

## CHAPTER 1 EXECUTIVE SUMMARY

The Madison Metropolitan Sewerage District (MMSD) owns and operates the Nine Springs Wastewater Treatment Plant (NSWWTP), a 50 million gallon per day (mgd) advanced wastewater treatment plant (WWTP). Wastewater generated within the District's 178-square mile service area is collected and treated at the NSWWTP, which discharges highly treated effluent to Badfish and Badger Mill Creeks. Treated biosolids from the NSWWTP are recycled to agricultural land through MMSD's successful Metrogro program.

The District modified the solids handling system at the NSWWTP in the last major construction project at the plant, the 10<sup>th</sup> Addition. An advanced anaerobic digestion process was implemented (temperature-phased anaerobic digestion) to provide a Class A biosolids product. A variety of technical and operational issues arose that prevented the District from achieving the intended goals for the advanced digestion process. Thus, the District authorized this Solids Handling Facilities Plan (11<sup>th</sup> Addition Facilities Plan) to evaluate solids handling system alternatives for the NSWWTP over a 20-year period (2010 through 2030) with the primary goal to provide the District with a detailed "roadmap" to achieve a reliable, cost-effective, sustainable process yielding a Class A biosolids end product.

Under current waste loadings the NSWWTP solids handling system processes approximately 100,000 lbs/day of waste primary and secondary solids, yielding the liquid Class B biosolids product for the Metrogro program. The District is currently transporting and applying about 40 million gallons of Metrogro on area farm land annually. Plant loading projections out to the year 2030 predict that the solids handling system loadings will increase to more than 150,000 lbs/day, a 50% increase above existing loadings.

An evaluation of the existing solids handling system was performed and it was determined that the digestion system should revert to mesophilic mode with Class B biosolids. This is an interim mode of operation until the issues that arose with the 10<sup>th</sup> Addition Class A biosolids system can be addressed through this facilities plan and resulting 11<sup>th</sup> Addition construction.

An overview screening of Class A biosolids technologies led to a “first tier” evaluation of six different anaerobic digestion alternatives. An ensuing “second tier” evaluation provided a more detailed analysis of the following:

- Conventional mesophilic digestion with thermal pretreatment
- Multi-stage acid phase digestion
- Acid phase digestion with thermal post treatment

Sizing, design criteria, and preliminary site layouts were developed for each of the alternatives. Evaluation criteria included consideration of sludge thickening, digester heating, digester mixing, digester foaming, Class A biosolids production, struvite mitigation, and full scale process experience. Economic (present worth) and non-economic comparisons of the alternatives were prepared. From the second tier evaluations, the technology recommended for implementation in the 11<sup>th</sup> Addition to the NSWWTP is multi-stage acid phase digestion.

The recommended plan, converting the existing anaerobic digestion system to multi-stage acid phase digestion (mesophilic acid phase, thermophilic gas phase), is proposed to achieve the District’s goals for Class A biosolids via a site specific Class A permit. The plan includes the addition of the following major facilities:

- WAS Thickening Facilities
- Acid Digesters
- Thermophilic Digester No. 8
- Struvite Harvesting
- Digester Heating / Mixing Modifications
- Related Plant Improvements

The estimated capital cost for the recommended plan is \$45,000,000. The new construction is estimated to result in a net addition of \$160,000 to the plant’s annual O&M budget. It is anticipated that implementation of struvite recovery will result in O&M savings due to fertilizer revenue and reduction in iron chemical costs.

The most likely source of funds for this project is a low interest loan from the DNR’s Clean

Water Fund. The current interest rate for eligible projects is 2.910% (60% of market rate). Assuming that the project is 90% eligible for the reduced interest loan rate and an 18-year payment schedule, the annual debt service costs will be approximately \$3.33 million.

A preliminary sewer user charge analysis was performed as part of this Facilities Plan. Residential customers pay for MMSD-provided services and sewer service provided by their local community. The current (year 2010) typical residential annual charge is estimated to be \$245, including both MMSD and local community charges. In year 2014 when the debt service costs for the project are fully incorporated into customer bills, the typical residential annual charge will be \$302. Without the project, the year 2014 residential annual charge would be reduced by \$18 to \$284. The impact of the project on residential rates is therefore on the order of a 6.5% increase.

The steps and anticipated schedule for implementing the recommended plant upgrade are outlined below:

Conduct Public Hearing	February 2010
Submit Facilities Plan to DNR	February 2010
DNR Approval of Facilities Plan	March 2010
Begin Design	January 2010
Submit Plans and Specifications to the DNR	December 2010
DNR Approval of Plans and Specifications	February 2011
Bidding	February 2011
Award of Contract	March 2011
Submit Clean Water Fund Application	March 2011
Begin Construction	April 2011
Substantial Completion/Startup of Facilities	October 2013
Complete Construction	December 2013