantaged community (Ref. Figure 2 – The Department of Water Resources Disadvantaged Communities Mapping Tool). Reducing water pressure will significantly reduce the wear and tear on residential plumbing fixtures, saving residents money.

- **Will the proposed project limit access to and ceremonial use of Indian sacred sites or result in other impacts on tribal lands?**

No.

- **Will the proposed project contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area?**

No.

REQUIRED PERMITS OR APPROVALS

The City of Banning will obtain a Permit-to-Construct from Banning Electric Utility for new equipment as well as alteration (both physical modification and change of operating conditions) to existing equipment. No other permits or approvals are expected to be required for the proposed project, as project components will be installed on existing facilities.

LETTERS OF SUPPORT

The City of Banning received letters of support, which are included in this application, from the following entities:

- Representative Raul Ruiz
- San Gorgonio Pass Water Agency
- Riverside County Flood Control and Water Control District
- Western Riverside Council of Governments

RAUL RUIZ, M.D.
36TH DISTRICT, CALIFORNIA
COMMITTEE ON ENERGY AND COMMERCE
SUBCOMMITTEE ON HEALTH
SUBCOMMITTEE ON OVERSIGHT AND INVESTIGATIONS
SUBCOMMITTEE ON ENVIRONMENT AND CLIMATE CHANGE

2342 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515
P: (202) 225-5330
F: (202 225-1238

43875 WASHINGTON STREET, SUITE F
PALM DESERT, CA 92211
P: (760) 424-8888
F: (760) 424-8993

445 EAST FLORIDA AVENUE
HEMET, CA 92543
P: (951) 765-2304
F: (951) 765-3784

Website: http://ruiz.house.gov

Congress of the United States
House of Representatives
Washington, DC 20515-0536

February 25, 2020

The Honorable Brenda Burman
Commissioner
Bureau of Reclamation
1849 C Street, Northwest
Washington, DC 20240

Dear Commissioner Burman:

I write in support of the City of Banning and its application for a WaterSMART Small-Scale Water Efficiency Grant with the Bureau of Reclamation. Funding from this grant would enable the City of Banning to improve water efficiency and modernize existing water infrastructure through its Pressure Zone Separation and Water Loss Reduction Project.

Through its Pressure Zone Separation and Water Loss Reduction Project, the City would install a variable speed drive (VSD) to activate pressure relief valves (PRVs), rezone the City's main water zone, and install technology upgrades. This would ultimately reduce leak flow rates and bring much-needed upgrades to the City's water infrastructure.

Funding from the WaterSMART Small-Scale Water Efficiency Grant would allow the City to continue its modernization of public utility infrastructure. In its initial phase of modernization, the City converted electric utility meters to advanced metering infrastructure, then transformed their utility provision with updated systems that provide real-time leak detection. The City hopes to build on that momentum by applying pressure management that has the potential to save more than 100 acres of water per year, decreasing water losses by 47 percent.

The families and individuals I serve and represent stand to benefit a great deal from the City's Pressure Zone Separation and Water Loss Reduction Project. By modernizing the City's water system for water management, the City would improve water conservation to ensure the sustainability of our resources.

I support the City of Banning and its application, and I urge full and fair consideration, consistent with all relevant program rules and regulations. If you have any additional questions, please feel free to contact my Washington, D.C. office at (202) 225-5330.

Sincerely,

Raul Ruiz

Raul Ruiz, M.D.
Member of Congress

San Gorgonio Pass Water Agency

A California State Water Project Contractor
1210 Beaumont Avenue • Beaumont, CA 92223
Phone (951) 845-2577 • Fax (951) 845-0281

February 14, 2020

Ms. Robin Graber
Bureau of Reclamation
Bldg. 56, Room 1000
6th Avenue and Kipling Street
Denver, Colorado 80225

Subject: Small-Scale Water Efficiency Grant - City of Banning, California

Dear Ms. Graber:

The San Gorgonio Pass Water Agency (SGPWA) is pleased to provide this letter of support for the City of Banning's Pressure Zone Separation & Water Loss Reduction Project to the Bureau of Reclamation under the WaterSMART: Small-Scale Water Efficiency Grant Program. The proposed project will install a variable speed drive (VSD) as part of a system improvement that will lower water pressure and reduce water losses. Additionally, the project will include splitting the City's main pressure zone, rehabilitation of pressure relief valves (PRVs), and installing an upgraded telemetry control system that will allow for better pressure management and help to reduce background losses.

SGPWA provides imported water to local water agencies, including the City of Banning, to reduce local groundwater overdraft. The project is expected to save over 100 acre-feet per year of potable water that can remain in the Beaumont Basin (one of California's 22 adjudicated basins) and contribute to our goals of sustaining groundwater supplies. This is significant as imported water allocations from the State Water Project continue to decline.

Our agency fully supports the City's commitment and forward-thinking to improve water efficiency via water infrastructure improvements. We respectfully ask that you join us in support of the City's application for smart water efficiency projects that will protect our water resources.

Sincerely,

Jeff Davis
General Manager

JASON E. UHLEY
General Manager-Chief Engineer

1995 MARKET STREET
RIVERSIDE, CA 92501
951.955.1200
FAX 951.788.9965
www.rcflood.org

229832

RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

February 21, 2020

Ms. Robin Graber
Bureau of Reclamation
Bldg. 56, Room 1000
6th Avenue and Kipling Street
Denver, CO 80225

Dear Ms. Graber:

Re: Small-Scale Water Efficiency Grant
City of Banning, California

The Riverside County Flood Control and Water Conservation District (District) is pleased to support the City of Banning and their application to the Bureau of Reclamation (BOR) to improve the City's water infrastructure. The proposed Pressure Zone Separation and Water Loss Reduction Project has been identified as the primary intervention strategy to reduce background losses with a variable speed drive, water rezoning, pressure relief valves, and technology upgrades. Our mission is, in part, to support regional water conservation measures. As such, the District is a member of the San Gorgonio Pass Regional Water Alliance, along with the City of Banning and 11 other regional water providers and local governments.

The District is the regional flood management authority for the western part of Riverside County. Our purpose is to identify and manage flood hazards, construct and maintain flood control facilities, and promote conjunctive use and conservation of local and imported water supplies. We work with other water resource stakeholders in the San Gorgonio Pass region to optimally plan and manage water resources and develop mutually beneficial solutions that ultimately provide flood management and clean, reliable, and affordable water supplies for the citizens of the San Gorgonio Pass. Benefits of the project include a 47% decrease in real losses per year and an annual 12% energy savings that will save the City over $23,000 per year.

We are proud to work alongside the City of Banning and other municipalities that move toward a more efficient and reliable water infrastructure. I respectively ask BOR join me in support of this project.

Y
-Chief Engineer

JU:bad

February 14, 2020

Ms. Robin Graber
Bureau of Reclamation
Bldg. 56, Room 1000
6th Avenue and Kipling Street
Denver, Colorado 80225

Subject: Small-Scale Water Efficiency Grant - City of Banning, California

Dear Ms. Graber:

The Western Riverside Council of Governments (WRCOG) is happy to support the City of Banning's application to the Bureau of Reclamation (BOR) for the Pressure Zone Separation & Water Loss Reduction Project to improve the City's water infrastructure via the implementation of a variable speed drive (VSD), water rezoning, pressure relief valves (PRVs), and technology upgrades. The project has been identified as the most cost-effective intervention strategy to reduce background losses by reducing high water pressure.

