

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

TO: Wendy Jansma, West Unit Chief, Revolving Loan Section

FROM: Cindy Clendenon, Project Manager, West Unit

DATE: May 27, 2011

SUBJECT: Drinking Water Revolving Fund (DWRP)
City of Three Rivers Water System Improvements
Green Project Reserve and Principal Forgiveness Calculations
DWRP Project 7350-01

This memo documents the basis for the amount of DWRP loan forgiveness. The business case for Green Project Reserve Funding from the consulting engineer is attached.

The above-referenced project involves two construction contracts: one for water main improvements, and one for the installation of disinfection and iron sequestering systems at two of the city's three wellfields. An Alternative Justifiable Expenditure (AJE) analysis was completed for the water main work. The AJE excluded the ineligible storm sewer items for the Maple Street bid alternate that was added during the bid phase and subsequently selected by the city for implementation.

Most of the water main contract qualifies for the Green Project Reserve, with the exception of the water main loop proposed for the Airport Industrial Park, which was removed from the green project for the purpose of loan forgiveness calculations. The wellfield work is entirely non-green.

The calculations for green and non-green project costs and the associated principal forgiveness are shown on the next page. As the calculations show, the total principal forgiveness amount for the project is **\$763,923**.

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Eligible Water Main Construction per AJE Analysis (0.6515 eligibility ratio) = \$1,251,325
Eligible Wellfield Construction = \$870,000
Total Eligible Construction = \$1,251,325 + \$870,000 = \$2,121,325

Eligible Green Water Main (excluding Airport Loop) = \$1,251,325 - \$91,778 = \$1,159,547
Eligible Green Construction = \$1,159,547
Eligible Green as Percent of Total Eligible Construction = \$1,159,547 / \$2,121,325 = 54.66 percent

Eligible Non-Green Water Main extracted from AJE (Airport Loop) = \$91,778
Eligible Non-Green Well Field = \$870,000
Eligible Non-Green Construction = \$91,778 + \$870,000 = \$961,778
Eligible Non-Green as Percent of Total Eligible Construction = \$961,778 / \$2,121,325 = 45.34 percent

Total Eligible Project Cost (includes nonconstruction), rounded to nearest \$5,000 = \$2,665,000

Green Portion of Total Eligible Project Cost = \$2,665,000 x 0.5466 = \$1,456,689
Green Loan Forgiveness at 40 percent = \$1,456,689 x 0.4000 = \$582,676

Non-Green Portion of Total Eligible Project Cost = \$2,665,000 x 0.4534 = \$1,208,311
Non-Green Loan Forgiveness at 15 percent = \$1,208,311 x 0.1500 = \$181,247

Total Allowable Loan Forgiveness = Green + Nongreen = \$582,676 + \$181,247 = **\$763,923**

Attachment

City of Three Rivers

Green Reserve Project Memo

TO: Wendy Jansma, West Unit Supervisor
Revolving Loan and Operator Certification Section
Field Operations Division, Water Bureau

FROM: Jones & Henry Engineers, Ltd.

DATE: May 7, 2010

SUBJECT: City of Three Rivers
Qualification for Green Project Reserve Funding

The purpose of this memo is to document the basis for determining that the City of Three Rivers, qualifies for the green project reserve funding under the ARRA. This project is replacing 10,100 feet of 4-inch lined cast iron mains that are 70 to 90 years old. The following information was used to make this determination.

The city has developed a 20-year replacement plan to prioritize the replacement of water lines. This project will address some of the highest priority water main replacements based on age, condition, and hydraulic demands. The city reports an average of less than one main break a year. Many of these mains planned for replacement are expected to be 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 past years, Three Rivers has reported system-wide water losses up to 38% of the total volume delivered to the system, but have since made improvements to their system. Typically, water system losses in excess of 15% are generally considered unacceptable in the waterworks industry. For 2008, the total volume of water lost was only 39,600,000 gallons, or the equivalent of 14% of the total water pumped.

It is difficult to assign unaccounted water losses to specific areas of the distribution system without conducting a comprehensive leak detection program. However, there is little doubt that leakage is greatest in the older, lined cast iron piping. Although Three Rivers is only replacing 3% of their total pipe inventory, they are replacing 70 to 90-year old, antiquated piping that is most likely experiencing the highest percentage of leaks. It is expected that the replacement of these targeted mains will decrease the City's lost by at least the same amount as the percentage of the city's total pipe inventory they represent, resulting in a reduction of 1,100,000 gallons.

