

1. EXECUTIVE SUMMARY

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EXECUTIVE SUMMARY

Introduction

The Madison Metropolitan Sewerage District (MMSD) is a municipal corporation created for the purpose of collecting and treating wastewater from the Madison metropolitan area. MMSD provides service to 43 municipal customers, including cities, villages, town utility districts and town sanitary districts in the area. MMSD's service area encompasses 177 square miles and serves a current population of approximately 330,000 people. MMSD owns and operates a regional wastewater conveyance system and the Nine Springs Wastewater Treatment Plant (NSWTP). On an average day, MMSD treats 41 million gallons of wastewater at the NSWTP. Each municipality within MMSD owns and operates its own wastewater collection system which feeds into MMSD's conveyance system.

The Madison area is one of the fastest growing areas in Wisconsin. An expanding population and potential limitations in the collection system and at the NSWTP have prompted MMSD to develop a 50-year master plan. An overarching objective of the planning process was to continue the District's practice of providing exceptional service at a reasonable cost to its customers while striking an appropriate balance between environmental, social, and economic impacts.

The team of Malcolm Pirnie Inc. and Strand & Associates was retained by MMSD to develop a 50-Year Master Plan for its wastewater conveyance and treatment systems. The Capital Area Regional Planning Commission (CARPC) provided population and wastewater flow forecasts and analyzed impacts on the conveyance system capacity. A technical advisory committee (TAC) consisting of professionals in various water resource management areas was also formed to guide this planning effort.

Planning Goals

The purpose of the 50-Year Master Plan is to provide MMSD with a general guidance tool for providing service over the next 50 year planning period. Key areas evaluated as part of the master planning process include:

- Population growth and resulting impacts
- Collection, conveyance and treatment capacity/condition
- Centralized vs. decentralized treatment
- Mitigation of inter-basin water transfers
- Effluent reuse
- Regulatory drivers

Detailed information regarding each of the above areas is presented in a series of nine technical memoranda that are attached to this report. A 14 member TAC provided input throughout the master planning process on the above areas and other relevant issues. Public input was solicited through two rounds of outreach efforts targeting customer communities and other interested parties.

The resulting Master Plan includes:

- Capital improvement projects that are already in MMSD's capital plan.
- Near-term alternatives to address increased capacity needs prior to 2030, with consideration given to existing and potential regulatory requirements, mitigation of inter-basin water transfers (watershed balancing) and effluent reuse.
- Long-term alternatives to be implemented between 2030 and 2060.
- Signposts/key factors that should be monitored to assist with future decision making (e.g. technology improvements or new regulatory initiatives).

More detailed facility plans will need to be developed as necessary at intervals of five to ten years. These facility plans should review the Master Plan and related population, flow and load projections, and re-evaluate the importance of planning variables. The detailed facility plans may continue with the general direction identified in the Master Plan, or may make modifications if warranted. The Master Plan will be a dynamic document and will be reviewed and updated with each facility plan. This is consistent with the way MMSD used its previous 50 year Master Plan.

Master Planning Alternative Development

In addition to capacity and condition related projects already included in MMSD's capital improvement plan, several master planning alternatives were developed to address centralized versus decentralized wastewater treatment, inter-basin water transfer, and effluent reuse. These master planning alternatives are classified into two groups: near-term alternatives which could be implemented between 2010 and 2030 and long-term alternatives which could be implemented between 2030 and 2060.

Near-Term Master Planning Alternatives

The following two near-term master planning alternatives have been developed. Implementation of either of these alternatives between 2010 and 2030 will address the wastewater treatment and conveyance system capacity needs in a portion of MMSD's service area, namely service in the Sugar River basin:

- **Alternative MP-1 – Westside Conveyance System Expansion:** This alternative would expand the existing conveyance system and continue the current model of centralized treatment at the NSWTP. This alternative includes four variations for pumping treated effluent from the NSWTP to different locations in the Sugar River basin.
- **Alternative MP-2 – Sugar River WWTP:** This alternative includes construction of a new high quality effluent treatment plant in the Sugar River watershed to treat wastewater generated in the PS 17 service area. Effluent from this plant would be discharged to the Sugar River. The current discharge point on Badger Mill Creek for 3.6

mgd of effluent from the NSWTP would remain. This alternative includes two variations to discharge treated effluent at different locations on the Sugar River. If either of these variations is implemented, none of the conveyance system capacity expansion projects included in alternative MP-1 would be necessary.

