

## **2. INTRODUCTION**

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# INTRODUCTION

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## ***Background and Objectives***

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 an area of 177 square miles and serves a current population of approximately 330,000 people. MMSD owns 94 miles of gravity interceptor sewers, 29 miles of wastewater force mains, 17 regional wastewater pumping stations, and the Nine Springs Wastewater Treatment Plant (NSWTP). Each municipality within MMSD owns and operates their own sewer collection system which ultimately 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 conveyance system and at the existing treatment plant have prompted MMSD to develop a 50-year master plan. An overall 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. Members of the TAC and their affiliations include:

- Ken Bradbury, Wisconsin Geologic & Natural History Survey
- Kevin Conners, Dane County Land and Water Resources Department
- Greg Fries, City of Madison Storm Water Utility
- John Hausbeck, Department of Health and Family Services
- Ken Johnson, Department of Natural Resources
- Sue Jones, Dane County Lakes and Watershed Commission
- Dick Lathrop, University of Wisconsin/Department of Natural Resources
- John Magnuson, UW-Madison Limnology Department
- Kamran Mesbah, Capital Area Regional Planning Commission
- Larry Nelson, City of Madison Engineering/Water Utility
- Daniel Noguera, UW-Madison Civil and Environmental Engineering Dept
- Ken Potter, UW-Madison Civil and Environmental Engineering Dept
- Bill Sonzogni, State Laboratory of Hygiene

The master planning project includes the following tasks:

**Task 1 – Project Kickoff Meeting and Gather Initial Relevant Data**

The project was started with a kickoff meeting at MMSD. The consultants used the meeting to introduce the team and to briefly review the project. The consultants collected relevant information and data for the development of the Master Plan.

**Task 2 – Project Scoping and Visioning Workshop**

After the kickoff meeting and preliminary data gathering, two workshops were conducted between the Technical Advisory Committee (TAC), MMSD staff and the consultants. The purpose of these workshops was to review and verify the overall goals, objectives and tasks of the master plan; brainstorm on planning concepts and future scenarios; and establish the mechanisms used to manage and execute the project.

**Task 3 – Detailed Review of Current Plans and Wastewater Data**

The information collected under Task 1 was reviewed in more detail to provide the framework and baseline conditions for the master planning effort. Previous population projections and collection system evaluations by the Capital Area Regional Planning Commission (CARPC) staff, the Dane County groundwater model, and other relevant information were also reviewed.

**Task 4 – Evaluate Existing Facilities**

The existing facilities were evaluated using the data collected in previous tasks. As part of the effort to define baseline conditions, a detailed evaluation of the NSWTP and the MMSD conveyance system (interceptor sewers, pump stations, and force mains) was conducted. The evaluation included a review of main sewer capacities, historical and projected capacities of pump stations, and identification of bottlenecks in the collection system.

**Task 5 – Estimate Growth and Future Conditions**

Using the information gathered in Task 1 and information developed by CARPC, this task looked at the expected population changes in the Madison region over the next 50 years, and how these changes would impact MMSD’s wastewater conveyance and treatment requirements.

**Task 6 – Define Planning Variables**

This task established the planning criteria and variables that were used in subsequent tasks. Multiple meetings and workshops were held with the TAC, MMSD staff and consultants to assist with this effort.

**Task 7 – Scenario Planning Workshop**

Two scenario planning workshops were conducted with the TAC, MMSD staff and consultants to review planning variables to assure that all potentially significant applicable factors were considered, that relevant historical perspectives were considered, and that critical uncertainties were identified.

### **Task 8 – Develop and Evaluate Planning Alternatives**

Based on the initial planning, definition of planning variables, and the team’s scenario planning work, a range of planning alternatives were developed that would enable MMSD to address future service area changes such as population growth and distribution, water quality and availability, regulatory requirements, and public expectations and preferences. These planning alternatives involved changes and improvements to the NSWTP and the conveyance system as well as treatment and discharge alternatives.

### **Task 9 – Develop Rating Criteria**

Under this task, the planning alternative ranking and evaluation criteria were developed. Weighted scores were assigned to each ranking criterion according to their level of importance as determined collectively by the TAC, MMSD staff and the consultant team.

### **Task 10 – Rank Options and Develop Pros and Cons**

Under this task, all planning alternatives were ranked and evaluated using the ranking criteria developed in Task 9. Advantages and disadvantages of each planning alternatives were discussed, and recommendations were made regarding implementation of near-term and long-term solutions by MMSD.

### **Task 11 – Develop Draft Report**

Most of the previously described tasks have Technical Memos associated with them. Information in these Technical Memos formed the basis for developing a comprehensive draft report. All work tasks, evaluations, and recommendations were summarized in the draft report.

