

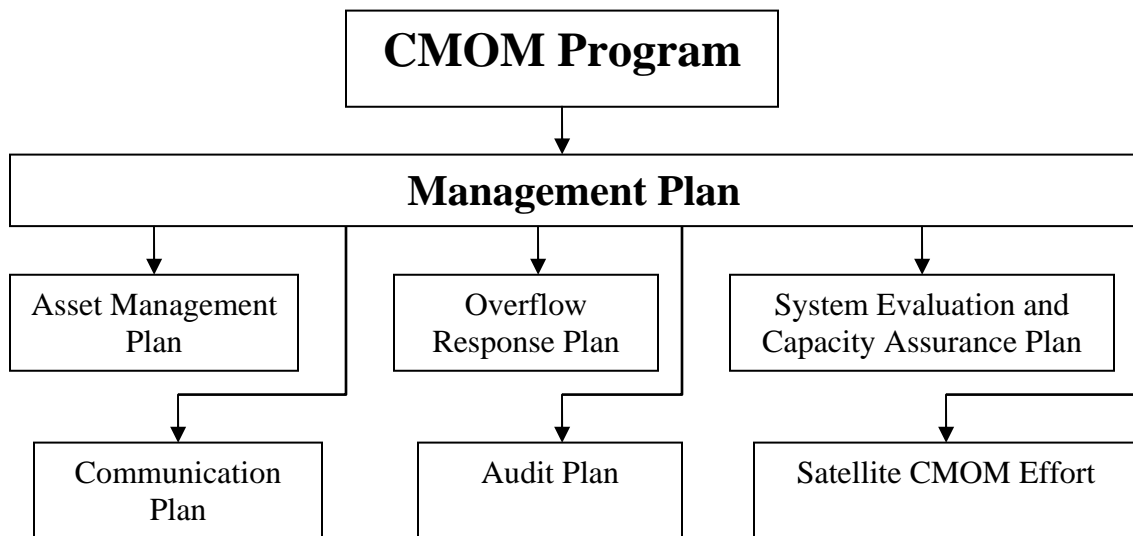


# **Capacity, Management, Operation and Maintenance (CMOM) Program**

Milwaukee Metropolitan  
Sewerage District

June 2007

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## ACRONYMS

AIMS – Asset Information Management System  
AM – Asset Management  
AMP – Asset Management Plan  
AMSA – Association of Metropolitan Sewerage Agencies (n/k/a NACWA)  
AMT – Asset Management Team  
AMWT – Asset Management Work Team  
AWWA – American Water Works Association  
BCA – Business Case Analysis  
BOD – 5-day Biochemical Oxygen Demand  
CIP – Capital Improvement Program  
CCS – Central Control System  
CFR – Code of Federal Regulations  
CM – Corrective Maintenance  
CMAR – Compliance Maintenance Annual Report  
CMMS – Computerized Maintenance Management System  
CMO – Constructability, Maintainability, and Operability  
CMOM – Capacity, Management, Operations and Maintenance  
CSO – Combined Sewer Overflow  
DS – Diversion Structure  
FFS – Flow Forecasting System  
FPOPs – Facilities, Programs, Operational Improvements and Policies  
GASB 34 – Governmental Accounting Standards Board Statement 34  
GIS – Geographical Information System  
HEC-RAS – Hydrologic Engineering Center-River Analysis System  
HSPF – Hydrologic Simulation Program-Fortran  
I/I – Infiltration and Inflow  
IS – Intercepting Structure  
ISS – Inline Storage System  
IWPP – Industrial Waste Pretreatment Program  
JIWWTP – Jones Island Wastewater Treatment Plant  
LID – Low Impact Development  
LOP – Level of Protection  
LOS – Level of Service  
LTCP – Long Term Control plan  
MGD – Million Gallons per Day  
MIS – Metropolitan Interceptor Sewer  
MMSD – Milwaukee Metropolitan Sewerage District

MOUSE – Modeling of Urban Sewers  
MP – Management Plan  
NACWA – National Association of Clean Water Agencies (f/k/a AMSA)  
NASSCO – National Association of Sewer Service Companies  
NPDES – National Pollutant Discharge Elimination System  
NSC – Near Surface Collector  
O&M – Operations and Maintenance  
ORP – Overflow Response Plan  
PdM – Predictive Maintenance  
PM – Preventive Maintenance  
PPE – Personal Protective Equipment  
QA – Quality Assurance  
R&R – Refurbishment and Replacement  
RaMP – Risk Management Priority Number  
RCFA – Root Cause of Failure Analysis  
RFA – Request for Assistance  
RTC – Real Time Control  
SCADA – Supervisory Control and Data Acquisition  
SECAP – System Evaluation and Capacity Assurance Plan  
SEWRPC – Southeastern Wisconsin Regional Planning Commission  
SMP – Standard Maintenance Procedure  
SOC-CA – Systems Operation and Control Contract Administrator  
SOP – Standard Operating Procedure  
SSO – Sanitary Sewer Overflow or Sanitary Sewer Outfall  
SSWWTP – South Shore Wastewater Treatment Plant  
TAT – Technical Advisory Team  
TSS – Total Suspended Solids  
USEPA – United States Environmental Protection Agency  
UWS – United Water Services  
VRSSI – Volume Reserved for Separate Sewage Inflow  
WDNR – Wisconsin Department of Natural Resources  
WMP – Watercourse Management Plan  
WPDES – Wisconsin Pollutant Discharge Elimination System  
WWPFMP – Wet Weather Peak Flow Management Program  
WWTP – Wastewater Treatment Plant

## DEFINITIONS

*2020 Facilities Plan* – Milwaukee Metropolitan Sewerage District’s plan for facilities, policies, operational improvements and procedures for the planning horizon from 2000 to 2020.

*Asset Management Work Team* – A team of District and contract operator employees convened to provide input in developing the Asset Management Plan Strategy developed and documented in the *CMOM Strategic Plan*.

*Biosolids* – Stabilized solid matter resulting from the wastewater treatment process

*Business Case Analysis* – A method for determining and comparing the community benefits of a project to its total cost.

*CMOM Strategic Plan* – Documentation provided to the Wisconsin Department of Natural Resources in 2005. The CMOM Strategic Plan included strategies for the management plan, asset management plan, overflow response plan, system evaluation and capacity assurance plan, communication plan, audit plan and satellite effort that were further developed into the District CMOM Program.

*Computerized Maintenance Management System* – Database of assets, asset maintenance plans and work orders used for scheduling and tracking maintenance time and costs

*Contract Operator* – Private firm contracted by the Milwaukee Metropolitan Sewerage District to perform the maintenance and operation activities associated with the District’s wastewater conveyance and treatment assets.

*Corrective Maintenance* – Maintenance activities intended to restore an asset from a failed condition to normal operation.

*Diversion Structure (DS)* – Structure built either on a combined sewer or on a combined sewer overflow to direct flow into a near surface collector sewer (where it is directed towards the Inline Storage System.) The diversion structure will generally handle wet weather flow above the capacity of the regulating device in the Intercepting Structure. Diversion structures can also be built in the same structure with the Intercepting Structure.

*Dropshaft* – Conveyance structure that is the primary vertical link between the near surface conveyance facilities and the deep Inline Storage System.

*Great Plains* – District asset accounting software and database.

*Intercepting Structure (IS)* – Structure built on a combined sewer that intercepts dry weather flow and a portion of wet weather flow and directs it to the Metropolitan Interceptor Sewer (MIS) System. Intercepting structures use one of three types of devices to regulate the flow into the MIS. The devices are: 1) An orifice; 2) A tilting gate; or 3) A leaping weir.

*Level of Protection* – The wastewater flow (applies to flow in the conveyance system, at the treatment plants or in the watercourse system) recurrence interval that the District has identified and used for planning, designing, and constructing facilities to protect against SSOs, diversions, and surface flooding.

*Maximo* – Computerized maintenance management system presently used by the District’s contract operator

*Permit* – Wisconsin Pollutant Discharge Elimination System permit issued to the Milwaukee Metropolitan Sewerage District (current permit was issued in 2003.)

*Predictive Maintenance* – Inspection, testing and maintenance activities that are primarily intended to determine an assets condition. Typical activities include sewer televising, structural inspections, vibration testing, and oil analysis.

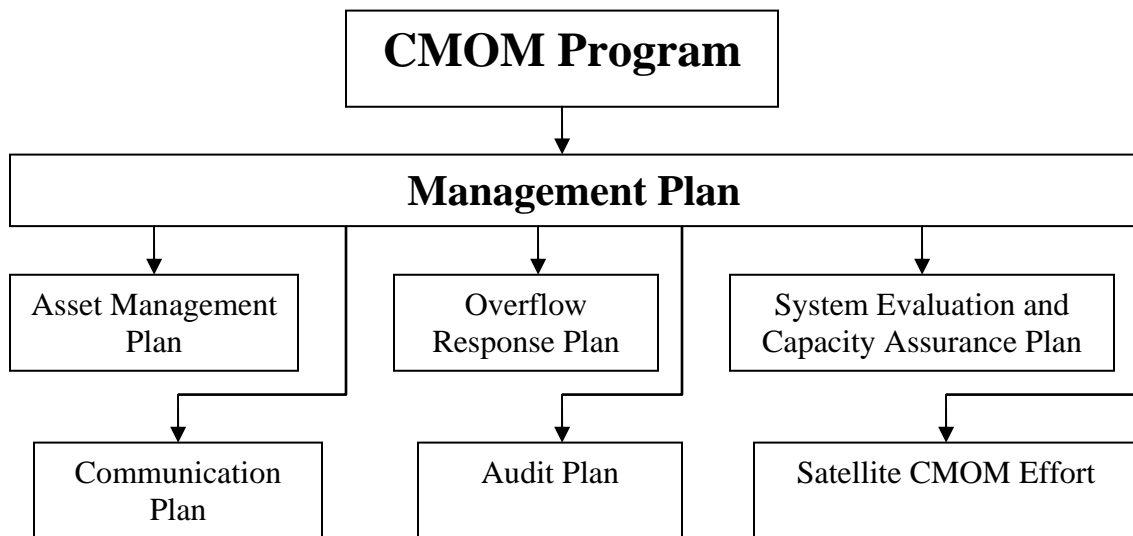
*Preventive Maintenance* – Maintenance activities intended to maintain the normal function of an asset.

*Sewershed* – Portion of the District service area. Sewersheds are delineated by sewer flow tributary area and do not cross municipal boundaries, meter basin boundaries or District sub-systems.

*Stipulation* – Agreement entered into between the Milwaukee Metropolitan Sewerage District and the State of Wisconsin in 2002 that specifies activities and projects the District must complete within a set timeframe.

*Wastewater System* – The system of Metropolitan Intercepting Sewers (MIS), including the intercepting structures, Near Surface Collector sewers (NSC), including diversion structures, Inline Storage System (ISS), Combined Sewer Overflow (CSO) and outfall sewers, and the wastewater treatment plants (Jones Island and South Shore) owned by the Milwaukee Metropolitan Sewerage District.

# Executive Summary



## ES.1 CMOM Program Background

The Milwaukee Metropolitan Sewerage District (MMSD or District) has prepared this Capacity, Management, Operations and Maintenance (CMOM) Program Documentation to satisfy a requirement of the stipulation agreement (Stipulation) (1) entered into between the District and the State of Wisconsin in May of 2002.

CMOM principles were proposed by the United States Environmental Protection Agency (USEPA) in 2001 as a part of the draft Sanitary Sewer Overflow (SSO) rule (2) that was subsequently withdrawn. The withdrawn SSO rule, although never formally adopted, was considered, in the absence of other guidance, in the development of the District CMOM Program.

This document describes the goals of the District CMOM Program, as well as the means and methods that the District has in place and is implementing to achieve the goals and ensure execution of the CMOM program.

## ES.2 CMOM Program Development

The District retained Brown and Caldwell (Consultant) in 2002 to guide the District through the process of developing a CMOM Program. The Consultant used: 1) The withdrawn SSO Rule; 2) The Management, Operations and Maintenance (MOM) checklist from USEPA Region 4; and 3) Consultant staff that was experienced with CMOM principles and practices to develop the framework for conducting a CMOM Readiness Review.

The Readiness Review consisted of the Consultant interviewing District staff, reviewing District documents, and conducting field visits. The information gathered was compared to checklists, industry practices, and District goals. The comparison resulted in a description of the gaps that existed between where the District is and where it desires to be. This information and analysis was compiled into the *MMSD CMOM Readiness Review and Implementation Strategy Development (CMOM Strategic Plan)*, which was completed in December 2005. The *CMOM Strategic Plan* recommended a variety of standards, actions, and procedures to be investigated and incorporated into the District's CMOM Program. The District used this document as the guidance for developing and implementing the District CMOM Program as presented in this document.

## ES.3 CMOM Program Goals

During the Readiness Review process, the District determined that CMOM principles could be applied not only to its wastewater conveyance system (as CMOM principles were described for), but to the District's wastewater treatment plants and jurisdictional watercourses also. The District then stated a goal for the overall CMOM Program, as well as goals for each of its areas of responsibility of conveyance, treatment, and watercourses.

The overall CMOM Program goal, as developed for and stated in the *CMOM Strategic Plan*, is:

By June 2007, MMSD will develop and implement a cost-effective CMOM Program based upon best practices for wastewater conveyance, wastewater treatment and watercourse management, which results in maximizing the capacity of the existing and planned facilities to convey and treat wastewater, providing flood management, and improving water quality in the MMSD service area. The program must be consistent with goals from other MMSD policies and facilities plans.

The goals for the conveyance, treatment and watercourse areas are (also developed for and stated in the *CMOM Strategic Plan*):

### **Conveyance**

By June 30, 2007, MMSD will implement a CMOM Program with the intent of eliminating all SSOs except those caused by circumstances as defined by Title 40 of the Code of Federal Regulations (CFR) §122.41 (m) (4), and minimizing CSOs in accordance with the current discharge permit.

### **Treatment**

By 2007, the MMSD will implement a CMOM Program for cost-effective wastewater treatment that will achieve and sustain:

- Effluent, biosolids, and air emissions quality meeting or better than regulatory and permit requirements.
- Sustain operational readiness, reliability, and redundancy for liquid and solids processing.
- Achieve AM implementation.
- Improve coordination of wastewater treatment plant operations with collection system facilities and staff.
- Improve proper work management related to maintenance.

### **Watercourse**

MMSD will implement a CMOM Program intended to minimize the risk of flooding associated with the one percent probability flood event to habitable structures along jurisdictional streams in an environmentally responsible and cost-effective manner, through updating and implementing its Watercourse Management Plan.

## **ES.4 CMOM Program Components**

The District CMOM Program contains the chapters described below, which address specific requirements of the CMOM Program as listed in the Stipulation. The chapters contain language addressing how the District is applying CMOM principles to its conveyance, treatment, and watercourse facilities.

### **Management Plan (Chapter 2)**

The Management Plan contains the goals and objectives, organizational structure to manage the CMOM Program, legal authority to control I/I, design criteria, benchmarking methods, performance measures and reporting methods for CMOM compliance reviews.

### Asset Management Plan (Chapter 3)

The Asset Management Plan contains the immediate, near-term and long-term actions the District intends to implement regarding its assets. It addresses the vision, organization and planning for the asset management plan, as well as asset needs such as asset knowledge, asset planning, asset refurbishment and replacement, asset development, asset operation and maintenance, asset condition monitoring, asset financing and asset financial reporting.

### Overflow Response Plan (Chapter 4)

The Overflow Response Plan contains the District procedures for being aware of, responding to and reporting of overflows. The response includes review and analysis to develop corrective actions, where necessary, to prevent future overflows.

### System Evaluation and Capacity Assurance Plan (Chapter 5)

The System Evaluation and Capacity Assurance Plan contains the District's capacity evaluations for wastewater conveyance, wastewater treatment and watercourse systems. This plan includes descriptions of the generation of flows and loadings, system responses and identification of deficiencies relative to the desired level of protection against overflows and flooding.

### Communication Plan (Chapter 6)

The Communication Plan contains the District plan for communicating its CMOM Program to stakeholders, including internal, regulatory and public stakeholders, as well as receiving feedback from stakeholders.

### Audit Plan (Chapter 7)

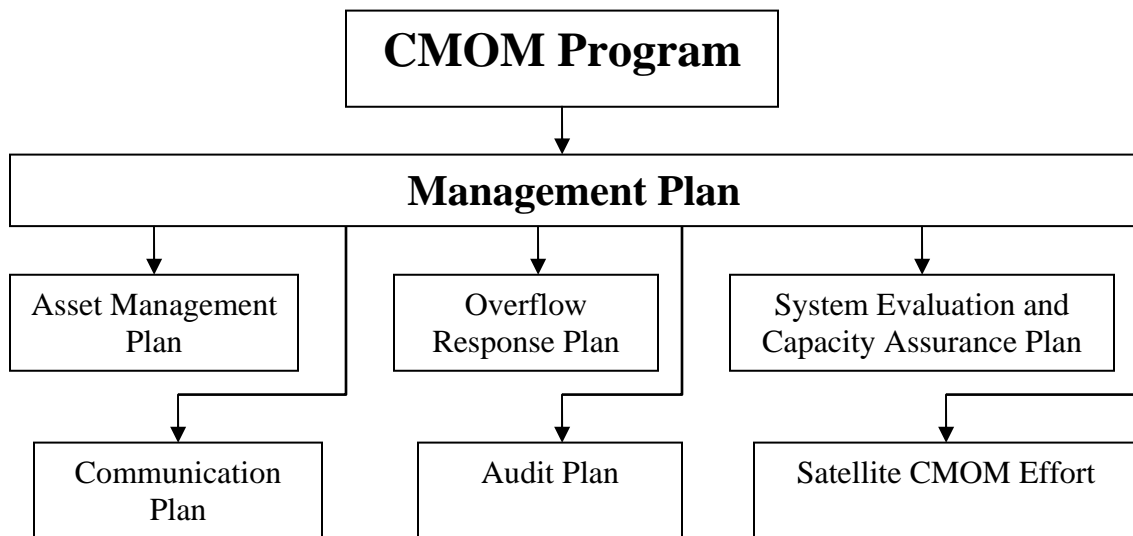
The Audit Plan contains the District plan for conducting an audit of the entire CMOM Program in the year 2012.

### Satellite CMOM Effort (Chapter 8)

Chapter 8 describes the efforts that the District has taken to date and has planned for the future to meet the Stipulation requirements regarding inclusion of the satellite municipalities and development of a regional CMOM Program.

The Program, including objectives, strategies, tactics and other activities will be subject to change and refinement as the District continues implementing and gains experience with the CMOM Program. Future changes to the CMOM Program will be documented in District CMOM reports.

# Introduction



## 1.1 Background

The Milwaukee Metropolitan Sewerage District (MMSD or District) has prepared its Capacity, Management, Operation, and Maintenance (CMOM) Program to comply with the requirements of a Stipulation Agreement (Stipulation) (1) between the District and the State of Wisconsin. The Stipulation spells out, among other items, certain requirements of the District CMOM Program and a deadline for completion. Further detail on the requirements of the Stipulation is provided below in section 1.3 and Appendix 1-1.

## 1.2 Overview of the District

The Milwaukee Metropolitan Sewerage District is a special purpose District existing under the laws of the State of Wisconsin to provide regional wastewater treatment and flood management services. The District is governed by a commission of 11 members that are appointed by the mayor of the City of Milwaukee and the Intergovernmental Cooperation Council. The District's mission statement is:

*To cost-effectively protect public health and the environment, prevent pollution and enhance the quality of area waterways*

The District's service area consists of Milwaukee County, except for the City of South Milwaukee, and portions of Ozaukee, Washington, Waukesha, and Racine Counties in the southeastern part of the State of Wisconsin.

The District currently owns approximately 300 miles of collection, conveyance and storage sewers and two regional wastewater treatment plants. The District also has jurisdictional authority to construct improvements over approximately 124 miles of watercourse systems within Milwaukee County.

There are two primary sources of information regarding CMOM programs that the District used as references to develop its program. The first and main source was the Stipulation, for which the District had to meet all requirements. The second source was the draft sanitary sewer overflow (SSO) rule (2) proposed by the United States Environmental Protection Agency (USEPA) that was subsequently withdrawn. Although this withdrawn SSO Rule was never promulgated, it was considered, in the absence of other guidance, in developing the District CMOM Program. Each of these is discussed below.

## 1.3 District Stipulation Agreement

The District entered into the Stipulation in 2002. The Stipulation requires the District to, among other things:

- Complete a 2020 Facilities Plan<sup>1</sup>

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<sup>1</sup> The CMOM Program was developed in coordination with the 2020 Facilities Plan. The 2020 Facilities Plan satisfies the SECAP requirements of a CMOM Program.

- Develop a CMOM Program
- Implement District rule changes that require satellite systems to develop CMOM Programs

The Stipulation requires that the “...regional CMOM shall be comprised of four integrated components.” The four components are:

- 1) A management plan;
- 2) An overflow response plan;
- 3) A system evaluation and capacity assurance plan; and
- 4) A communications and program audit plan.

In addition, the Stipulation spells out:

- ✓ The approach that the District shall undertake to develop the CMOM program;
- ✓ Inclusion of the District satellite municipalities;
- ✓ Documentation requirements of the CMOM Program; and
- ✓ A deadline for completion of the CMOM Program.

The development of the District CMOM Program was coordinated with the 2020 Facilities Planning Process and was included in the public input process used during development of the 2020 Facilities Plan.

The paragraphs of the Stipulation regarding the CMOM Program at the District are included in Appendix 1-1.

## 1.4 Withdrawn SSO Rule

In the year 2001, § 122.42 of the USEPA rules was proposed to be revised to add paragraphs (e), (f) and (g). These revisions to the USEPA rules are collectively referred to in this document as the withdrawn SSO rule (2). CMOM program requirements are listed in § 122.42 (e). The prohibition of discharges is discussed in § 122.42 (f), including those discharges caused by severe natural conditions or other factors beyond the control of the utility. Reporting, public notification and recordkeeping requirements are discussed in § 122.42 (g). The withdrawn SSO rule was considered, in the absence of other guidance, in developing the District CMOM Program.

There are three sections regarding the CMOM program itself in § 122.42 (e). They are the general standards, the components of a CMOM program, and communications. The components of a CMOM program, as proposed in the withdrawn SSO rule are:

- (i) Goals
- (ii) Organization
- (iii) Legal Authority
- (iv) Measures and Activities
- (v) Design and Performance Provisions
- (vi) Monitoring, Measurement, and Program Modifications
- (vii) Overflow Emergency Response Plan
- (viii) System Evaluation and Capacity Assurance Plan
- (ix) CMOM Program Audits

The District considered the withdrawn SSO rule and applied its components and principals, in the absence of other guidance, to fulfill the requirements and intentions of the Stipulation-required CMOM Program. The entire text of the proposed § 122.42 (e), (f), and (g) is included in Appendix 1-2.

## 1.5 District CMOM Program Structure

The District CMOM Program is structured to satisfy the Stipulation requirements and is comprised of the following:

### Management Plan (Chapter 2)

The Management Plan contains the goals and objectives, organizational structure to manage the CMOM Program, legal authority to control I/I, design criteria, benchmarking methods, performance measures and reporting methods for CMOM compliance reviews.

### Asset Management Plan (Chapter 3)

The Asset Management Plan contains the immediate, near-term and long-term needs of the District regarding its assets. It addresses the vision, organization and planning for the asset management plan, as well as asset needs such as asset knowledge, asset planning, asset refurbishment and replacement, asset development, asset operation and maintenance, asset condition monitoring, asset financing and asset financial reporting.

### Overflow Response Plan (Chapter 4)

The Overflow Response Plan contains the District procedures for being aware of, responding to and reporting of overflows. The response includes review and analysis to develop corrective actions, where necessary, to prevent future overflows.

### System Evaluation and Capacity Assurance Plan (Chapter 5)

The System Evaluation and Capacity Assurance Plan contains the District capacity evaluations for wastewater conveyance, wastewater treatment and watercourse systems. This plan includes descriptions of the generation of flows and loadings, system responses and identification of deficiencies relative to the desired level of protection against overflows and flooding.

### Communication Plan (Chapter 6)

The Communication Plan contains the District plan for communicating its CMOM Program to stakeholders, including internal, regulatory and public stakeholders, as well as receiving feedback from stakeholders.

### Audit Plan (Chapter 7)

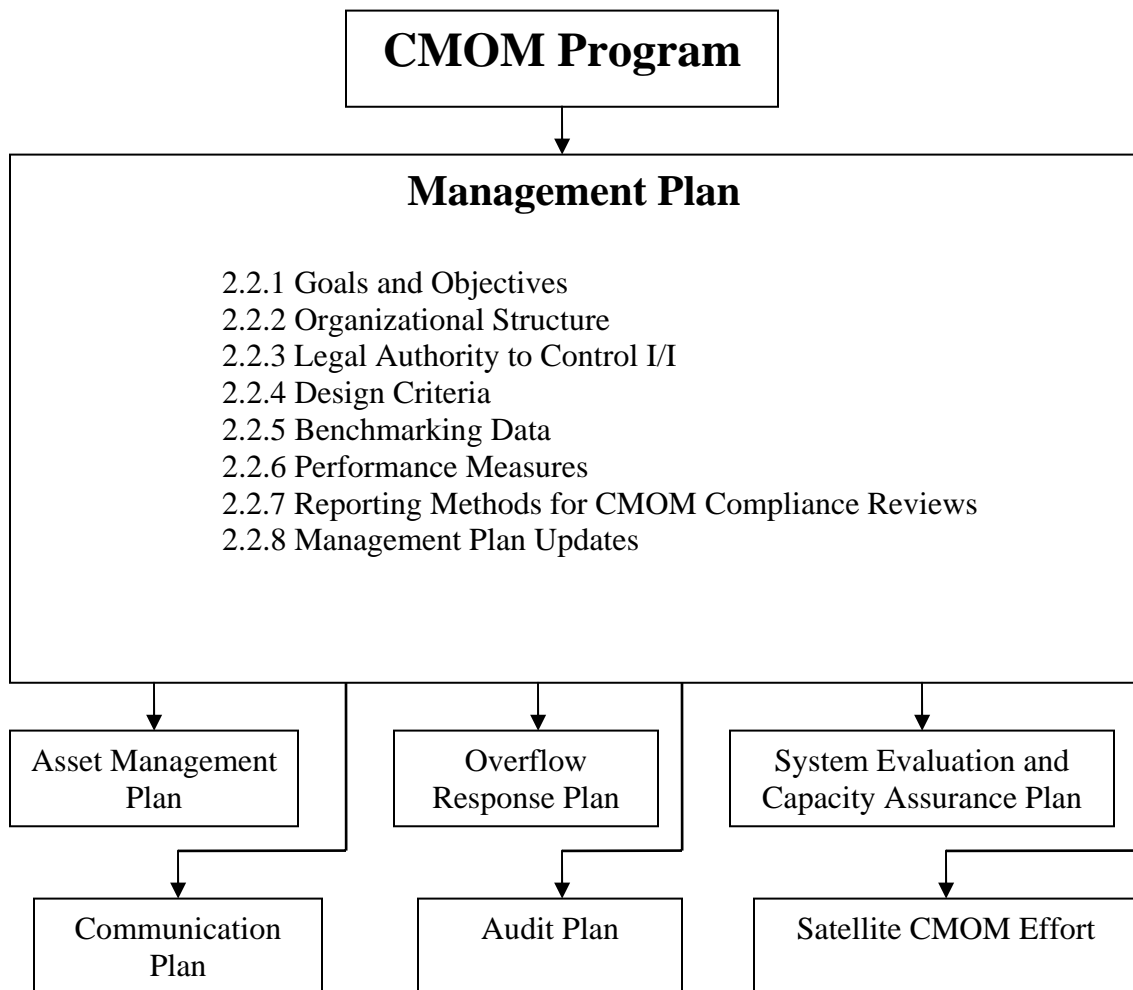
The Audit Plan contains the District plan for conducting an audit of the entire CMOM Program in the year 2012.

### Satellite CMOM Effort (Chapter 8)

Chapter 8 describes the efforts that the District has taken to date and has planned for the future to meet the Stipulation requirements regarding inclusion of the satellite municipalities and development of a regional CMOM Program.