WRCOG's Executive Committee consists of representatives from 18 cities, the Riverside County Board of Supervisors, the Eastern and Western Municipal Water Districts, the Morongo Band of Mission Indians, and the Riverside County Superintendent of Schools. As a group, WRCOG is focused on important regional matters that include securing a reliable supply of water to meet the existing and future demands of the subregion. This is accomplished by working collectively through its committee structure to share information and utilize resources that are cost effective. Western Riverside County's economic well-being and quality of life depend on conservation efforts that reduce water use and support alternative means for conveying water to southern California residents and businesses. For this reason, we are proud to support the City of Banning's effort that help to move our region towards more efficient and reliable water infrastructure. We welcome BOR's partnership in support of Banning's project and hope you give favorable consideration to the City's proposal.

If you have any questions I can be reached at (951) 405-6701 or rbishop@wrcog.us.

Sincerely,

Rick Bishop

Rick Bishop
Executive Director

OFFICIAL RESOLUTION

A resolution from the City Council of the City of Banning will be provided within 30 days of the application deadline. The Resolution is scheduled for Council on March 10, 2020.

The City of Banning will adopt this Resolution on March 10, 2020. An executed copy will be provided to the Bureau of Reclamation within 30 days of the grant deadline.

RESOLUTION 2020-XX

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF BANNING, CALIFORNIA, APPROVING THE APPLICATION FOR GRANT FUNDS FROM THE BUREAU OF RECLAMATION WATERSMART GRANTS: SMALL-SCALE WATER EFFICIENCY PROJECTS FOR FY 2020 PROGRAM FUNDING OPPORTUNITY NO. BOR-DO-20-F006

WHEREAS, the President of the United States and the United States Department of the Interior have provided funds for the WaterSMART Program; and

WHEREAS, the Bureau of Reclamation has been delegated the responsibility for the administration of this grant program, establishing necessary procedures; and

WHEREAS, said procedures established by the Bureau of Reclamation require a resolution certifying the approval of application(s) by the applicant's governing board before submission of said application(s); and

WHEREAS, the applicant, if selected, will enter into an agreement with the Bureau of Reclamation to carry out the development of the proposal.

NOW, THEREFORE, BE IT RESOLVED, by the City Council of the City of Banning a follows:

SECTION 1. The City Council approves the filing of an application for the WaterSMART: Small-Scale Water Efficiency Projects for Fiscal Year 2020 Program for the City of Banning; and

SECTION 2. The City Council appoints the City Manager, or his designee, to act as agent with legal authority to enter into the grant agreement; and

SECTION 3. The City Council certifies that the City Council of the City of Banning has reviewed and supports the proposed application; and

SECTION 4. The City Council certifies that the City of Banning has sufficient matching funds to provide the amount of funding/in-kind contributions specified in the funding plan included in the grant application; and

SECTION 5. The City Council certifies that the City of Banning will work with the Bureau of Reclamation to meet established deadlines for entering into a grant or cooperative agreement.

SECTION 6. The City Clerk shall certify to the adoption of this resolution and shall cause a certified resolution to be filed in the book of original resolutions.

The City of Banning will adopt this Resolution on March 10, 2020. An executed copy will be provided to the Bureau of Reclamation within 30 days of the grant deadline.

PASSED, APPROVED AND ADOPTED this 10 day of March, 2020.

_____
Daniela Andrade, Mayor
City of Banning

ATTEST:

_____
Marie A. Calderon, Deputy City Clerk
City of Banning

APPROVED AS TO FORM AND LEGAL CONTENT:

_____
Kevin G. Ennis, City Attorney
Richards, Watson & Gershon

CERTIFICATION:

I, Marie A. Calderon, Deputy City Clerk of the City of Banning, California, do hereby certify that the foregoing Resolution No. 2020-XX was duly adopted by the City Council of the City of Banning, California, at a regular meeting thereof held on the 10th day of March, 2020, by the following vote, to wit:

AYES:

NOES:

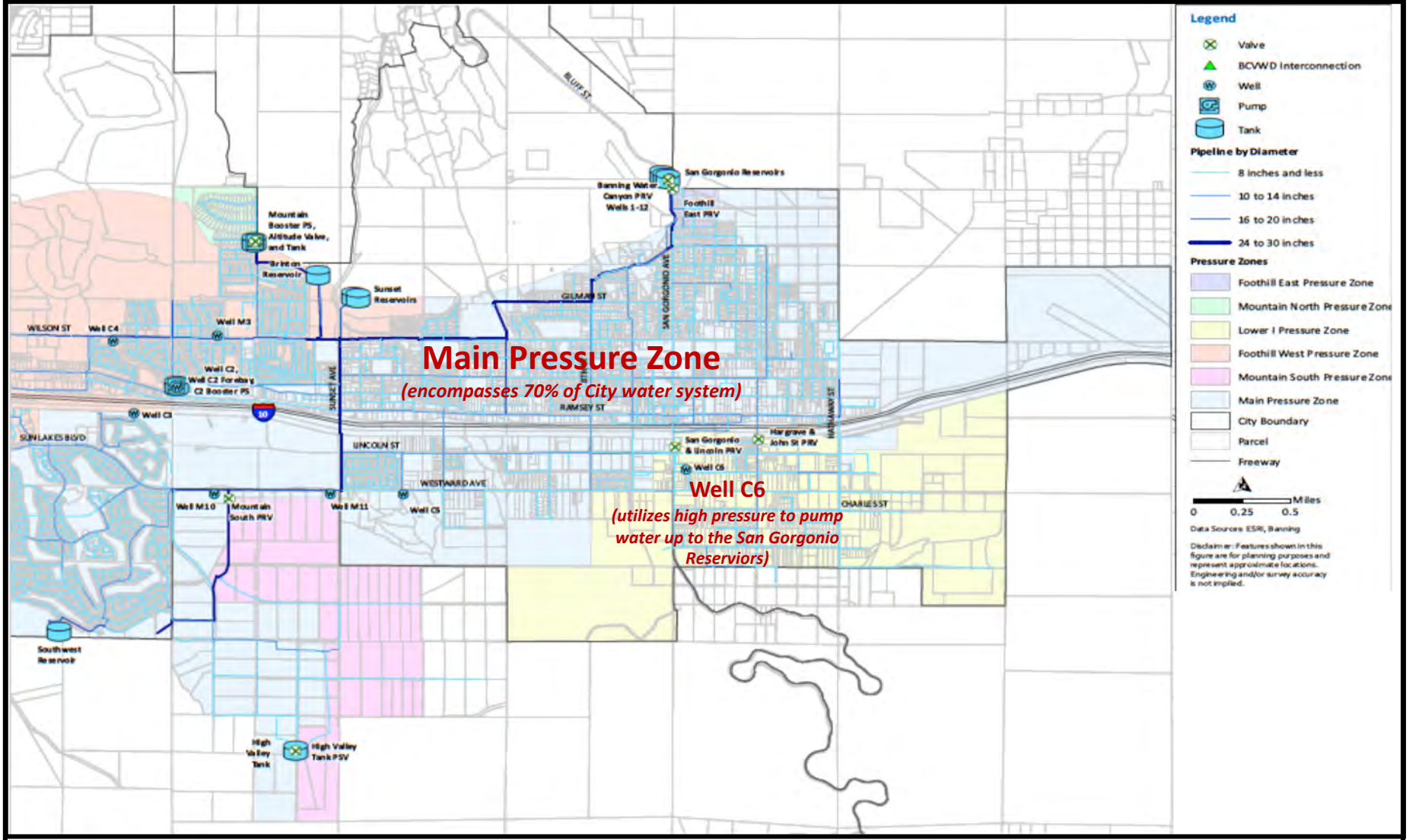
ABSTAIN:

ABSENT:

_____
Marie A. Calderon, Deputy City Clerk
City of Banning, California

Attachment A

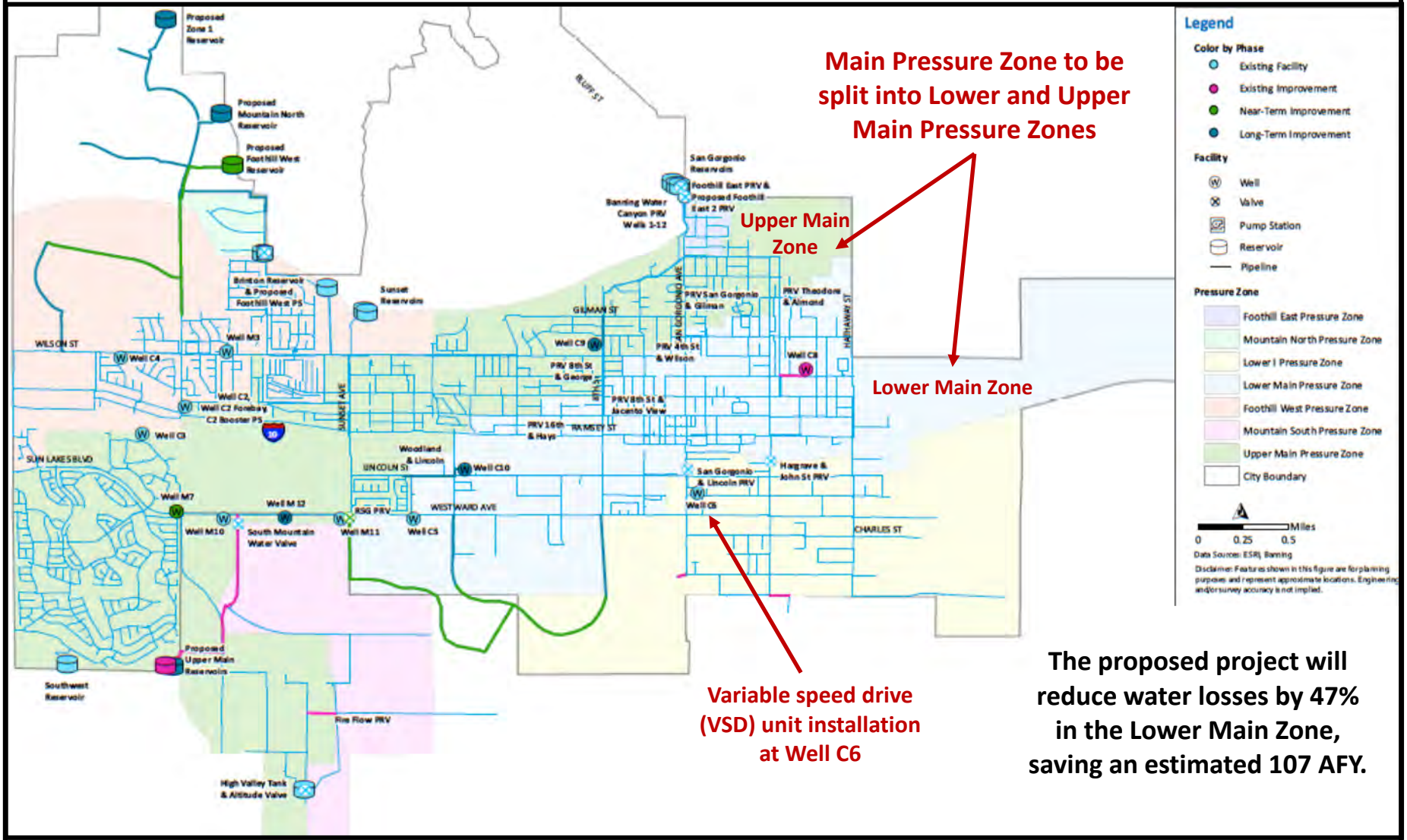
Existing Pressures Zones



City of Banning – Pressure Zone Separation & Water Loss Reduction Project
BOR WaterSMART: Small-Scale Water Efficiency

Attachment A

Proposed Water System Improvements



City of Banning – Pressure Zone Separation & Water Loss Reduction Project
BOR WaterSMART: Small-Scale Water Efficiency

Attachment B – CEQA

The City of Banning determined the proposed project qualifies for a California Environmental Quality Act (CEQA) Categorical Exemption. Environmental documentation has been filed and stamped by the County of Riverside (see attached documentation).

Print Form

Notice of Exemption

Appendix E

To: Office of Planning and Research
P.O. Box 3044, Room 113
Sacramento, CA 95812-3044

County Clerk
County of: Riverside
4080 Lemon Street, First Floor
Riverside, CA 92501

From: (Public Agency): City of Banning
99 E. Ramsey Street
Banning, CA 92220
(Address)

Project Title: City of Banning Pressure Zone Separation & Water Loss Reduction Project

Project Applicant: City of Banning

Project Location - Specific:
Well C6 located at 176 E. Lincoln St.; Pressure Relief Valves located at 4th St & Wilson St., 8th St. & George, 8th St. & Jacinto View, 16th St. & Hayes, San Gorgonio & Gilman, Theodore & Almond Way, Woodland & Lincoln St.

Project Location - City: Banning Project Location - County: Riverside

Description of Nature, Purpose and Beneficiaries of Project:
Project will install a new variable speed drive at Well C6 and rehab existing pressure relief valves at 7 locations throughout the City to separate the Main Pressure zone into an Upper Main and Lower Main zone. This will reduce water pressure-related system leakage & excess unwanted consumption for approx. 25% of customers.

Name of Public Agency Approving Project: City of Banning

Name of Person or Agency Carrying Out Project: Luis Cardenas, PE

Exempt Status: **(check one):**

- ☐ Ministerial (Sec. 21080(b)(1); 15268);
- ☐ Declared Emergency (Sec. 21080(b)(3); 15269(a));
- ☐ Emergency Project (Sec. 21080(b)(4); 15269(b)(c));
- ☒ Categorical Exemption. State type and section number: 15301(b)
- ☐ Statutory Exemptions. State code number: _____

Reasons why project is exempt:
Project consists of the repair and minor alteration of existing public utilities.

Lead Agency Contact Person: Jennifer Jackson Area Code/Telephone/Extension: 951-922-3130

If filed by applicant:

1. Attach certified document of exemption finding.
2. Has a Notice of Exemption been filed by the public agency approving the project? ☐ Yes ☐ No

Signature: _____ Date: 2-10-20 Title: Community Dev Director

☒ Signed by Lead Agency ☐ Signed by Applicant

Authority cited: Sections 21083 and 21110, Public Resources Code.
Reference: Sections 21108, 21152, and 21152.1, Public Resources Code.

Date Received for filing at OPR: _____

FILED / POSTED
County of Riverside
Peter Aldana
Assessor-County Clerk-Recorder
E-202000155
02/14/2020 04:22 PM Fee: $ 50.00
Page 1 of 1
Removed: By: Deputy

Attachment C

Water Loss Control Gap Assessment

City of Banning

September 2019

Contents

List of Figures

1 Strategy Overview

The City of Banning reached out to Water Systems Optimization (WSO) to complete a thorough review of water loss control initiatives. Water loss control has recently gained more attention from state regulators and water system managers. Industry leaders recognize the importance of optimizing distribution system efficiency as a potentially cost-effective water conservation measure. To help the City update their water loss strategy, WSO completed the following tasks:

- **Task 1:** Review past water audits and supporting data to interpret key performance indicators and gain high level appreciation for need to refine data collection and instrument maintenance practices.
- **Task 2:** Conference calls with relevant agency staff from engineering, production and operations, and billing and finance to better understand the need for and interest in water loss control.
- **Task 3:** In-person presentation of primary findings including a facilitated strategy session including representatives from relevant agency departments.
- **Task 4:** Written report describing prioritized water loss control activities for the City to consider as part of a broader water loss control effort (this document).

