

Drinking Water Revolving Fund  
Green Project Reserve Qualification Template

Applicant:

Loch Alpine Sanitary Authority  
2014 DWRF Water Improvements  
Project No. xxx-01  
7402-01 7410-01

Identify by page number from project plan, or attached excerpts, where water efficiency or energy efficiency improvement justification is provided or discussed to support the need for the recommended green project reserve component: Pages 1-3, 10-13, 15, 20, 21, 24, 25, 27

1. Over the last 10 years, 27 water main breaks have occurred on the water mains that are proposed for replacement, an average of 0.80 breaks/mile/year.
2. Identify the length, diameter, age and type of pipe to be replaced: **15,770 feet of 4-inch and 1040 feet of 6 –inch of pre 1950 cast iron water main.**
3. Each break is estimated to result in the average loss of 200,000 gallons of water, calculated to total 540,000 gallons/ year water lost for those water mains.
4. Present data indicating how this is a significant source of water loss in the system and how the pipes proposed for replacement are likely to generate the greatest return in leak reduction:  
**Over the last 3 years, LASA has lost approximately 16% of their water. Losses are partially attributed to water main breaks.**

The water treatment plant filters backwash twice per week using 20,000 gallons per backwash and the Ann Arbor Golf and Outing Club pool is filled annually and not accounted for in the records. The percentage of lost water does not include those uses.

<u>Year</u>	<u>Pumped</u>	<u>Sold</u>	<u>Lost %</u>
2011	46.36 mg	38.58 mg	12.2%
2012	51.10 mg	38.56 mg	20.4%
2013	44.53 mg	35.17 mg	16.3%

The 4-inch and 6-inch water mains proposed for replacement constitute approximately 29% of the 11.1 miles of distribution mains in the Loch Alpine Sanitary Authority.

During the period from 2004 – 2013, 38 water main breaks occurred in the distribution mains. Of these 39 breaks, 27, or 71% of the breaks occurred in the 4-inch and 6-inch mains proposed for replacement.

Approximately 70% of the breaks over the last 10 years have been on 30% of the distribution system.

Data indicates approximately 200,000 gallons of water per break is lost. Therefore, for the 27 breaks in the 4-inch and 6-inch water mains, approximately 5.4 million gallons of water have been lost, averaging 540,000 gallons per year.

Replacing the proposed 4-inch and 6-inch water mains will result in a savings of 540,000 gallons per year, or 3.3% of the current lost water.

5. The energy savings from pumping / delivering water through the new mains versus the old ones is estimated at 1,948 Kwh/year.  
Currently the LASA uses approximately 3607 KWh to produce 1 million gallons of water (based on 2013 usage). The LASA expects to save 1,948 KWh per year due to the reduction of lost water from the 2014 DWRF Water Main Improvements project.
6. Describe the condition of the replaced mains with respect to friction/ head loss, etc from tuberculation or other deterioration issues. As appropriate, identify if the soils are corrosive and contributing to the deterioration/breaks or leaks in the mains, and how the replacements mains are designed to address future corrosion.  
The water mains are proposed to be replaced with 8" PVC piping with a C factor of 160. The existing 4-inch and 6-inch mains are reportedly tuberculated and likely have a C factor of 80 or less and reduced flow area. The existing soils are generally not corrosive, however the PVC piping will be able to withstand the environment..
7. Total project costs for the water main replacement component of the project are \$3,400,000
8. Identify the source of data used for these calculations:  
Data was obtained LASA water treatment pumpage and sales records, as well as maintenance records and interviews with LASA operations staff.

Submitted by:

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Name

\_\_\_\_\_

Date

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Title

## Green Project Reserve Business Case Evaluation

Loch Alpine DWRP Project Plan, DWRP No. 7402-01

WSSN: 03940

Prepared by Patrick J. Brennan, P.E.