The Program, including objectives, strategies, tactics and other activities will be subject to change and refinement as the District continues implementing and gains experience with the CMOM Program. Future changes to the CMOM Program will be documented in District CMOM reports.

# Management Plan



## 2.1 Management Plan Development

The Milwaukee Metropolitan Sewerage District (MMSD or District) has prepared this Management Plan in response to a stipulation agreement (Stipulation) (1) entered into between the District and the State of Wisconsin in May of 2002. The Management Plan describes the means and methods that the District has in place to ensure complete execution of the Capacity, Management, Operations and Maintenance (CMOM) program.

CMOM principles were proposed by the United States Environmental Protection Agency (USEPA) as a part of the draft Sanitary Sewer Overflow (SSO) rule (2) that was subsequently withdrawn. The withdrawn SSO rule, although never formally adopted, was considered, in the absence of other guidance, in the development of the District CMOM Program.

This Management Plan is a further development of the Management Plan Strategy that was documented in the *MMSD CMOM Readiness Review and Implementation Strategy Development (CMOM Strategic Plan)* (3) completed in December 2005. There are many items that were identified during the readiness review and strategy development and documented in the *CMOM Strategic Plan* that have been partially or completely addressed as of the completion of this document. These items are still included to provide background information and continuity to the evolution of the Management Plan from readiness review to strategy development to final plan. In addition, the strategies, tactics and performance measures described in this Management Plan will be subject to change and refinement as the District continues implementing and gains experience with the CMOM Program.

The Stipulation requirements, withdrawn SSO rule and District goals related to CMOM are discussed below.

### 2.1.1 Stipulation Requirements

The Wisconsin Department of Natural Resources (WDNR) has outlined certain requirements for the District CMOM program within the Stipulation. WDNR is also incorporating CMOM program requirements in its rules and in Wisconsin Pollutant Discharge Elimination System (WPDES) permits. The District CMOM Program has been developed to comply with the Stipulation requirements, but will also comply with the permit requirements.

The Stipulation states in item 7;

“7. While sanitary sewer overflows in the District’s system have been significantly reduced, there are still sanitary sewer overflows within the District’s and its satellite municipalities’ sanitary sewer systems. To continue the District’s program to reduce with the goal of eliminating all non-permitted sanitary sewer overflows, the District shall implement the regional Capacity, Management, Operation and Maintenance (CMOM) program. The regional CMOM shall be comprised of four integrated components:”

The first component listed is:

“A. *Management Plan.* A plan that outlines the goals of the CMOM, the organizational structure to manage it, the legal authority to control infiltration and inflow (I/I), design criteria, benchmarking data, and performance measures to attain the goals. A significant effort associated with the Management Plan shall be the development of an asset management (AM) program that provides for both programmed maintenance and tracking of the asset condition to enable early recognition of expansions or major rehabilitation necessary to avoid capacity limitations.”

This description written into the Stipulation spells out in detail what must be in the District’s CMOM Management Plan.

### **2.1.2 Principles from Withdrawn SSO Rule**

The USEPA proposed the draft SSO rule in 2001. Although the draft SSO rule was later withdrawn and never promulgated, in the absence of other guidance, the District has considered this withdrawn rule in developing its CMOM Program. Within this withdrawn rule, there were five general principles described that indicate CMOM compliance for a wastewater utility. The following is the text from § 122.42 (e) (1) of the withdrawn SSO Rule:

“General Standards. You, the permittee, must:

- i. Properly manage, operate, and maintain, at all times, all parts of the collection system that you own or over which you have operational control;
- ii. Provide adequate capacity to convey base flows and peak flows for all parts of the collection system you own or over which you have operational control;
- iii. Take all feasible steps to stop, and mitigate the impact of, sanitary sewer overflows in portions of the collection system you own or over which you have operational control;
- iv. Provide notification to parties with a reasonable potential for exposure to pollutants associated with the overflow event; and
- v. Develop a written summary of your CMOM Program and make it, and the audit under paragraph (e) (2) (ix) of this section, available to any member of the public upon request.”

These five principles outline the purpose of a CMOM program and its impacts to the community.

### **2.1.3 District-specific goals**

The District operates according to its mission statement (shown below). The District develops 3-year strategic plans that outline goals and strategies for the entire organization that contribute to achieving its mission. The goals of the 2007-2009 Strategic Plan (4) are shown below. All programs that are developed by the District are geared towards contributing to the mission, which includes the CMOM Program.

**District Mission Statement**

*To cost-effectively protect public health and the environment, prevent pollution and enhance the quality of area waterways.*

**District Strategic Plan Objectives** (from 2007-2009 Strategic Plan)

*Continue to provide District services to improve water quality, protect the environment, public health, and property.*

*Maintain the District's contribution to a competitive regional economy, consistent with its role in environmental protection.*

*Continue to provide leadership in educating the public to understand the various causes and impacts of water pollution.*

From the District's organizational mission statement and strategic plan objectives, the following three criteria were established as guidance for the creation of the CMOM program.

1. Establish an overall CMOM mission statement that encompasses a desired program outcome for all three service areas: wastewater collection, conveyance and storage, wastewater treatment, and watercourse management.
2. Establish individual CMOM Program goal statements for wastewater collection, conveyance and storage, wastewater treatment, and watercourse management. Separating the goals for each service area will allow the District to state focused objectives and define performance measures.
3. Establish a set of objectives supporting the CMOM goal for each service area. MMSD must develop strategies and performance measures that support the objectives.

**2.1.4 Components of the Management Plan**

The components of the Management Plan are derived from the Stipulation and the withdrawn USEPA guidance and are the following:

- District CMOM goals and objectives (2.2.1)
- Organizational Structure to manage the CMOM program (2.2.2)
- Legal authority to control I/I (2.2.3)
- Design criteria (2.2.4)
- Benchmarking data (2.2.5)
- Performance measures (2.2.6)
- Reporting methods for CMOM compliance reviews (2.2.7)
- Management Plan Updates (2.2.8)

The Management Plan serves to outline and document the District CMOM Program, which will satisfy the Stipulation language and other District goals.

## 2.2 The CMOM Management Plan

The Management Plan is the guiding document of the District CMOM Program. The first and most important items included in the Management Plan are the District goals (2.2.1). All other standards, rules and activities that are defined in the Management Plan and the other plans of the CMOM Program are supporting the achievement of the goals.

Also included in the Management Plan are: the District's organizational structure (2.2.2), which includes a CMOM program manager; the District's Rules that are in place to manage infiltration and inflow (I/I) (2.2.3); design criteria for sewers (2.2.4); the benchmarks that the District will use to compare itself to other agencies (2.2.5); the internal performance measures that the District will use to gauge effectiveness of its programs (2.2.6); reporting methods for CMOM compliance (2.2.7); and Management Plan Updates (2.2.8).

Each of these activities is fully described in the sections that follow.

### 2.2.1 Goals and Objectives

This first section of the Management Plan defines the District goals. In support of these goals are specific objectives, as well as the strategies and tactics that have already been or will be employed to achieve each objective. Also included in this section are the performance measures that the District will use to gauge achievement of each objective. The performance measures are regrouped and discussed again in section 2.2.6, with additional detail provided on the data requirements for determining the value of the performance measures.

The District is responsible for:

- 1) The regional collection, conveyance and storage (hereinafter referred to as conveyance) system;
- 2) The wastewater treatment plants; and
- 3) A large portion of the watercourse systems in the region.

The District is applying CMOM principles to all three service areas and has divided the CMOM Program into an overall component and a component for each of the three service areas. Goals, objectives, strategies, tactics and performance measures have been prepared for each component.

The overall component is discussed first, followed by the conveyance, treatment and watercourse components, in that order.

#### 2.2.1.1 Overall Program Goal

The overall CMOM Program goal, as developed by the District, in accordance with its Mission, and documented in the *CMOM Strategic Plan*, is "By June 2007, MMSD will develop and implement a cost-effective CMOM Program based upon best practices for wastewater conveyance, wastewater treatment and watercourse management, which results in maximizing the capacity of the existing and planned facilities to convey and treat wastewater, providing flood management, and improving water quality in the

MMSD service area. The program must be consistent with goals from other MMSD policies and facilities plans.”

To achieve the overall program goal, the District will pursue the following objectives:

1. Enable implementation of the CMOM Program within the District organizational structure (2.2.1.1.1)
2. Communicate the goals and objectives of the CMOM Program to internal and external stakeholders, monitor the CMOM Program implementation, and institute program modifications (2.2.1.1.2)
3. Continue to maintain adequate financial planning (2.2.1.1.3)
4. Continue to comply with regulatory requirements (2.2.1.1.4)
5. Establish a regional CMOM program (2.2.1.1.5)
6. Continue to maintain a safe work environment and sustain a competent workforce (2.2.1.1.6)

Each of these objectives is discussed in further detail below. The discussion includes the strategies and tactics that will be employed to achieve the objectives, as well as the performance measures defined to gauge achievement of the objectives.

### **2.2.1.1.1 Overall Objective 1**

#### *Objective:*

Enable implementation of the CMOM Program within the District organizational structure.

Achieving this objective requires dedicating and organizing human resources toward activities that reduce Sanitary Sewer Overflows (SSOs) and Combined Sewer Overflows (CSOs), and striving to improve water quality, both in treatment plant effluent and in watercourse management. To accomplish this, the District is creating, funding and filling the CMOM Program Manager position. The District is linking the CMOM Program with the Asset Management program by having a single person be the manager of both.

#### *Strategies:*

- Assign CMOM Program Management responsibilities for overseeing the CMOM Program. (Completed as of June 2006)
- Establish a CMOM work team consisting of key personnel from the Technical Services and Water Quality Protection divisions. (Completed as of June 2006)
- Assign responsibility for overseeing the AM Program. (Completed as of June 2006)
- Appoint a permanent asset management team (AMT). (Completed as of June 2006)

#### *Tactics:*

- Create, fund and fill the CMOM Program Manager position to oversee and guide the implementation of the program. Responsibilities of the CMOM Program Manager include documenting the CMOM Program, providing input, technical advice and guidance related to capital projects, and reviewing program standards

- and specifications to ensure compliance with established regulatory requirements. (Completed as of June 2006)
- Establish a CMOM work team consisting of the CMOM Program Manager and one person from the areas of: Contract Compliance, Capital Planning, Engineering Services, Industrial Waste Pretreatment Program, Systems Monitoring, Field Monitoring and one person from the contract operator (presently United Water Services.) The team will meet periodically to ensure implementation of the CMOM program at the District is being achieved. (Completed as of June 2006)
  - Assign the CMOM work team the task of reviewing the CMOM responsibility in each division on a periodic basis.
  - Create, fund and fill the Asset Manager position to oversee and guide the implementation of the Asset Management Plan (AMP). Responsibilities of the Asset Manager include, but are not limited to, providing input, technical advice and guidance related to AM. These responsibilities will be strongly related to the CMOM Program. (Completed as of June 2006)
  - Establish an Asset Management Team (AMT) to continue the preparatory work done by the Asset Management Work Team. The Asset Management Team should consist of the Asset Manager and one person from the areas of: Contract Compliance, Capital Planning, Engineering Services, Budgeting, Accounting and one person from the contract operator. (Completed as of June 2006)
  - The AMT has been charged with the responsibility to ensure a long-range AMP is developed, supported by top management, communicated to stakeholders, implemented, regularly audited, and updated as necessary

*Performance Measures:*

- Organizational Best Practices Index<sup>1</sup>
- CMOM Manager responsibilities assigned
- CMOM work team established and functioning
- Asset Manager responsibilities assigned
- Asset Management Team established and functioning

### **2.2.1.1.2 Overall Objective 2**

*Objective:*

Communicate the goals and objectives of the CMOM Program to internal and external stakeholders, monitor the CMOM Program implementation, and institute program modifications.

The strategies formulated to achieve this objective involve communicating with District employees, satellite system owners, customers, regulators, and other stakeholders. The communication must be two way: receiving feedback and suggestions on the CMOM Program, and outputting information on various cycles regarding CMOM implementation. The strategies also must include the details on how the implementation will be monitored and the procedure for modifying program elements.

<sup>1</sup> Organizational Best Practices Index is also a Benchmark- see section 2.2.5 for further information

*Strategies:*

- Develop an internal communications program that brings together periodic CMOM Program tracking data and provides this information to District staff.
- Develop an external communications program that assembles CMOM program tracking data relevant to each stakeholder group and makes the information available to the group. This is an *ongoing and continuing effort* that will not change for the foreseeable future with the District's Technical Advisory Team<sup>2</sup> (TAT).
- Track the implementation of specific CMOM strategies and tasks, including deliverables and performance measures, on an annual basis and report the results.
- Establish protocols for input from District staff on improving the CMOM Program.
- Prepare a procedure for modifying program elements.

*Tactics:*

- Establish performance measures that are easy to track and for which information is readily available. (completed as of June 2007)
- Prepare an annual CMOM report, detailing the work completed in the previous year
- Use the District's internal web site to create a CMOM page to post information on the elements accomplished, performance measures and trending of performance measures.
- Use the District's public web site to post CMOM reports
- Prepare annual presentations for division meetings on the status of the CMOM program. Develop a template to address the same items regularly.
- Prepare annual presentations to the TAT on the status of the CMOM Program. Develop a template to address the same items regularly. (ongoing and continuing effort)
- Prepare annual memoranda to the Commission on the status of the CMOM Program. Develop a template to address the same items regularly.
- Include on the CMOM web pages a tool for inputting suggestions regarding CMOM implementation. Include standard fields to get consistent information from each suggestion.
- Interview annually a sampling of personnel from the District and get their opinions on CMOM implementation. Prepare a set of standard questions that accompany questions tailored to each person.
- Prepare a standard report for modifying program elements that may include a precise statement of the change, details of the implications to the program, an analysis of the costs and benefits of the changes, and a recommendation for or against the change.
- Set up a charge number to allow charging time and materials for items related to CMOM implementation

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<sup>2</sup> The Technical Advisory Team consists of District, SEWRPC, WDNR and satellite system representatives

*Performance Measures:*

- CMOM page on the District's internal web site updated annually to include new reports and communications
- CMOM page on the District's public web site updated annually to include new reports and communications
- Annual TAT briefing completed
- Annual Commission memorandum completed
- Annual staff briefing completed
- Percent of annual reports completed on time (for five-year program audit)
- Cost to date on CMOM activities

**2.2.1.1.3 Overall Objective 3***Objective:*

Continue to maintain adequate financial planning

The strategies formulated to achieve this objective involve using existing financial information that the District maintains and compiles.

*Strategies:*

- Compile and review a list of measures that indicate sound financial planning

*Tactics:*

- Compile a list of financial statistics that presently are or can be produced from existing data. (Completed as of June 2007)
- Prepare a list of financial measures for this objective. (Completed as of June 2007)
- Prepare recommendations for benchmarking operation and maintenance costs

*Performance Measures:*

- Establish a method for benchmarking operation and maintenance costs by December 31, 2008
- Percent of cash financing (six-year average)
- Outstanding Debt
- The six-year capital financing plan is updated and revised annually
- Bond Ratings

**2.2.1.1.4 Overall Objective 4***Objective:*

Continue to comply with regulatory requirements.

This objective is included to ensure that as a main function, District compliance with its WPDES Permit (5) requirements is being fully addressed.

*Strategies:*

- Review the WPDES permit, existing and proposed State rules, and existing and proposed Federal rules for specific items that must be tracked and reported.

*Tactics:*

- Prepare annual compilation of statistics and trend results related to treatment plant effluent quality and sewage overflows

*Performance Measures:*

- Percent of time effluent biochemical oxygen demand (BOD) is in compliance with WPDES permit limits
- Percent of time effluent total suspended solids (TSS) is in compliance with WPDES permit limits
- Percent of time effluent fecal count is in compliance with WPDES limits
- Percent of flow resulting from wet weather events that is captured and treated (calculated according to the formula stated in the District's 2003 WPDES permit, section 3.2.5)
- Number of sanitary sewage overflows occurring more frequently than the WDNR approved Level of Protection
- Percent of overflow events for which a public notification was issued
- Compliance Maintenance Annual Report (CMAR) overall score

**2.2.1.1.5 Overall Objective 5***Objective:*

Establish a regional CMOM program

Supporting strategies would relate to assisting satellite municipalities with CMOM compliance activities.

*Strategies:*

- Adopt rule changes consistent with the 2020 Facilities Plan that require and define CMOM compliance for satellite systems. (Revised Rule, Chapter 3 adopted on May 21, 2007)
- Provide assistance to District satellite municipalities on issues related to their compliance with District Rules and Regulations. (ongoing and continuing effort)
- Ensure that satellite municipalities are designing and constructing sewers and connections consistent with District Rules and Regulations. (ongoing and continuing effort)

*Tactics:*

- Adopt changes to Chapter 3 of the District's Rules. (Revised Rule, Chapter 3 adopted on May 21, 2007)
- Fund and complete the CMOM readiness review and compliance strategy development for each satellite system. This is a **current effort** that is expected to be completed by the end of 2007.

- Review annual reports submitted by the satellites for CMOM compliance related items (see section 2.2.3.3 below for further information)
- Provide feedback to satellite system owners based on their submitted reports
- Document and continue implementing the District sewer plan review process and Quality Assurance (QA) inspection process for satellite systems

*Performance Measures:*

- All satellite CMOM readiness reviews completed by December 31, 2007
- All satellite CMOM compliance strategies completed by December 31, 2007
- District has taken appropriate action for each satellite system that has not submitted a Management Plan, Overflow Response Plan, Communication Plan, Audit Plan, System Evaluation and Capacity Assurance Plan (when required), and Infiltration and Inflow Management Plan by June 30, 2009
- District sewer plan review process defined and documented by December 31, 2008
- Percent of sewer plans reviewed by the District within deadlines established by District Rules
- District sewer construction QA Program defined and documented by June 30, 2008
- Percent of sewer construction projects receiving QA inspection as defined by the QA program

### **2.2.1.1.6 Overall Objective 6**

*Objective:*

Continue to maintain a safe work environment for District employees and sustain a competent District workforce.

*Strategies:*

- Maintain safety training programs (ongoing and continuing effort)
- Support development of the Succession Planning Program (Program implementation begun as of June 2007)

*Tactics:*

- Continue to provide assistance to employees related to certifications, licenses, etc. required by a position
- Continue to provide opportunities for employees to attend educational training seminars, conferences and classes.
- Continue to provide regular safety training including but not limited to CPR, confined space entry, first aid, and rescue training
- Continue to provide employees with Personal Protective Equipment (PPE)
- Continue to provide information and input to the development of the Succession Planning Program

*Performance Measures:*

- Annual regulatory training completed

- Annual training hours per employee
- Employee Health and Safety Severity Rate<sup>3</sup>

### 2.2.1.2 Conveyance Goal

The goal for the conveyance service area, as developed by the District, in accordance with its mission and documented in the *CMOM Strategic Plan* is “By June 30, 2007, MMSD will implement a CMOM Program with the intent of eliminating all SSOs except those caused by circumstances as defined by Title 40 of the Code of Federal Regulations (CFR) §122.41 (m) (4), and minimizing CSOs in accordance with the current discharge permit.”

To achieve the conveyance goal, the District will pursue the following objectives:

1. Establish CMOM program elements specific to minimizing the number and volume of CSOs (2.2.1.2.1)
2. Modify District Rules to address peak wet weather flows from satellite systems that impact District system operation (2.2.1.2.2)
3. Where possible, establish additional practices to prevent SSOs, maintain or improve system performance, and avoid preventable failures (2.2.1.2.3)
4. Continue to establish and document level of protection, design, and performance standards for new conveyance assets constructed in the District service area (2.2.1.2.4)
5. Minimize the cost of conveyance asset ownership while maintaining necessary stewardship of assets and achieving defined protection levels (2.2.1.2.5)
6. Enhance District level of knowledge and understanding of wet weather flows and system response to precipitation and other factors (2.2.1.2.6)
7. Provide information receipt, response activity, and feedback regarding customer inquiries (2.2.1.2.6)

Each of these objectives is discussed in further detail below. The discussion includes the strategies and tactics that will be employed to achieve the objectives, as well as the performance measures defined to gauge achievement of the objectives.

#### 2.2.1.2.1 Conveyance Objective 1

*Objective:*

Establish CMOM program elements specific to minimizing the number and volume of Combined Sewer Overflows (CSOs)

Although combined sewer flow and separate sewer flow eventually commingle within the District system, CSOs are regulated differently from SSOs. The 2003 WPDES permit requires the District to include a long-term control plan (LTCP) in the 2020 Facilities Plan. The LTCP is specific to CSO discharges. The District plans to apply CMOM to CSOs and combined sewer systems even though CMOM principles were originally developed for SSOs and sanitary sewer systems. The strategies to achieve CSO control may mirror those for controlling SSOs.

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<sup>3</sup> Benchmark – see section 2.2.5 for further information

*Strategies:*

- In accord with the compliance schedule in the District WPDES permit, document District status with respect to the USEPA CSO Control Policy and the Nine Minimum Controls.
- Incorporate into the CMOM Overflow Response Plan (ORP) any specific requirements for CSOs from the District system.
- Implement the 2020 Facilities Plan recommendations with respect to CSOs.
- Ensure operational readiness of all existing District overflow control facilities, including facilities constructed to prevent building sewer back-ups.

*Tactics:*

- Review the final documentation regarding the CSO Control Policy and the Nine Minimum Controls.
- Ensure the Nine Minimum Controls are being implemented as documented.
- Implement the facilities plan recommendations with respect to CSOs.
- Include requirements in the operations contract for inspecting and ensuring proper operation of combined sewer facilities (intercepting structures, diversion structures, and combined sewer outfalls)
- Provide details in the ORP that include overflows from the combined sewer service area

*Performance Measures:*

- Number of dry weather CSOs
- Number of wet weather CSOs
- Ratio of event unused volume of the Inline Storage System (ISS) to event wet weather CSO volume

**2.2.1.2.2 Conveyance Objective 2***Objective:*

Modify District Rules to address peak wet weather flows from satellite systems that impact District system operation.

The District will use the 2020 Facilities Plan to manage satellite municipality flows via a sewershed capacity allocation process which considers base and peak flows. Chapters 2 and 7 of the District's Rules and Regulations articulate the current process for administering capacity. Chapter 3 of the District's Rules, which previously was titled "Infiltration and Inflow Control", but has been changed to "Management, Operation, and Maintenance of Tributary Sewers", has been rewritten and adopted by the District's Commission. The rule revisions include standards for sewersheds, including the maximum allowable I/I allocated by the 2020 Facilities Plan and requirements for CMOM implementation by the satellite system owners.

*Strategies:*

- Adopt rule changes as discussed in the 2020 Facilities Plan that provide for improved management of municipal discharges during peak wet weather flow conditions. (Revised Rule, Chapter 3 adopted on May 21, 2007)
- In collaboration with the TAT, establish a Wet Weather Peak Flow Management Program.

*Tactics:*

- Adopt rule changes, utilizing the input from the Technical Advisory Team, to implement I/I controls for satellite systems. (Revised Rule, Chapter 3 adopted on May 21, 2007)
- Adopt rule changes to define and require CMOM Program (Management Plan, Overflow Response Plan, Communication Plan, Audit Plan, System Evaluation and Capacity Assurance Plan when required, and I/I Management Plan) requirements and compliance for satellite systems. (Revised Rule, Chapter 3 adopted on May 21, 2007)
- Develop a Wet Weather Peak Flow Management Program (WWPFMP), which will include establishment of peak flow performance standards, methodologies for determining peak flows related to the District's approved level of protection, establishment of enforcement and/or incentive activities, continuing improvements to the District flow monitoring and rain gauge system and other necessary measures that will allow for consistent comparison of measured peak wet weather data to accepted standards and will provide methods for attaining compliance.

*Performance Measures:*

- District Rules regarding CMOM Program requirements and I/I controls for satellite systems adopted by June 30, 2007
- Development of the Wet Weather Peak Flow Management Program by June 30, 2009
- Percent of sewersheds exceeding the Maximum Allowable Infiltration and Inflow Rate, as defined by District Rules, Chapter 3 (see section 2.2.3.3 below)

**2.2.1.2.3 Conveyance Objective 3***Objective:*

Where possible, establish additional practices to prevent SSOs, maintain or improve system performance, and avoid preventable failures.

Supporting strategies would relate to operations and maintenance, the industrial waste pretreatment program, real-time control systems and the ORP

*Strategies:*

- Evaluate standard operating and standard maintenance procedures for all critical conveyance facilities on an ongoing basis

- Complete implementation of the committed projects as identified in the 2020 Facilities Plan
- Implement the recommended studies and projects from the 2020 Facilities Plan for the conveyance system as defined by the 2020 Implementation Plan.
- Maintain beneficial use of real-time controls (RTC) to maximize effectiveness of wet weather conveyance capacity (ongoing and continuing effort)
- Continue to administer the District's approved industrial waste pretreatment program (IWPP) (District has had a regulatory-approved IWPP since 1983)
- Perform Root Cause Failure Analyses (RCFA) on SSOs
- Evaluate operational readiness of all existing District sanitary sewer overflow facilities, including facilities constructed to prevent building sewer back-ups.
- Develop a CMOM ORP that identifies critical facilities, details response procedures, and provides a system for updating the ORP

*Tactics:*

- Prepare a list of critical conveyance facilities
- Review standard operating procedures (SOPs) (District and contract operator's) regarding critical facilities
- Review standard maintenance procedures (SMPs) (contract operator's) for critical facilities
- Complete and implement the comprehensive modeling and RTC Strategies project (has been implemented by the Stipulation-required 12/31/2004 deadline)
- Implement operator training on RTC (ongoing and continuing effort)
- Prepare list of recommendations to changes for SOPs and SMPs to reduce the risk of preventable SSOs, where possible
- Complete RCFA on SSOs to determine the root cause of the overflow, the Level of Protection provided, and corrective action plans for reducing the risk of overflows
- Include requirements in the operations contract to maintain the current inspection and testing of SSOs to ensure their operational readiness, to the maximum extent possible, without causing an SSO
- Include requirements in the operations contract to have procedures for responding to overflows at critical facilities
- Incorporate into the ORP a system for feedback from field personnel
- Maintain communications with satellite system owners, through the TAT, on operations and maintenance issues that affect the capacity and function of District facilities
- Analyze VRSSI<sup>4</sup> predictions, post-event, for events that result in a CSO and/or SSO

*Performance Measures:*

- Number of dry weather SSOs

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<sup>4</sup> VRSSI – Volume Reserved for Separate Sewage Inflow is a predicted volume of inflow that must be reserved for flow from the separate sewer area and is used to determine the appropriate time to close the gates that allow combined sewage into the inline storage system.

- Number of wet weather SSOs
- Number of wet weather SSOs where wet weather event generated flow is less than the WDNR approved Level of Protection
- Volume of wet weather SSOs
- Volume of wet weather SSOs where wet weather event generated flow is less than the WDNR approved Level of Protection
- Number of wet weather building backups caused by District facility capacity or function
- Percent of total flow entering the conveyance system that is captured and treated
- Develop a plan for periodic operational readiness testing of sanitary sewer overflow facilities by June 30, 2009
- Percent completion of post-overflow review process within one-year of overflow occurrence
- Regulatory-approved IWPP in operation

#### 2.2.1.2.4 Conveyance Objective 4

##### *Objective:*

Continue to establish and document level of protection, design, and performance standards for conveyance assets constructed in the District service area.

This objective is timely as the District executes the 2020 Facilities Planning process. The 2020 Facilities Plan (6) will determine the level of protection against overflows to be provided by the District's conveyance, storage and treatment system (Wastewater System). Design and performance standards for all assets will be based on providing this protection level.

##### *Strategies:*

- Review 2020 Facilities Plan target level of protection for conveyance assets.
- Audit the implementation of procedures established for asset creation, modification, and removal (Fixed Asset SOPs) and make corrections to the procedures, as necessary, to improve capture of critical asset information.
- Include requirements in the District operation and maintenance (O&M) contract for capture of information necessary to make asset life-cycle decisions
- As a component of the Asset Management Plan (AMP), ensure asset management procedures identify assets, their condition, and their replacement schedule
- Update the District's Geographic Information System (GIS) as conveyance construction projects are completed (ongoing and continuing effort)
- Perform a business case analysis, as defined by the AMP, on new capital projects and throughout the life of the project to ensure the project satisfies standards for project objectives, relevant project data, development and evaluation of options including costs and benefits (tangible and intangible), project work plan and milestones, and financial and environmental issues.
- Track implementation of the capacity improvement facilities identified in the 2020 Facilities Plan.