Ultimately, during the in-person strategy session, City water department leaders and WSO staff developed the water loss control project timeline shown in Figure 1. This timeline is currently in draft form and may need to be modified to accommodate other operational priorities. Each project shown in the timeline is categorized as a data management, water loss analysis, real loss, or apparent loss activity, and described in more detail through the rest of this report.

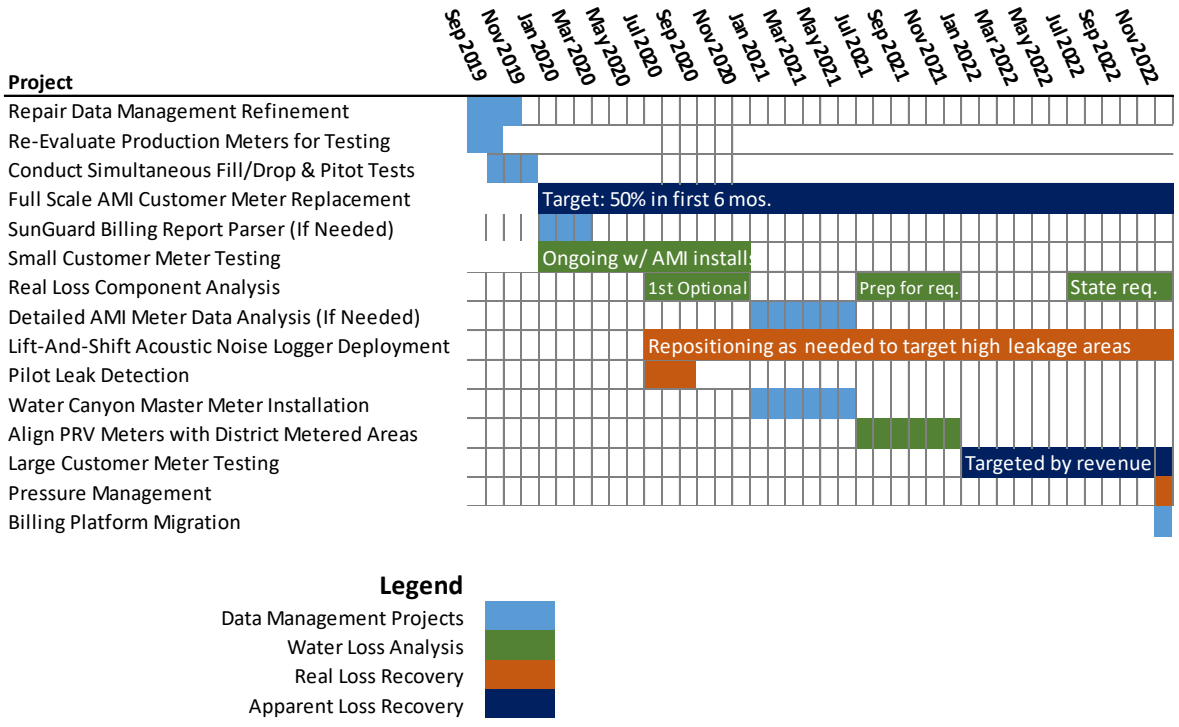


Figure 1: City of Banning Proposed Water Loss Project Timeline

2 Data Management Projects

Data management projects seek to streamline the City's data collection and archival practices. By engaging in these projects, the City can expect to collect more accurate data in a format that allows for efficient analysis.

2.1 Re-Evaluate Production Meters for Testing

In past years, the City has been able to complete pitot tube tests on meters that record less than 90% of the source volume recorded in each year. To improve confidence in the reported volumes of water supplied in the water audit, every source meter that is feasible to test should be tested. The City should re-evaluate each metering site to determine the feasible and most appropriate testing strategy for that site. Ideal test strategies involve insertion probe testing and drop/fill tests.

1. **Insertion probe testing:** Insertion meter testing using a single point water velocity measurement device, instead of a multiport pitot tube, may provide a more sensitive means of evaluating the effect of turbulent flows on the confidence in test results. The single point velocity measurement is important because technicians can measure the velocity at different points across the pipe diameter and assess how the velocity at each point changes through time. The well site WSO visited at the City was equipped with a tap suitable for this style of test; it had a minimum 1" bore.
2. **Drop/fill testing:** Figure 2 shows a simplified diagram of how a fill test works. Essentially water is passed through the meter at a representative flow rate and introduced into a nearby reservoir. It's important that all the water flowing through the meter ends up in the reservoir, with no leaky valves in between. By comparing the volume change in the nearby reservoir (Vr) to the meter's registration (Vm), City staff will be able to assess the meter's accuracy.

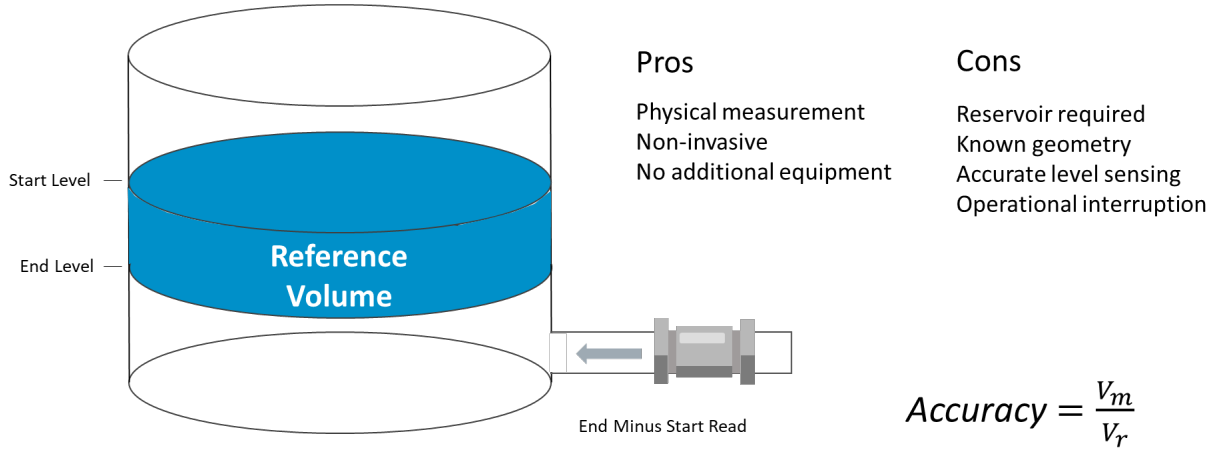


Figure 2: Fill Test Summary

2.2 Conduct Simultaneous Fill/Drop & Pitot Tests

After evaluating the most appropriate test strategies for each source metering site, the City may wish to complete simultaneous insertion probe or pitot tube and fill tests at select sites. WSO reviewed a representative as-built drawing of a typical well site at the City, Figure 3. The as-built shows that, like most well sites, there is not adequate straight length of pipe to ensure a stable and laminar flow profile required for accurate metering. WSO would expect the flow condition to affect both the in-situ meter and a pitot tube or insertion style test meter installed immediately upstream or downstream of the in-situ meter. Therefore, WSO recommends that the City conduct a fill test at the same time as a pitot or insertion probe test since the volume change in the reservoir is not affected by upstream or downstream straight length at the metering site. By comparing the test result from the pitot tube or insertion probe with the result from the fill test, the City will be better able to assess confidence in pitot or insertion meter test results at sites with limited straight length.