June 18, 2014

DEQ ODWMA Jackson District staff have reviewed the Green Project Reserve (GPR) Qualification Template included in the Loch Alpine Sanitary Authority (LASA) DWRP Project Plan dated April 2014 for consistency with available guidance. The GPR Qualification Template was reviewed in view of the principles in bold type, below, followed by staff comments.

1. **Demonstrate substantial benefits/savings compared to the average level of efficiency currently available.**
  - a. The project proposes to replace approximately 29% of the 11.1 miles of distribution mains. 71% of the 38 water main breaks over the past 10 years have occurred in the 4-inch and 6-inch mains that are proposed for replacement. Approximately 200,000 gallons are lost per break and 540,000 gallons per year from the water mains proposed for replacement. This equates to 3.3% of the lost water. Since LASA uses approximately 3607 kWh to produce 1 MG of water, it is expected that replacing the water mains will save 1,948 kWh annually. LASA also produces an average of 50 MG of water annually, using 180,000 kWh. Therefore, the energy efficiency increase from preventing water main breaks from the 4-inch and 6-inch mains is approximately 1.1%. Based on LASA's water rate of \$7.62/1000 gallons, the annual savings from eliminating water main breaks in 4-inch and 6-inch mains will be \$4,115.00. Note that this evaluation assumes the frequency of water main breaks will remain constant.
  - b. The report states that the replacement pipes will have C-factors of 160 compared to the estimated C-factor of 80 for the existing pipes. This implies that there will be increased energy savings from less friction in the piping; however, the author did not quantify the savings.
  - c. The author also could have stated that the water system facilities (pumps, iron filters, etc.) could be expected to last longer due to the reduced volume of water produced as a result of performing the water main replacement work.
  - d. The Project Plan Summary of Need notes that water is also wasted by regular flushing of dead ends, and that looping these dead ends will reduce the quantity of water used in flushing.
  - e. Also noted is that savings will be realized from the cost of water main repairs, which include materials, manpower and equipment costs. Again, these savings are not quantified.

2. **Water and energy efficiency benefits/savings must be a substantial part of the rationale or justification for the project, and cannot simply be incidental water and/or energy efficiency benefits.**
  - a. Reduced water losses that result in energy savings is stressed in the Statement of Project Need. The report refers to a 2009 Water Upgrade Study that identifies the 20-year needs of the system and prioritizes the problems, then proposes to correct the most important problems.
3. **Technical component of a business case: Using information from maintenance or operations records, engineering studies, project plans, etc., 1) identify problems (including any data on water and/or energy inefficiencies) in the existing facility, and 2) clarify the technical benefits from the project in water and/or energy efficiency terms.**
  - a. The report refers to a 2009 Water Upgrade Study that identifies the 20-year needs of the system and prioritizes the problems, then proposes to correct the most important problems. At this time the most pressing need for the system is to replace leaky, undersized, and unreliable water mains. The report estimates the savings in water and thereby in energy that could be realized by preventing future water main breaks in the water mains proposed for replacement.
4. **Describe financial component of a business case including 1) Estimate cost and water savings from the project based on the technical analysis of benefits, and 2) Determine, within total project costs, that savings associated with energy and water efficiency improvements comprise a substantial part of financial justification for project.**
  - a. The cost of the proposed project is adequately estimated. As described in item 1, above, resultant savings and increased efficiency are quantified by the author for water lost by water main breaks.
  - b. The value of the water lost in water main breaks is approximately 2% of the equivalent annual cost of the present worth of the sum of the capital costs plus O&M costs less the salvage value based on repaying the loan in 13.15 years. However, savings from correcting the other identified problems and associated costs were not quantified, and the expected life of the new water main is much greater than 13.15 years; therefore, the savings will be much greater than 2%.

Although the total energy savings are understated in the GPR Qualification Template included in the DWRF Project Plan, DEQ staff believe there will be substantial energy saving benefits from performing the proposed work, thereby justifying the Green Project Reserve.