*Tactics:*

- See the Asset Management Plan (Chapter 3 of this document)

*Performance Measures:*

- Level of Protection defined (by the 2020 Facilities Plan) and approved by the WDNR for the Wastewater System
- Fixed Asset SOPs audited by December 31, 2008
- Number of conveyance construction project updates to the GIS
- Backlog of conveyance construction project updates to the GIS
- Percent of conveyance assets with defined condition and management method (condition based monitoring, economic based strategy, run to failure)
- Document requirements and procedures for conducting Business Case Analysis (BCA) on conveyance projects by June 30, 2008
- Percent of BCAs completed when required by District procedures
- Facilities Plan implementation on schedule

**2.2.1.2.5 Conveyance Objective 5***Objective:*

Minimize the cost of conveyance asset ownership while maintaining necessary stewardship of assets and achieving defined protection levels.

This objective essentially defines Asset Management (AM). To achieve the objective, the District will need to follow the steps related to establishing AM as a core business practice. These steps include defining current asset management activities, benchmarking them against industry best practices, identifying priority areas for improvement, and establishing a plan for implementing AM. This process will both lower the cost of asset ownership and help to better define protection levels for the systems the District owns and operates.

*Strategies:*

- Document and define the existing District AM business practices (completed as of December 2005)
- Benchmark current AM business practices (completed as of December 2005)
- Identify areas of CMOM compliance supported by AM implementation
- Prepare an Asset Management Plan (completed as of June 2007)
- Define an implementation process for AM
- Estimate implementation costs for action items
- Establish performance measures for implementation (completed as of June 2007)

*Tactics:*

- See the Asset Management Plan (Chapter 3 of this document)

*Performance Measures:*

- Conveyance system integrity<sup>5</sup>
- Preventive Maintenance (PM) backlog (sewers)
- PM backlog (conveyance equipment and pump stations)
- Planned maintenance ratio (preventive (PM) and predictive (PdM) maintenance vs all maintenance): hours (total for all conveyance facilities)
- Planned maintenance ratio (PM and PdM vs all maintenance): costs (total for all conveyance facilities)

**2.2.1.2.6 Conveyance Objective 6***Objective:*

Enhance District level of knowledge and understanding of wet weather flows and system response to precipitation and other factors.

The strategies employed to meet this objective will involve the collection, management and availability of monitoring data. The objective may include District and satellite data regarding sewer flows, precipitation, river levels, lake levels, and groundwater levels.

*Strategy:*

- In cooperation with the TAT, develop and implement a Wet Weather Peak Flow Management Program
- Review the system of monitoring data collection and storage as practiced by the District.

*Tactics:*

- Review process of correcting problems with monitoring equipment, implement recommendations for preventing and correcting problems identified
- Review locations of portable flow monitoring stations on an ongoing basis to verify best use
- Review calibration logs of all monitoring and measuring equipment to ensure data collected is accurate
- Review procedures for collecting, converting, managing, storing and using data.
- Prepare recommendations for ensuring data integrity, usefulness and availability
- Review system and procedures for collection of precipitation data

*Performance Measures:*

- Development of the Wet Weather Peak Flow Management Program by June 30, 2009
- Percent of portable flow monitors repaired within 5 business days after reporting problems (unless problem requires replacement of equipment)
- Percent of monitoring sites with less than one month of missing or bad data
- Percent of monitoring sites calibrated [check and adjustment as necessary] annually

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<sup>5</sup> Conveyance system integrity is also a benchmark, see section 2.2.5 for further information

- Percent of rain gauges calibrated annually
- Percent of data reviewed for QA within 30 days

### 2.2.1.2.7 Conveyance Objective 7

*Objective:*

Provide information receipt, response activity, and feedback regarding customer inquiries.

*Strategy:*

- Review all typical points of contact with District customers and ensure that questions, complaints and requests are directed to the appropriate responding party in a timely manner.

*Tactics:*

- Review the procedures for recording, and responding to, customer inquiries (For the purposes of this objective, conveyance inquiries are defined as calls received concerning building backups, sewage overflows, spills into the system, clogged or collapsed sewers or structures, illegal dumping into sewers or catch basins, missing manhole covers or contractors interfering with or damaging District facilities, which are all potentially critical issues. The District is not always the responding party for these issues. Calls related to sewer extensions, connections, site development and other non-critical issues are not counted as inquiries for this objective.)
- Perform a review of customer inquiry documentation
- Prepare recommendations and implement procedures to maintain or improve service response for customers

*Performance Measures:*

- Percent of inquiry documentation completed

### 2.2.1.3 Treatment Goal

The goal for the treatment service area, as developed by MMSD, in accordance with its mission and documented in the *CMOM Strategic Plan* is “By 2007, the MMSD will implement a CMOM Program for cost-effective wastewater treatment that will achieve and sustain:

- Effluent, biosolids, and air emissions quality meeting or better than regulatory and permit requirements.
- Sustain operational readiness, reliability, and redundancy for liquid and solids processing.
- Achieve AM implementation.
- Improve coordination of wastewater treatment plant operations with collection system facilities and staff.
- Improve proper work management related to maintenance.”

To achieve the treatment goal, the District will pursue the following objectives:

1. Continue to minimize process diversion events, consistent with the discharge permit (2.2.1.3.1)
2. Continue to optimize effectiveness of wet weather treatment capacity (2.2.1.3.2)
3. Continue to provide effluent quality that meets or exceeds WPDES permit requirements and effluent quality goals (2.2.1.3.3)
4. Continue to manage bio-solids in a manner that maximizes wastewater treatment and provides beneficial reuse of the bio-solids (2.2.1.3.4)
5. Continue to document level of protection, design and performance standards for new treatment plant assets (2.2.1.3.5)
6. Minimize the cost of wastewater treatment asset ownership while maintaining necessary stewardship of assets and achieving defined protection levels (2.2.1.3.6)

Each of these objectives is discussed in further detail below. The discussion includes the strategies and tactics that will be employed to achieve the objectives, as well as the performance measures defined to gauge achievement of the objectives.

### 2.2.1.3.1 Treatment Objective 1

#### *Objective:*

Continue to minimize process diversion events, consistent with the discharge permit.

#### *Strategies:*

- Upon completion of process improvements that impact capacity at either the Jones Island wastewater treatment plant (JIWWTP) or the South Shore wastewater treatment plant (SSWWTP), complete hydraulic and/or process capacity calculations to update the stated capacity of the treatment plant unit processes.
- Maintain periodic review and update as necessary the comprehensive wet weather flow operating plan for the JIWWTP and SSWWTP. The District will update this plan as necessary to reflect the operating plan for the conveyance system.

#### *Tactics:*

- Review the wet weather strategy documents<sup>6</sup> (Appendix 2-1) to ensure the conveyance and treatment strategies are synchronized
- Investigate avenues for completing treatment process and hydraulic capacity calculations as projects are completed, maintained and refurbished
- Continue to require contract operator to implement training and skills requirements for process operators and supervisors for all shifts at both plants.

#### *Performance Measures:*

- Percent of plant influent flow volume receiving secondary treatment
- Number of in-plant diversions
- Number of in-plant diversions during conditions not consistent with permit requirements

<sup>6</sup> Wet weather strategy documents consists of Deep Tunnel Gate Operation, Excess Flow Decision Tree, JIWWTP Wet Weather Strategy, SOPs for High Flow Procedure at JIWWTP (Primary Area), SOPs for High Flow Procedure at JIWWTP (Secondary Area), Checklist for High Flow Operations South Shore Primary Operators, Checklist for High Flow Operations South Shore Secondary Operators

### 2.2.1.3.2 Treatment Objective 2

*Objective:*

Continue to optimize effectiveness of wet weather treatment capacity.

This objective is closely tied with the previous objective. The District has made recent capital investments and operational changes that should increase wet weather treatment capacity at both plants (J02001: JI Wet Weather Capacity Improvement and S02003: SS Wet Weather Capacity Improvement). The strategies involved will deal with maximizing treatment capacity available to operations staff for managing wet weather flows.

*Strategies:*

- Define this strategy according to the wet weather strategies mentioned above.
- According to recommendations of the current facilities plan, construct, operate, and maintain in operational readiness new wet weather flow treatment facilities.
- Ensure operational readiness of treatment process units in standby mode

*Tactics:*

- Continue to evaluate methods for estimating the necessary VRSSI during wet weather events.
- Continue to evaluate the RTC system to assist in prediction of the necessary VRSSI for each wet weather event.
- For each overflow event where tunnel capacity or treatment capacity was available at the time of overflow, analyze how to improve decision making for future events.

*Performance Measures:*

- Volume of sanitary sewer overflows due to closure of the ISS separate sewer gates
- Volume of sanitary sewer overflows due to closure of the ISS separate sewer gates where the event generated flow is below the approved Level of Protection<sup>7</sup>
- Number of sanitary sewer overflow events due to closure of the ISS separate sewer gates
- Number of sanitary sewer overflow events due to closure of the ISS separate sewer gates where the event generated flow is below the approved Level of Protection

### 2.2.1.3.3 Treatment Objective 3

*Objective:*

Continue to provide effluent quality that meets or exceeds WPDES permit requirements and effluent quality goals.

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<sup>7</sup> The method for determining the event generated flow for the approved Level of Protection will be developed after approval of the 2020 Facilities Plan.

This objective is critical to satisfying the wastewater treatment CMOM goal statement. The District has a long track record for producing effluent quality beyond the requirements of its WPDES permit. Both the Jones Island and South Shore treatment plants have not violated discharge permit effluent requirements for the period of 1998 through 2006. Supporting strategies for this objective should address the operational readiness of treatment processes and the operational data needed to determine the state or capacity of all treatment processes that affect effluent quality.

*Strategies:*

- For each treatment process unit, continue to determine the data needed to make operational decisions that will maximize treatment effectiveness.
- Continue to optimize the number of treatment process units in operation at all times.

*Tactics:*

- Require the contract operator to review treatment processes and determine data needed to make good operational decisions, including information on the status and availability of the various units for each treatment process
- Ensure required data is being collected, managed and distributed properly to enable good decision-making
- Review decision method for taking process units out of operation
- Review abilities for restoring operations in process units

*Performance Measures:*

- Receipt of NACWA Peak Performance Award<sup>8</sup>
- Percent of time effluent BOD is in compliance with WPDES permit
- Percent of time effluent TSS is in compliance with WPDES permit
- Percent of time effluent fecal count is in compliance with WPDES permit
- Percent of time effluent Phosphorous is in compliance with WPDES permit
- Percent of time effluent Ammonia is in compliance with WPDES permit

#### **2.2.1.3.4 Treatment Objective 4**

*Objective:*

Continue to manage biosolids in a manner that maximizes beneficial reuse

This objective reflects the role of biosolids management in protecting the effective wastewater treatment capacity and providing for disposal of biosolids. The District has a long standing practice of generating biosolids reuse products at the two wastewater treatment plants. Since 1926, The District has produced Milorganite<sup>®</sup> at the Jones Island plant, which is used in many residential and commercial landscaping programs. Since 1975, the South Shore Plant has produced the Agri-Life product, which is hauled to area farms where it is injected into the soil. Strategies should deal with adequate capacity of

<sup>8</sup> The National Association of Clean Water Agencies (NACWA) issues Silver, Gold and Platinum awards to participating agencies. Silver is awarded for five or less permit violations, Gold is awarded for zero permit violations, and Platinum is awarded after five continuous years of receipt of the Gold award.

the biosolids handling processes and the effectiveness of the biosolids reuse program. MMSD should continue to review the reuse program both on a short- and long-term basis in order to protect its long-term viability.

*Strategies:*

- Continue to ensure that adequate solids handling capacity exists at both JIWWTP and SSWWTP such that effluent quality is not negatively affected.
- Continue to ensure that the contract operator is collecting all necessary characteristic data to maintain biosolids product quality.
- Closely monitor the beneficial biosolids reuse program in accord with WPDES requirements so that program effectiveness can be maintained.
- Continually review beneficial reuse options, on a near-term and long-term basis, in order to ensure a viable reuse program.

*Tactics:*

- Implement the biosolids recommendations of the 2020 Facilities Plan
- Monitor contract operator performance regarding biosolids production, quality and storage

*Performance Measures:*

- Percent of biosolids produced that are beneficially reused

### **2.2.1.3.5 Treatment Objective 5**

*Objective:*

Continue to establish and document levels of protection, design and performance standards for treatment plant assets.

The same AM strategic concepts discussed under Section 2.2.1.2.4 (conveyance) apply to the wastewater treatment assets.

*Strategies:*

- Review the 2020 Facilities Plan target Level of Protection for the Wastewater System and the impacts for the treatment plants (hydraulic and process capacities necessary to achieve the target Level of Protection)
- Prepare the Asset Management Plan
- Audit the implementation of procedures established for asset creation in 2001 (Fixed Asset SOPs) and make corrections to the procedures, as necessary, to improve capture of critical asset information.
- Include requirements in O&M contract for capture of information necessary to make asset life-cycle decisions
- As a component of the AM Program, ensure asset management procedures identify the asset, its condition, and replacement schedule.
- Perform a business case analysis, as defined by the AM Program, on new capital projects and throughout the life of the project to ensure the project satisfies minimum standards for project objectives, relevant project data, development and

evaluation of options including costs and benefits (tangible and intangible), project work plan and milestones, and financial and environmental issues.

- Implement the capacity improvement facilities identified in the 2020 facilities plan.

*Tactics:*

- See the Asset Management Plan

*Performance Measures:*

- Level of Protection defined (by the 2020 Facilities Plan) and approved by the WDNR for the Wastewater System
- Fixed Asset SOPs audited by December 31, 2008
- Percent of treatment plant assets with defined condition and management method (condition based monitoring, economic based strategy, run to failure)
- Document requirements and procedures for conducting Business Case Analysis on treatment plant projects by June 30, 2008
- Percent of Business Case Analyses completed where required by District procedures
- Facilities Plan implementation on schedule for treatment plant studies and projects

### **2.2.1.3.6 Treatment Objective 6**

*Objective:*

Minimize the cost of wastewater treatment plant asset ownership while maintaining necessary stewardship of assets and achieving defined protection levels.

The same AM strategic concepts discussed above in section 2.2.1.2.5 (conveyance) apply to the wastewater treatment plants.

*Strategies:*

- Determine the cost of asset ownership of each treatment process.
- Determine an asset replacement schedule according to evaluation methods adopted by the AMT.
- Document and define District AM business practices.
- Benchmark current AM business practices.
- Identify areas of CMOM compliance supported by AM implementation.
- Prepare an Asset Management Plan
- Define an implementation process for AM.
- Estimate implementation costs for action items.
- Establish performance measures for implementation.

*Tactics:*

- See the Asset Management Plan

*Performance Measures:*

- Percent of Preventive Maintenance (PM) tasks completed
- O&M cost per Million Gallons per Day (MGD) treated
- Corrective Maintenance (CM) completion status
- Planned maintenance ratio<sup>9</sup>: cost
- Planned maintenance ratio: hours

**2.2.1.4 Watercourse goal**

The goal for the watercourse management service area, as developed by the District, in accordance with its mission and documented in the *CMOM Strategic Plan* is “MMSD will implement a CMOM Program intended to minimize the risk of flooding associated with the one percent probability flood event to habitable structures along jurisdictional streams in an environmentally responsible and cost-effective manner, through updating and implementing its Watercourse Management Plan.”

To achieve the watercourse goal, the District has stated the following objectives:

1. Within jurisdictional streams, cost-effectively protect or remove habitable structures from flooding associated with the one-percent probability flood event (2.2.1.4.1)
2. Ensure that new development and redevelopment do not result in habitable structures being added to the one-percent floodplain or diminish the protection provided by the District’s watercourse projects (2.2.1.4.2)
3. Provide efficient coordination for system-wide watercourse maintenance (2.2.1.4.3)
4. Establish and document level of protection, design, and performance standards for new assets in the watercourse system (2.2.1.4.4)
5. Minimize the cost of watercourse asset ownership while maintaining necessary stewardship of assets and achieving defined protection levels (2.2.1.4.5)
6. Continue to be a leader in the effort to improve the area’s water quality (2.2.1.4.6)
7. Provide information receipt, response activity, and feedback regarding customer inquiries on the watercourse systems (2.2.1.4.7)

Each of these objectives is discussed in further detail below. The discussion includes the strategies and tactics that will be employed to achieve the objectives, as well as the performance measures defined to gauge achievement of the objectives.

**2.2.1.4.1 Watercourse Objective 1***Objective:*

Within jurisdictional streams, cost-effectively remove habitable structures from flooding associated with the one-percent probability flood event

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<sup>9</sup> Planned maintenance ratios indicate the amount of preventive and predictive maintenance to all maintenance, which includes corrective maintenance

This objective addresses meeting the District level for flood protection. Strategies to accomplish it will include updating watercourse system plans, implementing recommended projects, and measuring the effectiveness of the solutions.

*Strategies:*

- Undertake updates to the Watercourse Management Plans (7) on a scheduled basis.
- Develop and implement design and construction of solutions that ensure watercourse conveyance and storage capacities will minimize the damage from the one-percent probability flood event.

*Tactics:*

- Identify all habitable structures in the one-percent probability floodplain area.
- Update the watercourse GIS to include District floodplain, habitable structures and other features associated with watercourse conveyance and storage capacity
- Complete Phase II Watercourse Management Plan studies
- Determine likely projects for removal/protection
- Complete preliminary engineering studies of proposed removal and protection projects
- Implement solutions to watercourse conveyance and storage capacity issues

*Performance Measures:*

- Number of habitable structures impacted by the one-percent probability flood
- Watercourse Management Plan implementation is on schedule<sup>10</sup>

## 2.2.1.4.2 Watercourse Objective 2

*Objective:*

Ensure that new development and redevelopment do not result in structures being added to the one-percent floodplain or diminish the protection provided by the District's watercourse projects

The District adopted Chapter 13 of its Rules, the Surface Water and Storm Water rule, effective January 1, 2002. The rule is intended to mitigate the effects of new development and redevelopment on potential flooding. This objective addresses the topic of Chapter 13 compliance, including the District's role in supporting and collaborating with municipalities as they work toward compliance.

*Strategies:*

- Continue to work with municipalities in ensuring new development and redevelopment meet the intent of Chapter 13 requirements.
- Continue to work with municipalities to ensure discharges to watercourses do not increase flood risk.

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<sup>10</sup> Watercourse Management Plan project implementation has a goal of removing 95% of habitable structures from the District's floodplain by 2009. If implementation is on target to meet that goal, it is considered to be on schedule.

- Continue to acquire ownership or conservation easements on land identified as providing natural water quantity and quality benefits.

*Tactics:*

- Review all stormwater management plans required to be submitted by the Chapter 13 rule
- Identify watersheds that have had a significant number of plans required by Chapter 13
- Consider additional investigation and analysis of watersheds with significant numbers of stormwater management plans
- Review local storm sewer construction plans
- Identify areas that are cost-effective to purchase or obtain easements on for providing natural storm water storage
- Investigate methods for ensuring development does not occur in the District-defined floodplain (may differ from the regulatory floodplain)
- Continue to promote Low Impact Development (LID)

*Performance Measures:*

- Percent of stormwater management plans reviewed within timeframe allowed
- Area of property protected/preserved through District ownership or conservation easements

### **2.2.1.4.3 Watercourse Objective 3**

*Objective:*

Provide efficient coordination for system-wide watercourse maintenance

A significant amount of watercourse capital construction has occurred in recent years, and initially much of the asset maintenance is included in the contract to the respective construction firm. Eventually, the District will need to take over these maintenance responsibilities or communicate the maintenance responsibilities to riparian owners. This maintenance is critical to protecting the constructed flood protection level. It will also be important for the District to employ these maintenance practices on all jurisdictional streams in order to preserve their ability to convey flood flows and be a surface water resource to area residents.

*Strategies:*

- Continue inspection and maintenance of the watercourse systems

*Tactics:*

- Inspect jurisdictional watercourses and constructed capital projects at prescribed schedules.
- Work with riparian owners to ensure necessary activities are undertaken by the appropriate party.
- Ensure maintenance of constructed projects to achieve defined level of protection.
- Ensure maintenance of jurisdictional streams provides necessary conveyance and storage.

*Performance Measures:*

- Completeness of watercourse stream bank ownership in GIS database
- Percent of riparian owners aware of maintenance responsibilities when an issue has been identified
- Percent of riparian owners completing maintenance responsibilities after receiving District communication

**2.2.1.4.4 Watercourse Objective 4***Objective:*

Establish and document level of protection, design, and performance standards for new assets in the watercourse system.

The same AM strategic concepts discussed under Section 2.2.1.2.4 (conveyance) apply to the watercourse system.

*Strategies:*

- For each watercourse, determine the actual level of protection and establish what constraints exist for meeting the required level, if any.
- Audit the implementation of procedures established for asset creation in 2001 (Fixed Asset SOPs) and make corrections to the procedures, as necessary, to improve capture of critical asset information.
- Include requirements in O&M inspection procedures for capture of information necessary to make asset life-cycle decisions
- As a component of the AM Program, ensure asset management procedures identify the asset, its condition, and replacement schedule.
- Perform a business case analysis, as defined by the AM Program, on new capital projects and throughout the life of the project to ensure the project satisfies minimum standards for project objectives, relevant project data, development and evaluation of options including costs and benefits (tangible and intangible), project work plan and milestones, and financial and environmental issues.
- Update the GIS as watercourse construction projects are completed
- Implement the capacity improvement facilities identified in the Watercourse Management Plans (see Chapter 5 of this document for further information on the Watercourse Management Plans.)

*Tactics:*

- See the Asset Management Plan

*Performance Measures:*

- Level of Protection defined and accepted by Stakeholders (completed as of August 2000 with the completion of the Watercourse Management Plans)
- Fixed Asset SOPs audited by December 31, 2008
- Percent of watercourse assets with defined condition and management method (condition based monitoring, economic based strategy, run to failure)

- Document requirements and procedures for conducting Business Case Analysis on watercourse projects by June 30, 2008
- Percent of Business Case Analyses completed where required by District procedures
- Linear feet of watercourse stream bank with a current condition assessment
- Number of watercourse construction project updates to the GIS
- Backlog of watercourse construction project updates to the GIS

#### **2.2.1.4.5 Watercourse Objective 5**

*Objective:*

Minimize the cost of watercourse asset ownership while maintaining necessary stewardship of assets and achieving defined protection levels

The same AM strategic concepts discussed under Section 2.2.1.2.5 (conveyance) apply to the watercourse system.

*Strategies:*

- Determine the cost of asset ownership of each watercourse project.
- Determine needed maintenance schedule according to evaluation methods adopted by the AMT.
- Document and define the MMSD AM business practices.
- Benchmark current AM business practices.
- Identify areas of CMOM compliance supported by AM implementation.
- Define an implementation process for AM
- Estimate implementation costs for action items.
- Establish performance measures for implementation.

*Tactics:*

- See the Asset Management Plan

*Performance Measures:*

- Percent of scheduled watercourse inspections completed
- Percent of scheduled culvert and structure inspections completed
- Watercourse O&M costs
- Watercourse O&M hours

#### **2.2.1.4.6 Watercourse Objective 6**

*Objective:*

Continue to be a leader in the effort to improve the area's waterways

This objective deals directly with the District's mission to improve the quality of the regional waterways. Strategies will address the topics of habitat improvement, pollution control, and runoff reduction.

*Tactics:*

- Continue to remove concrete channels consistent with the District Mission Statement and Commission Policy.
- Reduce the pollutant loading in the watercourse by (1) utilizing best management practices at District construction jobs, (2) undertaking maintenance programs on jurisdictional streams, (3) working with local municipalities, SEWRPC, WDNR, and conservation groups on regional water pollution identification and erosion control issues.
- Encourage and promote low impact development techniques.
- Continue to include habitat features and natural vegetation where possible on District capital projects.

*Performance Measures:*

- Percent of jurisdictional watercourse with natural stream beds
- Percent of jurisdictional watercourse with habitat features and natural vegetation

**2.2.1.4.7 Watercourse Objective 7***Objective:*

Provide information receipt, response activity, and feedback regarding customer inquiries on the watercourse systems.

*Strategy:*

- Review all typical points of contact with District customers and ensure that questions, complaints and requests are handled quickly and appropriately.

*Tactics:*

- Review the procedures for recording and responding to customer inquiries (For the purpose of this objective, watercourse inquiries include calls received related to debris in a channel or flooding issues which are potentially critical issues. It does not include calls received related to vegetation management, graffiti or other non-critical issues.)
- Perform a review of customer complaint logs
- Prepare recommendations and implement procedures to maintain expected service response for customers

*Performance Measures:*

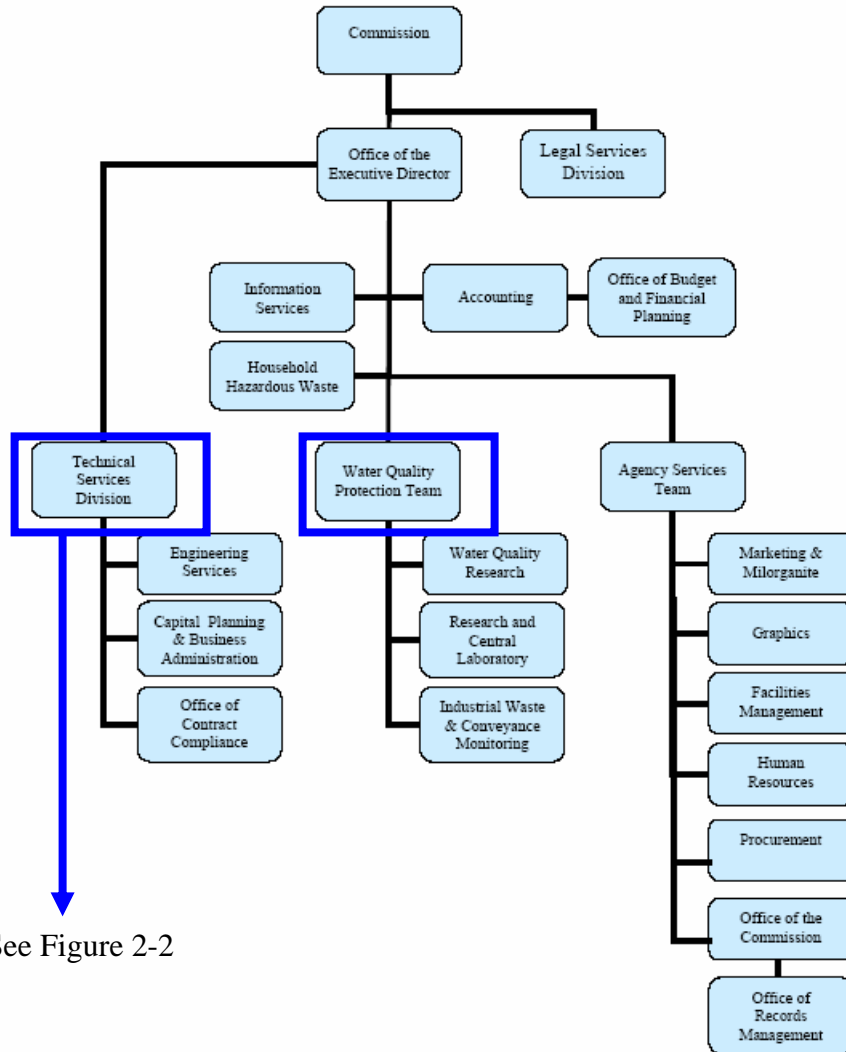
- Percent of inquiry documentation completed

### **2.2.2 Organizational Structure to Manage the CMOM Program**

This second section of the Management Plan includes an organizational chart and a description of the organizational requirements necessary for implementing the District CMOM program.

