

# **GREEN PROJECT RESERVE BUSINESS CASE**

Village of Junction City, WI  
Sewer Lining & Utility Project

CWF No. #4588-02

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**TABLE OF CONTENTS**

**1.0 GENERAL INFORMATION ..... 1**

- 1.1. Introduction..... 1
- 1.2. Project Need & Scope..... 1
- 1.3. Green Components Summary As Submitted in GPR Addendum ..... 2
- 1.4. Green Components Summary Revised ..... 2

**2.0 COMPONENT A – INFLOW/INFILTRATION CORRECTION ..... 2**

- 2.1. Reason for Change since GPR Addendum ..... 2
- 2.2. Technical Justification ..... 2
- 2.3. Financial Justification ..... 3

**APPENDICES**

**Appendix A Potential Energy Savings Calculation Appendix B Project Cost Breakdown**

**Appendix B Project Cost Breakdown**

## **1.0 GENERAL INFORMATION**

### **1.1. Introduction**

This business case demonstrates that the Junction City WWTP Repair, Lift Station, and Sanitary Sewer Improvements (CWF #4588-02) project achieves identifiable and substantial “green” benefits in the project components listed below. This business case was developed according to the “2010 Clean Water and Drinking Water State Revolving Fund 20% Green Project Reserve: Guidance for Determining Project Eligibility” publication, dated April 21, 2010.

### **1.2. Project Need & Scope**

The Village of Junction City's aging sanitary sewer system was televised in 1998 and 1999 with additional areas televised in 2010 and 2011. Those reports indicated severely deteriorated sewer mains, cracks, broken pipes, pipe separation, sags and root intrusion impeding flow. While the Village has actively worked to repairs manholes many are still badly deteriorated. High groundwater levels throughout the collection system and the deterioration of the sewer system due to age has led to significant groundwater infiltration and inflow through leaking joints, leaking lateral connections, and broken and cracked pipe sections resulting in reduced useable capacity in the sanitary sewers. Excessive I/I puts additional treatment burden at the Village’s WWTP, and has led to continued high costs for sewer collection system repair and increases the likelihood of back-ups and overflows during rain events in the Village.

The Village proposes to replace existing deteriorated sanitary sewers, manholes and service laterals that are located in areas of high groundwater. These locations are primarily on the west side of the Village both north and south of Main Street. Conventional replacement is proposed in areas where sags in sewer mains exist. Jack/bore under railroad segments is proposed. Some sewer proposed for replacement runs along rear yards with existing water mains. There is concern that proper separation between the two utilities does not exist. This will be further evaluated and corrected with the new sewer. Sewer lining will also be considered based on further evaluation during project design.

In addition, there is compliance/maintenance work planned for the Wastewater Treatment Facility and Lift Station. This portion of the work includes but is not limited to: replacement of the recirculation pump for the sludge tank; new samplers at the WWTF; cleaning work includes but is not limited to: replacement of the recirculation pump for the sludge tank; new samplers at the WWTF; cleaning of the existing dome/cover over clarifier. The project also includes the replacement of twelve check valves at the lift station.

### 1.3. Green Components Summary As Submitted in GPR Addendum

COMPONENT	DESCRIPTION	BUSINESS CASE No.	GREEN COST
A	Inflow/Infiltration Correction	3.5-4	\$550,000
B	Energy Efficient Pumps at Lift Station	3.5-6	\$20,000
	<b>TOTAL GREEN COMPONENTS</b>		<b>\$570,000</b>

### 1.4. Green Components Summary Revised

COMPONENT	DESCRIPTION	BUSINESS CASE No.	GREEN COST
A	Inflow/Infiltration Correction	3.5-4	\$364,816
B	Energy Efficient Pumps at Lift Station	3.5-6	\$0
	<b>TOTAL GREEN COMPONENTS</b>		<b>\$364,816</b>

## 2.0 COMPONENT A – INFLOW/INFILTRATION CORRECTION

### 2.1. Reason for Change since GPR Addendum

The original GPR Addendum included \$550,000 for sewer lining work and reconstructed sewer mains on two blocks. The numbers below have been updated to reflect actual bid prices for the sewer lining work.