Long-Term Master Planning Alternatives

Long-term alternatives are those planning alternatives that cannot be implemented soon enough to provide relief in the conveyance system; however, they remain potentially viable options beyond the year 2030 for mitigating inter-basin transfers of water, or providing high quality effluent for reuse options. The following two alternatives have the potential to be implemented after 2030.

- **Alternative MP-3 – Centralized High Quality Effluent Treatment & Distribution:**
This alternative includes construction of facilities at the NSWTP that would produce a high quality effluent for use in various applications including, stream flow augmentation, infiltration, industrial reuse, or turf irrigation. It also includes a pumping station and effluent force main to convey the effluent from the NSWTP to a point of use near PS 13.
- **Alternative MP-4 – Decentralized High Quality Effluent Treatment Facilities:**
This alternative includes construction of facilities northeast of the Dane County Regional Airport. The new treatment plant would receive wastewater flows tributary to PS13 or both PS13 and PS14. Effluent from this facility could be used for stream flow augmentation to Starkweather Creek, wetland restoration at Cherokee Marsh, groundwater infiltration, industrial reuse water or turf irrigation.

Conclusions and Recommendation

All near-term and long-term planning alternatives were evaluated and ranked using the 10 ranking criteria developed during this planning effort. Conclusions and recommendations resulting from the Master Planning process include the following:

- Sufficient capacity exists at the NSWTP through 2030, provided there are no significant regulatory changes that would require a higher level of treatment.
- Sufficient space exists at the NSWTP for future expansion to serve the anticipated treatment needs through 2060.
- Alternative MP-1A, which reflects a continuation of the District's current service model with no provision for additional effluent conveyance capacity to the Sugar River basin, achieves the lowest cost for providing wastewater conveyance and treatment service in MMSD's westside service area. However, this alternative will not mitigate future inter-basin transfers of water between the Sugar River basin and the Yahara River basin.
- Alternatives MP-1B, MP-1C and MP-1D, reflect a continuation of the District's current service model, but include pumping up to an additional 4.3 mgd of treated effluent to the Sugar River watershed to address the inter-basin transfer issue. The additional total life cycle costs to implement any of these alternatives would be \$34 million assuming the current discharge limits to Badger Mill Creek and Badfish Creek stay unchanged.

- If mitigation of the inter-basin flow imbalance between the Sugar River basin and the Yahara River basin is determined to be necessary, satellite facilities in the Sugar River Basin may be favorable from both economic and non-economic standpoints to address west side conveyance capacity issues. More detailed cost and non-economic comparisons between alternatives with centralized treatment and alternatives with satellite treatment will need to be conducted since their life cycle costs and social and environmental benefits are closely ranked.
- Watershed balancing should be an important planning variable for future projects. Multiple planning alternatives could be implemented to mitigate inter-basin water transfers.
- Effluent reuse options should be evaluated during future facilities planning efforts, but will require partnerships to implement. Partnerships could potentially include other municipalities, water utilities, or public/private partnerships.
- Effluent discharge to Badfish Creek should continue, but the quantity could be impacted by watershed balancing and/or effluent reuse projects that decrease the amount of water that would otherwise have been discharged to Badfish Creek.
- Due to the long planning horizon, specific effluent reuse projects cannot be clearly defined for long term alternatives. Preliminary evaluation shows that the most cost effective approach to providing effluent for reuse options is to continue to treat wastewater centrally and construct an effluent delivery system(s).
- Reduction of inflow/infiltration (I/I) in the existing conveyance system is an important element for the areas that experience high groundwater during wet weather conditions. Effective I/I reduction could delay the need for major capital improvement projects required to expand the capacities of the conveyance system and treatment facilities. Therefore, programs to reduce I/I are recommended for all planning alternatives.
- Future service alternatives such as satellite plants in the upper Yahara River basin that would discharge to the Madison lakes and regional service options involving Sun Prairie and Stoughton are not further evaluated in the Master Plan. At this time, the strict regulatory constraints, high construction and operation costs, lack of proven technology, and potential strong public resistance make these service alternatives less favorable than the services provided under the current operating model. However, these alternatives may become more viable in the future with changes in the political environment, water resource demand, or improvements in wastewater treatment technologies.
- Signposts such as technology improvements, regulatory trends, population growth rate, population shift, and changes in water use should be closely monitored during the planning period to allow MMSD to make appropriate adjustments to the Master Plan. The Master Plan will be a dynamic document and should be reviewed and updated periodically to reflect the impact of these types of key factors.