The District organizational chart is shown in Figure 2-1. The two divisions that have primary involvement in implementing the CMOM Program are the Technical Services Division and the Water Quality Protection Team, both of which fall under the Executive Director's authority. Although the Executive Director is not involved in the daily aspects of implementing the CMOM Program, it is through his direction that it is being implemented. Therefore, the activities that will take place are all under his authority. In the Technical Services Division, the Planning & Business Administration area contains the CMOM Program Manager, the person responsible for day to day execution of the tactics discussed above. The job description for the District CMOM Program Manager is included as Appendix 2-2.

### Milwaukee Metropolitan Sewerage District Organizational Chart



See Figure 2-2

Figure 2-1: District Organizational Chart

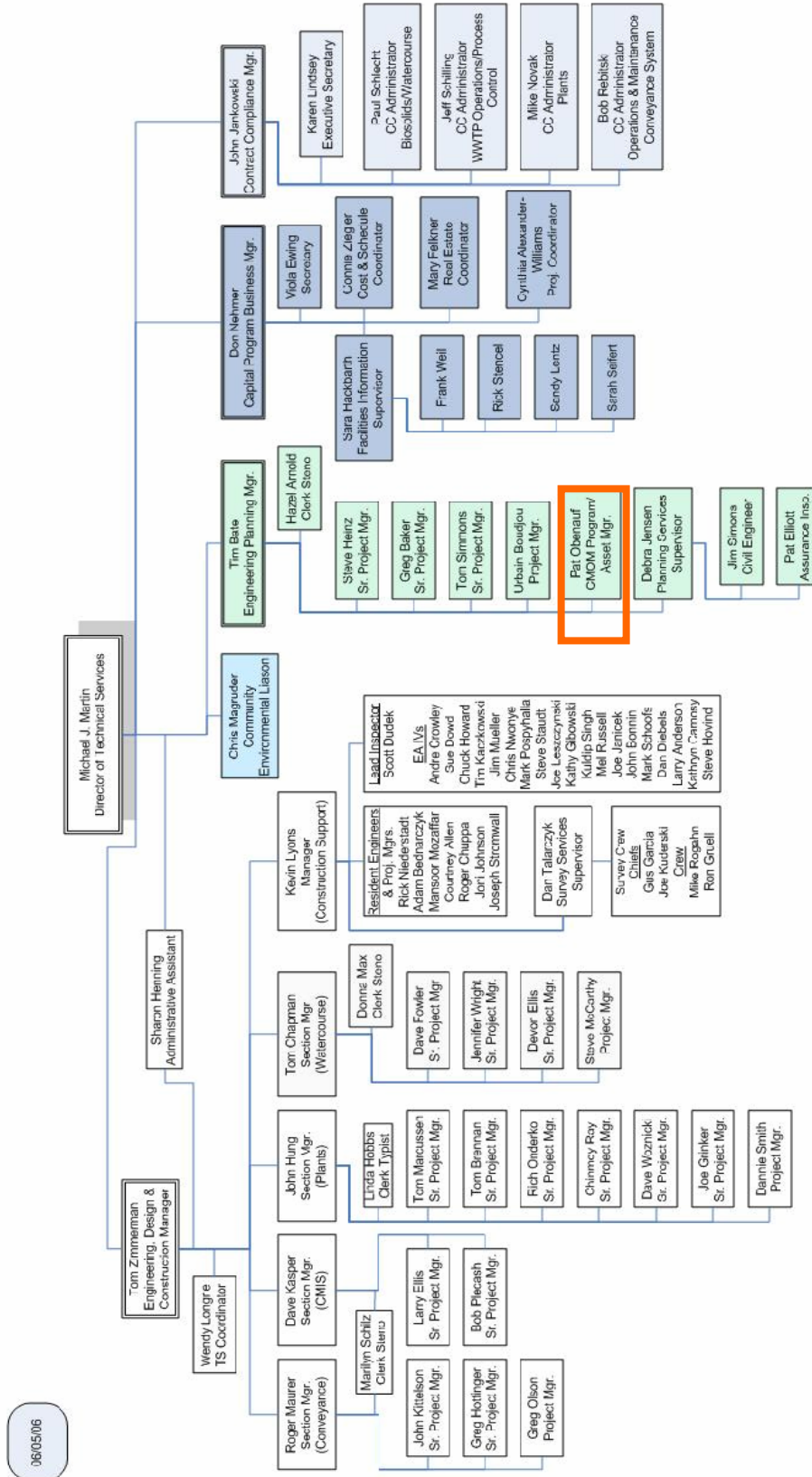


Figure 2-2: Technical Services Division Organizational Chart

### **2.2.3 Legal Authority to Control Infiltration and Inflow (I/I)**

This third section of the Management Plan describes the legal authority that the District has for defining allowable amounts of infiltration and inflow (I/I) into the District owned Metropolitan Interceptor Sewer (MIS) system.

The District has Rules and Regulations (Rules) that must be followed by any person, including governmental units, that discharges wastewater into the MIS system. Infiltration and inflow is addressed in various sections of the Rules.

I/I is addressed first through design requirements as specified in the Rules, section 2.405 and section 2.501. I/I is also addressed by standards, inspection and testing for construction of sewers and manholes in the Rules, Chapter 2, sections 2.501, 2.304, and 2.305, respectively. Each of these sections of the Rules is discussed below. The entire text of District Rules, Chapter 2 is included in Appendix 2-3.

Chapter 3 of the Rules has recently been revised and was adopted by the District Commission on May 21, 2007, with an effective date of May 27, 2007. The revisions incorporate standards for identifying those sewersheds that have excessive I/I, the process for control of excessive I/I, and the CMOM requirements for local municipalities. The entire text of District Rules, Chapter 3 is included in Appendix 2-4.

The entire set of District Rules is available online at <http://www.mmsd.com/rules/index.cfm>.

#### **2.2.3.1 Design requirements related to I/I Control**

Section 2.405 of the Rules addresses inflow sources through connection controls.

##### **2.405 Inflow Prevention**

1. No person or governmental unit may directly connect a new sewer or system of sewers to a District facility if the connecting sewer would contain wastewater prohibited by Sec. 3.202, MMSD Rules.
2. No person or governmental unit may directly connect a new sewer or system of sewers to a District facility if the governmental unit where the connection would be located has not adopted an inflow prevention ordinance as required by Sec. 3.203, MMSD Rules.
3. The District may require the disconnection of any existing sewer or system of sewers if the District determines that the governmental unit where the connection is located has an inadequate inflow prevention ordinance or has failed to effectively enforce its inflow prevention ordinance.
4. New permanent connections of local sewer bypasses to District facilities are prohibited except when a governmental unit has implemented all infiltration and inflow reduction measures recommended by the District's most recent *Facilities Plan* in the basin to be served by the bypass and the governmental unit demonstrates that the bypass continues to be necessary.

Section 2.501 of the Rules addresses infiltration as follows:

3. Sewers shall be designed to exclude infiltration to the maximum extent practicable and to exclude inflow as required by Chapter 3, MMSD Rules

### **2.2.3.2 Construction requirements related to I/I Control**

Sections 2.305 (1) and (2) and section 2.501 (2) of the Rules refers to The Standard Specifications for Sewer and Water Construction in Wisconsin (STANDARD SPECIFICATIONS) (8) for details on construction and testing specifications as follows:

#### 2.305 Sewer and Manhole Testing

1. For any sewer other than a relay sewer, passing a leakage test is required before any lateral sewer is connected. This leakage test shall conform to the requirements of The Standard Specifications for Sewer and Water Construction in Wisconsin, as amended at the time of the test.
2. For all new manholes, passing a vacuum test is required before the commencement of use. At a minimum, this vacuum test shall conform to the requirements of either The Standard Specifications for Sewer and Water Construction in Wisconsin, as amended at the time of the test, or standards established by the District, whichever are more restrictive.

#### 2.501 General

2. Specifications for sewers and ancillary facilities shall be based upon The Standard Specifications for Sewer and Water Construction in Wisconsin or other standards that provide an equivalent or better level of service and environmental protection.

The STANDARD SPECIFICATIONS includes specifications for construction of pipe joints (3.2.10), manholes, including frame to chimney seals (3.5.4), and pipe to manhole connections (3.5.7). There are also specifications for testing, including an infiltration test (3.7.2), an air test (3.7.3), and an exfiltration test (3.7.4) for sewers and a chimney inflow test (3.7.5) and a vacuum test (3.7.6) for manholes. These sections of the STANDARD SPECIFICATIONS are included as Appendix 2-5.

Section 2.304 of the Rules addresses inspection requirements for sewer construction.

#### 2.304 Inspections

1. During construction, governmental units shall inspect every sewer or ancillary facility listed in Sec. 2.201(2) [sanitary sewer extensions, sanitary relay sewers, sanitary relief sewers, combined relay sewers, combined relief sewers, sewage lift stations and force mains, private interceptor main sewers] of this chapter, except as provided in Sub. (9) [9 below]. Governmental units shall ensure that inspectors have sufficient qualifications and use effective inspection procedures and record-keeping forms.
2. The purpose of inspections shall be to determine whether the plans and specifications approved by the District have been followed during construction and to ensure that a sewer or ancillary facility, as constructed, excludes infiltration and inflow to the maximum extent practicable.

3. The inspector shall observe whether the sewer or ancillary facility complies with the applicable infiltration and inflow minimization provisions of:
  - a. The District's rules, and
  - b. The local sewer system and construction plans, as approved by the District.
4. If the sewer or ancillary facility fails to comply with this chapter, then the inspector shall require immediate reconstruction or modification to achieve compliance.
5. The inspector shall be present during all in-ground placement or assembly of the sewer or ancillary facility.
6. The inspector shall record observations on a form provided by the District or a substantially similar form. The inspector may record observations electronically. These observations shall describe the conditions relevant to determining whether the observed activity complies with the requirements of Sub. (2) [2 above]. At the conclusion of the inspection, the inspector shall sign the following certification:

*I certify that the information recorded here is true, accurate and complete and based upon my personal observations. To the best of my knowledge, the sewers and ancillary facilities I have inspected comply with all currently applicable infiltration and inflow minimization requirements.*
7. a. Governmental units shall maintain inspection records for at least five years from the date of the completion of construction.  
b. Governmental units shall allow the District to review and copy these records at no charge to the District.
8. If the District finds that a governmental unit's inspection program is ineffective and if the District has notified the government unit of the District's findings, then the District may hold in abeyance its review of local sewer system plans, construction plans, or any other District action related to sewer construction in the governmental unit.
9. a. The District shall perform inspections instead of a governmental unit if the District has determined that a governmental unit has an ineffective inspection program or if an intergovernmental cooperation agreement provides for District inspections. If the District performs these inspections, then the governmental unit shall reimburse all of the District's costs.  
b. An intergovernmental cooperation agreement may increase the scope of District inspections to include subjects beyond the subjects listed in Sub. (2). Potential subjects include, but are not limited to, construction management, engineering services, or surveying services. An intergovernmental cooperation agreement established according to this subsection shall require the governmental unit to reimburse all of the District's costs.
10. Any person or governmental unit constructing a sewer or ancillary facility subject to this chapter shall allow the District to inspect the sewer or ancillary facility during construction.

11. Inspections of private interceptor main sewers shall be equivalent to inspections of other similar facilities, with the inspector being present during all in-ground placement or assembly.

### **2.2.3.3 Investigation and Reduction requirements related to I/I**

The title of District Rules, Chapter 3 is “Management, Operation, and Maintenance of Tributary Sewers.” The purpose of the Chapter is stated in 3.101:

The purpose of this chapter is to ensure that all sewers tributary to the District’s sewerage system, including public sewers, private interceptor main sewers, and building sewers, are managed, operated, and maintained to:

- (1) maximize the efficiency and effectiveness of the District’s conveyance and treatment facilities;
- (2) minimize the probability, duration, and magnitude of overflows; and
- (3) reduce the exposure of the public to pathogens carried by wastewater.

Chapter 3 of the District Rules addresses I/I by:

1. Prohibiting the connection of clear water drains to sanitary sewers except foundation drains constructed prior to 1954 (District Rules, Chapter 3, sections 3.107 and 3.108)
2. Requiring manholes that are in the 100-year floodplain or are submerged for significant periods to have solid, non-vented covers and be sealed to effectively prevent infiltration (District Rules, Chapter 3, section 3.112)
3. Prohibiting the opening of sanitary manholes submerged in flooded areas (District Rules, Chapter 3, section 3.113)
4. Specifying maximum allowable I/I rates for sewersheds (District Rules, Chapter 3, section 3.201)
5. Requiring peak flow rate reduction if I/I rates exceed the maximum allowable (District Rules, Chapter 3, section 3.202)
6. Requiring all governmental units that discharge to District sewers to:
  - a. Have a CMOM program (District Rules, Chapter 3, section 3.105) that includes an I/I management plan
  - b. Have ordinances prohibiting the connection of clear water drains to sanitary sewers (District Rules, Chapter 3, section 3.109)
  - c. Perform inspections if it is suspected that prohibited connections are causing excessive I/I in an area (District Rules, Chapter 3, section 3.110)
  - d. Require remedial actions, and have enforcement mechanisms in place, to correct identified prohibited connections (District Rules, Chapter 3, section 3.111)
  - e. Prepare an annual report detailing the actions taken to control and reduce I/I in the previous year (District Rules, Chapter 3, section 3.301)

The entire text of District Rules, Chapter 3 is included in Appendix 2-4.

## **2.2.4 Design Criteria**

This fourth section of the management plan describes sewer design criteria in effect in the District service area.

District Rules, Chapter 2, sections 2.501 through 2.504 list requirements for designing sanitary sewers, combined sewers, private sanitary mains and manholes. Additional rules regarding design that are referenced and must be followed are the WDNR Administrative Code Chapter NR 110, Wisconsin Department of Commerce Administrative Code Chapter COMM 82, and the STANDARD SPECIFICATIONS.

### **2.2.4.1 Sanitary sewers**

District Rules, Chapter 2, Sections 2.501 and 2.502, state the requirements for design of sanitary sewers. In general, NR 110 is used as the standard, with additional MMSD requirements for determining flows and including drops where the sewer has an angle of divergence. Examples of the requirements included in NR 110 are for; 1) Sewers- required capacity, minimum size, depth, minimum slope, alignment, backfill, and testing; 2) Manholes- location, spacing, drop connections, size, materials, and water tightness; 3) Siphons- number of barrels, minimum size, and minimum velocity; 4) Construction- materials, quality, labeling, material types, non-pressure pipe and joint minimum standards, pressure pipe and joints minimum standards. The full text of sections 2.501 and 2.502 is included in Appendix 2-3. The full text of WDNR Chapter NR 110 is included as Appendix 2-6.

### **2.2.4.2 Combined sewers**

Chapter 2, sections 2.501 and 2.503, of the District's Rules state the requirements for design of combined sewers. The requirements of NR 110 also apply to combined sewers, except that the determination of required capacity is not specified. Since the required capacity for combined sewer design is based on storm sewer sizing, the required capacity is left up to the municipality owning the sewer. District Rules also include requirements for storm drainage structures connected to combined sewers. The full text of sections 2.501 and 2.503 is included in Appendix 2-3. The full text of WDNR Chapter NR 110 is included as Appendix 2-6.

### **2.2.4.3 Private Main sewers**

Chapter 2, section 2.501, of the District's Rules states that design of private main sewers must conform to section 2.504, which has the requirements for manholes, as discussed below. The design requirements listed in NR 110.13 apply to private sanitary main sewers as well as public sanitary main sewers. In addition, private sanitary mains must be approved by the Wisconsin Department of Commerce prior to District review and approval, per section 2.213 of the Rules. The full text of section 2.501 and 2.213 is included in Appendix 2-3. The full text of WDNR Chapter NR 110 is included as Appendix 2-6.

#### **2.2.4.4 Manholes**

Chapter 2, section 2.504 of the District's Rules states the requirements for manholes, in addition to the requirements of NR 110, discussed above. District Rules address the diameter of drops in drop manholes, the flow channel, manholes within the 100-year flood plain, the frame to chimney joint, and lids. The full text of section 2.504 is included in Appendix 2-3.

## 2.2.5 Benchmarking Data

This fifth section of the Management Plan describes the measures the District will use to compare and improve its performance relative to other agencies. The measures that will be used for benchmarking are also listed above as performance measures. The performance measures that are also benchmarks are indicated with an asterisk in section 2.2.6 (Performance Measures.)

A review of existing data sources was completed to determine what existing benchmarks are and what data is necessary for the District to use these benchmarks. There were four sources of information for which information was available and was reviewed for determining benchmarks. The four sources are Qualserve (USA), Water Services Association of Australia (Australia), National Benchmarking Initiative (Canada), and the National Association of Clean Water Agencies (USA.)

Comments on a review of the benchmarks available from each source are as follows:

- 1) **Qualserve**. This organization is the result of collaboration between the Water Environment Federation (WEF) and the American Water Works Association (AWWA). They have completed several annual performance surveys and have compiled the statistics into a report titled *Benchmarking Performance Indicators for Water and Wastewater Utilities* (9). These performance measures are in a form that is ready for comparison with many District measures.
- 2) **Water Services Association of Australia** [National Performance Framework.] Due to the differences in levels of service/levels of protection, these performance measures would be difficult to use.
- 3) **National Benchmarking Initiative** [Earth Tech in Canada.] This effort is similar to the Qualserve effort but in Canada. Since the Qualserve data is more comprehensive and provided by agencies in the United States, it is more useful than the National Benchmarking Initiative.
- 4) **National Association of Clean Water Agencies** (NACWA.) NACWA produced the 2005 Financial Survey: A National Survey of Municipal Wastewater Management Financing and Trends. This provides some useful measures and information for financial benchmarking. NACWA also provides awards to wastewater treatment plants for meeting all permit requirements. NACWA members can apply for these awards.

Of these four, the Qualserve report provided the most useful information and was comprehensive enough for the District to use some of the benchmarks. In addition, the District has applied for and received gold and platinum awards from NACWA under the Peak Performance Awards. These awards are considered benchmarks as they apply to various wastewater utilities across the country.

The compliance maintenance annual report (CMAR) overall score, which must be completed per the WPDES permit, is considered a benchmark in that all utilities from Wisconsin must complete the CMAR and thus, it can be used for comparison.

The Benchmarking performance measures are shown in Table 2-1.

Table 2-1: District Benchmarks

<b>Benchmark</b>	<b>Comparison Source</b>	<b>Data Requirements</b>	<b>Reference Objective</b>
Organizational Best Practices Index	Qualserve – Benchmarking Performance Indicators for Water and Wastewater Utilities	Self rating on a scale of 1 to 5 of seven areas: Strategic planning, Long-term financial planning, Risk management planning, Performance measurement system, Optimized asset management program, Customer involvement program, continuous improvement program	2.2.1.1.1 – Enable Implementation of the CMOM Program with the District Organization Structure
Bond Rating		Assigned by Rating Agencies	2.2.1.1.3 – Continue to maintain adequate financial planning
CMAR overall score	Wisconsin DNR	Determined through completing the CMAR form	2.2.1.1.4 – Continue to comply with regulatory requirements
Training hours per employee	Qualserve – Benchmarking Performance Indicators for Water and Wastewater Utilities	Total qualified formal hours of training for employees/total full time equivalent positions during the reporting period (District employees only)	2.2.1.1.6 – Continue to maintain a safe work environment for District employees and sustain a competent District workforce
Employee Health and Safety Severity Rate	Qualserve – Benchmarking Performance Indicators for Water and Wastewater Utilities	100 x total days away from work/total days worked by all employees during the reporting year (District employees only)	2.2.1.1.6 – Continue to maintain a safe work environment for District employees and sustain a competent District workforce
Conveyance system integrity	Qualserve – Benchmarking Performance Indicators for Water and Wastewater Utilities	100 x total number of collection system failures/total miles of pipe in collection system during reporting period (failures are defined as a loss of capacity resulting from a flow restriction (i.e. deposition of solids, structural failure, deterioration of	2.2.1.2.5 – Minimize the cost of conveyance asset ownership while maintaining necessary stewardship of assets and achieving defined protection levels

		materials, or root intrusion)	
Planned maintenance ratio (conveyance): hours	Qualserve – Benchmarking Performance Indicators for Water and Wastewater Utilities	$100 \times (\text{hours of PM and PdM}) / (\text{hours of PM, PdM, and CM})$	2.2.1.2.5 – Minimize the cost of conveyance asset ownership while maintaining necessary stewardship of assets and achieving defined protection levels
Planned maintenance ratio (conveyance): cost	Qualserve – Benchmarking Performance Indicators for Water and Wastewater Utilities	$100 \times (\text{cost of PM and PdM}) / (\text{cost of PM, PdM, and CM})$	2.2.1.2.5 – Minimize the cost of conveyance asset ownership while maintaining necessary stewardship of assets and achieving defined protection levels
Receipt of NACWA Peak Performance Award	NACWA	Yes/No	2.2.1.3.3 – Continue to provide effluent quality that meets or exceeds WPDES requirements and effluent quality goals
Planned maintenance ratio (treatment): hours	Qualserve – Benchmarking Performance Indicators for Water and Wastewater Utilities	$100 \times (\text{hours of PM and PdM}) / (\text{hours of PM, PdM, and CM})$	2.2.1.3.6 – Minimize the cost of wastewater treatment plant asset ownership while maintaining necessary stewardship of assets and achieving defined protection levels
Planned maintenance ratio (treatment): cost	Qualserve – Benchmarking Performance Indicators for Water and Wastewater Utilities	$100 \times (\text{cost of PM and PdM}) / (\text{cost of PM, PdM, and CM})$	2.2.1.3.6 – Minimize the cost of wastewater treatment plant asset ownership while maintaining necessary stewardship of assets and achieving defined protection levels
O&M cost per MGD treated	Qualserve – Benchmarking Performance Indicators for Water and Wastewater Utilities	Total O&M costs for wastewater treatment/total volume processed during the reporting period	2.2.1.3.6 – Minimize the cost of wastewater treatment plant asset ownership while maintaining necessary stewardship of assets and achieving defined protection levels

## **2.2.6 Performance Measures**

This sixth section of the Management Plan lists all of the performance measures from the goals and objectives section. The performance measures are grouped in functional categories to allow easier viewing.

The performance measures are grouped first by whether they are in the overall component or one of the three service area components. The second grouping is by function.

For the overall component, the functional areas are:

- Program organization
- Communication
- Finance
- System performance
- Satellite systems
- Personnel & Safety

For the conveyance, treatment and watercourse components, the functional areas are:

- System performance
- System monitoring
- System conservation (watercourse only)
- Asset management
- Capital program implementation
- Customer service

The tables included below provide a listing of the performance measures for each component (Overall, Conveyance, Treatment and Watercourse) of the CMOM Program. Included in the tables are the functional area, performance measure name, data requirements, and the related objective.

All performance measures are on an annual basis, except for those with completion dates or otherwise noted. Evaluation of District performance, based on these measures, will be documented in the CMOM Program Annual Report and the Audit Report. For further information, see the Communication Plan (Chapter 6 of this document) and the Audit Plan (Chapter 7 of this document).

### 2.2.6.1 Overall Performance Measures

Table 2-2: Overall Performance Measures

<b>Functional Area</b>	<b>Measure</b> * indicates the measure is also a benchmark (see 2.2.5)	<b>Data Requirements</b>	<b>Reference Objective</b>
Program Organization	Organizational Best Practices Index*	See Benchmarking Data, Section 2.2.5 above	2.2.1.1.1 – Enable implementation of the CMOM Program within the District organizational structure
Program Organization	CMOM Manager responsibilities assigned	Yes/No	2.2.1.1.1 – Enable implementation of the CMOM Program within the District organizational structure
Program Organization	CMOM work team established and functioning	Yes/No	2.2.1.1.1 – Enable implementation of the CMOM Program within the District organizational structure
Program Organization	Asset Manager responsibilities assigned	Yes/No	2.2.1.1.1 – Enable implementation of the CMOM Program within the District organizational structure
Program Organization	Asset Management Team established and functioning	Yes/No	2.2.1.1.1 – Enable implementation of the CMOM Program within the District organizational structure
Program Organization	Cost to date on CMOM activities		2.2.1.1.2 – Communicate the goals and objectives of the CMOM Program to internal and external stakeholders, monitor the CMOM Program implementation, and institute program modifications
Communication	CMOM page on the District’s internal web site updated annually to include new reports and	Yes/No	2.2.1.1.2 – Communicate the goals and objectives of the CMOM Program to internal and external stakeholders, monitor the CMOM Program

<b>Functional Area</b>	<b>Measure</b> * indicates the measure is also a benchmark (see 2.2.5)	<b>Data Requirements</b>	<b>Reference Objective</b>
	communications		implementation, and institute program modifications
Communication	CMOM page on the District’s public web site updated annually to include new reports and communications	Yes/No	2.2.1.1.2 – Communicate the goals and objectives of the CMOM Program to internal and external stakeholders, monitor the CMOM Program implementation, and institute program modifications
Communication	Annual TAT briefing completed	Yes/No	2.2.1.1.2 – Communicate the goals and objectives of the CMOM Program to internal and external stakeholders, monitor the CMOM Program implementation, and institute program modifications
Communication	Annual Commission memorandum completed	Yes/No	2.2.1.1.2 – Communicate the goals and objectives of the CMOM Program to internal and external stakeholders, monitor the CMOM Program implementation, and institute program modifications
Communication	Annual staff briefing completed	Yes/No	2.2.1.1.2 – Communicate the goals and objectives of the CMOM Program to internal and external stakeholders, monitor the CMOM Program implementation, and institute program

<b>Functional Area</b>	<b>Measure</b> * indicates the measure is also a benchmark (see 2.2.5)	<b>Data Requirements</b>	<b>Reference Objective</b>
			modifications
Communication	Percent of annual reports completed on time	CMOM Program Annual Report completion date	2.2.1.1.2 – Communicate the goals and objectives of the CMOM Program to internal and external stakeholders, monitor the CMOM Program implementation, and institute program modifications
Communication	Percent of overflow events for which a public notification was issued	Overflow events, Overflow events with public notification	2.2.1.1.4 – Continue to comply with regulatory requirements
Finance	Establish a method for benchmarking operation and maintenance costs by December 31, 2008	Yes/No	2.2.1.1.3 – Continue to maintain adequate financial planning
Finance	Percent of cash financing (six-year average)		2.2.1.1.3 – Continue to maintain adequate financial planning
Finance	Outstanding Debt		2.2.1.1.3 – Continue to maintain adequate financial planning
Finance	Six-year capital financing plan is updated and revised annually	Yes/No	2.2.1.1.3 – Continue to maintain adequate financial planning
Finance	Bond Ratings*	See Benchmarking Data, Section 2.2.5 above	2.2.1.1.3 – Continue to maintain adequate financial planning
System Performance	Percent of time effluent BOD is in compliance with WPDES permit limits	Weekly and Monthly average of the effluent BOD results (count 7 days for each week out of compliance and 30 days for each month out of compliance)	2.2.1.1.4 – Continue to comply with regulatory requirements
System Performance	Percent of time effluent	Weekly and Monthly average of the	2.2.1.1.4 – Continue to comply with

Functional Area	Measure * indicates the measure is also a benchmark (see 2.2.5)	Data Requirements	Reference Objective
	TSS is in compliance with WPDES permit limits	effluent TSS results (count 7 days for each week out of compliance and 30 days for each month out of compliance)	regulatory requirements
System Performance	Percent of time effluent fecal coliform count is in compliance with WPDES permit limits	Monthly geometric mean of the fecal coliform count results	2.2.1.1.4 – Continue to comply with regulatory requirements
System Performance	Percent of flow from system resulting from precipitation that is captured and treated	Volume of flow discharged from treatment plants, volume of CSOs, average daily base flow (calculated according to the formula stated in the District’s 2003 WPDES permit, section 3.2.5)	2.2.1.1.4 – Continue to comply with regulatory requirements
System Performance	Number of sanitary sewage overflows occurring more frequently than the WDNR approved Level of Protection	Quarterly overflow reports contain documentation of overflow events	2.2.1.1.4 – Continue to comply with regulatory requirements
System Performance	CMAR overall score*	See Benchmarking Data, Section 2.2.5 above	2.2.1.1.4 – Continue to comply with regulatory requirements
Satellite systems	All satellite CMOM readiness reviews completed by December 31, 2007	Yes/No	2.2.1.1.5 – Establish a regional CMOM program
Satellite systems	All satellite CMOM compliance strategies completed by December 31, 2007	Yes/No	2.2.1.1.5 – Establish a regional CMOM program

