Clean Water State Revolving Fund FY13 Green Project Reserve

- Preliminary -


# Sandpiper Shores Master Utilities GPR Justification
# FY17 Wastewater System Upgrade (pop. 165)
# SRF Loan #WW 1705
# $1,010,000

## Preliminary Green Project Reserve Justification

### Business Case GPR Documentation

1. PREMIUM ENERGY EFFICIENT MOTORS AND VFDS (Energy Efficiency). Installs premium energy efficient motor and VFD; GPR Business Case per Section 3.2-2: *Use of premium efficiency motors and VFD pumps in a new project; if a project achieves less than a 20% reduction in energy efficiency, then it may be justified using a business case* ($xxxxx).
2. RENOVATION OF GRAVITY WASTEWATER COLLECTION SYSTEM EXPERIENCING EXCESSIVE I/I (Energy Efficiency). Business Case GPR per 3.5-4: *I/I correction projects that save energy from pumping …and are cost effective.* ($xxxxx)
3. INSTALLS ADVANCED FLUORESCENT LIGHTING (Energy Efficiency). Business Case GPR per 3.5-7: *Upgrade of lighting to energy efficient sources such as …compact fluorescent lighting;* ($xxxx).

# 1. PREMIUM EFFICIENCY PUMP & VFD (PRELIMINARY)

## Summary

- Sandpiper Shores Master Utilities (SSMU) upgraded and renovated their wastewater system, funded with a FY13 SRF Loan. The irrigation pump station upgrade includes a premium pump and Variable Frequency Drive (VFD)[1].
- Loan amount = $1,010,000
- GPR-eligible = Motors/VFDs = $xxxx
- Green portion of loan = xx %

## Description[2]

- Energy efficient practices incorporated in the design of the SSMU upgrade include the installation of a premium efficiency pump/VFD

## GPR Justification

***VFD:***

- The Baseline Standard Practice (BSP) for comparison is a standard Epact motor not controlled by a VFD[3].
- VFD efficiency data is from the Baldor Adjustable Speed Drive Energy Savings Calculator[4] (for pump applications).
- The estimated annual energy savings for utilizing a VFD compared to the Baseline Standard Practice using an energy cost of $0.10/kWh = $xxxx .
- An estimated incremental cost increase of $xxxx for the VFD was used to calculate the simple payback period.

***Motors:***

- The BSP for comparison is a pump with a standard Epact motor controlled by a VFD[5].
- Premium motor energy savings was compared to the BSP.
- The estimated annual energy savings for utilizing a VFD compared to the BSP using an energy cost of $0.10/kWh = $xxxx .
- An estimated incremental cost increase of $xxx for a pump with a premium motor was used to calculate the simple payback per system.

## Conclusion

- The use of a premium energy-efficient pump and VFD is categorically GPR eligible as it is cost effective as shown above.
- **GPR Costs Identified**:
  Premium Efficiency Pump & VFD: $xxxx
- **GPR Justification**: The Pump/VFD system is Categorically GPR eligible (Energy Efficiency) per Section 3.2-2 page 9[6]: *Use of premium efficiency motors and VFD pumps in a new project where they are cost effective*.

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[1] 7-10-17 Phone discussion, K. McNeill IDEQ – S. MacNee T-O Engineers
[2] SSMU Final Wastewater Facilities Plan, T-O Engineers, October 2016
[3] NYS Energy Research and Development Authority, Energy Evaluation Memorandum, Village of Greenport WWTP Upgrade 8-2009
[4] http://www.baldor.com/support/software_download.asp?type=BE$T+Energy+Savings+Tool
[5] NYS Energy Research and Development Authority, Energy Evaluation Memorandum, Village of Greenport WWTP Upgrade 8-2009
[6] 2012 Clean Water State Revolving Fund Green Project Reserve: Guidance for Determining Project Eligibility

# 2. RENOVATION OF GRAVITY COLLECTION SYSTEM (PRELIMINARY)

## Summary

- Renovation of the City's gravity wastewater collection system to reduce excessive inflow and infiltration (I/I).
- Estimated loan amount = $1,010,000
- Estimated energy efficient (green) portion of loan = xx% ($xxxx)