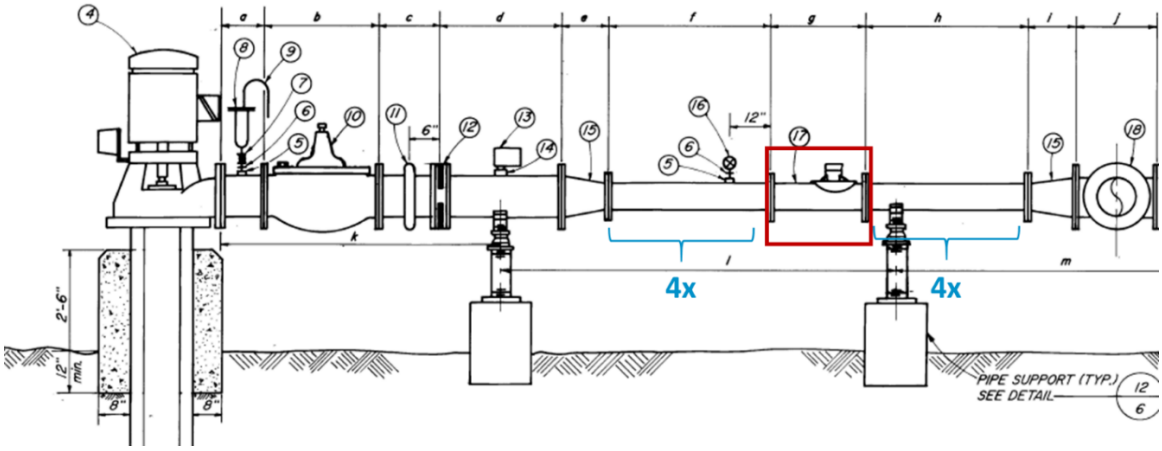


Figure 3: Representative Well Site As-Built

2.3 Repair Data Management Refinement

WSO reviewed samples of three sources of data that describe leaks repaired by the City; work orders, the GIS system, and the leak "clipboard" excel workbook. A thorough review of the fields contained in those samples can be found in WSO's excel workbook titled, "Leak Records Review – City of Banning.xlsx". WSO's review contains specific recommendations for fields that the City should be tracking to facilitate completion of annual real loss component analyses (RLCA).

Current plans outlined by the State Water Resources Control Board (SWRCB) indicate that RLCA will become a statewide reporting requirement starting in the year 2023. Therefore, it is especially important that the City ensure they are tracking all the necessary data points for each leak to make completing the RLCA as efficient as possible. To accomplish this, as shown in Figure 4, WSO recommends that the City archive all relevant leak data points in a single flat table with one row for each leak. This approach streamlines data archival since there would be just one source of data for each leak instead of many, and data in an excel-friendly table can be easily summarized as required for each analysis. The City's GeoViewer project may serve this purpose.

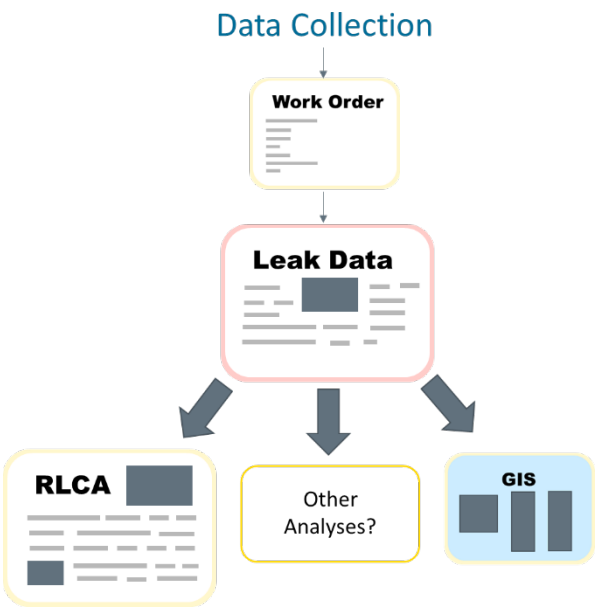
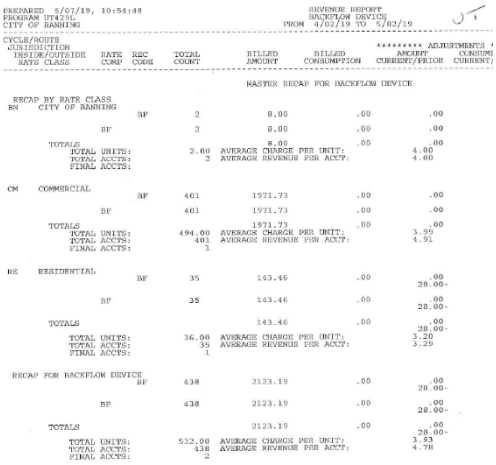


Figure 4: Proposed Leak Data Archival Process

2.4 SunGard Billing Report Parser (If Needed)

City staff indicated that one of the challenges with the existing billing system is generating useful reports in an excel-friendly format that would facilitate additional analysis. While the City does have the Cognos reporting package, and that suite of tools may meet the reporting and analytical needs for the City, staff currently copy and paste figures from .csv or .pdf format reports exported directly from the billing system. This can be a very time-consuming manual process, and as with any manual data manipulation, errors are possible. WSO is well equipped to develop custom data processing tools that would allow users to store .csv and .pdf reports in a single folder and then execute a small program to harvest the relevant datapoints from each file in the folder and output a clean excel file with the organized data. This toolset could significantly reduce the time required to manually transcribe data from one document to another while reducing the potential for errors.



PREPARED 5/07/19, 10:54:48 REVENUE REPORT
PROGRAM UT425L BACKFLOW DEVICE
CITY OF BANNING FROM 4/02/19 TO 5/02/19

MASTER RECAP FOR BACKFLOW DEVICE

CYCLE/ROUTE / JURISDICTION INSIDE/OUTSIDE RATE CLASS		RATE COMP	REC CODE	TOTAL COUNT	BILLED AMOUNT	BILLED CONSUMPTION	ADJUSTMENTS AMOUNT CURRENT/PRIOR	CONSUMP CURRENT/
RECAP BY RATE CLASS								
BN CITY OF BANNING								
			BF	2	8.00	.00	.00	
			EF	2	8.00	.00	.00	
TOTALS					8.00	.00	.00	
TOTAL UNITS:				2.00	AVERAGE CHARGE PER UNIT:		4.00	
TOTAL ACCTS:				2	AVERAGE REVENUE PER ACCT:		4.00	
FINAL ACCTS:								
CM COMMERCIAL								
			BF	401	1971.73	.00	.00	
			EF	401	1971.73	.00	.00	
TOTALS					1971.73	.00	.00	
TOTAL UNITS:				494.00	AVERAGE CHARGE PER UNIT:		3.99	
TOTAL ACCTS:				401	AVERAGE REVENUE PER ACCT:		4.91	
FINAL ACCTS:				1				
RE RESIDENTIAL								
			BF	35	143.46	.00	.00	28.00-
			EF	35	143.46	.00	.00	28.00-
TOTALS					143.46	.00	.00	28.00-
TOTAL UNITS:				36.00	AVERAGE CHARGE PER UNIT:		3.20	
TOTAL ACCTS:				35	AVERAGE REVENUE PER ACCT:		3.29	
FINAL ACCTS:				1				
RECAP FOR BACKFLOW DEVICE								
			BF	438	2123.19	.00	.00	28.00-
			EF	438	2123.19	.00	.00	28.00-
TOTALS					2123.19	.00	.00	28.00-
TOTAL UNITS:				532.00	AVERAGE CHARGE PER UNIT:		3.93	
TOTAL ACCTS:				438	AVERAGE REVENUE PER ACCT:		4.78	
FINAL ACCTS:				2				

Figure 5: Billing System Report Example

2.5 Detailed AMI Meter Data Analysis (If Needed)

Replacing every customer meter in the City's service territory is a major undertaking. In WSO's experience, agencies undergoing similar efforts sometimes run into challenges managing the data from the new AMI meters. Examples of specific issues that may arise during the AMI replacement effort include:

- **Mismatched Location IDs:** While replacing meters, it's important to track which location a new meter is installed to ensure that billed volumes represent use from the intended location. Incorrectly associating a meter with a location can result in billing one customer for use at a different location.
- **Mismatched Meter Multiplier Units:** Some AMI systems allow users to configure the units in which each meter is read. However, the billing software must also be configured to matching units. For example, if the meter is read in CCF, but the billing software is configured to interpret those readings as CF, the water agency may bill for 100x less volume than was delivered.
- **Duplicated Use:** There are many potential causes for duplicated use in billed and summary volumes, such as faulty SQL queries between raw meter readings and meter characteristics tables in billing databases. The impact of duplicates on billed volumes and summary analyses of authorized use can be significant.
- **Negative Use:** While WSO has seen bi-directional AMI meters installed backwards, resulting in negative use volumes, it's more common to encounter electrical or software problems that introduce negative use volumes into AMI meter reading data.
- **Mishandled Meter Rollovers:** Some AMI meters still use a digital register reading that increments upwards like an odometer, before "rolling" over back past 0 units. Some new AMI software systems do not handle rollovers consistently, which can result in enormous negative use volumes in raw AMI data.
- **Missing Meters:** Simply failing to configure a meter in the billing system that was installed in the field could result in significant revenue losses.

These problems can be hard to identify in the enormous volume of data generated by an AMI customer metering system. While the City should be checking for issues like those described above throughout the AMI installation effort, WSO recommends that the City plan to conduct a thorough review of the AMI data collected approximately one year after beginning the replacement effort. By waiting one year at least, the City will have collected enough data for analysis, while retaining the ability to update practices for a significant number of remaining AMI meter installations as needed. To conduct such a review, WSO has outlined an example data request in the appendix, "Appendix III: AMI Data Reporting Capability". City staff should ensure that the new AMI system can provide raw data a format that would facilitate error detection before committing to replacing all the meters.

While this project is categorized under data management, the results of a detailed analysis of AMI use data may also result in apparent loss recovery for the City.

2.6 Water Canyon Master Meter Installation

Several well meters record the volume of water supplied from the Water Canyon. Each of the lines from wells upstream join into a single master line before feeding the distribution system. This configuration presents an opportunity for the City to install a master meter on the line to record the total volume of water produced at the well sites. There are several potential benefits to installing a new master meter, including:

- **Improved Installation Conditions:** If possible, the new metering site could be designed with a minimum of >20x pipe diameters upstream straight length and >10X pipe diameters downstream.

Straight length of pipe is important to ensure that the flow profile at the metering site is well developed (laminar) to provide optimum conditions for metering accuracy.

- **Avoided Compounding Meter Error:** By reducing the number of meters recording the volume of water supplied from this area, the City avoids compounding meter errors. Managing one meter's potential error is easier than many.
- **Simplified Testing and Calibration Efforts:** While installing the new meter, if possible, the City should also install a test port inline with the meter with enough upstream and downstream straight length to facilitate insertion meter or pitot tube testing.

2.7 Billing Platform Migration

City staff indicated that the existing billing system presents some challenges for the water department including identifying customer master and sub-metering arrangements, tracking service types, and generating user-friendly reports. Migrating to a new billing platform also presents challenges since other utility departments use the same system. Therefore, selecting a new billing system must involve diverse stakeholders to ensure an updated system will meet each group's minimum functionality requirements.

3 Water Loss Analysis

Water loss analysis projects aim to assess the types of water loss the City is experiencing, value those losses, and select appropriate intervention strategies to recover losses cost effectively.

3.1 Small Customer Meter Testing

While replacing AMI meters, the City plans to test a random sample of small customer meters being replaced in addition to a random sample of new meters before being installed. WSO recommends testing a random sample between 250-300 meters from each group to assess their performance, however, operational constraints may limit on the number of meters that can be tested. The results of testing can be used to estimate the expected return on investment for the meter replacement program.

Figure 6: Example Small Customer Meter

3.2 Real Loss Component Analysis

The State Water Resources Control Board (SWRCB) and the Department of Water Resources (DWR) will likely require California urban retail water suppliers complete three real loss component analyses (RLCA), with the first submission due in 2023. In addition, a real loss component analysis is the latest industry

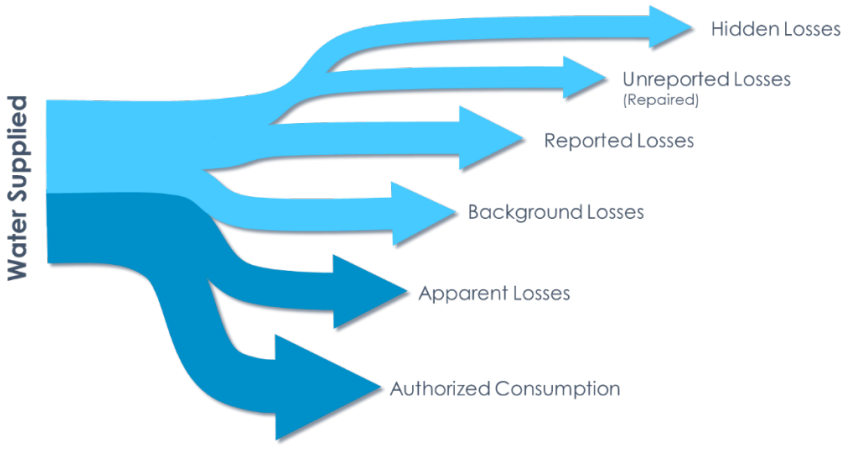
standard methodology for estimating potential water loss recovery. Furthermore, it is the starting point for evaluating investments in water loss recovery. Therefore, WSO recommends that the City complete at least one RLCA in advance of state submission to provide ample opportunity for refinement before the results of the RLCA are considered in a regulatory context.

The remainder of this section provides a conceptual overview of the real loss component analysis approach. Based upon the results of the water audit, the total volume of real loss can be further subdivided to allocate the volume to three meaningful categories:

- **Background Leakage:** Leaks of low flow rates, continuously running, and not discoverable by leak detection. Typically composed of pin-holes and minor leaks at pipe joints and fittings.
- **Reported Leakage:** Reported Leakage includes breaks reported by the public or utility staff. Generally high flow rate and of relatively short duration.
- **Unreported Leakage:** Breaks not reported by the public or utility staff but either discovered or potentially discoverable through leak detection. Unreported leaks that have not yet been discovered are collectively referred to as "**hidden losses**" or "hidden leakage." Unreported leaks are generally moderate flow rates with average runtimes dependent on the intervention practices of the respective utility.

