

**Drinking Water Revolving Fund
Green Reserve Qualification Template**

Applicant: City of Livonia
Project Name: 2015 DWRF Water System Improvements

7356-01
Project No: ~~7355-01~~

Identify by page number from the project plan, or attach excerpts, where water efficiency or energy efficiency improvement justification is provided or discussed to support the need for the recommended green reserve project component: Pages 9 and 15.

Please ensure all requested information is provided to enable an assessment by the Michigan Department of Natural Resources and Environment (DNRE) of whether the project or project component can qualify for funding from the green project reserve.

~~**Meter Replacements with Conventional Meters**~~

~~The City of Livonia is not proposing to construct meter replacements as part of the project plan. This section is not applicable.~~

- ~~1. Over the last five years, water lost or unaccounted for in the system has averaged _____ gallons per year and is _____ percent of the water produced each year.~~
- ~~2. Identify the source of this information (i.e. water audit, water conservation study, production and billing records): _____~~
- ~~3. Identify the portion of the water loss that is likely due to inaccurate meters: _____~~
- ~~4. The expected reduction in water loss by installing replacement traditional water meters in all or a portion of the system is _____ gallons per year, reducing the water loss percentage to _____.~~
- ~~5. It takes _____ kilowatt hours (kWh) of electricity to produce and distribute 1,000 gallons of water. At a cost of \$ _____ per kWh, the estimated annual electrical cost for the water loss due to inaccurate meters based on the five-year average is \$ _____.~~
- ~~6. Based on the average cost per year for the loss and the estimated cost of _____ for replacing the meters, the project will pay for itself in _____ months/years.~~
- ~~7. Attached all relevant data and calculations that were used to provide answers to these questions:~~

Water Main Replacement

1. Over the last 10 years, 144 water main breaks have occurred on the water mains that are proposed for replacement, an average of 1.5 breaks/mile/year.
2. Identify the length, diameter, age and type of pipe to be replaced:

The projects discussed here are listed as project 3A, 3B, 4, 6, 7, 8A and 8B in the project plan. The projects include 10,666 feet of 6-inch cast iron water main and 38,488 feet of 8-inch cast iron water main will be replaced, for a total of 49,154 feet of cast iron main replaced. The water main is all about 60 years old (constructed in the 1950s).

3. Each break is estimated to result in the average loss of 4 million gallons of water, calculated to total 57.6 million gallons/year of water lost for those water mains.
4. Present the 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.

The City's water system has approximately 2,460,480 lf of water main, or approximately 466 miles. Of that water main, 49,154 lf is 6-inch and 8-inch cast iron water main that is proposed for replacement.

Within the 49,154 lf of water main, the City experiences approximately about 1.4 water main breaks/year. Within the remaining 2,442,080 lf, the City experiences about 0.14 breaks/mile/year. By replacing this water main, it is estimated that the City will experience a reduction of 2.3% in the number of water main breaks that they experience.

5. The energy savings from pumping/delivering water through the new water mains versus the old ones is estimated at 91,820 KwH/year.
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 replacement mains are designed to address future corrosion:

Based on hydrant flow testing performed in the project areas, it is expected that the current C factor is equal to 50. Once replaced, the new 8-inch ductile iron water main will have a C factor equal to 120. This will significantly decrease the friction loss in the pipe. Head losses will be further reduced by the upsizing of 6-inch to 8-inch in diameter.

7. Total projects costs for the water main replacement component of the project are \$11,010,000.00.

8. Identify the source of data used for these calculations: City of Livonia Water Master Plan and Department of Public Works Records

Submitted by:

Patrick M. Droze P.E. and Vicki M. Putala, P.E.

5/29/2014

Name

Date

Title

**Drinking Water State Revolving Fund
Green Project Reserve Business Case
Water Mains – Pipe Replacements
City of Livonia**

The purpose of this memo is to document the basis for determining that the City of Livonia DWRP Project, qualifies for the green project reserve funding under the ARRA. This project is replacing 18,400 feet of 6-inch and 8-inch unlined cast iron mains that are more than 60 and 90 years old (constructed in the 1920s and 1950s) in the initial year. This includes Projects 2 and 8A from the DWRP Project Plan. The following information was used to make this determination.

The City completed a water master plan in 2010 that recommended and prioritized improvements to the distribution system. This initial phase of their project will address 13,000 feet of the 416,460 feet of the 6-inch cast iron pipe and 5,400 feet of the 752,189 feet of the 8-inch cast iron pipe remaining in the City. Many of these mains are corroded and contain deposition that has significantly reduced the carrying capacity while at the same time, increasing the friction losses and energy necessary to deliver water through them.

Over the last 10 years, the City experienced 16 water main breaks in that portion of the system to be replaced, for an average of 0.5 breaks per mile per year. In comparison, the City only experienced an average of 0.14 breaks per mile per year in the remainder of the water main system. The City also estimates that each break results in an average water loss of 4 million gallons for a total of 6.4 million gallons per year in the piping to be replaced. Livonia expects a 2.5% reduction in breaks system-wide by replacing these mains.

The new mains will also have an improved C factor as compared to the existing pipes. Based on recent hydrant flow testing in the proposed project areas, the current, unlined cast iron piping is estimated to have a C factor equal to 50, while the new, cement-lined, ductile iron and/or HDPE piping will have a C factor equal to 120. Livonia anticipated energy savings of 1,395 Kwh/year from pumping water through the new mains versus the old ones.

Additional benefits include reductions in unnecessary operation and maintenance expenditures and eliminating potential health hazards associated with waterborne pathogens entering the water distribution system during breaks.

Based on this information, the City of Livonia feels that the project meets the eligibility criteria for the green project reserve funding. The water main replacements will improve water conservation/efficiency by reducing water losses experienced from frequent breaks and on-going leaks as well as provide for reduced energy use.