The new mains will also have an improved C factor as compared to the existing lined cast iron pipes. Therefore, the city estimates there will be a significant energy savings from pumping water through the new mains versus the old ones.

Based on the information provided by Three Rivers, this project does qualify for the green project reserve funding. The water main replacements will improve water conservation/efficiency by reducing water losses experienced from undetectable water losses. The costs that qualify for green project reserve will be determined after bids are received and the amount of the loan established. At that point, the percentage of this loan that is provided by the ARRA can be applied to the total amount spent on this portion of the project to determine the green project reserve.

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

Applicant: City of Three Rivers Project No:
Project Name: Drinking Water System Improvements Project Plan 2010

Water Main Replacement

1. Over the last ten years, **15** water main breaks have occurred on the water mains that are proposed for replacement, an average of **less than one break/mile/year**.
2. Identify the length, diameter, age and type of pipe to be replaced: **Length: 10,100; Diameter: 4-inch; Age: 70 to 90 years old; Type of Pipe: lined cast iron**
3. Each break is estimated to result in the average loss of **20,000 to 25,000** gallons of water, calculated to total **20,000 to 25,000** gallons/year of water lost for those water mains.
3. 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 does not experience a large amount of water main breaks per year, but does have undetected leakage throughout the City. In 2008 the City lost approximately 14% of its total water pumped, which is considered good for a municipality, but can be improved with water main replacement.

4. The energy savings from pumping/delivering water through the new water mains versus the old ones is estimated at **1,235 Kwh/year**.
5. 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:

The inside of the existing water main is expected to have build-up on the inside of the mains from the high iron content and hard water. The extent of the build-up, or possible corrosion is difficult to determine since the City has not recently excavated any portion of this water main. As mentioned above, the City is replacing this main to reduce the potential amount of water loss and improve the hydraulics of the system in the selected areas.

6. Total projects costs for the water main replacement component of the project are **\$2,881,500**.
7. Identify the source of data used for these calculations: **The existing drinking water system information was provided by the City of Three Rivers. The proposed drinking water improvement information was provided by Jones & Henry Engineers, Ltd.**

Submitted by: Jones & Henry Engineers, Ltd., May 7, 2010

Jansma, Wendy (DNRE)

From: Wozniak, Gary (DNRE)
Sent: Friday, May 28, 2010 9:53 AM
To: Clendenon, Cynthia (DNRE); Jansma, Wendy (DNRE)
Cc: Benzie, Richard (DNRE)
Subject: RE: Three Rivers green approval

Thank you Cindy,

I have reviewed the May 7, 2010, Green Reserve Project Memo and Qualification Template prepared by Jones & Henry Engineers, Ltd. The project involves replacing over 10,000-feet of undersized 4-inch diameter main. This main is unlined (not lined as the template erroneously indicates) cast iron material approximately 70–90 years old. (Modern ductile-iron main is cement lined to prevent interior corrosion and tuberculation, while the older unlined cast iron main is susceptible to interior corrosion, and tuberculation. Tubercules hinder flow and increase headloss in the pipe.) While the template admits that the condition of the mains is unknown, and the Draft project plan does not address the poor interior condition of the water mains, the vintage mains are typically a problem in communities without proper water treatment.

But the real savings in energy come from the mere upsizing of the mains from 4-inch to 8-inch. This increase in main diameter will drastically reduce the headloss in the pipe during high flows. Also, the addition of iron removal treatment at the source will decrease the amount iron deposition in the mains. Iron deposition from current chlorination practices result in intensive flushing and customer complaints. This in turn leads to inefficient pumping, increased energy usage, and wasted water use from flushing. Based on these reasons, I approve the Green Reserve Project memo.

Please let me know if you have any questions, or need any other information.

Gary Wozniak, P.E.
District Engineer
MDNRE WB FOS
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Kalamazoo, MI 49009-5025
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wozniakg@michigan.gov

From: Clendenon, Cynthia (DNRE)
Sent: Thursday, May 27, 2010 2:50 PM
To: Wozniak, Gary (DNRE)
Subject: FW: Three Rivers green approval

Here are the two attachments again, for convenience, or in case you misplaced them from before. Thanks.

From: Clendenon, Cynthia (DNRE)
Sent: Thursday, May 27, 2010 2:45 PM
To: Wozniak, Gary (DNRE)
Subject: Three Rivers green approval

Hi Gary,

On May 10, I sent you Three Rivers "green" memo from Jones and Henry Engineers, for your review and approval. Wendy reminds us that we need district approvals, including Three Rivers, by next week. Thanks for your attention.

Have a great holiday.

5/28/2010