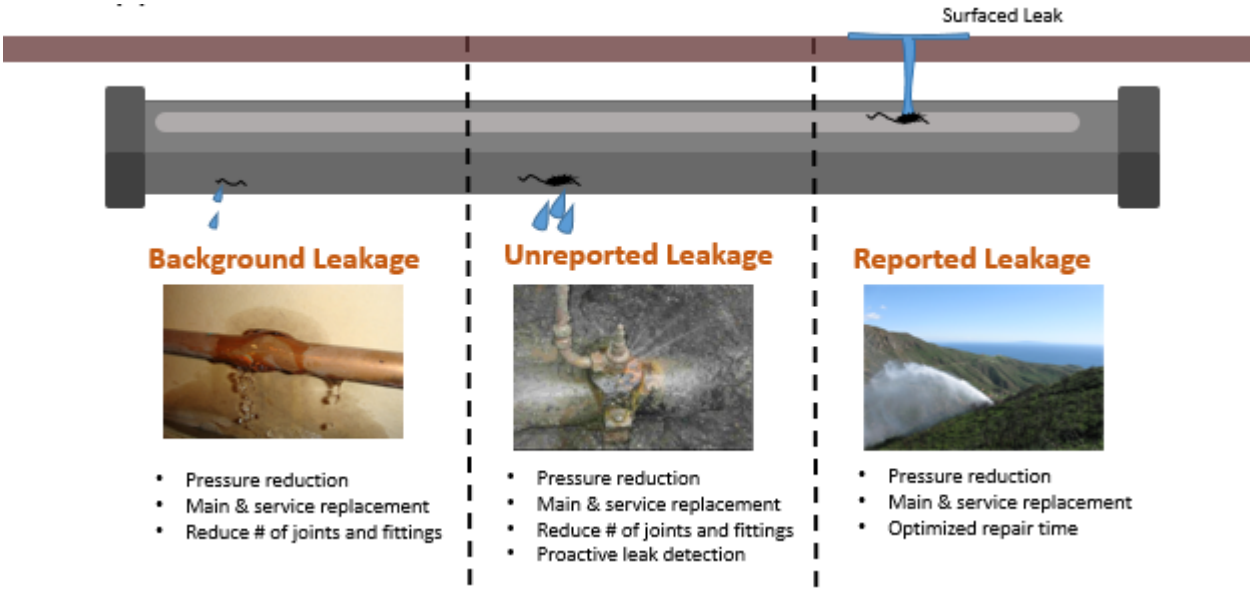
The disaggregation of real losses (also called a real loss component analysis) is a process of elimination, and as such, any error in the preceding volumes will have a direct impact on subsequent volumes. Figure 9 shows how volumes are deducted from the total volume of water supplied to estimate components of real losses.

Figure 7: From Water Audit to Real Loss Component Analysis



The categories of background, reported, and unreported leakage were defined to describe types of loss that can be recovered using specific intervention strategies. Figure 8 shows the different types of real loss and the intervention strategies relevant to their recovery. For example, the principal recovery strategy for unreported leaks that have not been identified and repaired is proactive leak detection. Notably, all forms of real loss can be recovered through strategic pressure management because leak incidence and flow rate are highly related to pressure dynamics in water distribution systems.

Figure 8: Types of Real loss and Their Intervention Strategies

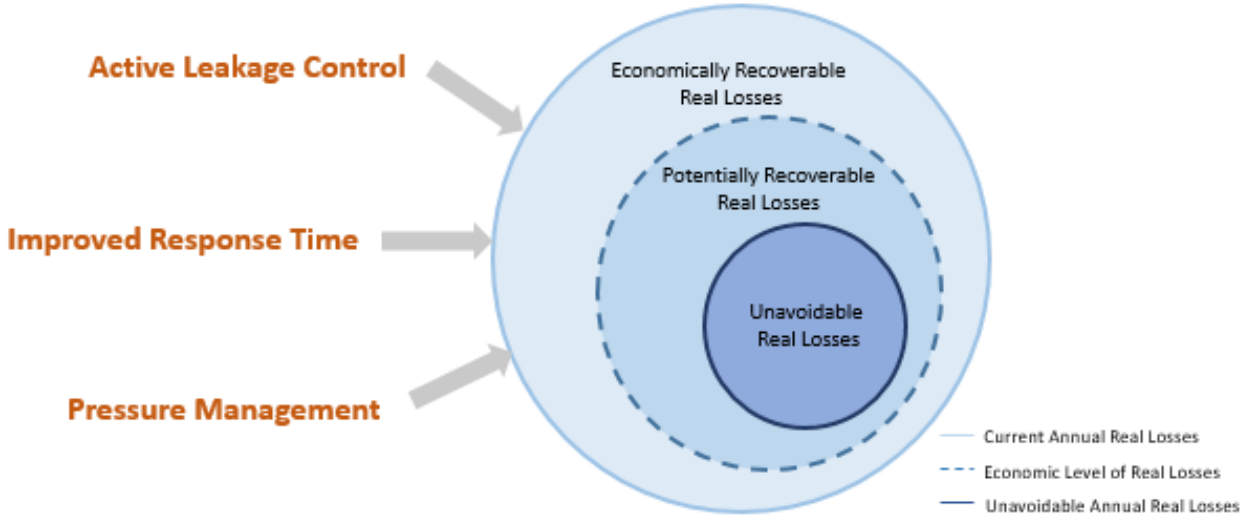


The goal in prescribing real loss intervention is to seek a balance between the value of water saved and the cost of intervention. This balance is called the Economic Level of Leakage (ELL). WSO typically considers three primary short to medium term intervention strategies against real losses because they are commonly the most cost effective:

- **Proactive Leak Detection:** The largest volume of recoverable leakage currently running in the distribution system is comprised of hidden losses. These losses are potentially recoverable using acoustic leak detection equipment.
- **Pressure Management:** Pressure management is typically the only viable intervention strategy to reduce background losses. (Although it is also an effective strategy for reducing all types of loss.) WSO quantified the potential savings by reducing the system average pressure and therefore reducing leak flow rates.
- **Improved Response Time**: Typically a small percentage of real losses are lost to reported leakage—leaks that were called in to the utility for repair. One avenue for recovery is to respond to and contain these reported leaks faster.

The ELL, visualized in Figure 9, represents the most effective level of leakage given current valuation of resources. The outer blue circle represents the Current Annual Real losses (CARL). The inner core represents the volume of real losses that cannot be technically removed due to the inherent limitations of current leakage management technologies. This volume is called the Unavoidable Annual Real loss (UARL). The UARL is calculated based on industry standard values (leakage allowances) published by the American Water Works Association (AWWA). The published UARL values represent the technically achievable lowest level of real losses for networks operated with 'best practice' leakage management and with infrastructure in good condition.

Figure 9: The Economic Level of Real losses



3.3 Align PRV Meters with District Metered Areas

City staff described installing meters at PRV sites that define the boundaries of existing pressure zones. These PRV meters could be used to complete separate water loss analyses for each pressure zone. Each pressure zone would effectively be a hydraulically discrete district metered area (DMA). By assessing water losses on a monthly, or even weekly, basis for each zone the City would be better able to deploy water loss recovery efforts where water losses are severe enough to justify the investment.

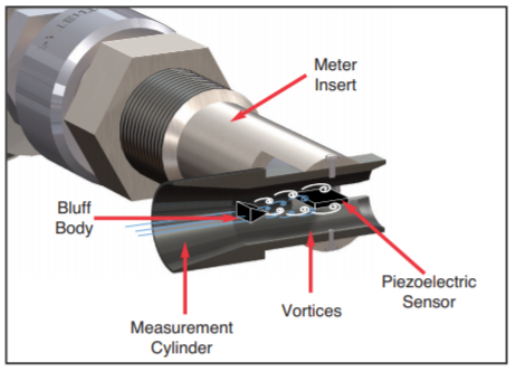


Figure 10: Example Cla-Val PRV Meter

WSO is not certain of realistic expectations for PRV meter accuracy, like the unit shown in Figure 10. However, it's possible that the meters are accurate enough to detect significant changes in water loss above a previously established "baseline" level of loss calculated after completely surveying the pressure zone and repairing all detectable leaks.

4 Real Loss Recovery Projects

Real loss recovery projects aim to reduce real losses by helping to find and subsequently repair leaks in the distribution system.

4.1 Lift-And-Shift Acoustic Noise Logger Deployment

As part of the recent grant award from the Bureau of Reclamation, the City will purchase approximately 15 acoustic noise loggers for leak detection. These units are installed on accessible system appurtenances and transmit leak alarms when they detect sustained leak noise. In WSO's experience, these types of acoustic loggers transmit a high proportion of false positive leak alarms, but it will be interesting to evaluate the City's experience with their selected vendor.

Figure 11: Example Seba Acoustic Noise Loggers

The City should deploy acoustic noise loggers and once satisfied that all detectable leaks in that area have been found, shift the loggers to a new location. Ultimately, the City may wish to deploy the loggers in regions where leaks tend to return more rapidly after previous leak detection and repair efforts. In this way, the noise loggers could serve as an advanced warning system for newly developing leaks in high risk areas, if the system functions as expected.