### **Task 12 – Develop Final Report**

Based upon the feedback gathered on the draft report, the Final Report was prepared and delivered to MMSD.

### **Task 13 – Public Involvement**

Efforts to engage the public and key stakeholders were conducted in two phases. The first phase was conducted early in the planning effort and included the development and distribution of an educational “fact sheet” and questionnaire, compilation of the questionnaire responses, and presentations of the master planning process and elements to numerous audiences.

The second phase of the public involvement effort involved District staff presenting preliminary findings, conclusions and recommendations in various public forums, including eighteen meetings of various public bodies where the presentation was included as part of their regular meeting, and an open house held at MMSD’s offices.

## ***Plan Basis***

Information from the following documents, written prior to the Master Plan, was reviewed and considered during the planning process:

1. MMSD Facility Plan Upgrade, Volume 1-4, October, 1994
2. MMSD Nine Springs WWTP 9<sup>th</sup> Addition, Preliminary Design Report, June, 1995
3. Evaluation of Alternative Management Strategies – Dane County Regional Hydraulic Study, August, 1997
4. MMSD Facility Plan Report – Nine Springs WWTP 10<sup>th</sup> Addition, Volume 1-3, January, 2000
5. MMSD Vision, Goals and Strategies, 2<sup>nd</sup> Edition, March, 2003
6. MMSD Nine Springs WWTP 10<sup>th</sup> Addition, Preliminary Design Report, April, 2002
7. Madison MSD Collection System Facilities Plan, July, 2002
8. Dane County Water Quality Plan – Summary Plan, September, 2004
9. 2004 Modeling and Management Program – Dane County Regional Hydrologic Study, September, 2004
10. Seventy-Sixth Annual Report of the Commissioners of the Madison Metropolitan Sewerage District, 2005
11. MMSD Report on Sewerage and Sewage Treatment by Greeley & Hansen, January, 1961
12. Draft of Dane County Comprehensive Plan, 2007
13. City of Madison, Wisconsin Comprehensive Plan, 2006
14. MMSD WPDES permit issued in 2004.

## ***Project Documentation***

The completion of the master planning project tasks was documented through a series of technical memoranda (TMs) as summarized in Table 2-1. Table 2-1 also includes the issues discussed in each TM and the appendix where each TM can be found.

**Table 2-1. Master Plan Technical Memoranda**

<b>TM No.</b>	<b>Document Title</b>	<b>Document Content</b>	<b>Master Plan Report Appendix</b>
1	Review of Existing Treatment Facilities	This TM provides an evaluation of the existing flows and loadings to the NSWTP, unit capacities of the existing liquid treatment and solids disposal facilities, plant hydraulics, site considerations, electrical distribution systems, and operation and maintenance facilities.	A

TM No.	Document Title	Document Content	Master Plan Report Appendix
2	Flow and Loading Projections	This TM documents projected flows and loadings for the 50-year planning period. The memorandum presents information regarding the plant influent flow and loading projections, and internal loadings which will result from the projected influent flows and loadings. The projected internal flows and loadings were compared with the rated unit process capacities determined in TM-1. The comparison results provide information to be used for identifying the system needs for the planning period.	B
3	Conveyance Facilities Analysis (CFA)	This TM reviews the existing MMSD conveyance infrastructure with regard to age and condition of the infrastructure asset, and the ability to meet projected capacity requirements for the planning years assuming all wastewater will continue to be treated at the NSWTP.	C
4	Planning Variables	This TM documents a workshop held with the TAC and key MMSD staff to identify and discuss major planning variables that will govern or impact MMSD's available options for continuing to provide high quality services over the 50-year master planning period.	D
5	Regulatory Review and Analyses	This TM reviews existing and foreseeable future regulatory issues potentially affecting MMSD's planning and operations in the next 50 years.	E
6	Scenario Planning Workshops	This TM documents the two scenario planning workshops held with the Technical Advisory Committee (TAC) and key MMSD staff to identify and discuss possible future scenarios that may occur during the 50-year planning period and their implications to MMSD's available options for continuing to provide high quality services over the planning period.	F
7	Development of Planning Alternatives	This TM develops projects and groups them into potential planning alternatives that provide different approaches to meet the needs of the MMSD during the next 50 years.	G
8	Planning Alternative Ranking Criteria	This TM identifies the applicable ranking criteria to be used for master planning alternative ranking and determines appropriate level of importance for all ranking criteria to be used in the planning alternative evaluation.	H
9	Planning Alternative Ranking and Evaluation	This TM refines the master planning alternatives developed by TM-7; determines the life cycle costs for the selected master planning alternatives; evaluates and ranks planning alternatives using the criteria and methods developed in TM-8; recommends the best near-term planning alternatives for implementation, evaluates and identifies long-term planning alternatives and provides general guidance for potential implementations.	I