<b>Functional Area</b>	<b>Measure</b> * indicates the measure is also a benchmark (see 2.2.5)	<b>Data Requirements</b>	<b>Reference Objective</b>
Satellite systems	District has taken appropriate action for each satellite system that has not submitted a Management Plan, Overflow Response Plan, Communication Plan, Audit Plan, System Evaluation and Capacity Assurance Plan (where required) and I/I management plan by June 30, 2009	Yes/No	2.2.1.1.5 – Establish a regional CMOM program
Satellite systems	District sewer plan review process defined and documented by December 31, 2008	Yes/No	2.2.1.1.5 – Establish a regional CMOM program
Satellite systems	Percent of sewer plans reviewed by the District within deadlines established by the sewer plan review process	Sewer plans reviewed, Sewer plans submitted	2.2.1.1.5 – Establish a regional CMOM program
Satellite systems	District sewer construction Quality Assurance program defined and documented by June 30, 2008	Yes/No	2.2.1.1.5 – Establish a regional CMOM program
Satellite systems	Percent of sewer construction projects receiving QA inspection as	Sewer construction projects, Sewer construction projects visited at least once	2.2.1.1.5 – Establish a regional CMOM program

<b>Functional Area</b>	<b>Measure</b> * indicates the measure is also a benchmark (see 2.2.5)	<b>Data Requirements</b>	<b>Reference Objective</b>
	defined by the QA program		
Personnel & Safety	Annual regulatory training completed	Yes/No	2.2.1.1.6 – Continue to maintain a safe work environment for District employees and sustain a competent District workforce
Personnel & Safety	Annual training hours per employee*	See Benchmarking Data, Section 2.2.5 above	2.2.1.1.6 – Continue to maintain a safe work environment for District employees and sustain a competent District workforce
Personnel & Safety	Employee Health and Safety Severity Rate*	See Benchmarking Data, Section 2.2.5 above	2.2.1.1.6 – Continue to maintain a safe work environment for District employees and sustain a competent District workforce

### 2.2.6.2 Conveyance Performance Measures

Table 2-3: Conveyance Performance Measures

<b>Functional Area</b>	<b>Measure</b> * indicates the measure is also a benchmark (see 2.2.5)	<b>Data Requirements</b>	<b>Reference Objective</b>
System Performance	Number of dry weather CSOs	Annual number of Dry Weather CSO events	2.2.1.2.1 – Establish CMOM Program elements specific to minimizing the number and volume of CSOs
System Performance	Number of wet weather CSOs	Annual number of Wet Weather CSO events	2.2.1.2.1 – Establish CMOM Program elements specific to minimizing the number and volume of CSOs
System Performance	Ratio of event unused volume of the ISS to the wet weather CSO volume	Event volume of Wet Weather CSOs, Event volume remaining in ISS	2.2.1.2.1 – Establish CMOM Program elements specific to minimizing the number and volume of CSOs
System Performance	District rules regarding CMOM Program requirements and I/I controls for satellite systems adopted by June 30, 2007	Yes/No	2.2.1.2.2 – Modify District Rules to address peak wet weather flows from satellite systems that impact District system operation
System Performance	Development of the Wet Weather Peak Flow Management program by June 30, 2009	Yes/No	2.2.1.2.2 – Modify District Rules to address peak wet weather flows from satellite systems that impact District system operation
System Performance	Percent of sewersheds exceeding maximum allowable infiltration and inflow rate, as defined by District Rules, Chapter 3	Number of sewersheds determined to be exceeding the maximum allowable infiltration and inflow rate (defined in Chapter 3 - Rules (number determined by 2020 Facilities Plan and WWPFMP), Total number of	2.2.1.2.2 – Modify District Rules to address peak wet weather flows from satellite systems that impact District system operation

Functional Area	Measure * indicates the measure is also a benchmark (see 2.2.5)	Data Requirements	Reference Objective
		sewersheds	
System Performance	Number of dry weather SSOs	Annual number of dry weather SSO events	2.2.1.2.3 – Where possible, establish additional practices to prevent SSOs, maintain or improve system performance, and avoid preventable failures
System Performance	Number of wet weather SSOs where the event generated flow is less than the WDNR approved level of protection	Annual number of wet weather SSO events where the event generated flow is less than the WDNR approved level of protection	2.2.1.2.3 – Where possible, establish additional practices to prevent SSOs, maintain or improve system performance, and avoid preventable failures
System Performance	Number of wet weather SSOs	Annual number of wet weather SSO events	2.2.1.2.3 – Where possible, establish additional practices to prevent SSOs, maintain or improve system performance, and avoid preventable failures
System Performance	Volume of wet weather SSOs where the event generated flow is less than the WDNR approved level of protection	Annual volume of wet weather SSOs where the event generated flow is less than the WDNR approved level of protection	2.2.1.2.3 – Where possible, establish additional practices to prevent SSOs, maintain or improve system performance, and avoid preventable failures
System Performance	Volume of wet weather SSOs	Annual volume of wet weather SSOs	2.2.1.2.3 – Where possible, establish additional practices to prevent SSOs, maintain or improve system performance, and avoid preventable failures
System Performance	Number of building backups caused by District	Annual review of building backup data, determination of those attributable to	2.2.1.2.3 – Where possible, establish additional practices to prevent SSOs,

<b>Functional Area</b>	<b>Measure</b> * indicates the measure is also a benchmark (see 2.2.5)	<b>Data Requirements</b>	<b>Reference Objective</b>
	facility capacity or function	District facilities	maintain or improve system performance, and avoid preventable failures
System Performance	Percent of total flow entering the conveyance system that is captured and treated	Total flow volume delivered to the treatment plants, SSO and CSO volumes	2.2.1.2.3 – Where possible, establish additional practices to prevent SSOs, maintain or improve system performance, and avoid preventable failures
System Performance	Regulatory-approved Industrial Waste Pretreatment Program in operation	Yes/No	2.2.1.2.3 – Where possible, establish additional practices to prevent SSOs, maintain or improve system performance, and avoid preventable failures
Asset Management	Develop a plan for periodic operational readiness testing of sanitary sewer overflow facilities by June 30, 2009	Yes/No	2.2.1.2.3 – Where possible, establish additional practices to prevent SSOs, maintain or improve system performance, and avoid preventable failures
Asset Management	Percent completion of post-overflow review process within one year	Total number of overflow events and system failures, number of reviews completed	2.2.1.2.3 – Where possible, establish additional practices to prevent SSOs, maintain or improve system performance, and avoid preventable failures
Asset Management	Level of Protection defined and approved by the WDNR for the wastewater system	Yes/No	2.2.1.2.4 – Continue to establish and document level of protection, design and performance standards for conveyance assets constructed in the

<b>Functional Area</b>	<b>Measure</b> * indicates the measure is also a benchmark (see 2.2.5)	<b>Data Requirements</b>	<b>Reference Objective</b>
			District service area
Asset Management	Fixed Asset SOPs audited by December 31, 2008	Yes/No	2.2.1.2.4 – Continue to establish and document level of protection, design and performance standards for conveyance assets constructed in the District service area
Asset Management	Number of conveyance construction project updates to the GIS	Number of completed conveyance construction projects updated in GIS. Includes whole conveyance projects. Does not include changes to attributes of existing assets.	2.2.1.2.4 – Continue to establish and document level of protection, design and performance standards for conveyance assets constructed in the District service area
Asset Management	Backlog of conveyance construction project updates to the GIS	Number of completed conveyance construction projects not updated in GIS. Includes whole conveyance projects. Does not include changes to attributes of existing assets.	2.2.1.2.4 – Continue to establish and document level of protection, design and performance standards for conveyance assets constructed in the District service area
Asset Management	Percent of conveyance assets with defined condition and management method	Total number of assets, Total number of assets with defined condition and management method	2.2.1.2.4 – Continue to establish and document level of protection, design and performance standards for conveyance assets constructed in the District service area
Asset Management	Document requirements for conducting Business Case Analysis on conveyance projects by June 30, 2008	Yes/No	2.2.1.2.4 – Continue to establish and document level of protection, design and performance standards for conveyance assets constructed in the District service area
Asset Management	Percent of Business Case	Number of Business Case	2.2.1.2.4 – Continue to establish and

Functional Area	Measure * indicates the measure is also a benchmark (see 2.2.5)	Data Requirements	Reference Objective
	Analyses completed where required by District procedures	Analyses/Preliminary Engineering Studies conducted when required by District procedures	document level of protection, design and performance standards for conveyance assets constructed in the District service area
Capital Program Implementation	Facilities Plan implementation on schedule	Yes/No	2.2.1.2.4 – Continue to establish and document level of protection, design and performance standards for conveyance assets constructed in the District service area
Asset Management	Conveyance system integrity*	See Benchmarking Data, Section 2.2.5 above	2.2.1.2.5 – Minimize the cost of conveyance asset ownership while maintaining necessary stewardship of assets and achieving defined protection levels
Asset Management	PM backlog (sewers)	Number of open PM work orders for sewers older than 90 days	2.2.1.2.5 – Minimize the cost of conveyance asset ownership while maintaining necessary stewardship of assets and achieving defined protection levels
Asset Management	PM backlog (conveyance equipment and pump stations)	Number of open PM work order for conveyance equipment older than 90 days	2.2.1.2.5 – Minimize the cost of conveyance asset ownership while maintaining necessary stewardship of assets and achieving defined protection levels
Asset Management	Planned maintenance ratio (hours)*	Hours of PM, PdM, and CM (PM+PdM) / (PM+PdM+CM)	2.2.1.2.5 – Minimize the cost of conveyance asset ownership while maintaining necessary stewardship of assets and achieving defined protection

Functional Area	Measure * indicates the measure is also a benchmark (see 2.2.5)	Data Requirements	Reference Objective
			levels
Asset Management	Planned maintenance ratio (cost)*	Cost of PM, PdM, and CM (PM+PdM) / (PM+PdM+CM)	2.2.1.2.5 – Minimize the cost of conveyance asset ownership while maintaining necessary stewardship of assets and achieving defined protection levels
System Monitoring	Percent of portable flow monitors repaired within 5 business days after reporting problems	Number of portable flow monitors with reported repairs, number of portable flow monitor repairs taking longer than 5 days to complete (do not count repairs that require equipment replacement)	2.2.1.2.6 – Enhance District level of knowledge and understanding of wet weather flows and system response to precipitation and other factors
System Monitoring	Percent of permanent monitoring sites with less than one month of missing or bad data	Number of permanent monitoring sites, Number of permanent monitoring sites with more than one month of missing or bad data	2.2.1.2.6 – Enhance District level of knowledge and understanding of wet weather flows and system response to precipitation and other factors
System Monitoring	Percent of monitoring sites calibrated	Number of permanent monitoring sites, Number of permanent monitoring sites calibrated	2.2.1.2.6 – Enhance District level of knowledge and understanding of wet weather flows and system response to precipitation and other factors
System Monitoring	Percent of rain gauges calibrated	Number of rain gauges, Number of rain gauges calibrated	2.2.1.2.6 – Enhance District level of knowledge and understanding of wet weather flows and system response to precipitation and other factors
System Monitoring	Percent of data reviewed for QA within 30 days		2.2.1.2.6 – Enhance District level of knowledge and understanding of wet weather flows and system response to precipitation and other factors
Customer Service	Percent of inquiry	Number of sewer inquiries received,	2.2.1.2.7 – Provide information

<b>Functional Area</b>	<b>Measure</b> * indicates the measure is also a benchmark (see 2.2.5)	<b>Data Requirements</b>	<b>Reference Objective</b>
	documentation completed	number of sewer inquiry documentations completed. Sewer inquiries are defined as calls received of building backups, sewage overflows, spills into the system, clogged or collapsed sewer or structure, illegal dumping into a sewer or catch basin, missing manhole covers or contractors striking District facilities.	receipt, response activity, and feedback regarding customer inquiries

### 2.2.6.3 Treatment Performance Measures

Table 2-4: Treatment Performance Measures

<b>Functional Area</b>	<b>Measure</b> * indicates the measure is also a benchmark (see 2.2.5)	<b>Data Requirements</b>	<b>Reference Objective</b>
System Performance	Percent of plant influent flow volume receiving secondary treatment	Flow volume delivered to the treatment plants, Flow volume diverted around secondary treatment	2.2.1.3.1 – Continue to minimize process diversion events, consistent with the discharge permit
System Performance	Number of in-plant diversions	Number of diversion events	2.2.1.3.1 – Continue to minimize process diversion events, consistent with the discharge permit
System Performance	Number of in-plant diversions during conditions not consistent with permit requirements		2.2.1.3.1 – Continue to minimize process diversion events, consistent with the discharge permit
System Performance	Volume of SSOs due to closure of the ISS separate sewer gates where the event generated flow is below the approved Level of Protection	SSO Volume after ISS separate sewer gate closure, event classification (above or below LOP)	2.2.1.3.2 – Continue to optimize effectiveness of wet weather treatment capacity
System Performance	Volume of SSOs due to closure of the ISS separate sewer gates	SSO Volume after ISS separate sewer gate closure	2.2.1.3.2 – Continue to optimize effectiveness of wet weather treatment capacity
System Performance	Number of SSO events due to closure of the ISS separate sewer gates where the event generated flow is below the approved Level	Number of SSO events occurring after ISS gate closure, event classification (above or below LOP)	2.2.1.3.2 – Continue to optimize effectiveness of wet weather treatment capacity

<b>Functional Area</b>	<b>Measure</b> * indicates the measure is also a benchmark (see 2.2.5)	<b>Data Requirements</b>	<b>Reference Objective</b>
	of Protection		
System Performance	Number of SSOs due to closure of the ISS separate sewer gates	Number of SSO events occurring after ISS gate closure	2.2.1.3.2 – Continue to optimize effectiveness of wet weather treatment capacity
System Performance	Receipt of NACWA Peak Performance Award	Yes/No	2.2.1.3.3 – Continue to provide effluent quality that meets or exceeds WPDES requirements and effluent quality goals
System Performance	Percent of time effluent BOD is in compliance with WPDES permit	Weekly and Monthly average of the effluent BOD results (count 7 days for each week out of compliance and 30 days for each month out of compliance)	2.2.1.3.3 – Continue to provide effluent quality that meets or exceeds WPDES requirements and effluent quality goals
System Performance	Percent of time effluent TSS is in compliance with WPDES permit	Weekly and Monthly average of the effluent TSS results (count 7 days for each week out of compliance and 30 days for each month out of compliance)	2.2.1.3.3 – Continue to provide effluent quality that meets or exceeds WPDES requirements and effluent quality goals
System Performance	Percent of time effluent fecal coliform count is in compliance with WPDES permit	Monthly geometric mean of the fecal coliform count results (count 30 days for each month out of compliance)	2.2.1.3.3 – Continue to provide effluent quality that meets or exceeds WPDES requirements and effluent quality goals
System Performance	Percent of time effluent Phosphorous is in compliance with WPDES permit	Monthly average of the effluent Total Phosphorous results (count 30 days for each month out of compliance)	2.2.1.3.3 – Continue to provide effluent quality that meets or exceeds WPDES requirements and effluent quality goals
System Performance	Percent of time effluent Ammonia is in compliance with WPDES permit	Weekly average of the effluent Total Ammonia Nitrogen results (count 7 days for each week out of compliance)	2.2.1.3.3 – Continue to provide effluent quality that meets or exceeds WPDES requirements and effluent quality goals

<b>Functional Area</b>	<b>Measure</b> * indicates the measure is also a benchmark (see 2.2.5)	<b>Data Requirements</b>	<b>Reference Objective</b>
System Performance	Percent of produced biosolids that are beneficially reused	Biosolids produced, Biosolids sent to landfill	2.2.1.3.4 – Continue to manage biosolids in a manner that maximizes beneficial reuse
Asset Management	Level of Protection is defined (by the 2020 Facilities Plan) and approved by the WDNR for the Wastewater System	Yes/No	2.2.1.3.5 – Continue to establish and document levels of protection, design and performance standards for treatment plant assets
Asset Management	Fixed Asset SOPs audited by December 31, 2008	Yes/No	2.2.1.3.5 – Continue to establish and document levels of protection, design and performance standards for treatment plant assets
Asset Management	Percent of treatment plant assets with defined condition and management method	Number of assets, number of assets with defined condition and management method	2.2.1.3.5 – Continue to establish and document levels of protection, design and performance standards for treatment plant assets
Asset Management	Document requirements for conducting Business Case Analysis on treatment plant projects by June 30, 2008	Yes/No	2.2.1.3.5 – Continue to establish and document levels of protection, design and performance standards for treatment plant assets
Asset Management	Percent of Business Case Analyses completed where required by District procedures	Number of business case analyses conducted	2.2.1.3.5 – Continue to establish and document levels of protection, design and performance standards for treatment plant assets
Capital Program Implementation	Facilities Plan implementation on	Yes/No	2.2.1.3.5 – Continue to establish and document levels of protection, design

Functional Area	Measure * indicates the measure is also a benchmark (see 2.2.5)	Data Requirements	Reference Objective
	schedule for treatment plant studies and projects		and performance standards for treatment plant assets
Asset Management	Percent of PM tasks completed	Number of PM tasks generated by CMMS, Number of PM tasks completed.	2.2.1.3.6 – Minimize the cost of wastewater treatment plant asset ownership while maintaining necessary stewardship of assets and achieving defined protection levels
Asset Management	O&M cost per MGD treated*	See Benchmarking Data, Section 2.2.5 above	2.2.1.3.6 – Minimize the cost of wastewater treatment plant asset ownership while maintaining necessary stewardship of assets and achieving defined protection levels
Asset Management	CM completion status	Number of open CM work orders older than 90 days	2.2.1.3.6 – Minimize the cost of wastewater treatment plant asset ownership while maintaining necessary stewardship of assets and achieving defined protection levels
Asset Management	Planned maintenance ratio: cost	Cost of PM, PdM, and CM (PM+PdM) / (PM+PdM+CM)	2.2.1.3.6 – Minimize the cost of wastewater treatment plant asset ownership while maintaining necessary stewardship of assets and achieving defined protection levels
Asset Management	Planned maintenance ratio: hours	Hours of PM, PdM, and CM (PM+PdM) / (PM+PdM+CM)	2.2.1.3.6 – Minimize the cost of wastewater treatment plant asset ownership while maintaining necessary stewardship of assets and achieving defined protection levels

### 2.2.6.4 Watercourse Performance Measures

Table 2-5: Watercourse Performance Measures

<b>Functional Area</b>	<b>Measure</b>	<b>Data Requirements</b>	<b>Reference Objective</b>
System Performance	Number of habitable structures impacted by the one-percent probability flood	One-percent probability floodplain, current aerial photography	2.2.1.4.1 – Within jurisdictional streams, cost-effectively remove habitable structures from flooding associated with the one-percent probability flood event
Capital Program Implementation	Watercourse Management Plan implementation is on schedule	Yes/No	2.2.1.4.1 – Within jurisdictional streams, cost-effectively remove habitable structures from flooding associated with the one-percent probability flood event
System Conservation	Percent of stormwater management plans reviewed within the timeframe allowed	Number of stormwater management plans submitted, number of stormwater management plans reviewed with allowable timeframe	2.2.1.4.2 – Ensure that new development and redevelopment do not result in structures being added to the one-percent floodplain or diminish the protection provided by the District’s watercourse projects
System Conservation	Area of property protected/preserved through District ownership or conservation easement	Purchases and easements obtained through Conservation Fund and Greenseams	2.2.1.4.2 – Ensure that new development and redevelopment do not result in structures being added to the one-percent floodplain or diminish the protection provided by the District’s watercourse projects
Asset Management	Completeness of streambank ownership in GIS	Watercourse GIS, streambank parcels, streambank parcel ownership	2.2.1.4.3 – Provide efficient coordination for system-wide watercourse maintenance

<b>Functional Area</b>	<b>Measure</b>	<b>Data Requirements</b>	<b>Reference Objective</b>
Asset Management	Percent of riparian owners aware of maintenance responsibilities when an issue has been identified	Number of riparian parcel owners, Number of riparian parcel owners informed of maintenance responsibilities	2.2.1.4.3 – Provide efficient coordination for system-wide watercourse maintenance
Asset Management	Percent of riparian owners completing maintenance responsibilities after receiving District communication	Number of riparian parcels requiring maintenance, Number of riparian parcels completing maintenance	2.2.1.4.3 – Provide efficient coordination for system-wide watercourse maintenance
Asset Management	Level of Protection defined and accepted by Stakeholders	Yes/No	2.2.1.4.4 – Establish and document level of protection, design and performance standards for new assets in the watercourse system
Asset Management	Fixed Asset SOPs audited by December 31, 2008	Yes/No	2.2.1.4.4 – Establish and document level of protection, design and performance standards for new assets in the watercourse system
Asset Management	Percent of watercourse assets with defined condition and management method	Number of assets, number of assets with defined condition and management method	2.2.1.4.4 – Establish and document level of protection, design and performance standards for new assets in the watercourse system
Asset Management	Document requirements for conducting Business Case Analysis on watercourse projects by June 30, 2008		2.2.1.4.4 – Establish and document level of protection, design and performance standards for new assets in the watercourse system
Asset Management	Percent of Business Case Analyses completed where	Number of business case	2.2.1.4.4 – Establish and document level of protection, design and performance

<b>Functional Area</b>	<b>Measure</b>	<b>Data Requirements</b>	<b>Reference Objective</b>
	required by District procedures	analyses conducted	standards for new assets in the watercourse system
Asset Management	Linear feet of streambank with a current condition assessment	Footage of streambank assets, footage of streambank assets with condition assessment	2.2.1.4.4 – Establish and document level of protection, design and performance standards for new assets in the watercourse system
Asset Management	Number of watercourse construction project updates to the GIS	Number of watercourse construction project updates to the GIS. Includes whole projects. Does not include revision of attributes to existing assets.	2.2.1.4.4 – Establish and document level of protection, design and performance standards for new assets in the watercourse system
Asset Management	Backlog of watercourse construction project updates to the GIS	Number of completed watercourse construction projects not entered in watercourse GIS. Includes only whole projects. Does not include revision of attributes to existing assets.	2.2.1.4.4 – Establish and document level of protection, design and performance standards for new assets in the watercourse system
Asset Management	Percent of scheduled watercourse inspections completed	Number of scheduled watercourse inspections, number of scheduled watercourse inspections completed	2.2.1.4.5 – Minimize the cost of watercourse asset ownership while maintaining necessary stewardship of assets and achieving defined protection levels
Asset Management	Percent of scheduled culvert and structure inspections completed	Number of scheduled culvert and structure inspections, number of	2.2.1.4.5 – Minimize the cost of watercourse asset ownership while maintaining necessary stewardship of

Functional Area	Measure	Data Requirements	Reference Objective
		scheduled culvert and structure inspections completed	assets and achieving defined protection levels
Asset Management	Watercourse O&M costs	Watercourse O&M costs	2.2.1.4.5 – Minimize the cost of watercourse asset ownership while maintaining necessary stewardship of assets and achieving defined protection levels
Asset Management	Watercourse O&M hours	Watercourse O&M hours	2.2.1.4.5 – Minimize the cost of watercourse asset ownership while maintaining necessary stewardship of assets and achieving defined protection levels
System Conservation	Percent of jurisdictional watercourse with natural streambeds	Total length of jurisdictional watercourse, length of jurisdictional watercourse with natural streambeds	2.2.1.4.6 – Continue to be a leader in the effort to improve the area’s waterways
System Conservation	Percent of jurisdictional watercourse with habitat features and natural vegetation	Total length of jurisdictional watercourse, length of jurisdictional watercourse with habitat features and natural vegetation	2.2.1.4.6 – Continue to be a leader in the effort to improve the area’s waterways
Customer Service	Percent inquiry documentation completed	Number of watercourse inquiries received, number of watercourse inquiry documentations completed.	2.2.1.4.7 – Provide information receipt, response activity, and feedback regarding customer inquiries on the watercourse system

Functional Area	Measure	Data Requirements	Reference Objective
		Watercourse inquiries include debris in channel and flooding complaints. Does not include vegetation management or graffiti.	

## **2.2.7 Reporting Methods for CMOM Compliance Reviews**

This seventh section of the Management Plan discusses the means for documenting and reporting on CMOM compliance. The purpose of this section is to have defined methods for communicating activities, accomplishment and changes to the CMOM program to stakeholders, including regulatory authorities. The District will employ three methods of formal reporting regarding implementation and execution of the CMOM program. The three methods are the Compliance Maintenance Annual Report (CMAR), the CMOM Program Annual Report and the CMOM Program Audit Report. Each of these is discussed below.

### **2.2.7.1 Compliance Maintenance Annual Report**

The District is required by its WPDES permit from the WDNR to submit an annual CMAR. This submittal includes a specific section regarding the CMOM program documentation. However, it also includes more specific data regarding treatment plant flows, plant effluent quality, biosolids quality and disposal, plant maintenance, collection system maintenance, collection system overflows, and financial management. All of these items are related to the goals and performance measures included in the District CMOM program. Although the CMAR does not contain reporting for every area, it does act as an annual summary of the important goals and measures.

### **2.2.7.2 CMOM Program Annual Report**

The District will prepare a CMOM Program Annual Report each calendar year. This annual report will encompass the entire District CMOM program. The report will have short discussions regarding meeting of goals and objectives, and also have supporting data tabulated and analyzed.

Further discussion of the annual report is contained in the Communication Plan (Chapter 6, section 6.2.1.2 of this document).

### **2.2.7.3 CMOM Program Audit Report**

The District will conduct an audit of its CMOM program in the year 2012. The audit will include the following steps:

1. Reviewing District performance measures
2. Reviewing District benchmarks
3. Reviewing stakeholder input
4. Formation of chapter review teams with cross-divisional representation from the District
5. Completion of an update to the entire CMOM program

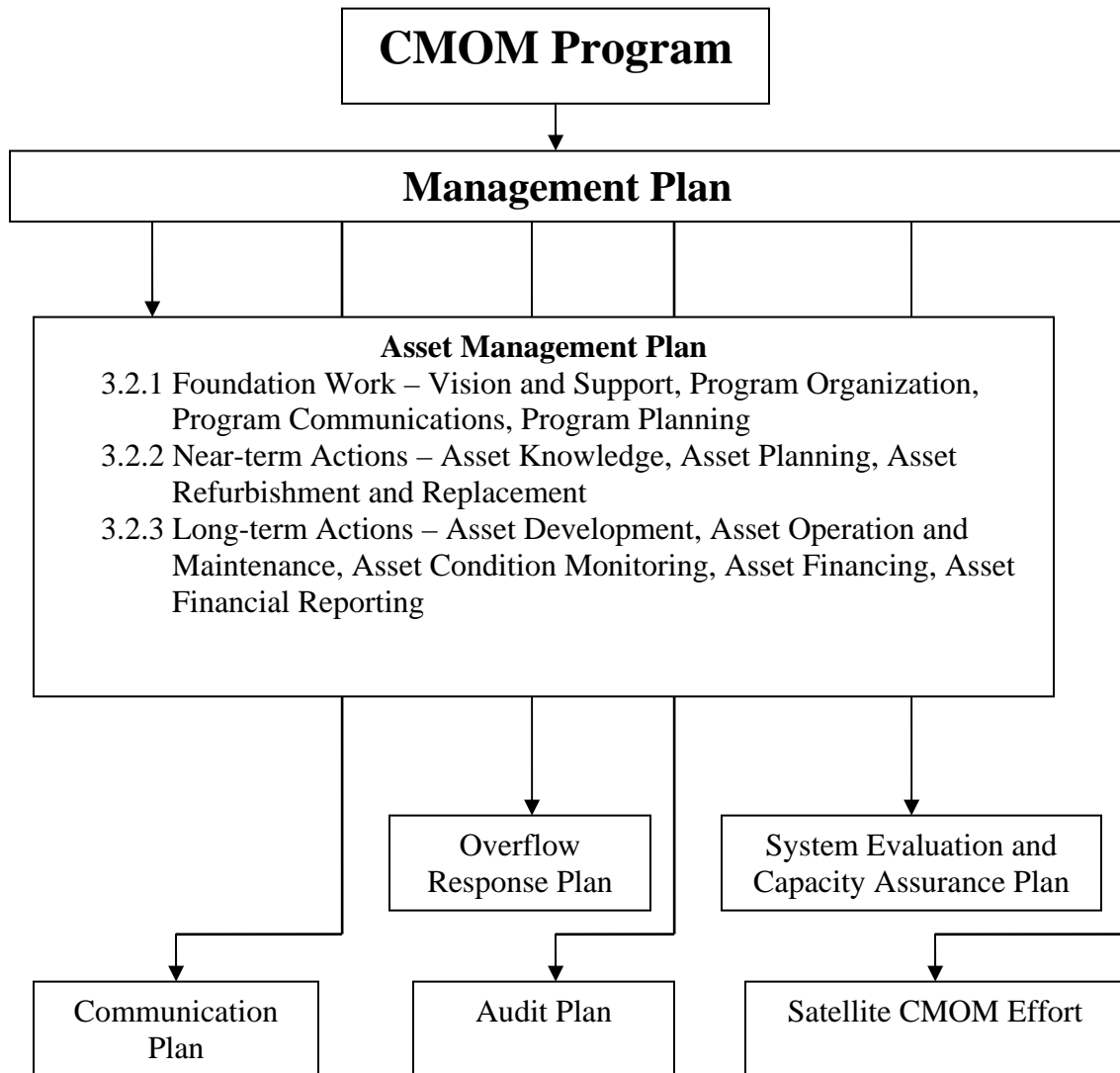
Further discussion of the auditing process is included in the Audit Plan (Chapter 7 of this document).

