Clean Water State Revolving Fund Green Project Reserve
- Final -

City of Ashton Wastewater Facility Upgrade Project

SRF Loan #WW1701 (pop. 1084)

$4,900,000

Final Green Project Reserve Justification

Categorical GPR Documentation

1. INSTALL NEW ENERGY-EFFICIENT AERATORS AND MIXERS IN AERATED TREATMENT PONDS (Energy Efficiency). Business Case per GPR 3.2-2: *Projects that achieve a 20% reduction in energy consumption are categorically eligible for GPR.* ($414,577).

2. INSTALLS ENERGY-EFFICIENT EFFLUENT TRANSFER PUMPS IN NEW EFFLUENT PUMP STATION (Energy Efficiency). Business Case per GPR 3.2-2: *Projects that achieve a 20% reduction in energy consumption are categorically eligible for GPR*. ($21,585).

1. New Energy-Efficient Aerators & Mixers

Summary

- The winter storage pond has been constructed allowing treated wastewater to be land applied during summer months eliminating a stream discharge and avoiding permitting issues.
- Total Loan amount = $4,900,000
- Estimated Categorical energy efficient (green) portion of loan = 8.5% ($414,577)
- Annual Energy savings = 72% (Based on Final Installed Costs)


Past Lagoon Aeration

Background

- A four-cell lagoon provided secondary treatment through four (4) 5 HP Aeromix Tornado aspirating aerators in Lagoon No. 1 and two (2) more aerators in Lagoon No. 2.
- The aerators were expensive to maintain. Common repairs included replacement of the hollow shaft and lower bearing at a cost of $3,000 every two years. Motors were replaced every three years at $450 each.
- The aerators were also expensive to operate, being powered by standard efficiency motors.
- There were short-circuiting issues due to poor mixing.


Completed Pond

Energy Efficiency Improvements[1]

Existing System

- In the past, six (6) 5 HP aerators with standard efficiency motors were used for mixing and oxygen transfer = 30 HP total. The aerators ran for an average of 24 hours daily; therefore the energy consumed on an annual basis by the past system = (24 hrs/da)(365da/yr)(30 HP)(.7457 kW/HP) = 195,970 kWh/yr.

[1] 9-15-17 Fielding, Keller Associates to McNeill, IDEQ SRF

(con't) New Energy-Efficient Aerators & Mixers

Baseline Standard Practice (BSP)

- The Baseline Standard Practice design is four 5 HP aerators in Lagoon 1, two 5 HP aerators in Lagoon 2, and two 5 HP aerators in Lagoon 4 for mixing and oxygen transfer = 40 HP total.
- The aerators run year-round, 24 hours per day, therefore the energy consumed on an annual basis for the BSP design = (24 hrs/da)(365 da/yr)(40 HP)(.7457 kW/HP) = 261,293 kWh/yr.
- The cost of the aeration equipment for the BSP design is (8)($14,383) = $115,064.

GPR Alternative

- The GPR alternative replaces the BSP design with five (5) new 5 HP aerators with energy-efficient motors, and three (3) fractional HP mixers (26 HP total). The new aerators will run for 24 hours for five months during the winter, November through March. Therefore the energy consumed on an annual basis by the new aerators = (24 hrs/da)(151 da/yr)(25 HP)(.7457 kW/HP) = 67,560 kWh/yr.
- The fractional HP mixers (1/3 HP each) will run year-round, 24 hours per day. The energy consumed on an annual basis by the new mixers = (24 hrs/da)(365 da/yr)(1 HP)(0.7457 kW/HP) = 6,532 kWh/yr.
- Therefore, the total power requirement for the GPR Alternative = Aerators + Mixers = 67,560 kWh/yr + 6,532 kWh/yr. = 74,092 kWh/year
- The cost of the aeration equipment for the GPR Alternative is (5)($25,649) + (3)($95,444) = $414,577.

GPR Savings vs. BSP

- The annual power savings = total power use for the BSP design vs the GPR alternative. The calculated power savings = 261,293 – 74,092 = is 187,201 kWh/year.
- The annual cost savings is = annual power savings (187,201 kWh/year) ($0.0951/ kWh) = $17,803/yr.
- The payback period for the GPR Alternative is the cost difference between the BSP & the GPR Alternative ÷ $/year savings = 16.8 years, well within the equipment life.

Conclusion

- Using premium energy efficient aerators and reducing the number of aerators by using fractional HP mixers, the City reduces their power needs by approximately 187,201 kW-hr per year and annual power costs by approximately $17,803 each year from the BSP design. This represents a 72% overall savings per year in energy and costs.
- **GPR Alternative Costs**:

  Energy efficient aerators = (5)($25,649) = $128,245
  Fractional HP mixers = (3)($95,444) = $286,332
  Total = $414,577 (Final Installed Costs)[2]

- **GPR Justification:** Categorically GPR per 3.2-2: *Projects that achieve a 20% reduction in energy consumption are categorically eligible for GPR*[3].

[2] 11-1-18 Jaden, Keller Associates to McNeill, IDEQ SRF
[3] Attachment 2. EPA Guidance for Determining GPR Eligibility for FY12 SRF Projects

2. HIGH EFFICIENCY PUMPS

Summary

- A pond was constructed to store treated effluent in the winter; effluent will be land applied as irrigation during the summer months. This eliminates the existing stream discharge and avoids permitting issues.
- Total Loan amount = $4,900,000
- Estimated Categorical energy efficient (green) portion of loan = 0.4% ($21,585) (Final Costs)
- Annual Energy savings = 26%

Background

- A new pump station was installed to transfer treated effluent from the treatment lagoons to the new winter effluent storage pond.

Results[4]

- GPR-eligible items are the high efficiency pumps to transfer treated wastewater from the lagoons to the new winter effluent storage pond.

Effluent Transfer Pumps

- The effluent pump station consists of three (3) pumps to pump the design maximum day flow of 0.118 MGD from the lagoons to the winter storage pond.
- The Baseline Standard Practice (BSP) is a pump with an efficiency = 58.2%; energy usage = 3,311 kWh/year.
- The cost of the BSP pumps is 3 @ $5,000/ea = $15,000
- The GPR Alternative pumps will have an efficiency = 78.2%; energy usage = 2,455 kWh/year.
- The cost of the GPR pumps is 3 @ $7,195/ea = $21,585
- Energy Reduction = BSP pumps 3,311 kWh/yr – GPR pumps 2,455 kWh/yr = 856 kWh/yr = 26% reduction

Conclusion

- Using high efficiency pumps instead of pumps with efficiencies more common to wastewater pumps will save the City 855 kWh/yr or a 26% reduction in energy demand.
- **GPR Costs**:
  GPR pumps = 3 pumps @ $7,195 ea = $21,585 (Final Installed Costs)[5]
- **GPR Justification**: Categorically GPR per 3.2-2: *Projects that achieve a 20% reduction in energy consumption are categorically eligible for GPR*[6].

[4] 9-15-17 Fielding, Keller Associates to McNeill, IDEQ SRF
[5] 11-1-18 Jaden, Keller Associates to McNeill, IDEQ SRF
[6] Attachment 2. EPA Guidance for Determining GPR Eligibility for FY12 SRF Projects