

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

TO: File

FROM: Clarence Jones, Project Manager

DATE August 3, 2015

SUBJECT: State Revolving Fund (SRF) Project No. 5578-01  
Zeeland Project Plan Clean Water Plant (CWP) Upgrades  
Green Project Reserve (GPR) Qualifying Costs

In the Part III Application for the above-referenced project, the accompanying bid information was used to determine the final qualifying GPR amounts to be included in the Order of Approval package.

The following items eligible for GPR qualifications are from the Grand River Construction Company's successful low bid proposal for the Zeeland CWP upgrade project:

Aerobic Digestion	\$870,844
SCADA System	\$515,678
Energy Efficient VFD's, Fine Bubble Diffusers, DO Control System	\$1,727,470

Based on the information supplied by Moore and Bruggink Engineers Inc. the following CWP upgrades qualify for GPR. The Aerobic Digestion Facility once in operation will significantly reduce the total volume of biosolids residuals to be processed. At a 30% Volatile Suspended Solids reduction, that equates to 342,210 lbs. of solids per year that will no longer need to be disposed of. The new system is expected to reduce the amount of lime needed to stabilize the biosolids. At the design flows, the CWP will realize a savings of \$47,000 per year in lime costs alone and a \$20,000 per year decrease in biosolids hauling costs compared to the current system. The new SCADA system will save the city money through constant monitoring of the CWP processes expected to be \$24,503 per year. The Energy Efficient Blowers, VFD's, Diffusers, and Control System will allow monitoring of dissolved oxygen levels in the aeration basins, and VFD controls of blower operation will allow energy efficient use of the blowers by matching their speed to the oxygen requirements which is expected to save the city of Zeeland \$22,340 per year in energy savings.

A copy of the bid proposal is attached to this memo. SRF eligible construction costs for this project is \$11,677,000, including the GPR component costs of \$3,113,992. The project GPR construction cost percentage is  $\$3,113,992 \div \$11,677,000 = 0.2700$ . Since the SRF loan amount is \$1,500,000, the total GPR project costs including both construction and non-construction costs, is  $\$12,499,024 \times 0.2700 = \$3,374,736$ .

Because 100 percent of the GPR eligible costs qualify for "principal forgiveness," the maximum amount usable for this purpose is \$3,374,736. This amount is limited to the total SRF loan amount of \$1,465,000.

Please note that the eligibility of the GPR items was presented by Mr. Brian Hannon of Moore & Bruggink Engineers Inc. on behalf of the city of Zeeland in a 4-page business case document dated July 29, 2013 and in a supplementary documentation email dated October 2, 2013. The proposed Zeeland GPR presentation was supported by Mr. Keith Zahn of the DEQ-Water Resources Division Grand Rapids District Office in his email dated September 29, 2013.

Attachment

**“CITY OF ZEELAND CLEAN  
WATER PLANT”**

SRF #5578-01

***GREEN PROJECT RESERVE  
BUSINESS CASE***

Prepared for the

**City of Zeeland,  
Ottawa County, Michigan**

July 29, 2013

**MOORE & BRUGGINK, INC.**  
engineering clean water 

(616) 363-9801

[www.mbce.com](http://www.mbce.com)

## Summary

- There are several key elements of the “City of Zeeland Clean Water Plant” Project that would qualify for the Green Project Reserve Program.
  1. Aerobic Digestion Facility
  2. New SCADA System
  3. Energy Efficient Blowers, VFD’s, Fine Bubble Diffusers, and DO control system

The design for the wastewater treatment plant provides an opportunity to change the current method of stabilizing biosolids with lime to an aerobic digestion process, which will eliminate the use of lime, and significantly reduce the volume of biosolid residuals. In addition, the existing analog control panel can be replaced with a SCADA system which will help monitor processes throughout the plant to aid in process control to minimize energy consumption and chemical usage throughout the plant. Finally, one of the largest energy consumers in the treatment plant, the blowers, will be replaced with high efficiency blowers which will run on VFD’s to control the speed and energy usage. This will be accomplished via a feedback loop from the DO sensors in the aeration tanks, allowing more efficient process control, and saving a significant amount of energy versus constant speed blowers with no DO control. In addition, fine bubble diffusion system will be placed in the aeration tanks, further reducing the volume of air necessary to run the process.

- Estimated Loan Amount: \$9,300,000
- Estimated Eligible (“Green”) portion of the loan: \$1,950,000

Equip/Const = \$1,695,000  
Design/Const Engineering/Inspection, etc. = \$255,000  
Total = \$1,950,000

This equates to 21 % of the project cost.