### **2.2.8 Management Plan Updates**

The Management Plan will receive annual updates through the annual review of the performance measures and preparation of the CMOM Program Annual Report.

For further information, see the Communication Plan (Chapter 6, section 6.2.1.2 of this document) and Audit Plan (Chapter 7, section 7.2.1 of this document).

# Asset Management Plan



## 3.1 Asset Management Plan Development

The Milwaukee Metropolitan Sewerage District (MMSD or District) has prepared this Asset Management Plan (AMP) in response to a stipulation agreement (Stipulation) (1) entered into between the District and the State of Wisconsin in May of 2002. The AMP describes the measures and activities that the District will undertake to ensure proper function of the assets that provide conveyance, storage, and treatment of wastewater and conveyance and storage of storm water runoff.

In addition to the Stipulation requirements, the following areas were considered in the development of the AMP; 1) General principles of asset management; 2) The Business Process Gap Analysis conducted at the District; and 3) Capacity, Management, Operation, and Maintenance (CMOM) Program objectives.

Asset management principles were also proposed by the United States Environmental Protection Agency (USEPA) as a part of the draft Sanitary Sewer Overflow (SSO) rule (2) that was subsequently withdrawn. The withdrawn SSO rule, although never formally adopted, was considered, in the absence of other guidance, in the development of the District AMP.

This Asset Management Plan is a further development of the Asset Management Plan Strategy that was developed and documented in the *MMSD CMOM Readiness Review and Implementation Strategy Development (CMOM Strategic Plan)* (3) completed and submitted to the Wisconsin Department of Natural Resources (WDNR) in December 2005. There are many items that were identified during the readiness review and strategy development and documented in the *CMOM Strategic Plan* that have been partially or completely addressed as of the completion of this document. These items are still included to provide background information and continuity to the evolution of the Asset Management Plan from readiness review to strategy development to final plan. In addition, the strategies and tactics described in this Asset Management Plan will be subject to change and refinement as the District continues implementing and gains experience with the CMOM Program.

The Stipulation Requirements, withdrawn SSO rule, general asset management principles, District business process gap analysis, and CMOM objectives are discussed in more detail below.

### 3.1.1 Stipulation Requirements

The Wisconsin Department of Natural Resources (WDNR) has outlined certain requirements for the District CMOM program in the text of the Stipulation. WDNR will also be incorporating CMOM program requirements in their rules and in Wisconsin Pollutant Discharge Elimination System (WPDES) permits. The District CMOM Program has been developed to comply with the Stipulation requirements, but will also comply with the rule and permit requirements.

The Stipulation discusses asset management requirements in paragraph 7 A. The following text is taken from the Stipulation:

“7. While sanitary sewer overflows in the District’s system have been significantly reduced, there are still sanitary sewer overflows within the District’s and its satellite municipalities’ sanitary sewer systems. To continue the District’s program to reduce with the goal of eliminating all non-permitted sanitary sewer overflows, the District shall implement the regional Capacity, Management, Operation and Maintenance (CMOM) program. The regional CMOM shall be comprised of four integrated components:”

The first component listed is:

“A. *Management Plan.* A plan that outlines the goals of the CMOM, the organizational structure to manage it, the legal authority to control infiltration and inflow (I/I), design criteria, benchmarking data, and performance measures to attain the goals. A significant effort associated with the Management Plan shall be the development of an asset management (AM) program that provides for both programmed maintenance and tracking of the asset condition to enable early recognition of expansions or major rehabilitation necessary to avoid capacity limitations.”

Thus the Asset Management Program must have: 1) A system for ensuring programmed maintenance; and 2) A system for obtaining condition information and programming capital asset replacements to avoid capacity limitations.

### **3.1.2 Principles from Withdrawn SSO Rule**

The USEPA proposed the draft SSO rule in 2001. Although the draft SSO rule was later withdrawn and never promulgated, in the absence of other guidance, the District has considered this withdrawn rule in developing its AMP. Within this withdrawn rule, there was a section on the measures and activities a utility must undertake that indicate CMOM compliance. The following is the text from § 122.42 (e) (2) (iv) of the withdrawn SSO rule:

- “(iv) Measures and Activities. Your CMOM program must address the following elements that are appropriate and applicable to your system and identify the person or position in your organization responsible for each element:
- (A) Provide adequate maintenance facilities and equipment;
  - (B) Maintenance of a map of the collection system;
  - (C) Management of information and use of timely, relevant information to establish and prioritize appropriate CMOM activities (such as the immediate elimination of dry weather overflows or overflows into sensitive waters such as public drinking water supplies and their source waters, swimming beaches and waters where swimming occurs, shellfish beds, designated Outstanding National Resource Waters, National Marine Sanctuaries, waters within Federal, State, or local parks, and water containing threatened or endangered species or their habitat), and identify and illustrate trends in overflows, such as frequency and volume;
  - (D) Routine preventive operation and maintenance activities;

- (E) A program to assess the current capacity of the collection system and treatment facilities which you own or over which you have operational control;
- (F) Identification and prioritization of structural deficiencies and identification and implementation of short-term and long-term rehabilitation actions to address each deficiency;
- (G) Appropriate training on a regular basis; and
- (H) Equipment and replacement parts inventories including identification of critical replacement parts.”

This information from the withdrawn rule was considered, in the absence of other guidance, in developing the District AMP.

### **3.1.3 General Asset Management Principles**

There are various guides available that describe asset management principles, such as the *International Infrastructure Management Manual* (10) and *Managing Public Infrastructure Assets to Minimize Cost and Maximize Performance* (11). These guides describe the goals of an asset management plan and some of the means by which this can be accomplished. The principles described in these guides were used in the development of this asset management plan.

The key elements of asset management are:

- Taking a life-cycle approach.
- Developing cost-effective management strategies for the long-term.
- Providing a defined level of service and monitoring performance.
- Managing risks associated with asset failures.
- Using the physical resources of the agency in a sustainable manner.
- Continuously improving AM practices.

Asset management is practiced in different forms and at different levels by all owners of infrastructure assets. The level of asset management can be well defined or it can be as simple as rules of thumb and operator judgment. Regardless of the level of asset management practiced at a utility, defining and documenting the approach is one way to implement improvements.

Asset management can be defined as “Managing infrastructure assets to minimize the total cost of owning and operating them, while providing the desired level of service.” Sometimes added on to this definition is “at an acceptable level of risk.” However, risk can be calculated as a cost, so whether risk is mentioned separately depends on how the utility views risk, as a cost or as a separate factor to manage.

Within this statement, there is a great degree of variability as to the approaches that can be taken. Overall, though, it means that a utility must provide a structured approach for gathering, storing and analyzing costs related to the planning, engineering, design, construction, start-up, operations, maintenance, energy use, rehabilitation, refurbishment

and disposal of its assets. The structured approach is necessary to have the information available when making asset management decisions.

Another way of stating this is to say that an asset management plan is a defined system to improve the management of asset life-cycle costs such that:

- There is a defined and accepted Level of Service (The District uses the terms Level of Protection against overflows for its wastewater conveyance, storage, and treatment system (Wastewater System) and Level of Protection against flooding for its jurisdictional watercourse systems)
- The system organizes and allows easy visual access to all asset physical data (i.e. identification, location, dimensions, material, connectivity, construction method, environment)
- The system provides the ability to forecast operations (and operations costs), maintenance (and maintenance costs), repairs (and repair costs), refurbishments (and refurbishment costs), and replacements (and replacement costs) and compare predicted costs to realized costs for improved decision making.
- There is a standard procedure for approving capital project spending
- The system contains and allows easy visual access to the required cost data necessary for making decisions regarding asset spending.
- The plan provides a system to ensure personnel are trained according to documented procedures and that the procedures are regularly audited.

All of these ideas are incorporated into the District's asset management plan. Because doing things economically is at the core of asset management, some of its principles are also subject to cost-effectiveness and may be applied to a greater or lesser degree.

### **3.1.4 District Business Process Gap Analysis**

A set of specific business processes has been defined that characterizes a good asset management program. These specific processes are grouped into business areas and are shown in Appendix 3-1. These processes were all rated by the District (through the Asset Management Work Team, AMWT) and the Consultant during the readiness review for the current level of implementation at the District. The difference between the current and desired level of implementation is termed a gap. The size of the gap and the criticality of the business process were considered in determining a score for each process. This resulted in the business areas being grouped into actions that needed immediate attention, actions to be completed in the near term (2-5 years) and actions to be completed in the long term (5-10 years).

In summary, the AMWT completed the following work:

- Evaluated District performance in twelve major areas and 81 specific topic areas related to AM.
- Compared District performance in each area to "best practices" as provided by the consulting team.
- Reviewed current performance and defined desired performance in each area, calibrating the vision against what seems reasonably achievable over the next five to ten years.

- Prioritized the major AM areas in terms of “immediate,” “near-term,” and “long-term.”

The Evaluation Matrix, provided in Appendix 3-1 shows the results of this “gap analysis”. The matrix showed that the most significant gaps were present in the following areas:

- *Vision and support* – Gaining Commission and top management support, establishing goals and measurable objectives.
- *Organization* – Establishing the asset management team (AMT) and allocating the resources necessary to carry the AM plan forward.
- *Plan communication* – Identifying stakeholders and stakeholder groups, defining stakeholder interests, and developing and maintaining communication vehicles to educate stakeholders and keep them informed of progress in AM.
- *Plan development* – Assessing current practices, developing an AM vision, performing a gap analysis, and preparing an AMP to improve practices.

Because these business areas are essential to having an asset management plan, the actions necessary to close these gaps were placed in the immediate category. For this reason, much of the work described in the *CMOM Strategic Plan* has already been completed for these areas.

### **3.1.5 District CMOM Program Objectives**

The CMOM objectives that are supported by the asset management plan are:

CMOM conveyance objective 4, treatment objective 5 and watercourse objective 4 – Continue to establish and document level of protection, design, and performance standards for new conveyance, treatment plant, and watercourse assets constructed in the District service area (Management Plan – 2.2.1.2.4, 2.2.1.3.5, and 2.2.1.4.4).

CMOM conveyance objective 5, treatment objective 6 and watercourse objective 5 – Minimize the cost of conveyance, treatment plant, and watercourse asset ownership while maintaining necessary stewardship of assets and achieving defined protection levels (Management Plan – 2.2.1.2.5, 2.2.1.3.6, and 2.2.1.4.5).

The CMOM objectives are worded generally, but all point to the same idea of achieving the defined level of protection while minimizing the costs of asset ownership necessary to achieve the level of protection.

### **3.1.6 Components of the Asset Management Plan**

The actions defined in the *CMOM Strategic Plan* were grouped by their urgency. To remain consistent and provide for continuity, the same groupings of actions are followed in the AMP. They are as stated below.

Foundation Work (titled Immediate Actions in the *CMOM Strategic Plan*)

- Vision and Support (3.2.1.1)
- Program Organization (3.2.1.2)
- Program Communications (3.2.1.3)

#### Program Planning (3.2.1.4)

##### Near-term Actions

Asset Knowledge (3.2.2.1)

Asset Planning (3.2.2.2)

Asset Refurbishment and Replacement (3.2.2.3)

##### Long-term Actions

Asset Development (3.2.3.1)

Asset Operations and Maintenance (3.2.3.2)

Asset Condition Monitoring (3.2.3.3)

Asset Financing (3.2.3.4)

Asset Financial Reporting (3.2.3.5)

For each of these twelve business process areas, the District has determined various objectives to close the identified gaps and improve upon the existing asset management system. Each objective is discussed in more detail in the Asset Management Plan.

## 3.2 The Asset Management Plan

As discussed in detail in the *CMOM Strategic Plan* and mentioned above, a gap analysis was performed on existing District practices. The gap analysis covered 81 specific topics in 12 categories. A summary of the gap analysis is included in Appendix 3-1. From the gap analysis, the *asset management strategic plan* was prepared and is documented in the *CMOM Strategic Plan*.

Many of the items that were identified during the readiness review and strategy development and documented in the *CMOM Strategic Plan* have been addressed with the completion of this Asset Management Plan (AMP). The items described in Foundation Work (section 3.2.1), and some of the items described in Near-Term Actions (section 3.2.2) and Long-Term Actions (section 3.2.3) have been partially or completely addressed. These items are still included in this plan to provide background information and continuity to the evolution of the AMP from readiness review to strategy development to final plan. Therefore, this asset management plan documents the activity that has already occurred and spells out the future activities that the District will undertake to have a system for achieving its objectives related to asset management.

### 3.2.1 Foundation Work

Four areas emerged from the gap analysis in the *CMOM Strategic Plan* as needing immediate attention. These areas were:

- I. Vision and Support (3.2.1.1)
- II. Plan Organization (3.2.1.2)
- III. Plan Communication (3.2.1.3)
- IV. Plan Development (3.2.1.4)

In addition, it was determined necessary to provide some immediate gains through asset management practices. The immediate gains would provide additional impetus to implementation of the plan and are discussed below in section 3.2.1.5.

The objectives that were listed for filling the gaps in each of these five areas in the *CMOM Strategic Plan* are included below along with the actions that have been completed. The items in this section have been completely addressed and are considered complete as of the preparation of this document. Besides any actions necessary to maintain their status, there will be no further actions taken under these objectives.

#### 3.2.1.1 Vision and Support

There are two objectives under the Vision and Support heading.:

1. Obtain Understanding and Support from District Executive Management and Commission
2. Establish Relationships Between Levels of Protection and Costs

##### 3.2.1.1.1 Vision and Support Objective 1

###### *Objective*

Obtain Understanding and Support from District Top Management and Commission

There are three major items that show the level of support for implementing an asset management plan at the District. First is the District Mission Statement. Second is the additional staff that has been added and third is the support of the asset management team.

#### *District Core Mission*

The District has the following mission statement:

***To cost-effectively protect public health and the environment, prevent pollution and enhance the quality of area waterways***

Visible in this statement are the level of service that the District desires to provide, as well as the term “cost-effectively.” These concepts are the core of asset management programs.

A specially formed subcommittee of the District Commission submitted a report titled “Milwaukee Metropolitan Sewerage District Commission Subcommittee for Future Financial Planning – Final Report” in November of 2006. Included in this report are the concepts of providing the required level of protection while minimizing major financial commitments. This is a self-speaking commitment of the Commission in support of asset management principles. This document is available as a link from the District Commission web page (<http://www.mmsd.com/about/commission.cfm>).

#### *Asset Manager/Asset Management Database Coordinator position funding*

The position of Asset Manager (in conjunction with the CMOM program manager position) was funded and has been filled since June 2006. In addition, the position of Asset Management Database Coordinator was funded and has been filled since October 2006. In reviewing the funding requirements for these two positions, the District Commission and Executive Management were informed of the importance of the positions for the success of the AMP.

#### *Asset Management Team*

The District has organized an asset management team (AMT) and has utilized this team to develop and document the AMP. The District will continue to utilize this team to implement the actions listed in the plan, as well as audit and make changes to the plan.

The commitment to fund and fill the two positions and organize the AMT indicates that the Commission and Executive Management support the development and implementation of the Asset Management Plan.

### **3.2.1.1.2 Vision and Support Objective 2**

#### *Objective:*

Establish Relationships Between Levels of Protection/Levels of Service and Costs.

Level of Protection (LOP) is defined for the District’s Wastewater System as the wastewater recurrence interval that can be conveyed, stored and treated without causing a

sanitary sewer overflow in the conveyance system. LOP is defined for the District watercourse system as the flood flow recurrence interval that can be conveyed without causing surface or structure flooding.

The LOP is applied to the system as a whole (conveyance and treatment together or watercourse). The various elements of the system (sewers, pump stations, treatment plant unit processes, channels, culverts, etc.) have capacity, effluent requirement, operating restrictions, and other limitations (Levels of Service) that figure in to the ability of the system to provide the LOP.

The 2020 Facilities Plan documents the analysis of Level of Protection for the conveyance and treatment system. Included in the analysis are costs for having 5-year and 10-year Levels of Protection and the recommended Level of Protection (5-year) for future facilities. For additional information, see Chapter 9 of the Conveyance Report of the 2020 Facilities Plan.

The Level of Protection identified for the watercourse systems (100-year flood flow) is documented in the District's Watercourse Management Plans (WMP). For further discussion of the WMP, see the system evaluation and capacity assurance plan, Chapter 5, section 5.2.3 of this document.

### **3.2.1.2 Plan Organization**

Organizing and implementing an asset management plan, similar to CMOM program organization, involves setting up a structure where asset management is a focus of District activity. The District has gone about this by creating the position of Asset Manager to work with the AMT.

The AMT is a cross-functional and formally recognized team that has provided the input to develop the District AMP. The AMT will also have to implement the details of the AMP, ensure they are carried out, audit the plan and make changes to it in the future. The Asset Manager works with the AMT to ensure asset management principles are understood, incorporated in regular activities and audited to evaluate their effectiveness.

There are two objectives under the Plan Organization heading:

1. Establish the Position of Asset Manager and Formally Charter the AMT
2. Gain the Resources necessary to conduct the AMT work

#### **3.2.1.2.1 Plan Organization Objective 1**

Objective:

Establish the Position of Asset Manager and Formally Charter the AMT

As previously described, this objective has been fully completed by the District. The AMT consists of personnel across the District. Table 3-1 lists the representation of the team.

**Table 3-1 Representation of the AMT**

<b>Function</b>	<b>Organization/Division</b>
Asset Manager	MMSD – Technical Services
Contract Compliance	MMSD – Technical Services
O&M	Contract Operator
Project Management/Design	MMSD – Technical Services
Accounting	MMSD – Accounting
Budget Planning	MMSD – Budget Planning
Project Management/Scheduling	MMSD – Technical Services
Geographic Information Systems	MMSD – Technical Services

### 3.2.1.2.2 Plan Organization Objective 2

*Objective:*

Gain the Resources Necessary to Conduct the AMT Work through the First Full Year

The Asset Manager and Asset Management Database Coordinator positions are fully funded. Besides these two positions, the remainder of the AMT is committed to participating as a part of their employee accountabilities. There are no additional resources necessary to continue the work of the AMT

### 3.2.1.3 Plan Communication

Communication with stakeholders will be one key to successful implementation of the AMP. To communicate with stakeholders requires determining the information that is most important to the stakeholder. For this reason, the stakeholder groups were identified by the primary information relating to CMOM and Asset Management that they are concerned with.

There is one objective under the Plan Communication heading.

#### 3.2.1.3.1 Plan Communication Objective 1

*Objective:*

Identify Key AM Stakeholder Groups and Identify Their Interests

*Tactics:*

- Convene an AMT meeting to identify District stakeholders
- Identify stakeholders primary interests
- Identify means to communicate with stakeholders
- Develop the communication methods

The AMT has identified the key stakeholder groups by their main interest, as well as the method for communicating with that group regarding their key interest. The information is shown in Table 3-2.

The purpose of identifying the groups in this manner is to identify a suitable communication medium applicable to the groups' main interest.

The details of the communication medium through which information about the asset management plan will reach the stakeholder groups is work that is currently in development by the AMT.

**Table 3-2 Stakeholder Groups, Key Information and Communication Methods**

<b>Stakeholder group</b>	<b>Primary Interest related to CMOM and Asset Management</b>	<b>District Information to be Provided</b>	<b>Main Communication Method</b>	<b>Additional Communication Method</b>
Environmental Groups, Regulators, General Public	Overflows/Level of Protection	SSO locations and volumes	Real-time MMSD Storm Update Website Historical Discharge Monitoring Reports Compliance Maintenance Annual Report	MMSD Public Web Site
Satellite system owners, Industrial customers	Level of Service (Sewer capacity, connections)	Availability of sewers, limitations on connections, peak flow	TAT meetings	MMSD Public Web Site
O&M Contractor, Consultants, Construction Contractors	Ability to profit	Changes to typical contract language that affect their costs	Annual Consultant/Contractor meetings	
Internal Staff	Impact on job function	Tasks, Deliverables, Deadlines	Division Meetings Staff Meetings	MMSD Internal Web Site
Service area property owners, Commission, Executive Management	District Cost-effectiveness	Discussion of Costs and Benefits of CMOM Program and Asset Management	CMOM Program Annual Report	

### 3.2.1.4 Plan Development

As discussed above, the gap analysis and asset management strategic plan have previously been completed and documented in the *CMOM Strategic Plan*. With the completion of this document, the asset management plan is considered developed. This work has all been completed by and/or with the input of the AMT (formerly known as the Asset Management Work Team - AMWT). The AMT will continue implementing, auditing and improving the AMP per the details provided in this document.

### 3.2.1.5 Immediate Gains

To validate the concept of AM and encourage the adoption of improved AM practices throughout the District, the AMWT recommended that some actions be taken to generate immediate gains through AM. The main action was to examine lower-priority projects in the proposed capital improvement program (CIP) to determine if the projects can be re-cast, delayed, or replaced by more cost-effective alternatives.

The AMWT recommended using the business case analysis technique (BCA). A BCA provides a powerful, analytical framework aimed at expressing benefits and costs arising from projects from the customers' point of view. A BCA goes beyond traditional cost-benefit analyses in the following ways:

- BCAs carefully examine the perceived problems that are addressed by specific CIP projects or combinations of projects.
- BCAs propose alternative approaches to addressing the problems. These approaches may be far-ranging and quite different from the approach currently planned.
- BCAs always carefully consider the “do-nothing” alternative.
- Staff, not outside consultants, typically perform BCAs. A BCA is a “business” review, not an “expert” review.
- Organizations should periodically repeat BCAs throughout the plan/design cycle so that projects are always under review at a fundamental level and so that projects cannot “take on lives of their own.”
- An attempt is made to quantify costs and benefits in three areas; economic, social, and environmental.

In some cases, staff can perform the analysis as complete benefit/cost analyses, giving immediate guidance for management decisions. In other cases, staff will be unable to quantify costs and benefits completely. In such cases, staff can directly compare the residual net cost of a project with an unquantifiable benefit; this often expresses clearly the true cost of achieving policy or regulatory goals and facilitates more focused and effective capital decisions. Within the District, the Technical Services Division would perform the BCA on any given capital project.

There is one objective under the Immediate Gain heading:

### 3.2.1.5.1 Immediate Gain Objective 1

*Objective:*

Achieve Immediate Gains through the Practice of AM Techniques

*Tactics:*

- Review existing methods of analyzing projects done for the Water Pollution Abatement Program, 2010 Facilities Plan, and Central MIS projects.
- Review the District CIP and select a lower-priority project for analysis
- Define objectives and drivers for each project
- Define alternative approaches to meet the objectives
- For each approach, define cost and benefit categories. Where necessary, make assignments to specific staff to gather or estimate needed cost and benefit data
- Compile data and perform analyses
- Review BCA at AMT meeting
- Prepare recommendations

A District team has completed a BCA on a selected project that was in the District CIP. The BCA was presented to Technical Services management. Further details on how to incorporate the BCA process into preparing the CIP and in Project Management are presently being developed by the AMT.

### 3.2.2 Near-term actions

After establishing the foundation for the AMP by having worked through the immediate actions identified in the *CMOM Strategic Plan*, the AMT has shifted its focus to defining and implementing the near-term and long-term actions. These actions deal more with the assets themselves, whereas the foundation dealt mostly with establishing the plan. The near-term and long-term actions are focused on improving asset information and using this information to increase the efficiency and effectiveness of decision making regarding assets. Portions of the objectives under near-term and long-term actions have been addressed by the AMT as of the completion of this document and are discussed individually.

The District is a mature agency that has largely constructed its wastewater conveyance, wastewater treatment and watercourse systems. The capital improvement programs existing now are mainly intended to:

- Improve the existing system to serve additional lands within the District's ultimate service area
- Provide additional capacity to reduce or eliminate combined sewer and sanitary sewer overflow volumes and frequencies
- Reduce watercourse-related flooding
- Provide rehabilitation and upgrades that maintain or improve the usefulness of existing assets.

With this state of the system in mind, the AMWT recommended addressing items that will close the gaps in three AM areas:

- I. Asset Knowledge (3.2.2.1)
- II. Asset Planning (3.2.2.2)
- III. Asset Refurbishment and Replacement (3.2.2.3)

Details on the objectives, strategies, and tactical actions specific to each area of improvement are discussed below, beginning with asset knowledge.

In addition to developing the asset management plan, the District began developing an Asset Information Management System (AIMS), with the goal of completing it along with other near-term actions. Information is provided below in section 3.2.2.4 on the development of the AIMS.

#### 3.2.2.1 Asset Knowledge

Asset knowledge is that quantified asset information which is readily available for AM purposes. Having this information for all the District assets is the foundation for good-decision making. The definition implies that the information is organized and readily available in a clear and structured way.

Asset knowledge has five objectives:

1. Define the minimum level of detail for an asset (what assets to track)
2. Establish a uniform asset enumeration scheme (asset organization)
3. Identify existing assets and related attributes (asset data)
4. Identify the probability and consequence of failure of an asset (asset risk)

5. Establish the level of AM performed (asset management strategy)

Each of these objectives is discussed in more detail below.

### 3.2.2.1.1 Asset Knowledge Objective 1

*Objective:*

Define the minimum level of detail for an asset

*Tactics:*

- Review existing District information regarding capital assets
- Use the AMT to determine and document the District definition of an asset.

The District AMT has agreed on the following guidelines for what an asset is, how to fit an asset in the asset hierarchy, and to what level of detail District assets are to be tracked:

1. All parts grouped together into an asset at its lowest level must be able to share a replacement value and rehab/renewal schedule (not necessarily maintenance schedule)
2. Failure of any one part of the asset is not more critical than failure of any other regarding:
  - a. Costs incurred due to failure
  - b. Drop or disruption in Level of Protection
  - c. Health & safety implications
  - d. Regulatory violations
  - e. Public relations
3. Parts of the asset may be considered a child to the overall asset as a parent. These parts may be called out separately for maintenance (e.g. valves in a piping system), for custodial responsibility (e.g. spare parts), for criticality (e.g. a specific section of piping could fail that would spill to a sensitive area, whereas the remainder of the piping would spill to a safe area) or other reasons. This parent-child relationship can continue further down into the asset hierarchy, where a child becomes the parent to another part of the asset that is called out.

The appropriate level of detail to break an asset into will be checked by examining the purposes of tracking the costs at that level of detail. Examples include:

1. Historical costs
  - a. Planning
  - b. Design
  - c. Construction
  - d. Operating & Energy
  - e. Maintenance
  - f. Rehabilitation
  - g. Disposal
2. Predicting future operating & maintenance costs
3. Predicting future rehabilitation costs & timing
4. Predicting future renewal costs & timing

5. Monitoring asset stewardship
6. Decision making/analysis (optimizing expenditures)

Whatever the level of detail that an asset is broken into, the benefit of tracking at that level of detail must be greater than the additional cost from tracking one level up.