The original GPR Addendum also included \$20,000 for premium efficiency motors on the lift station, however, no premium efficiency motors will be installed as part of this project.

### 2.2. Technical Justification

**Appendix A** includes a comparison of WWTF Influent Flow to Water Sold to Customers from 2010, and 2011. The difference between these annual volumes indicates the potential savings in water treated by the WWTF. The initial data suggests that there is a significant amount of inflow and infiltration entering the collection system. First, the EPA states that a municipality has “excessive infiltration” if the average wastewater flow exceeds 120 to 130 gallons per capita per day (gpcd). The Junction City data shows an average wastewater flow of 199 to 223 gpcd. Secondly, the difference between WWTF influent and Water Sold indicates that potentially the wastewater influent flow could be reduced by 74.2% (25.14 MG each year). As WWTF influent is decreased by projects such as the sewer lining project, pumping and treatment costs will decrease and less energy will be used.

This project will line approximately 6,500 lineal feet of the oldest vitrified clay sewer mains in the Village. This amounts to approximately 17% of the total length (37,000 lf) of sewer collection piping in the Village. As no post construction data is available, this

report assumes that the 17% of the potential savings (25.14 MG) will be reduced due to this project, which amounts to a WWTF inflow reduction of 4.27 MG per year.

**2.3. Financial Justification**

Assuming the decreased influent flow will allow for the existing 10 Hp motors in the influent lift station to operate fewer run hours, the estimated annual energy savings can be calculated as follows:

Estimated Electricity Savings:

$$(.746) \times 245 \text{ hrs/year} \times 10 \text{ hp} / .80 \text{ efficiency} = \mathbf{2,288 \text{ kWh/yr}}$$

This project can be financially justified when comparing it to the cost of open cut reconstruction of the sewer main being replaced. The lineal foot bid price for 8” sanitary sewer main was \$23/lf.

For open cut installation a fair estimate for 8” sanitary sewer main would be \$25/lf plus \$25/lf for pavement restoration, and potentially \$15/lf for dewatering, which yields a total lf cost of \$65/lf.

From this, the financial savings per lineal foot is estimated at \$42/lf.

See **Appendix B** for determination of green cost based on project bid.

# **Appendix A**

## **Potential Energy Savings Calculation**

## Potential Energy Savings Calculation

Village of Junction City

CWF # 4588-02

Year	WWTF	*	Water	Potential	Potential
	Annual Total (MG)	(gpcd)	Annual Sold (MG)	Savings (MG)	Savings (%)
2010	35.67	222.6	8.60	27.06	75.9%
2011	31.99	199.7	8.77	23.22	72.6%
<b>Average</b>	33.83	211.1	8.69	25.14	74.2%

Total Length of Sewer Collection Mains = 37,000 lf  
 Total Length of Sewer Mains to be Lined = 6,500 lf  
 % of Total Mains to be Lined = 17.6%

Potential Savings (MG) = 25.14 MG  
 Estimated Reduction of WWTF Inflow = 17.6%  
 Estimated Reduction of WWTF Inflow = 4.42 MG

Reduced Pumping at Influent Lift Station (hrs) =  $(4.42 \text{ MG}) / (300 \text{ gpm}) / (60 \text{ min/hr})$   
 = 245 hrs/year

Reduced Pumping at Influent Lift Station (kWh) =  $(10 \text{ Hp}) / (0.8 \text{ efficiency}) \times (0.746) \times (210 \text{ hrs/year})$   
 = **2288 kWh/year**

\* EPA states infiltration is not excessive if the 7-14 day average domestic wastewater flow does not exceed 120-130 gpcd

# **Appendix B**

## **Project Cost Breakdown** (Based on Awarded Bid)

**GREEN COST SUMMARY**

**Village of Junction City**

CWF #4588-02

MSA # 05234014

	<b>As-Bid Construction</b>	<b>5% Contg.</b>	<b>Const. Tot</b>	<b>20% Engineering</b>	<b>Total</b>
2013 Sewer Lining Project (Terra)	\$291,853	\$14,593	\$306,445	\$58,371	<b>\$364,816</b>