GREEN INFRASTRUCTURE BUSINESS CASE
FOR

HARTSELLE UTILITIES WASTEWATER TREATMENT PLANT IMPROVEMENTS

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General Information and Project Summary

Hartselle Utilities (HU) provides electric, natural gas, potable water and sanitary sewer services to the residents of the City of Hartselle. The Hartselle Utilities Board of Directors (the Board) considers the provision of sanitary sewer service to be one of the most basic of public services which they provide, and has been placed on the approved projects list to receive Clean Water State Revolving Loan Funs (CWSRF) to upgrade its wastewater treatment plant (WWTP).

The Hartselle Utilities WWTP improvements will be located at the site of the existing treatment plant in Hartselle, Alabama. The project will include the construction of a septage receiving station, sludge dewatering facilities and a water reuse system.

In 2002, Hartselle Utilities retained an engineering firm to evaluate the Sanitary Sewer System (SSS) for the City of Hartselle. The results of the Study were comprehensive and indicated that a tremendous amount of work was needed. The work was divided into four phases which included repairs to 13 drainage basins and the WWTP. Phases 1-3 consisted of 14 separate construction projects designed to address the Inflow and Infiltration (I&I) problems and was completed in December 2008.

Two additional studies were commissioned by the Board to specifically address the WWTP. The first study was to evaluate the WWTP and make recommendations to improve the overall operational efficiency of the Plant. The second study was commissioned to address specifically the Sludge Holding Pond and the handling of sludge. In December of 2007, Phase 4, the rehabilitation of the operational components of the plant was started at the WWTP and continues today.

In the original studies, the engineering firm was not asked to incorporate environmentally friendly measures. As a result, the staff of Hartselle Utilities has incorporated projects which address environmental concerns and provides cost effective measures. Therefore, the design now incorporates “green initiatives” and a summary of the projects are outlined.

Sludge Management Facilities and Pond Closure

Summary

- The implementation of an innovative method of sludge dewatering will be used to conserve electrical energy requirements, potable water requirements and reduce facility expansion. Additionally, this project will address potential non-compliance with Part 503 regulations and mitigate a potential overflow of waste sludge and raw sewage due to inadequate capacity in the Sludge/Surge ponds.

- In anticipation of the Sludge Pond closure, it is necessary to provide a Septage Receiving Station. At this time Hartselle serves 9,800 out of 13,900 (71%) of its population with gravity sewer. The remaining 4,100 (29%) of Hartselle's population are served by on site septic tank systems. The WWTP is not currently equipped to receive waste from such systems. After the Septage Receiving Station at the WWTP is constructed, 100% of Hartselle residences will be served by sanitary sewer or septage disposal services.

Loan amount =	$ 586,600	Sludge Dewatering and Pond closure
Loan amount =	210,000	Septage Receiving Station
Total	$796,600	

- The estimated annual energy savings is approximately 62.9% or $12,050 per year based on current electric rates.

- A significant reduction in potable water usage will be realized in the sludge dewatering process.

Background

- The current two (2) acre sludge pond was built in 1987, and sludge build-up over the years has diminished the holding capacity of the pond. The waste activated sludge from the treatment plant discharges to the sludge pond for anaerobic digestion and has reached its capacity. This project will clean the sludge pond and permanently end on-site storage of waste sludge. Appropriate disposal of process dewatered sludge will go to a Class D landfill approved by ADEM.

Results

- The conventional methods to dewater sludge by either a centrifuge or belt press requires 70 to 90 hp equipment and a 25 to 30 kW power requirement for HVAC and lighting for the additional large buildings to house all of the equipment. The estimated water requirements for a belt press are 90 gpm during the process time and clean up. Centrifuges require water during shutdown and cleanup at a rate of 70 gpm.

- The proposed process of using portable sludge dredging equipment, sludge dewatering boxes and a polymer feed system will significantly reduce the electric energy requirement and potable water requirements compared to conventional methods. An unmanned, remote controlled dredge will be used for removing the sludge. An optional on board diesel engine provides power for the dredge mitigating additional demand for electrical power. The use of gravity dewatering boxes will eliminate 40 to 50 hp from the previously proposed options and will not require a building for operations. The only water required for the gravity dewatering boxes will be for occasional wash downs and will be accomplished with the proposed project for reuse water.

Calculated Energy Efficiency

- The annual electrical requirement for a conventional sludge dewatering facility and electrical powered dredge are estimated to be 208,570 kWh.

- The annual electrical energy requirements for the proposed portable sludge dredging equipment, sludge dewatering boxes and a polymer feed system are 77,440 kWh.

- The estimated annual reduction in energy requirements is 131,130 kWh or 62.9% and will save $12,050 in energy cost per year at current electric rates.

$$\frac{\text{kWh/year with Conventional Dewatering Facility} - \text{kWh/year with Proposed Dewatering Facility}}{\text{kWh/year with Conventional Dewatering Facility}}$$

For this project:

$$\frac{(208{,}570 \text{ kWh/year} - 77{,}440 \text{ kWh/year})}{208{,}570 \text{ kWh/year}} = 62.9\%$$

Conclusion

- By utilizing portable sludge dredging equipment, sludge dewatering boxes and a polymer feed system, Hartselle Utilities will remediate the existing sludge holding pond and reduce our annual energy requirements by 62.9% over a permanent centrifuge. This method will also significantly reduce additional water needs required by conventional methods of dewatering sludge by up to 90 gpm during the process time and clean up.

- Upon completion of the sludge holding pond remediation, the portable dredge equipment will be used to clean the existing adjacent surge ponds in order to maximize available surge capacity for I&I management.

- An additional benefit is this project may serve as a pilot for other facilities having similar requirements for sludge management and will compliment the GREEN initiatives sought by the American Recovery and Reinvestment Act of 2009.

Reuse Water Project

Summary

- Installation of High Efficiency Pumping Station and piping system to provide for reuse opportunities within the WWTP as well as city-wide sewer maintenance and repair needs.

- The Pumping Station will intercept currently discharged effluent water and will be piped for use in the wastewater treatment process and sewer collection system maintenance. This process currently requires the use of potable water at a rate of 12,111,000 gallons annually.

- This will result in a 99.7% reduction in potable water consumption (12,071,000 gallons annually).

$$\frac{\text{Current potable water purchased} - \text{Potable water purchased w/ reuse}}{\text{Current potable water purchased}}$$

For this project:

$$\frac{(12{,}111{,}000 \text{ gals./year} - 40{,}000 \text{ gals./year})}{12{,}111{,}000 \text{ gals./year}} = 99.7\%$$

- Loan amount = $112,800

Background

- The WWTP water needs include use for influent fine screening, septage receiving station, chlorination and dechlorination feed, sanitary facilities, laboratory, vehicle equipment and all plant wash down needs. This currently results in the purchase of over 1,000,000 gallons of potable water per month.

- The current WWTP process results in the discharge of normally high quality water to the environmentally sensitive Flint Creek water shed area.

Benefits

- With the increasing need to conserve costs of potable water supplies and limit the impact to the Flint Creek Water Shed, the Reuse Water Project will reduce potable water consumption of 12,071,000 gallons per year and as a result, reduce discharge by the same amount.

Conclusion

- By installing a reuse water system, the potable water needs for the WWTP are reduced to 40,000 gallons per year. Based on current rates, this is a savings of $26,935.00 per year. With already published projected rate increases from our potable water supplier of 18.7% over the next four years, reuse water would bring the savings to $31,780.00 annually.