Drinking Water State Revolving Fund Green Project Reserve

City of Ashton Drinking Water Project

SRF Loan #DW

$3,604,700

Final Green Project Reserve Justification

Categorical GPR Documentation

1. REPLACING 530 EXISTING MALFUNCTIONING WATER METERS WITH AMR SYSTEMS (Water Efficiency). Categorical GPR per 2.2-3a: *…replacing existing malfunctioning water meters with Automatic Meter Reading (AMR) systems;* also 2.2-9: *Projects that result from a water efficiency assessment such as water audits.* ($186,000).

Categorical & Business Case GPR Documentation

2. REPLACES 12,600 LINEAL FEET OF 4" DIAMETER AGING CAST IRON DISTRIBUTION PIPING WITH NEW 6" & 8" DIAMETER PVC PIPE (Water Efficiency). Categorical GPR per 2.4-1: *Projects that result from a water efficiency related assessment such as water audits;* Business Case 2.4-4: *Proper water infrastructure management should address where water losses could be occurring…fix them…replacing aging infrastructure.* ($1,863,959).

Business Case GPR Documentation

3. INSTALLS VFD ON AN EXISTING 25 HP BOOSTER PUMP (Energy Efficiency). Business Case per 3.5-1: *… energy efficient retrofits (includes VFDs (variable frequency drives)).* ($12,000).

Prepared by the State of Idaho SRF Loan Program
June 2013

Categorical

1. Existing Water Meter Replacement

Summary

- Replacing 530 malfunctioning water meters with an Automatic Meter-Reading system (AMR). In addition to the AMR component, the overall project also includes enhancements to the water treatment system to address high nitrate concentrations, and improvements to the distribution system.
- Loan amount = $3,604,700
- GPR portion of loan (AMR) = 5% ($186,000)

Background

- The water system serves 1,100 people and has approximately 500 residential connections. Total annual water use is 109 million gallons or 0.298 million gallons per day (MGD)[1].
- The existing water meters are approximately 18 years old, are not radio-read, are malfunctioning, and cannot be recalibrated.
- Increased water loss, due to leaks and inaccurate meter readings, are partly attributed to the old meters.

Results

- A 2008 water audit conducted by the City indicated[2] the water meters may be one source of the 15% water leakage measured in the audit. The existing meters are not of an automatic meter-reading type.
- The audit indicated the meters were not properly accounting for flows and that this type of meter could not be recalibrated.
- The Facilities Planning Study[1] recommended the replacement of the meters with an AMR system.
- The new AMR system will include built-in leak detection and backflow detection[3].

Other Benefits

- Replacing the old meters will increase water efficiency by decreasing the amount of water lost and by providing more accurate water-use information to customers and the system.
- Decreasing the amount of water lost will save on water pumping and treatment costs.

Conclusion

- Accurate metering of water consumption is an important conservation measure because providing more accurate water bills sends a strong price signal to customers and will result in more efficient consumption.
- Water leakage and inaccuracy increases with water meter age; therefore, an investment in water meters today will lead to additional water and dollar savings over time. Also, the water savings from the meter replacement will extend the life of the water supply and delay capital expansion projects.
- **GPR Costs**: Replacing malfunctioning water meter with AMR meters = $186,000
- **GPR Justification**:
  - The project is Categorically GPR-eligible (Water Efficiency) per Section 2.2-3a*: replacing existing malfunctioning water meters with Automatic Meter Reading (AMR) systems;*
  - Also GPR-eligible per Section 2.2-9: *projects that result from a water efficiency assessment such as water*

[1] City of Ashton Water Facilities Planning Study, November 2010, Schiess Engineers
[2] Water Audit Report for the City of Ashton, November 2008, Schiess Engineers
[3] 2/22/12 Correspondence with Marvin Fielding P.E., Design Engineer, Schiess Engineers

audits[4].

[4] 2010 EPA Guidelines for Determining Project GPR-Eligibility. Attachment 2.