- Breakdown of Capital Components:

AEROBIC DIGESTION FACILITY<sup>1</sup> = \$920,000  
SCADA SYSTEM<sup>2</sup> = \$150,000  
BLOWERS, VFD’S, FINE BUBBLE DIFFUSERS,  
CONTROL SYSTEM<sup>3</sup> = \$625,000

### *Notes:*

1. Reference SRF Project Plan for Zeeland Clean Water Plant #5578-01, Dated June 2013; PG 52, Table No. 18, Capital Cost Estimate, Aerobic Digestion.
2. Reference SRF Project Plan for Zeeland Clean Water Plant #5578-01, Dated June 2013; PG 32, Table No. 9, Capital Cost Estimate – Activated Sludge Expansion.
3. Reference SRF Project Plan for Zeeland Clean Water Plant #5578-01, Dated June 2013; PG 32, Table No. 9, Capital Cost Estimate – Activated Sludge Expansion. Some elements are rolled together in this table. Breakdown is as follows: Blowers = \$450,000, Diffusers = \$100,000, Air Piping = \$50,000, Controls = \$50,000. Total Capital = \$625,000

## **Background**

- Moore & Bruggink, Inc. has been commissioned by the City of Zeeland to provide a SRF Project Plan for an expansion and renovation of their Clean Water Plant (CWP), located in Zeeland, Michigan. The need for the expansion is based on the West Michigan Regional Planning Commission data for population projections within the system, and a large industry that has committed to increased flows into the system.
- Due to the size and scope of the expansion, there are many opportunities to implement green design practices such as energy efficiency and environmentally innovative activities that meet the definitions outlined in the EPA FY 2012 Requirements for Green Project Reserve Document.

## **Discussion of Eligible Project Components**

- Aerobic Digestion Facility:

This portion of the project is eligible for Green Project Reserve monies under the Environmentally Innovative Category. It is eligible with a business case under the “Treatment technologies or approaches that significantly reduce the volume of residuals or lower chemical volume in residuals” category. Currently, the Zeeland CWP stabilizes the biosolids residual using lime stabilization, which entails mixing the biosolids with lime and bringing them up to a 12 pH or higher for a minimum of two hours. Prior to stabilizing the biosolids, they are thickened in a sieve drum concentrator, which also uses polymer to flocculate the biosolids together to aid in thickening. Both the thickening and lime stabilization are chemical intensive processes. The lime stabilization actually adds to the total volume (dry weight) of residuals to be stored and ultimately land applied.

The planned expansion of the Zeeland CWP includes an Aerobic Digester Facility. This facility will aerobically digest and stabilize the biosolids, which will significantly reduce the total volume of biosolids residuals to be processed. At a conservative 30% Volatile Suspended Solids reduction, that equates to 348,210 lbs of solids per year that no longer need to be treated or disposed of. In addition, with a reduction in biosolids volume, it reduces the amount of polymer used in the sieve drum concentrator, and lime is no longer necessary to stabilize the biosolids. At the design flows, the plant will realize savings of approximately \$47,000 per year in lime chemical costs and a \$20,000 per year decrease in biosolids hauling costs in comparison with expansion of lime stabilization.

Aerobic digestion relies on blowers to provide oxygen to the digestion process. To remain energy efficient, a dissolved oxygen and oxidation reduction potential control system will be implemented to help turn on and off the blowers at the optimal time to avoid running the blower all the time and wasting energy. This has effectively been accomplished at several wastewater treatment plants in Michigan and has shown to drastically reduce the required energy to aerobically digest the biosolids.

- New SCADA System:

This portion of the project is eligible for Green Project Reserve monies under the Energy Efficiency Category. It is eligible with a business case under the “SCADA System” category. SCADA systems allow for constant monitoring of the process, which in turn allows for efficient use of energy and chemicals to treat wastewater, saving the City money. Examples of efficiencies include constant monitoring of influent flow rate, which can pace dosing of chemicals such as alum, polymer, and defoamer. Also, the ability to see online DO and TSS readings in the aeration tanks will help control blower speeds (as mentioned below in the business case for the blowers) as well as return and waste sludge rates to maintain optimum process efficiency for low energy consumption. SCADA systems can monitor energy consumption throughout the plant in real time, allowing for operators to trend energy usage data and look for further efficiencies.