## Background[7]

- The irrigation season and high groundwater levels in the study area extend throughout the Spring. Infiltation and inflow is occurring in the collection mains, contributing to excessive flows to the lagoon.
- During this period it is estimated I/I volume = 30% of average daily flow.
- Seven locations within the existing collection piping have been identified as possible sources of I/I[8]. Six of the locations will be repaired by replacing short sections of pipe. One location will require replacement of 40 L.F. of pipe.
- Replacement of the most dilapidated gravity mains is recommended, reducing total I/I by an estimated 20% on an annualized basis.

## Results[9]

***Cost Effectiveness***

- To determine the overall cost effectiveness and energy savings of the selected alternative, it is compared to the Best Practicable Alternative (BPA). For I/I projects for lagoon systems, the standard BPA consists of provision for additional downstream treatment of the increased wastewater I/I volume.
- Collection system piping replacement = $xxxxxx. Expansion of the lagoons to accommodate effective treatment/storage of I/I - $xxxxx.

***Energy Savings***

- Existing pump stations: reducing system I/I by 20% results in a direct reduction in energy consumption of 20% by the existing pump stations during the months of high groundwater levels, for the 40 year life of the project = (20%**)** x **$**2,000/year x 40 years = **$16,000**.
- BPA: the selected alternative avoids expanding the lagoons to accommodate the additional flow = $xxxx in capital costs savings.

## Conclusion

- The 20% annualized reduction in the quantity of wastewater resulting from the elimination of I/I in the collection system makes the project GPR-eligible since it saves costs from less pumping, and incurs less capital cost than the BPA.
- **GPR Costs**: GPR-eligible costs = GPR-eligible savings compared to the BPA = $16,000 + $xxxx = $xxxxx
- **GPR Justification**: The prioritized replacement of gravity sewer lines by the City as recommended in the Facility Plan is GPR-eligible by a Business Case per Section 3.5-4[10] (Energy Efficient): *Infiltration/Inflow (I/I) correction projects that save energy from pumping and reduced treatment costs and are cost effective*.

[7] 7-10-17 Phone discussion: K. McNeill, IDEQ – S. MacNee, T-O Engineers
[8] SSMU Final Wastewater Facilities Plan, T-O Engineers, October 2016
[9] City of Cascade FY12 GPR Justification; EPA recommended development of the standard BPA for I/I analyses.
[10] Attachment 2. April 21, 2010 EPA Guidance for Determining GPR Eligibility for FY11 SRF Projects, P.10

# 3. FLUORESCENT LIGHTING (PRELIMINARY)

## Summary

- Energy efficiency from the installation of advanced fluorescent lighting in the new irrigation pump station building.
- Total Loan amount = $1,010,000
- Categorical energy efficient (green) portion of loan = xx% ($xxx)

## Energy Efficiency Improvements

- Energy efficient T-8 magnetic fluorescent lighting is approximately 28 percent more energy efficient than standard T-12 magnetic fluorescent lighting for relatively the same light output. [11]
- LED lighting is approximately 58 percent more energy efficient that typical high pressure sodium lighting for relatively the same light output.[12]

## Conclusion

- **GPR Costs**:

| Equipment Name | Cost |
|---|---|
| Fluorescent Lighting | $xxxx |
| LED Lighting | $xxxx |
| **Total** | **$xxxxx** |

- **GPR Justification**: Advanced fluorescent lighting is GPR-eligible by a Business Case per 3.5-7[13]: *Upgrade of POTW lighting to energy efficient sources such as …compact fluorescent.*

[11] National Lighting Product Information Program, *Lighting Answers*, Volume 1 Issue 1, April 1993.
[12] Global Green Energy, *ROI Analysis - 250W high pressure sodium vs. EcoBright 120W LED street light*, accessed via http://www.gg-energy.com/
[13] Attachment 2. April 21, 2010 EPA Guidance for Determining Project Eligibility. Page 10.