2. Pipe Replacement

Summary

- Replacement of 12,600 feet of early1950s era lead-jointed cast iron (CI) distribution pipe with new 6-inch and 8-inch PVC pipe to eliminate the loss of 17 million gallons of water per year (MGY), equal to 15% of total production and 95% of total system water loss.
- Loan amount = $3,604,700
- Pipe Replacement portion of loan = 52% ($1,863,959)
- Annual water savings = 17 million gallons (MG)

Background

- A 2008 water audit conducted by the City indicated[5] extensive leakage most likely attributed to the 4" diameter 1950's era cast iron lead jointed distribution pipe. The audit later confirmed a loss of over 15% of total water production.
- A Water Facilities Planning Study[6] recommended the replacement of 12,600 linear feet of 4" diameter cast iron pipe with 6" and 8" diameter PVC distribution pipe.
- The project will replace 12,600 feet of 1950's era 4" diameter lead-joint cast iron pipe with 6" and 8" PVC.
- The new 6" and 8" PVC pipe will eliminate 95% of water leaks.

Calculated Savings by Eliminating Water Loss

- The total amount of water leaving the booster pump was determined using the daily flow records maintained by the City. The total amount of water delivered to service connections was determined using meter readings provided by the City plus an estimated water usage for several unmetered service connections.
- The results of this analysis show that approximately 18MGY is unaccounted for (=15% of the water leaving the booster pump).
- By replacing the 12,600 feet of pipe the system anticipates conserving 17 MGY (= 95% of overall water loss).
- At $465/MG of treated water produced, and $931/MG to pump water, a savings of $7,900/ year in water production costs and energy cost savings of $15,830/year will be realized, resulting in a total annual cost savings = $23,730/year.
- Over a 40 year period, cost savings = $950,000 are realized through lower water production and energy costs.

Conclusion

- By replacing the 12,600 feet of pipe the City anticipates conserving 17 MGY, and cost savings over the life of the project of at least $950,000. Additional cost savings will also be realized from lower energy costs for pumping due to less friction in the new, larger diameter PVC pipe to be installed.
- Other benefits include reductions in unnecessary pumping and O&M expenditures, and eliminating potential health hazards associated with waterborne pathogens entering the water distribution system.
- **GPR Costs**: Replacing 1,100 feet of distribution piping = $56,000
- **GPR Justification**:
  - The project is Categorically GPR-eligible (Water Efficiency) per Section 2.4-1: *Projects that result from a water efficiency related assessment such as water audits*;

[5] Water Audit Report for the City of Ashton, November 2008, Schiess Engineers
[6] Water Facilities Planning Study, City of Ashton, November 2010, Schiess Engineers

- Also GPR-eligible (Water Efficiency) per a Business Case by 2.4-4: *Proper water infrastructure management should address where water losses could be occurring…fix them…replacing aging infrastructure*[7].

Business Case

3. PUMP RETROFIT[8]

Summary

- VFD installation on an existing 25 HP booster pump (ABB Model ACS/ACH 550-U1-038A-4).
- Loan amount = $3,604,700
- Estimated energy efficiency (green) portion of loan = $12,000
- Estimated annual energy savings of $5,377 per year resulting in a payback period of approximately 2.2 years.

Background

- The city currently has a butterfly valve downstream of the booster pump throttled back about 75 percent to create back pressure on the pump in order to dampen surging. The throttled valve results in 20 psi of back pressure
- The pumps operate continuously (8,760 hr/yr) on an approximate normal distribution duty cycle.

Results

- With the VFD, the pump will operate more efficiently at all flows: with VFD costs of $12000, continuous pump operation (8760 hr/yr), normal distribution duty cycle, motor efficiency of 92.4%, and energy costs of $0.06/kWh, the WEG Electric Corp. Energy Savings Estimator[9] calculates an annual cost savings of $5,377 with a payback period of 2.2 years.
- Total savings in power costs with the VFD = $5,377/yr.
- Payback period = 2.2 years.

Conclusion

- By installing a VFD on a 25 HP booster pump the City can save up to $5,377/yr. in energy costs.
- The payback period for the VFD is approximately 2.2 years.
- **GPR Costs**: Installing a VFD = $12,000
- **GPR Justification**: The project is GPR-eligible (Water Efficiency) per a Business Case by Section 3.5-1: *energy efficient retrofits (includes variable frequency drives)*[10].

[7] Attachment 2. EPA Guidelines for Determining FY11 Project GPR-Eligibility.
[8] 3/10/11 Correspondence with Marvin Fielding P.E., Design Engineer, Schiess Engineers
[9] http://www.weg.net/green/us/save-money.html
[10] 2010 EPA Guidelines for Determining Project GPR-Eligibility. Attachment 2.