- Energy Efficient Blowers, VFD’s, Diffusers, and Control System:

This portion of the project is eligible for Green Project Reserve monies under the Energy Efficiency Category. It is eligible with a business case under the “POTW projects or unit process projects that achieve less than a 20% energy efficiency improvement” category. Blowers used to provide aeration to the activated sludge process are usually the largest energy user in the wastewater treatment plant. In this case, it is expected that there will be (2) 100 HP blowers added to the existing (2) 100 HP blowers and the (2) 50 HP blower to get the necessary firm air capacity of 7100 scfm. Currently, the existing blowers are run at a constant speed all the time to maintain a DO level in the aeration basins, even though the flow rate and loading change throughout the day and through the night. Fine bubble diffusion increases oxygen transfer to the wastewater, which allows for less firm air capacity than would be necessary with course bubble diffusion. Also, by monitoring the dissolved oxygen level in the aeration basins, the blowers can be controlled via VFD’s to lower the speed and HP required to deliver the correct amount of oxygen to the basins. As an example, during the middle of the night, if the flow drops off from 4.0 MGD to 2.5 MGD and influent concentrations remain consistent, the oxygen requirement (per 10 State Standards) drops from 11,769 lb/day to 7,355 lb/day, a 38% reduction for that period of time! VFD’s will allow the blower to turn down to match this oxygen requirement, which translates into large energy savings for the treatment plant.

## **Conclusion**

- There are many environmental benefits that can be gained by implementing these features into the Zeeland Clean Water Plant design. These features incorporate environmentally innovative and energy efficient design elements to treat wastewater and biosolids residuals. The portions of the project described above meet the criteria for eligibility under the Green Project Reserve Guidelines. The aerobic digester portion of the project will reduce the total chemical volume in the residuals and significantly reduced the overall quantity of biosolids residuals to be handled. The SCADA system will also allow greater monitoring of energy and chemical use for optimization. Lastly, the fine bubble diffusers, blowers, and DO control system will reduce overall energy usage, ultimately saving the plant money and allowing for better treatment.

**ARTICLE 1 – BID RECIPIENT**

1.01 This Bid is submitted to:

**City of Zeeland, 21 S. Elm Street, Zeeland, Michigan 49464**

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

**ARTICLE 2 – BIDDER’S ACKNOWLEDGEMENTS**

2.01 Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 90 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

**ARTICLE 3 – BIDDER’S REPRESENTATIONS**

3.01 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, and any data and reference items identified in the Bidding Documents, and hereby acknowledges receipt of the following Addenda:

<u>Addendum No.</u>	<u>Addendum, Date</u>
<u>1</u>	<u>06/29/2015</u>
<u>2</u>	<u>07/02/2015</u>
<u>3</u>	<u>07/07/2015</u>

- B. Bidder has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfied itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
- C. Bidder is familiar with and has satisfied itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work.
- D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.
- E. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and any Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of

such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs.

- F. Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.
- G. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
- H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and confirms that the written resolution thereof by Engineer is acceptable to Bidder.
- I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work.
- J. The submission of this Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, and that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

#### ARTICLE 4 – BIDDER'S CERTIFICATION

##### 4.01 Bidder certifies that:

- A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;
- C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and
- D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:
  - 1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process;
  - 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
  - 3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and
  - 4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

ARTICLE 5 – BASIS OF BID

5.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

Lump Sum Bid Price:	\$
Eleven million, six hundred seventy seven thousand	11,677,000

All specified cash allowances are included in the price(s) set forth above, and have been computed in accordance with Paragraph 13.02 of the General Conditions.

Liquidated Damages Rate (from Agreement): \$ 200.00 /day.

ARTICLE 6 – TIME OF COMPLETION

6.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.

6.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 7 – ATTACHMENTS TO THIS BID

7.01 The following documents are submitted with and made a condition of this Bid:

- A. Required Bid security;
- B. List of Proposed Subcontractors;
- C. List of Proposed Suppliers;

ARTICLE 8 – DEFINED TERMS

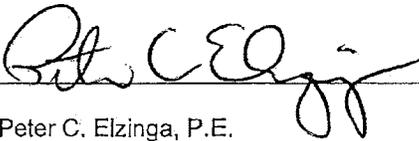
8.01 The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

ARTICLE 9 – BID SUBMITTAL

BIDDER: [Indicate correct name of bidding entity]

Grand River Construction, Inc.

By:  
[Signature]

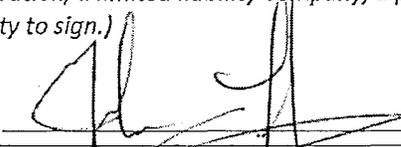


[Printed name]

Peter C. Elzinga, P.E.

(If Bidder is a corporation, a limited liability company, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest:  
[Signature]



\_\_\_\_\_

[Printed name]      John Fernandez

Title:                      Project Manager

Submittal Date:        July 9, 2015

Address for giving notices:

5025 40th Avenue

Hudsonville, MI 49426

Telephone Number:    (616) 669-5611

Fax Number:            (616) 669-3466

Contact Name and e-mail address:    Peter C. Elzinga, P.E.

pelzinga@grandriverconstruction.com

Bidder's License No.: \_\_\_\_\_  
(where applicable)

*NOTE TO USER: Use in those states or other jurisdictions where applicable or required.*