4.2 Pilot Leak Detection

While modern leak detection strategies like acoustic noise loggers, and even satellite leak detection, have gained much attention recently, there is still a place for traditional acoustic leak detection surveys conducted by trained technicians. Traditional surveys involve leak detection technicians walking the distribution system and listening to all accessible appurtenances including hydrants, valves, and service connections. Since the City has not tried proactive leak detection in the past, WSO recommends that the City engage in a small pilot program to help assess the potential for loss recovery without incurring the upfront investment of surveying the whole system. To start, WSO recommends that the City survey approximately 30% of the system, or 50 miles of mains. Based on the results of that effort the City will be better positioned to decide if it is cost effective to survey the remaining mileage.

4.3 Pressure Management

The City is currently operating the two largest pressure zones as a single pressure zone because water produced at well sites in one zone must be moved through distribution infrastructure to supply demands in the other zone. However, this arrangement has resulted in keeping one of the pressure zones at a very high pressure to maintain pressures at higher elevations in the other zone. The City should separate these zones to be able to reduce pressures in the lower zone.

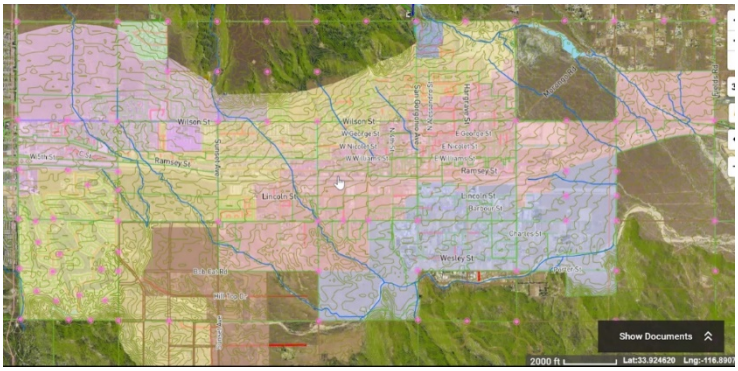


Figure 12: Pressure Zone Map

5 Apparent Loss Recovery Projects

Apparent loss recovery projects aim to identify and subsequently reduce apparent losses, like systematic data handling errors, customer metering inaccuracy, and theft.

5.1 Full Scale AMI Customer Meter Replacement

The City is planning on replacing every customer meter in the service territory starting in 2020 over a period of three years.

5.2 Large Customer Meter Testing

Customer meters greater than 2 inches typically record more than 20% of the volume of potable water for other water agencies in Southern California – therefore inaccuracy among this smaller group of meters may have a larger impact on the revenues collected for the City's water sales than other meters that record less volume.

An optimum test and repair frequency for each large meter should balance the risk of under-registration with the cost to test and repair the meter. WSO recommends that the City apply a least cost of ownership model to each large meter to derive the optimum frequency for testing each large meter. The City should seek to minimize the total cost of maintaining each large meter by balancing two component costs:

- **Cost of Testing and Repair:** The cost of testing and repair consists of any expenses relating to testing the meter, including staff time, and costs for labor and materials to repair the meter to as-new accuracy.
- **Cost of Inaccuracy:** If a customer meter under-registers the volume of water delivered to the customer then that customer would also be under-billed. The amount the customer is underbilled is also a cost associated with maintaining the meter.

Figure 13: Example Large Customer Meter

6 Appendix II: Past Water Audit Review

WSO reviewed the past three year's water audits for the City. Figure 14 shows the normalized rate of real and apparent losses for the three water audits submitted to the state in 2016, 2017, and 2018. The y-axis shows the normalized rate of loss in gallons per connection per day. The x-axis shows the submission year and the height of each bar indicates the value for that year. The horizontal dashed lines show the approximate median value for California urban retail water suppliers.

The City's normalized performance indicators show that the rate of real and apparent loss, as reported in the water audits, is significantly greater than the statewide median values. However, this simple comparison neglects the importance of the cost of water losses experienced by the City.

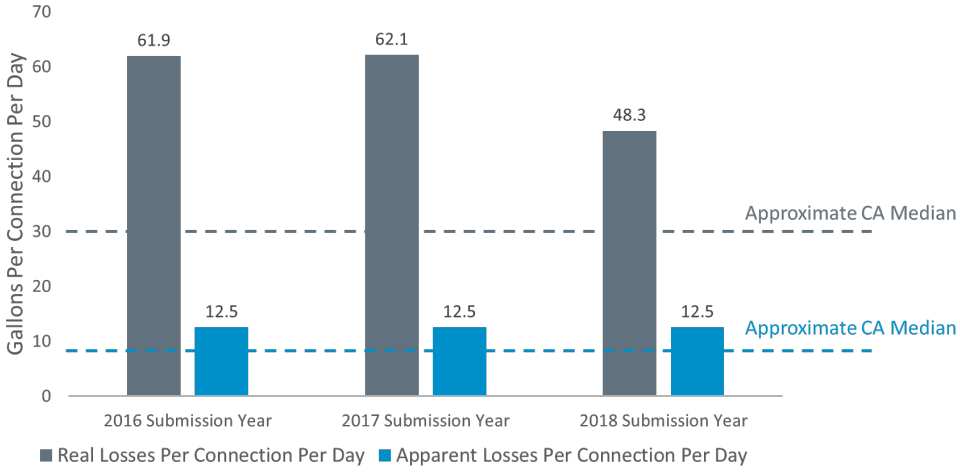


Figure 14: Normalized Volumetric Performance Indicators

The graph to the left in Figure 15 below shows the volume of real loss per mile of main for the City compared to the approximate statewide median value. As described above, the volume of loss per mile is greater for the City than the statewide median. The graph on the right shows the *value* of real loss for the City[1] per mile of main compared to the approximate statewide median value. Since the City's variable production cost is much lower than most California retail urban water suppliers, the value of real losses per mile of main for the City is significantly less than the approximate statewide median.

Figure 15: Volume vs. Value of Real Loss

[1] Real losses have been valued using variable production cost, however, it may be appropriate to value real losses at customer retail unit cost because the City must conserve water to remain within available resources.

7 Appendix III: AMI Data Reporting Capability

In WSO's experience, AMI metering manufacturers commonly make overly-optimistic claims about access to underlying customer use data from their systems. For example, to complete a detailed integrity analysis of underlying AMI use data, WSO would request data for the volume of use from each meter in the City for every *hour* or day since installation including each meter's ID and the MXU (transmitter) ID. The data must be provided in tidy .csv, .txt, or excel file(s). Many meter manufacturers have struggled to or have simply been unable to provide this data for analysis. However, when received in this format, WSO is most efficient in analyzing the exported data.

The example dataset below shows a sample of how this data should be formatted at a minimum. Due to the volume of data associated with hourly reads, the data export may need to be completed in multiple .csv or excel files.

Table 1: Example Format for Mass AMI Data Export

Meter ID	MXU	Timestamp	Volume (CF)
1	34	2019-01-01 00:00:00	0
1	34	2019-01-01 01:00:00	0
1	34	2019-01-01 02:00:00	1
1	53	2019-01-01 03:00:00	0
1	53	2019-01-01 04:00:00	5
1	53	2019-01-01 05:00:00	0
2	23	2019-01-01 00:00:00	0
2	23	2019-01-01 01:00:00	4
2	23	2019-01-01 02:00:00	8
2	23	2019-01-01 03:00:00	0
2	23	2019-01-01 04:00:00	0
3	346	2019-01-01 00:00:00	1
3	346	2019-01-01 01:00:00	0
3	346	2019-01-01 02:00:00	1
…	…	…	…