Clean Water State Revolving Fund Green Project Reserve

City of Greenleaf Wastewater Facility Project

SRF Loan #WW 1011

$6,110,518

Final Green Project Reserve Justification

Categorical & Business Case GPR Documentation

- TREATED EFFLUENT LAND APPLICATION SYSTEM CONSTRUCTION (Water Efficiency). Categorical GPR per Section 2.2-8: *Replacement of existing agricultural irrigation system with more efficient agricultural irrigation system*; also, (Water Efficiency) Business Case GPR per Section 4.5-8: *Land application in which feasible alternatives exist* ($885,968).

- INSTALLS SCADA FOR REMOTE MONITORING & CONTROL (Energy Efficiency). Business Case per GPR 3.5-8: *SCADA systems can be justified based on substantial energy savings* ($160,800).

Prepared by the State of Idaho SRF Loan Program
May 2013

1. LAND APPLICATION SYSTEM (LAS)

Summary

- The City of Greenleaf is constructing new wastewater facilities which include a 70-acre piece of land as the site of a new planned effluent reuse system. The system will assist in recharging the aquifer with high quality effluent.
- Loan amount = $6,110,518[1];
- GPR Costs = LAS + WWTP Pumps = $885,968
- Green portion of loan = 15%

Background

- The City is constructing a complete wastewater collection, treatment, and reuse system to replace failing septic systems and a failing community on-site subsurface wastewater disposal system.
- The failing systems have had a deleterious impact on the nitrate-priority, protected aquifer.
- The failing systems also resulted in the discharge of nitrogen and phosphorus to a watershed identified as water-quality impaired for nutrients.

LAS GPR Justification - Categorical[2]

- The new land application system will significantly increase water efficiency by replacing a poorly controlled siphon tube overland flood irrigation system with a highly controlled spray irrigation network of sprinkler pivot irrigators and level basins.
- The new irrigation system will also replace the current river-source irrigation water with treated effluent from the WWTP as a water source, resulting in a substantial reduction in the amount of water withdrawn from the river; this is particularly important in this high desert area with limited water resources.

LAS GPR Justification – Business Case[2]

- The wastewater disposal alternatives evaluated were the year-round discharge of treated effluent to surface water versus the beneficial reuse of treated effluent through highly controlled land application.
- The year-round surface discharge alternative requires an additional level of treatment at the WWTP to ensure compliance with the phosphorus standard; this additional treatment would have cost $315,467[3].
- The selected beneficial reuse option costs $885,968[3] which is more expensive than the other feasible alternative.

LAS Benefits[4]

- The benefits of the reuse option include: the high quality effluent produced, greater aquifer recharge, and overall positive impact on groundwater quality in the area. The effluent will be treated to Class B standards and reused on site to irrigate alfalfa or hybrid poplars during the critical TMDL period.
- Another major benefit of the Land Application System is that discharge of nitrogen and phosphorus will be eliminated to a watershed identified as water-quality impaired for nutrients.
- Surface water quality will also improve as the new highly managed agricultural reuse system will eliminate the current soil erosion and surface runoff that the existing flood irrigation system generates. This eliminates the discharge of sediment which also currently impairs water quality in the lower Treasure Valley.
- The land application and reuse system will also enable the City to comply with the conditions of the City's NPDES discharge permit, and with anticipated future permit conditions.

Conclusion

- The treated effluent slow-rate land application and reuse system was chosen over other alternatives because it results in the greatest positive benefit to groundwater quality and quantity and to surface water quality.
- **GPR Costs Identified:** Effluent Reuse System (incl earthwork, pumps, VFDs, piping, etc.) = $885,968
- **GPR Justification**: Categorical Justification (Water Efficiency) per Section 2.2-8, p.8*: Replacement of existing agricultural irrigation system with more efficient agricultural irrigation system*; and Business Case (Water Efficiency) per Section 4.5-8, page13: *land application in which feasible alternatives exist*.

---

[1] FY11 SRF WW Loan Agreement #1011
[2] Addendum No. 2 Greenleaf Wastewater Facilities Planning Study, May 2010, SPF Water Engineering and Civil Dynamics
[3] 3-25-13 email Civil Dynamics to K McNeill, IDEQ
[4] Greenleaf Wastewater Treatment EID, August 2010, SPF Water Engineering and Civil Dynamics

2. SCADA CONTROL TECHNOLOGY

Summary

- The SCADA system is comprised of various components including analytical sensors (temperature, dissolved oxygen, turbidity, chlorine residual, water level, and water pressure), flow meters, variable frequency drives (VFD), and programmable logic controller (PLC).
- Estimated loan amount = $6,110,518
- GPR Costs = $160,800 (Green portion of the loan = 3%)

Background/ Results[5]

The SCADA system is essential to the efficient daily operation of the WWTP:

- *Equalization Basin:* The pumps are controlled either by flow rate or water level and are VFD operated.
- *Oxidation Ditch:* The aerators are controlled by the dissolved oxygen concentration and are VFD operated to increase/decrease the dissolved oxygen concentration.
- *Secondary Clarifiers:* The clarifiers are VFD operated to vary the rate of speed for the removal of scum.
- *RAS/WAS Pumps:* These pumps are VFD operated and controlled to maximize pumping efficiency.
- *Utility Water Pump Station:* The vertical turbine pumps are controlled by pressure and are VFD operated to meet utility water demands throughout the WWTP.
- *Tertiary Filters:* These filters are turbidity controlled to meet a set turbidity limit.
- *Chemical Feed Systems:* The chlorine and de-chlorination pumps are controlled by chlorine residual concentration and/or flow rate and are operated to increase/decrease chemical feed as necessary.
- *Reuse Pump Station:* The pumps are controlled by pressure and are VFD operated to meet the demands of the reuse system.
- *Level Basins:* The irrigation level basins are controlled by the PLC to optimize irrigation sequencing between basins and irrigation water source.

Calculated Energy Efficiency Improvements

- The SCADA system increases the efficiency of operators by saving on labor costs.
  - The SCADA system collects operational data, stores the data, and summarizes it for reporting required for the NPDES and Reuse Permits.
  - It includes an alarm system associated with given set points throughout the WWTP. This is an advance warning system that alerts the operator.
  - The SCADA system contains a human-machine interface (HMI) that allows the operator to address alarms and adjust settings while offsite. In addition, the operator can also check the status of the WWTP components via the HMI at any time throughout the day. WWTP components includes: run status, dissolved oxygen concentrations, temperature, water levels, turbidity, operating pressures, flow rates, chlorine residual concentrations, etc.
- Savings in energy costs for the daily operations of the WWTP: @ 30% annual savings[6] = $12,000 per year[7]
- Savings in labor costs: 8 man hours per week = $14,560[8] per year

Conclusion

- The system results in a cost savings of $26,560 per year in energy and labor costs = payback of 6.05 years.
- **GPR Costs:** SCADA = $160,800
- **GPR Justification:** The SCADA is GPR-eligible per Section 3.5-8[9]: *SCADA systems can be justified based on substantial energy savings*.

---

[5] 3-26-13 email Civil Dynamics to K McNeill, IDEQ

[6] Responsible Charge Operator, Jason Wereley, phone discussion on 3/25/2013 – estimated %/yr. energy savings based on similar projects

[7] Estimated from February 2013 power bill.

[8] Based on Greenleaf Operator, Doug Amick, phone discussion on 3/26/2013 – estimated hourly rate of $35/hour.

[9] Attachment 2. April 21, 2010 EPA Guidance for Determining Project Eligibility. Page 10.