Along with the above definition, the District uses a minimum of 1) \$5,000 purchase price and 2) Useful life of 3 years or greater to define an asset. Any single piece of equipment that is not part of a larger asset and does not meet both of these requirements is considered a supply and is not listed in the fixed asset register.

In the future, this definition will be employed to refine the fixed asset register, to complete appropriate hierarchies of assets that roll up to the entire District, to correct any discrepancies between other asset source databases and to identify future assets.

### **3.2.2.1.2 Asset Knowledge Objective 2**

*Objective:*

Establish a uniform asset enumeration system

*Tactics:*

- Review the documentation regarding asset location and asset class descriptions and hierarchies.
- Review the location hierarchies of the two treatment plants for consistency.
- Update hierarchy documentation.
- Update Project Management Manual.

The District plans on using two asset enumeration systems simultaneously. One system is by location, and the other is by class. They are independent of each other. Classifying assets in a hierarchical manner by location allows management at different levels and facilitates accumulation of costs by asset, by facility, by infrastructure segment, etc. Maintaining class hierarchies allows the comparison of maintenance, operations, construction cost and life histories of asset types. This can improve the gathering of data necessary to make life-cycle planning decisions.

The District and the contract operator currently utilize a hierarchical asset enumeration system for the treatment plants and for equipment in the conveyance and watercourse systems. However, the application of it may be improved by ensuring consistency across all areas, as well as across the two treatment plants. The existing asset enumeration system will be examined and documented by the AMT. The documentation will reside in AIMS.

Documentation will provide for the ability to name future assets, ensure the assets are added to all relevant asset source databases and begin tracking costs early in their life. This requirement will be built into the design contracts and will be addressed by including procedures in the District's Project Management Manual.

As an example, design consultants may be able to assign asset numbers during the design process and reflect these numbers on their drawings. Construction contractors can then accumulate costs and provide final billing by asset in the same manner. This will greatly

improve the ability to manage new facilities effectively and to report financial results accurately.

### 3.2.2.1.3 Asset Knowledge Objective 3

#### *Objective:*

Continue to Identify Existing Assets and Related Attributes

#### *Tactics:*

- Review asset databases for conformity with the defined level of asset detail, hierarchical numbering system, and asset class assignments. Reinventory, renumber, and add/change class assignments as required.
- Investigate and determine which assets should be physically tagged with asset numbers. Review the existing tagging system to ensure it adequately addresses the needs of the AMP.
- Define identifying, parametric, and maintenance data required for each asset class. Review databases and add the required data where it is not present.

The District will review and update its asset management source databases to be reconciled with each other and in accordance with the minimum asset detail and asset enumeration guidelines described above.

The conveyance system will be updated using the latest “leg maps,” combined with the record drawings. The leg maps have been kept up to date and provide a view of large branches of the system.

The District is currently in the process of updating its conveyance geographical information system (GIS). At the end of this two year project, the District will have all of its conveyance facilities included in the new GIS system. With the new GIS will be improved access to facility data.

The plant equipment computerized maintenance management system (CMMS) database, (MAXIMO), and District accounting database (Great Plains) will be reconciled and updated according to an inventory that is being completed for the close-out of the current 10-year operation and maintenance (O&M) contract.

These systems all have existing information, but need to be updated and expanded to include any additional information that is deemed necessary per the details provided in this document.

In parallel with this effort, the District will record appropriate asset data if it is not recorded already. Such asset data will fall into three sets:

- Identifying information, such as serial number, date installed, and original cost.
- Parametric information, such as horsepower, flow capacity, length, and diameter.
- Maintenance history, such as types and frequencies.

The District will define the required information by asset class to ensure that a consistent set of data is achieved. This effort will be ongoing.

The District contract operator currently places equipment tags on all assets. The tag number is a sequential number that is also entered into MAXIMO with the asset information. This action is important to ensure information is recorded against the proper asset. There are many locations at the treatment plants and at conveyance pump stations where multiple pieces of identical equipment can create tracking difficulties without the use of asset tags.

Asset classes will have documented descriptions in the AIMS reference library. Present asset descriptions also need to be expanded and descriptive enough to allow future personnel to know what the asset is and be able to physically identify it.

#### **3.2.2.1.4 Asset Knowledge Objective 4**

*Objective:*

Identify the Consequence of Failure for Assets

Analysis of the consequence and probability of failure (risk = consequence x probability) has been completed for all District assets by asset class. This includes conveyance, treatment plant and watercourse assets. The consequence and probability of failures are multiplied together and then adjusted based on a redundancy factor. The result is a Risk Management Priority (RaMP) number. This RaMP number is used to prioritize assets by criticality and determine an appropriate management method (discussed in section 3.2.2.1.5 below).

There are currently 175 classes of assets in the District AIMS system for the three service areas of conveyance, treatment and watercourse. The factors that went into determining the consequence and probability of failure for each asset class, as well as the resulting RaMP number are provided in Appendix 3-2.

#### **3.2.2.1.5 Asset Knowledge Objective 5**

*Objective:*

Continue to Establish the Level of AM Performed

*Tactics:*

- Review asset listings and assign preliminary numerical cut-off points for the management strategies.
- Review assets assigned to each management strategy. Note assets that have special requirements (e.g., remote monitoring of condition via predictive maintenance for cost reasons even where condition-based monitoring is not indicated by criticality).
- Based on the second review, establish additional management strategies if substantial groups of assets need management methods different from those discussed above.
- Formalize the reviews by documenting the management strategies used and the criteria for determining the strategy.

- Establish procedures to ensure that assets are being managed according to the appropriate modes.

Once the District has identified, enumerated, and determined criticalities for assets, assets can be assigned to appropriate levels of management. The intent is to assign the most critical (highest risk) assets to the more intensive management modes, so that resources can be focused where they will have the greatest effect.

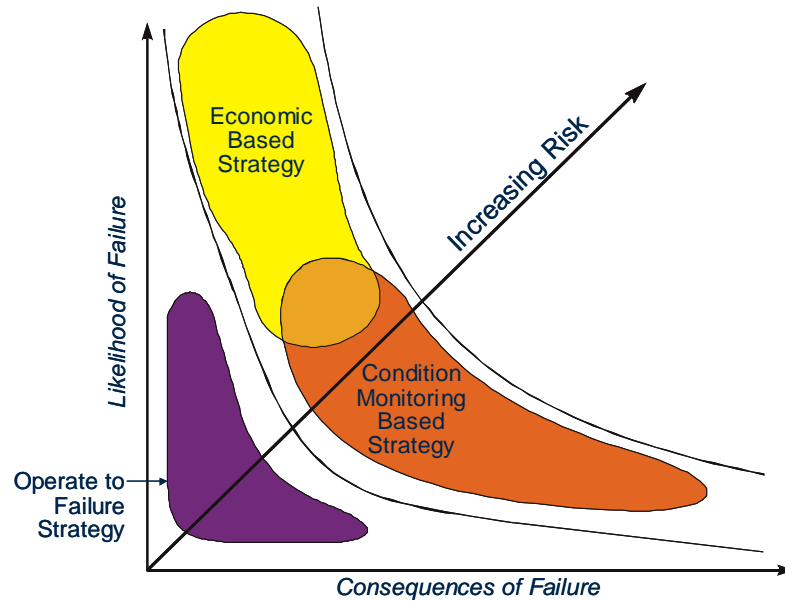
Intensity of management is in theory a continuum, however, cut-off points for the RaMP numbers will be established to create practical management modes. The three modes that the District will use are:

*Condition monitoring-based management* – These assets are so critical that unplanned failures will have serious consequences in level of service or regulatory violations. The District will base condition monitoring, maintenance, refurbishment and replacement schedules on minimizing the risk associated with these assets.

*Economic-based management* – These assets are less critical in that they can experience unplanned failures that do not have an adverse impact on service delivery and will not cause a regulatory violation. For these assets, condition monitoring, maintenance, refurbishment and replacement schedules will be based on economic analysis. Capturing reliable cost information by asset is a key to managing these assets.

*Operate to failure-based management* – These assets are not critical in that a failure will not have an impact on service delivery and will not cause a regulatory violation. For these assets, it is not economically practical to complete some or all of the monitoring and maintenance activities, but is cheaper to replace the asset when it fails.

Figure 3-1 shows this management mode concept graphically.



**Figure 3-1: Asset Management Maintenance Strategies**

Assigning assets to the various management modes in a way that matches Level of Service and Level of Protection requirements helps ensure that the District can meet those requirements at the least cost.

As assets are inspected and predictive maintenance is completed, useful lives can be updated. This information all feeds in to the calculation of the RaMP number, upon which management modes will be based. Therefore, condition monitoring efforts will be integral to updating management modes. For further information on condition monitoring, see section 3.2.3.2 below.

Asset knowledge is one of the bigger tasks to tackle. While there is much valuable information available for the existing assets, it is not all organized and concentrated in a way that is quickly and readily accessible. The District's GIS is in the process of being upgraded and expanded. The new GIS will include conveyance, treatment plant and watercourse assets to varying extents and is being designed to work with AIMS for data compatibility. The vision of the new system is to fulfill the needs of users of asset information and is a big part of completing asset knowledge objectives.

### 3.2.2.2 Asset Planning

Asset planning refers to the preparation of the expected life-cycle costs of ownership of an asset. Such costs typically include short-interval activities (operations, maintenance, energy, condition monitoring), and long-interval activities (refurbishment, replacement, disposal).

The District O&M budget reflects the short-interval costs and job plans in MAXIMO shows the scheduled short-interval activities.

Presently, the District's capital budget reflects some long-interval costs. This budget is presently projected for a 6 year future. The District is planning to expand this out further

in future budgets. The capital budget also includes the larger expenditures for acquisition, refurbishment, and replacement of assets.

Asset planning is important for two reasons:

- i. A key goal of AM is reducing asset ownership costs. An AM Program accomplishes this through the classical plan/act/measure/control cycle. AM works by preparing plans for assets, carrying out the plans, measuring the results, and updating the plans accordingly.
- ii. Having cost of ownership plans for all significant assets means that the District can accurately forecast aggregate ownership costs well into the future, giving a solid foundation for long-range funding plans.

Asset planning will start with asset plans developed by asset class. The District will then modify these plans for assets that are known to have different requirements than the typical asset in that class.

Asset Planning has three objectives:

1. Establish Short-Interval Portions of Asset Plans
2. Establish Long-Interval Portions of Asset Plans
3. Develop Procedures to Update Asset Plans

### **3.2.2.2.1 Asset Planning Objective 1**

*Objective:*

Continue to Establish Short-Interval Portions of Asset Plans

*Tactics:*

- Review MAXIMO to ensure that all preventive maintenance (PM) activities are represented at the appropriate level and with standard costs.
- Add condition monitoring activities when they are defined (according to section 3.2.3.2.1 below).
- Review procedures for gathering costs at the asset level.
- Review capability for extracting both plan and historical cost data from MAXIMO for further analysis (MAXIMO has limited analytic capabilities).

MAXIMO already contains the defined short-interval activities (primarily preventive maintenance) for many District assets. These activities will be reviewed to ensure that they are asset-specific and properly allocate costs in accordance with the asset hierarchy. Where necessary, the contract operator can add and perform additional activities (primarily condition monitoring) and record the data in MAXIMO.

In conjunction with this effort, the asset enumeration system will be checked in MAXIMO to ensure that the GIS and Great Plains databases also use the same numbers for the same assets. Equipment numbers should also be incorporated as they are used by present planners and designers for Process and Instrumentation Diagrams (must be used for tying supervisory control and data acquisition (SCADA) information and control information to the central control system (CCS)).

### 3.2.2.2.2 Asset Planning Objective 2

*Objective:*

Establish Long-Interval Portions of Asset Plans

The District will use AIMS to prepare and maintain plans for long-interval activities, including refurbishment, replacement and disposal.

*Tactics:*

- Prepare generic long-interval plans using asset classes. Enter these plans into the AIMS system.
- Modify the “generic” plans where specific timing and/or costs of long-interval activities are known, e.g., planned asset replacements.
- Ensure preventive maintenance (PM), predictive maintenance (PdM), and corrective maintenance (CM) information is being recorded appropriately to enable remaining useful lives to be estimated.
- Review PdM data, PM and CM trends and compare to asset plans.
- Tie together long-interval plans and short-interval plans to eliminate duplication of efforts, minimize unnecessary expenditures, increase coordination of efforts, and complete asset replacement in a timely fashion.

### 3.2.2.2.3 Asset Planning Objective 3

*Objective:*

Develop Procedures to Update Asset Plans

*Tactics:*

- Review current procedures to ensure that the contract operator is maintaining the asset database to accurately reflect assets in service.
- Analyze asset histories versus plans so that plans can be updated to reflect best current knowledge on maintenance frequencies and activities as well as expected R&R needs.

The District will update asset plans based on changes in the asset inventory, improved ownership cost knowledge, and maintenance information (including PM, PdM, and CM) either at the class level or the individual asset level. Improved knowledge will become available through regular reviews of asset condition, criticality, performance, and ownership costs.

### 3.2.2.3 Asset Refurbishment & Replacement

One of the focuses of AM is the improvement of asset refurbishment and replacement (R&R) decisions. R&R goals may vary from risk avoidance, in the case of highly critical assets, to risk management for less critical assets, where unplanned failures can be accepted. Improved asset knowledge is the key to better R&R decisions. Therefore, the District will need to consider criticality, condition, cost, and performance in the analysis.

Improved R&R decisions may go well beyond questions of timing, however. Where the District performs any major re-investment in an asset, the entire process for asset development may need to be revisited (needs analysis, alternatives formulation, etc).

Improved R&R planning arising from asset knowledge greatly improves the quality of capital funding strategies.

Asset R&R has three objectives

1. Improve R&R Planning
2. Improve R&R Analysis
3. Ensure R&R Actions are properly reflected in financial reporting

Each of these is discussed below.

### **3.2.2.3.1 Asset R&R Objective 1**

*Objective:*

Improve R&R Planning

*Tactics:*

- Review current data and methods to project R&R needs.
- Compare data and methods to experience recorded in MAXIMO.

The District will be developing and updating long-interval asset plans (see section 3.2.2.2.2 above). To improve R&R planning requires consistent, accurate, up-to-date information about existing assets. The requirements of the existing and future agreements with the contract operator include their providing accurate and consistent maintenance information. This includes PM, PdM and CM. For CM, failure modes must be included. Costs for materials and labor must be included for all maintenance.

The AIMS system provides the ability to view and analyze all of this information. With this analysis capability, better predictions can be made of future R&R needs. To the extent that the long-range portions of the asset plans reflect good asset knowledge, then there will be dependable R&R plans for individual assets and for assets in aggregate. This dependability will support maintenance of adequate reserves or other funding mechanisms for upcoming R&R costs.

### **3.2.2.3.2 Asset R&R Objective 2**

*Objective:*

Improve R&R Analysis

*Tactics:*

- Require contract operator to perform preliminary analysis on asset replacement requests

Proper R&R analysis requires the same type of investigation as when creating an asset. R&R analysis and business case analysis are done simultaneously to determine the appropriate time to replace an asset.

### 3.2.2.3.3 Asset R&R Objective 3

*Objective:*

Ensure R&R Actions are properly reflected for Financial Reporting

*Tactics:*

- Prepare guidelines for classifying R&R transactions for financial reporting purposes.
- Prepare procedures for analyzing and reporting R&R transactions as retirements, replacements, and improvements. In the case of the latter, the procedure should involve increasing the cost basis of the asset rather than adding a new asset.
- For refurbishments that affect the useful life of the underlying asset, procedures should ensure that the fixed asset register is updated to reflect the new remaining useful life.
- Prepare procedures for assigning costs to R&R actions so that the District is including appropriate internal costs in the R&R costs that are transferred to the fixed asset register. Organizations typically use a standard percentage for this purpose.
- All of the above should be reflected in the standard operating procedures (SOPs) for fixed assets.

Many organizations improperly record refurbishment, and sometimes replacement, actions in the fixed asset register (Great Plains). Since this register is used to report asset value and depreciation, these errors can result in inaccurate financial statements. Common problems include failure to remove retired assets and failure to extend the life of the refurbished assets.

There was no gap determined in this area. However, the AMT may determine that some additional action is required to avoid future problems in this area.

### 3.2.2.4 Asset Information Management System

The AIMS is a system put in place to organize and allow analysis of cost information for District assets. The system is operating, but is being continually developed to provide additional value to the District. The following goals in the areas of analysis and reporting have been set for the AIMS.

**Analyses:**

- Estimate total installed cost and schedule for assets anticipated to need refurbishment or replacement for a given planning horizon.
- Trend PM and CM work order frequency per asset class.
- Estimate modified remaining asset life based on use, condition, and maintenance history.
- Gather, store, and analyze data for BCA of CIP projects.
- Evaluate the risk of failure for assets to determine criticality.
- Forecast maintenance costs related to planned capital assets.

**Reports:**

- Report status of critical asset condition monitoring – planned and actual – and retrieve historic condition monitoring data.
- Report near-term (next 7 days) PM and CM work orders as scheduled in MAXIMO.
- Report PM and CM work order ages per asset, asset criticality group, asset class, system (location), and facility.
- Identify assets anticipated for replacement, based on useful life, and planned for replacement through scheduled CIP project.
- Display status of active construction projects, including the project phase, cost, and estimated completion.
- Report on asset failures by class, location, and criticality group according to root cause of failure analysis standard.
- Report CM and PM cost per asset class or per facility for comparison to and support for design assumptions.
- Display downtime for assets, facilities, or asset classes.
- Report planned versus actual project cost.
- Find asset data in a variety of ways (by facility hierarchy, search, asset class, project, etc.).

The AIMS will forecast long-range R&R. It will draw upon the Great Plains fixed asset reporting system, MAXIMO, the Watercourse CMMS, the Watercourse GIS and the Conveyance GIS databases. AIMS will help the District effectively address several of the areas identified for gap closure in the *CMOM Strategic Plan*.

### **3.2.3 AM Plan: Long-Term Actions**

Following the near-term actions, the next steps will focus on improving asset knowledge and using this knowledge more effectively to manage the infrastructure. Long term AM activities will include the following five areas:

- I. Asset Development (3.2.3.1)
- II. Asset Condition Monitoring (3.2.3.2)
- III. Asset O&M (3.2.3.3)
- IV. Asset Financing (3.2.3.4)
- V. Asset Financial Reporting (3.2.3.5)

#### **3.2.3.1 Asset Development**

The role of AM in asset development is to assure that the District optimizes its investment in new infrastructure. That means that the alternative that best meets the identified needs, meets the required level of service/level of protection, and that has the lowest anticipated life-cycle costs is implemented. Asset development is a critical role for AM because the greatest opportunity for savings exists when making the choice to build new infrastructure.

Asset development includes the following five objectives:

1. Develop a systematic approach to creating assets
2. Consider constructability, maintainability, and operability in the design process
3. Require that enumeration schemes be followed by designers and contractors
4. Maximize contractor contribution to asset development
5. Prepare asset plans coincident with asset delivery

Each of these objectives is discussed further below.

##### **3.2.3.1.1 Asset Development Objective 1**

*Objective:*

Develop a Systematic Approach to Creating Assets

Utilities adhering to the Australian/New Zealand approach to AM (described in the *International Infrastructure Management Manual*) have developed procedures to ensure that capital investments match up with required levels of service. Typically, all new projects require life-cycle benefit/cost analyses. While these analyses may not be able to quantify some sorts of benefits, such as regulatory or safety benefits, they can highlight the residual costs of such benefits and thus facilitate a rational approach to capital investment.

*Tactics:*

- Ensure the Business Case Analysis technique is developed in a method that is applicable for District-wide implementation.
- Prepare guidelines for determining when a Business Case Analysis should be performed.
- Incorporate the guidelines in the Project Management Manual and, if possible, in the budget preparation procedures.

- Require that consultants and the contract operator, if they perform such analyses, follow District standards.

### **3.2.3.1.2 Asset Development Objective 2**

#### *Objective:*

Continue to Consider Constructability, Maintainability, and Operability in the Design Process

One key to controlling life-cycle costs of ownership is to stress constructability, maintainability, and operability (CMO) during the design process. Knowledgeable personnel from the affected parts of the organization normally do such an evaluation early in the project and frequently review these aspects as the project develops.

#### *Tactics:*

- Ensure that during the design of new District assets, the input of the contract operator, construction management personnel, and Contract Compliance personnel is being obtained.
- Include guidelines in the Project Management Manual outlining the personnel to contact and specific items to be addressed.

### **3.2.3.1.3 Asset Development Objective 3**

#### *Objective:*

Require that Enumeration Schemes be Followed by Designers and Contractors

The District will refine the hierarchical asset enumeration scheme that all asset-based systems will share as describe above. Doing so will allow analysis by process, facility, and infrastructure segment. Consultants and contractors should use asset numbers during design and construction, where it is feasible to obtain the numbers prior to commencing design.

#### *Tactics:*

- Define and document the asset enumeration system
- Add asset enumeration requirements to the standard language for design contracts.
- Add asset enumeration requirements to construction contracts.

### **3.2.3.1.4 Asset Development Objective 4**

#### *Objective:*

Maximize Contractor Contribution to Asset Plan Development

For new or refurbishment facilities, contractors can substitute for District or consultant labor in providing asset planning and related information. The main information that can be obtained from the contractors is the asset identification and parametric information. To obtain this information consistently, standardized forms (with electronic versions available) should be developed that must be completed by the contractor prior to

acceptance. There are numerous benefits of having standardized forms for capturing asset information to enable transfer to the asset-based information systems.

*Tactics:*

- Review existing asset data
- Determine additional data capture requirements
- Prepare forms for contractors to complete and submit. Contractors should organize all data elements by asset and number assets per the asset hierarchy. Required data elements might include:
  - Identifying information
  - Parametric information
  - Maintenance information (activity, frequency, parts and materials, for each preventive maintenance type).
  - Estimated useful life of the asset (note that the District may need to issue a legal release to protect the contractor against premature, but out-of-warranty, failure).
  - Purchase and installed cost of the asset.
  - Nameplate information.
  - Warranty information.
- Add language to construction contract boilerplate to require that contractors provide the information in the appropriate form.
- Require that contractors deliver all O&M manuals and similar documentation in hard copy and electronic copy.

### **3.2.3.1.5 Asset Development Objective 5**

*Objective:*

Prepare Asset Plans Coincident with Facility Delivery

Contractors must provide O&M manuals at the time of substantial completion. District staff and the contract operator will need to review the requirements in the O&M manuals to create short-interval asset plans and long-interval asset plans. This will require a criticality analysis of the new facility in accordance with the hierarchy.

*Tactics:*

- Prepare procedures governing hierarchical criticality analysis of new facilities and assigning assets to appropriate AM strategies.
- Ensure PM, PdM, and the long-term asset plans are updated to reflect the result of the criticality analysis.

### **3.2.3.2 Asset Condition Monitoring**

Asset Condition Monitoring has three objectives:

1. Define Condition Monitoring Methods
2. Define the Condition Monitoring Program
3. Integrate Condition Monitoring with Other Business Processes

### 3.2.3.2.1 Asset Condition Monitoring Objective 1

*Objective:*

Define Condition Monitoring Methods

*Tactics:*

- Review existing condition monitoring methods used in each of the three District service areas.
- Prepare cost-effective recommendations for condition monitoring of District assets
- Include recommendations for condition monitoring in the new agreement being prepared for O&M services

Condition Monitoring methods vary for different assets. Discussion of the methods for the conveyance, wastewater treatment plants, and watercourse systems is provided below.

*Conveyance*

Inspection procedures have been developed for condition monitoring of the sewer system (pipes and structures). These procedures have been included in the language of the draft agreement for the O&M contract that will begin in 2008. The procedures require the contract operator to have a person certified by the National Association of Sewer Service Companies (NASSCO) performing the inspections, use NASSCO standardized defect coding, enter and store the information in an electronic database, and provide the District with a condition rating for each pipe and structure. With current condition monitoring information the remaining useful life can be updated. RaMP numbers, future inspections, maintenance, rehabilitation and reconstruction work will be based on the updated remaining useful life.

*Treatment Plants*

For the treatment plants, for which the majority of the assets are machinery and equipment, the contract operator is and will continue to be required to use predictive maintenance to minimize failures and maintain or extend the service life of the system. The following methods are to be included:

- vibration analysis
- tribology (lubricant) analysis
- temperature monitoring
- motor current analysis
- infrared thermography of electrical equipment
- acoustic emission analysis
- static motor winding testing
- dynamic motor winding testing
- comparison of pump and blower recorded performance with predicted performance curves

The method(s) used for a particular class of assets will initially be based on past experience. As the information available in MAXIMO and AIMS increases regarding asset failures, additional reviews and analyses will be conducted to determine whether particular tests should be added or removed.

The 2020 Facilities Plan is recommending a geotechnical and structural analysis be completed at the treatment plants. This will provide updated condition information on the majority of the remaining assets at the treatment plants.

#### *Watercourse System*

Watercourse inspection procedures have been established and documented in the Watercourse Inspection and Maintenance Plan. The District is in the process of defining inspection responsibilities. Regardless of the entity that will be performing the inspections, the system employed will be the same. The information will be returned to the District in a form similar to the conveyance system. River reaches will be videotaped, pictures taken of defects, standard defect codes will be used and a condition rating will be returned. This information will be used to update the remaining useful life of the asset, for which future inspections, maintenance, rehabilitation and reconstruction work will be based upon.

Inspection of box culverts in the watercourse system will be completed separately from the previously mentioned inspections. These inspections must include more detail on structural integrity. The District is planning to do these inspections in-house and currently has the technical expertise to do so. The field crews will be trained in 2007, with the inspections to begin after the training is completed. The data will be returned to and reviewed by a structural engineer for a final condition rating. This information will again be used to adjust the remaining useful life of the asset, for which future inspections, maintenance, rehabilitation and reconstruction work will be based upon.

### **3.2.3.2.2 Asset Condition Monitoring Objective 2**

#### *Objective:*

Define Condition Monitoring Program

#### *Tactics:*

- Review existing short-term asset plans by asset class, ordered by criticality.
- Analyze the ability of the existing condition monitoring system to predict the failure of an asset
- Review the costs involved in the condition monitoring program and the benefit provided
- Complete an analysis, using BCA techniques as appropriate, to modify asset plans to meet service levels, while minimizing costs

Defining an appropriate condition monitoring program is fundamental to establishing a cost-effective AM Program. The District must use condition monitoring economically to protect the Level of Service or Level of Protection as determined by the management strategy.

One of the main concepts incorporated in the condition monitoring program is to return an overall condition value or rating. This information can then be easily stored with other asset information, analyzed and trended over time. Discussion of this was included in section 3.2.3.2.1 above.

### 3.2.3.2.3 Asset Condition Monitoring Objective 3

#### *Objective:*

Integrate Condition Monitoring with Other Business Processes

#### *Tactics:*

- Use condition monitoring information to update probability of failure values, evaluate overall risk, and revise or prioritize maintenance schedules.
- Prepare procedures for using trend analysis of assessed condition, along with criticality and performance measures, to analyze and forecast R&R needs, timing, and costs.

The AIMS system is set up to use a condition monitoring rating in the risk matrix. As condition monitoring information is entered, the RaMP number for an asset is updated to reflect it. Since the strategy for managing an asset will depend on the RaMP number, the system is already built to incorporate condition monitoring into the cycle. The asset plans for those assets that are in the economic-based management strategy will be reviewed by the contract operator for determining maintenance schedules. It is in their interest to do this to increase their profit, provided they do not let the service level drop. The District will also review these asset plans as determined necessary to ensure proper stewardship of District assets.

Organizations practicing AM normally use condition assessments and trends in assessments to support maintenance scheduling, prediction of R&R timing, and R&R decisions. For condition monitoring to make its best contribution, the District also needs to use it for these purposes.

### 3.2.3.3 Asset O&M

The business process areas in the operations and maintenance group scored very strong at the District (see page 2 of Appendix 3-1). There were no gap closure requirements identified in the following areas:

- Defining required PM activities.
- PM scheduling – Performing defined PM activities at the prescribed intervals.
- Using indirect condition assessment (PdM) where cost-effective.
- Performing CM on a timely basis.
- Management of maintenance using the PM/CM balance—Measuring the balance between PM and CM and managing the maintenance process to achieve the optimum ratio between the two.
- Maintenance cost recording—Recording maintenance costs on an activity basis, by asset.
- Consideration of operational requirements—Management of operational methods to minimize the combined costs of O&M.

These areas will be kept as strong with the new O&M agreement as they are with the existing agreement.

There were, however, two items identified that could be improved, which became the following two objectives of Asset O&M:

1. Track Asset Failures Consistently
2. Prioritize Work Order Backlog by Risk

Each of these is discussed below.

### 3.2.3.3.1 Asset O&M Objective 1

*Objective:*

Track Asset Failures Consistently

*Tactics:*

- Include in the new agreement for O&M services that failure modes and information related to failures be input into the CMMS for tracking over time.
- Complete a review of failure codes that are presently used to ensure that they provide sufficient information for the desired purpose. Include additional failure codes as required.
- Complete a root cause failure analysis (RCFA) for asset failures (overflows, level of service failures, structural collapses).
- Document RCFAs and ensure that the documentation is included in AIMS, in the GIS, or in another main data source for future reference.
- Implement corrective actions recommended from RCFAs.

In AM, most learning comes from asset deterioration and failure. Experience in these areas, if properly recorded over time and analyzed, helps refine maintenance programs and improves prediction of R&R timing. The same experience can support pilot programs to extend service intervals in some cases.

### 3.2.3.3.2 Asset O&M Objective 2

*Objective:*

Prioritize Work Order Backlog by Risk

*Tactic:*

- Ensure that the contract operator prioritizes the maintenance backlog.
- Develop procedures as necessary to specify the method of determining risk involved with maintenance backlogs.

It is often the case that many maintenance work orders are open simultaneously, some for extended periods of time. Supervisors may be inconsistent in prioritizing this backlog. In general, supervisors should prioritize backlog by criticality of the underlying asset. While supervisors can do such a prioritization automatically if assets have criticality attributes, they will need to manually review the priorities. For example, a certain pump may be highly critical, but if it has been physically removed from service while putting a reliable spare in its place, the supervisor may lower its default maintenance priority.

### 3.2.3.4 Asset Financing

The only significant gap in the area of asset financing is knowledge of short- and long-term refurbishment and replacement needs. The District has a systematic approach in

place for this and produces a 6-year capital financing plan. However, this plan must frequently be revised as new projects are identified.

The AIMS system has been set up to enable the District to more easily identify its R&R needs. The system does not have all of the information to be able to adequately produce results yet. As more condition monitoring information is received by AIMS, the asset knowledge base is increased, and asset hierarchies are improved, the prediction of R&R needs will become more accurate. Therefore, the tactics employed under other objectives serve to close this gap and there are no additional objectives under this category.

### **3.2.3.5 Asset Financial Reporting**

Financial reporting, especially fixed asset reporting, is an important element of AM. In 2001, the District implemented Government Accounting Standards Board – Statement 34 (GASB 34) and regularly reviews internal cost controls to ensure continued compliance with GASB 34. Given that the District is in compliance with the depreciation approach of GASB 34, it is important to continue to represent asset value and depreciation accurately and based on best asset knowledge.

To maintain compliance, the asset database has to accurately reflect the District assets. To make sure it does, reconciling the asset database with MAXIMO, the conveyance GIS, and the watercourse CMMS will be completed. When the reconciliation is complete, the consistent application of procedures for adding and removing assets from the database will ensure it remains as an accurate accounting of District assets.

To address these issues, asset financial reporting has the following two objectives:

1. Improve the Consistency of the Accounting Asset Database
2. Improve Change Management Procedures in the Great Plains Fixed Asset Records

Each of these objectives is discussed below.

#### **3.2.3.5.1 Asset Financial Reporting Objective 1**

*Objective:*

Improve Consistency of the Accounting Asset Database

*Tactics:*

- Review the Great Plains fixed asset list, MAXIMO, the Conveyance GIS, Watercourse GIS and Watercourse CMMS databases.
- Review the completed inventory (June 2007) to determine how to compare asset listings for completing a reconciliation
- Complete a reconciliation of the database asset listings

The District has taken steps to coordinate its financial reporting database with MAXIMO asset records. Asset change procedures are in place to keep the two synchronized. However, there are still inconsistencies in conveyance assets where records in the Great Plains fixed asset list exist in varying degrees of detail.

An inventory that is being completed to close out the existing O&M contract will be used to update and reconcile both MAXIMO and the Great Plains fixed asset database. The inventory is to be completed by mid-2007 and the reconciliation of the databases should be completed by the end of 2007.

### **3.2.3.5.2 Asset Financial Reporting Objective 2**

*Objective:*

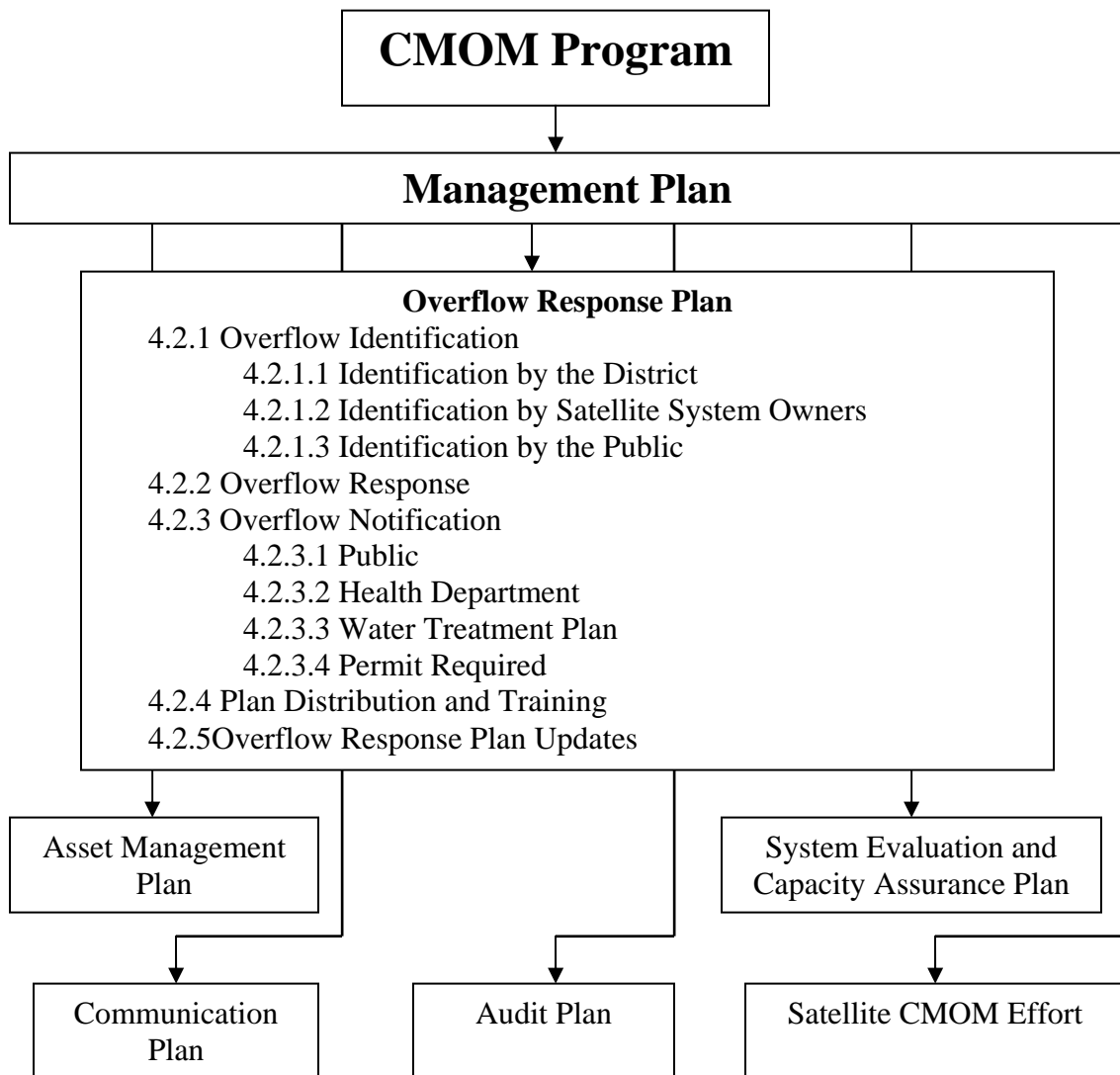
Improve Change Management Procedures in the Great Plains Fixed Asset Records

For accurate financial reporting, the fixed asset inventory (Great Plains) must be kept current. Keeping current means accurately reflecting in the records all additions, retirements, partial retirements, augmentations, and improvements to capital assets.

*Tactics:*

- Review the existing SOPs regarding addition and removal of fixed assets.
- Determine the positions responsible for carrying out actions required by the fixed asset SOPs
- Ensure that these positions have the ability to complete the actions (are trained in the procedures and able to carry them out)
- Audit some initial asset changes to ensure the procedures are being appropriately followed
- Audit the SOPs
- Document the process and include the results in the Asset Management reporting mechanism.
- Prepare a procedure for situations related to asset impairment. An impairment might arise from the way the District uses an asset or possibly from a reduction in value due to change in system configuration or regulatory action. In most cases, staff may need to make a judgment call whether to reduce the asset's cost basis, reduce its useful life, or both. Finance Department staff should prepare a procedure that would define impairment, state a definition of impairment, state how to calculate the financial ramifications, and define how to track the impaired asset within the financial database, with the underlying database record flagging the asset as impaired.

# Overflow Response Plan



## 4.1 Overflow Response Plan Development

The Overflow Response Plan (ORP) developed and documented here is a requirement of the 2002 Stipulation Agreement (Stipulation) (1) between the State of Wisconsin and the Milwaukee Metropolitan Sewerage District (MMSD or District). The ORP describes the measures in place to become aware of, respond to, and provide notification regarding overflows from District facilities.

Overflow Emergency Response Plan principles were proposed by the United States Environmental Protection Agency (USEPA) as a part of the draft Sanitary Sewer Overflow (SSO) rule (2) that was subsequently withdrawn. The withdrawn SSO rule, although never formally adopted, was considered, in the absence of other guidance, in developing the District ORP. However, the Stipulation requirements and District Capacity, Management, Operation, and Maintenance (CMOM) Program Objectives were the primary considerations.

This Overflow Response Plan is a further development of the Overflow Response Plan Strategy that was documented in the *MMSD CMOM Readiness Review and Implementation Strategy Development (CMOM Strategic Plan)* (3) completed in December 2005. There are many items that were identified during the readiness review and strategy development and documented in the *CMOM Strategic Plan* that have been partially or completely addressed as of the completion of this document. These items are still included to provide background information and continuity to the evolution of the Overflow Response Plan from readiness review to strategy development to final plan. In addition, the activities described in this Plan will be subject to change and refinement as the District continues implementing and gains experience with the CMOM Program.

The Stipulation requirements, withdrawn SSO rule, and CMOM objectives are discussed below.

### 4.1.1 Stipulation Requirements

The Wisconsin Department of Natural Resources (WDNR) has outlined certain requirements for the District ORP within the Stipulation language. The District ORP has been developed to comply with the Stipulation requirements.

The Stipulation states:

“7. While sanitary sewer overflows in the District’s system have been significantly reduced, there are still sanitary sewer overflows within the District’s and its satellite municipalities’ sanitary sewer systems. To continue the District’s program to reduce with the goal of eliminating all non-permitted sanitary sewer overflows, the District shall implement the regional Capacity, Management, Operation and Maintenance (CMOM) program. The regional CMOM shall be comprised of four integrated components:”

The second component listed is:

“B. *Overflow Response Plan*. An overflow response plan that identifies measures to protect public health and the environment. This plan will outline the public

notification, permit reporting, measuring and monitoring steps to be taken during an overflow event.”

The items listed are all addressed in this District ORP.

#### **4.1.2 Principles from Withdrawn SSO rule**

In the withdrawn SSO rule that had been proposed by the USEPA in 2001, an Overflow Emergency Response Plan is required as part of a CMOM program. The following is the text of §122.42 (2) (vii) of the proposed rule:

“Overflow Emergency Response Plan. You must develop and implement an overflow emergency response plan that identifies measures to protect public health and the environment. The plan must include mechanisms to:

- A. Ensure that you are made aware of all overflows, to the greatest extent possible;
- B. Ensure that overflows (including those that do not discharge to waters of the U.S.) are appropriately responded to, including ensuring that reports of overflows are immediately dispatched to appropriate personnel for investigation and appropriate response;
- C. Ensure appropriate immediate notification to the public, health agencies, other impacted entities (e.g. water suppliers) and the NPDES [National Pollutant Discharge Elimination System] authority. The CMOM program should identify the public health and other officials who will receive immediate notification;
- D. Ensure that appropriate personnel are aware of and follow the plan and are appropriately trained; and
- E. Provide emergency operations.”

Although the withdrawn SSO rule was never promulgated, these principles were considered, in the absence of other guidance, in the development of this ORP.

#### **4.1.3 District Objectives**

In addition to the regulatory requirements, the District has the additional goals of:

- 1) Employee safety
- 2) District contractor safety
- 3) Protection of District assets

These items are also all addressed in the District ORP.

#### **4.1.4 Components of the Overflow Response Plan**

The goals of the District Overflow Response Plan are a melding of the guidelines from the withdrawn SSO Rule, the Stipulation requirements and District Objectives. They are to ensure that:

- A. The District knows about all overflows from its system (4.2.1)
- B. All District overflows are appropriately responded to (4.2.2)

- C. The public, health protection agencies and other interested parties are promptly notified (4.2.3)
- D. District personnel and District contractors are trained in and follow the plan (4.2.4)
- E. District personnel and District contractors follow safety procedures during emergency responses (4.2.4)
- F. District assets are protected (4.2.4)
- G. The plan is distributed and updated regularly (4.2.5)

Each of these goals will be addressed in the plan in the section identified below:

Overflow Identification (section 4.2.1)

Overflow Response (section 4.2.2)

Overflow Notification (section 4.2.3)

Plan Distribution and Training (section 4.2.4)

Overflow Response Plan Updates (section 4.2.5)

## 4.2 Overflow Response Plan

The overflow response plan (ORP) provides documentation of the methods that are and will be used to ensure that the District is aware of, responds to, and provides notification of all overflows of sewage from District facilities. To this end, the ORP is divided into sections on overflow identification (4.2.1), overflow response (4.2.2), and notification (4.2.3). In addition to these primary activities, the ORP documents the training requirements to ensure the plan is executed properly (4.2.4) and regularly updated (4.2.5). The District is including diversions (blending) at the treatment plants as equivalent to an overflow for the identification and notification portions of the ORP.

### 4.2.1 Overflow Identification

Overflows and diversions are usually at locations that were constructed to protect the system in separate sanitary sewer systems, in combined sewer systems, and at the treatment plants. The District presently monitors all of these sites in one form or another. In addition to this, the District distributes phone lists to the satellite system owners so they can notify the District in the event of an overflow at a location other than a constructed site. Lastly, the District maintains a 24-hour number so that the public can call in an overflow or other issue with the sewerage system. Each of these items is discussed in further detail below.

#### 4.2.1.1 Identification by the District

The District identifies overflows through its extensive monitoring capabilities and through field investigations that occur during and after wet weather events. These are discussed for constructed sanitary sewer outfalls, combined sewer outfalls, and plant diversions below.

##### 4.2.1.1.1 Sanitary Sewer Outfalls

There are 35 sanitary sewer outfall (SSO) points listed for the District (Appendix 4-1). 33 of the SSO points are listed in the District's current Wisconsin Pollutant Discharge Elimination System (WPDES) permit (5). Two of the SSO points have been added to the District's system since the writing of the last permit and were not listed. Two of the points listed in the permit (205 and 208) are presently abandoned and cannot actually overflow. There are therefore, 33 potentially active SSO points in the District system that must be monitored.

These 33 potentially active SSO points can either operate by gravity, as the water level in the sewer rises, or with the aid of pumps. Presently 17 SSO points are continuously monitored by the Supervisory Control and Data Acquisition (SCADA) system and have the information relayed to the Central Control System (CCS), which is staffed 24 hours per day, every day of the year. These are indicated in Appendix 4-1 by a Yes in the current SCADA column.

Of the remaining 16 sites, eight have portable meters installed in the outfall pipes and are checked by District field crews after wet weather events to determine if an overflow occurred. These are indicated in Appendix 4-1 by a Yes in the Current Portable column.

Of the other eight sites, two have gates that must be manually activated (214 and 244), one will either be abandoned or monitored if it cannot be abandoned (207), two are cooling water discharges at Jones Island wastewater treatment plant that are sampled monthly (248 and 249) and the remaining three will be monitored by December 31, 2007 (237, manholes 02140 and 02141 in NS3 collector system).

Therefore, by 12/31/2007, all of the 33 active SSO points will be monitored. Some will be monitored in real-time by the CCS, some will be monitored with portable metering that is checked by field crews, some will be sampled monthly and some have to be manually activated.

#### **4.2.1.1.2 Combined Sewer Outfalls**

There are 117 combined sewer outfall points listed in the District's WPDES permit, as shown in Appendix 4-2. For the purposes here, the sewers that divert flow from one combined sewer system to another or to a diversion structure are called combined sewer overflows. The combined sewer segments that lead to a river or the lake and allow sewage out of the system are called combined sewer outfalls.

Of the 117 combined sewer outfall points, one (174A) has been abandoned, one (179) has been reconfigured and joins another (178), and one (143) is a duplicate of another (018). There are therefore 114 potentially active combined sewer outfall points that must be monitored.

One-hundred seven of the combined sewer outfalls are hydraulically connected to one of 20 drop shaft systems that allow combined sewage into the Inline Storage System (ISS). The water level is monitored continuously in all of the drop shafts and the associated junction chamber and is relayed to the CCS. By monitoring the water level in the junction chamber and also monitoring river and lake levels, it will be known if sewage is escaping from the system through a combined sewer outfall. In addition, combined sewer outfalls are activated when the gates in the drop shafts are closed to combined sewage to reserve room for separate sewage. If there is no intervention in the control of the District sewer system, the CCS operator receives a notification when the gates to the combined sewer system are shut. If there is intervention, then the procedure followed requires deliberate actions involving District or contract operator personnel. In either case District staff will be aware that an overflow is occurring.

Of the other seven combined sewer outfalls, one is the Emergency Wastewater Exit (061), which is continuously monitored for water level. The other six (010, 015, 016, 018, 019, and 197) combined sewer outfalls are all for relief of the District's Metropolitan Interceptor Sewer (MIS) system. These sites are all presently monitored for water level, either as an individual site in the SCADA system, by nearby SCADA sites, with portable meters, with surcharge level indicators, or a combination of the above. The portable meters and surcharge level indicators are checked after rain events by District monitoring staff, as discussed below in section 4.2.2.2.

At most combined sewer overflow/outfall locations, the intercepting structure (IS) is upstream of a diversion structure (DS). At these locations, if a gate malfunctions or the MIS or flow regulating device becomes clogged, the flow will reach the DS and be directed to the ISS. There are 15 locations where the structures are reversed and the IS is

downstream of the DS. These sites are considered critical, because issues such as malfunctioning gates and/or clogged regulating devices can result in an overflow. Because of this, they are presently checked on a weekly basis by field crews to spot potential maintenance issues. The District is also presently considering constructed solutions to eliminate these critical configurations.

#### **4.2.1.1.3 Plant Diversions**

Manually operated diversion gates at the South Shore wastewater treatment plant (SSWWTP) and Jones Island wastewater treatment plant (JIWWTP) are locked and supervisor approval is required to remove the locks and open the gates. Flow diversions resulting from overflow of weirs are alarmed both on a local level and at the CCS. Automatic diversion gates and flow resulting from opening any of the automated gates is continuously monitored via the plant wide SCADA systems. Therefore, contract operator staff should be immediately aware of all diversions, provided SOPs are followed and monitoring equipment is functioning properly.

#### **4.2.1.2 Identification by Satellite System Owners**

The satellite sewer system owners that discharge into the District system are annually provided a listing of District contacts for specific problems and the 24 hour number for reporting emergency problems. In addition, they are asked to verify the contact names and numbers that the District has for response in their systems and provide updated information if it should be changed (Appendix 4-3).

There are times when satellite system operators are performing work or investigating problems when they notice an issue caused by the MIS system. The purpose of providing District contact information to satellite system operators is so they can contact the appropriate party at these times.

#### **4.2.1.3 Identification by the Public**

The District's contract operator (presently United Water) is required to staff a 24-hour telephone number that is listed in the telephone book for the Milwaukee Metropolitan Sewerage District. District customers and the general public can call the main number during work hours or the 24-hour number during off-hours.

The District's main number is answered by a receptionist between the hours of 8:00am and 4:30pm, Monday through Friday excluding holidays. The receptionist has a list of issues that have come up in the past and where the call should be directed for each of those issues (Appendix 4-4). During off hours, a caller will get a message that includes the 24-hour number and directs callers to this number if it is a District-related emergency.

### **4.2.2 Overflow Response**

The response of the District and its contract operator to a possible overflow includes three parts.

1. Receive and document the information and direct it to the proper personnel.
2. Respond to the possible overflow.
3. Complete an analysis of the overflow.

Each of these is discussed below. The process of identification, response and notification is also shown graphically on the chart provided in Appendix 4-5.

#### 4.2.2.1 Information Receipt

Calls received by the District operator regarding possible overflows are routed to the 24-hour call center (CCS) maintained by the contract operator. However, some calls related to overflows will also be received by other District staff. Whether District staff or contract operator staff is the primary contact, the procedure is the same: The primary contact makes further contacts with District and contract operator staff, ensures a proper response, provides feedback and documents the issue and actions taken.

If the contract operator receives: 1) A call from the public through the 24-hour telephone line; 2) A call from District staff; 3) A notification indicating that there is a possible overflow from the conveyance system; or 4) A notification of a diversion at the treatment plant; the CCS Operator will begin the receipt and response process. The CCS operator records the necessary information on the “CCS Overflows/Bypasses” form (Appendix 4-6) and performs notifications according to District procedure MON-SPVS-070 (Appendix 4-7), which includes completing and sending out the “CCS Overflows-Bypasses” form. The notifications to District personnel include a phone call to the Monitoring Supervisor or Water Quality Protection manager and an e-mail that reaches staff in the Offices of Water Quality Protection, Contract Compliance, and the Executive Director.

If the overflow notice comes in through a phone call, the following information is collected from the caller:

- Location and other information enabling a field crew to quickly locate the problem
- Description/Observations (e.g. water flowing out of pipe, bubbling out of manhole)
- Date and time of observation, date and time of call
- Caller’s name and phone number (for providing feedback)

Issues that are not related to overflows that are phoned in to either District or contract operator staff are documented on Request for Assistance (RFA) forms (Appendix 4-8) and are considered separately for the purposes of the Overflow Response Plan.

#### 4.2.2.2 Response Procedures

After the information regarding a possible overflow or other potential problem in the conveyance system is received, the contract operator follows their procedures. The CCS operator may direct control of the issue to the conveyance system manager or on-call supervisor depending on the issue. The person in charge then directs the response, which may include calling in staff, securing emergency resources, securing the site, stopping, containing or mitigating the overflow, and documenting the incident. In addition, the contract operator may complete a Request for Assistance Form and communicate with District staff during an incident to ensure the response is appropriate. If the person in charge determines that the situation is an emergency, the Emergency Response Plan is

implemented, which includes an incident command system and procedures for responding to natural disasters, spills into the system, power loss, and other emergencies.

In addition to the contract operator's response, District staff performs some field work. The District work includes field checks to confirm possible overflows, collecting samples where required by the WPDES permit and collecting monitoring data that is necessary for determining the extent of the overflow. The District has standard operating procedure MON-SPVS-060 (Appendix 4-9) in place that describes the procedures and data to be collected by District staff for various wet weather events.

#### **4.2.2.3 Overflow Analysis**

For each overflow, a storm event summary is prepared and reviewed by personnel in the District's Contract Compliance Office. District procedure SOC-CA-01 (Appendix 4-10) outlines the requirements of the Storm Event Summary and review procedure. In addition, a review may be done under the direction of the District's Technical Services Division Director to determine if conditions warrant a detailed analysis of the overflow. The main issues reviewed are: 1) Is there a pending project to address any known problems in the area; and 2) Is this a recurring overflow? If there is a project pending, the analysis will focus on whether the proposed project would have eliminated the overflow. If there is not, the analysis will focus on identifying all details of the cause of the overflow and possible solutions.

The analysis, generally termed a root cause of failure analysis (RCFA), is used for overflows, possible overflows, failures and other unusual events. The analysis includes an evaluation of the overflow, system, precipitation, operations and maintenance details as necessary according to the review checklist and summary sheet included as Appendix 4-11.

#### **4.2.3 Overflow Notification**

The District has a defined procedure for notifying various parties when there is a possible overflow, confirmed overflow, or plant diversion. The process of notification is discussed below and also shown graphically on the chart provided in Appendix 4-5.

##### **4.2.3.1 Public Notification**

The e-mail that is sent by the contract operator (per 4.2.2.1 above) will be received by the District's Public Information Manager in the Office of the Executive Director. The Public Information Manager then takes the following actions:

- 1) Places a notice on the District's publicly accessible storm update site ([http://www.mmsd.com/news/storm\\_update.cfm](http://www.mmsd.com/news/storm_update.cfm)) for possible and confirmed overflows (Appendix 4-12).
- 2) Issues a news release and places it on the District's public web site (<http://www.mmsd.com/news/index.cfm>) for confirmed overflows.
- 3) Sends an e-mail to approximately 1,500 interested parties in the community for confirmed overflows.
- 4) Notifies the media for confirmed overflows.

#### **4.2.3.2 Health Department Notification**

The City of Milwaukee Health Department is notified via the original e-mail from the contract operator (per section 4.2.2.1 above) for confirmed overflows and when the combined sewer overflow (CSO) gates close (see Appendix 4-6).

#### **4.2.3.3 Water Treatment Plant Notification**

The Water Treatment Plants are notified via the original e-mail from the contract operator (per section 4.2.2.1 above) for confirmed overflows and when the CSO gates close (see Appendix 4-6).

#### **4.2.3.4 Permit Required Notification**

The WPDES administrator at the WDNR is notified via the original e-mail from the contract operator (per section 4.2.2.1 above) for confirmed overflows, CSO gate closure, and plant diversions (see Appendix 4-6). A letter providing detail for each specific overflow is sent to the WDNR within five days after the overflow. A quarterly report is also submitted that summarizes all of the overflows that occurred in the quarter and is considered the final documentation of the overflows. The Compliance Maintenance Annual Report (CMAR) that is submitted by June 30<sup>th</sup> each year also includes a summary of the overflows that occurred during the past year.

For the permit required notifications (5-day letter, quarterly report, and CMAR), the following information is included for each overflow as applicable:

- Estimated volume
- Estimated duration
- Location
- Reason and contributing circumstances
- Operational actions taken to maximize capture and treatment
- Steps being taken to prevent another discharge
- Precipitation intensity and totals (if caused by precipitation)
- Other relevant information

The District's Water Quality Protection Manager is responsible for completing and transmitting the 5-day letter, quarterly report and CMAR.

### **4.2.4 Plan Distribution and Training**

Many of the elements of the ORP have already been implemented at the District. However, to ensure that they are all being implemented in accordance with the ORP, there will be an initial implementation that will include targeted training with the staff involved. Thereafter, there will be annual reviews of the plan elements, which may result in modifications to the plan. Whether there are modifications or not, there will be annual targeted awareness training and presentations given as necessary to ensure implementation of the ORP.

#### **4.2.4.1 Initial Plan Implementation**

The overflow response plan will initially be distributed to the following:

- WDNR
  - WPDES Permit Administrator for the District
- District
  - Executive Director
  - Technical Services Division Director
  - Contract Compliance Manager
  - Water Quality Protection Manager
  - CMOM Program Manager
  - Public Information Manager
- Contract Operator
  - Project Manager
  - Technical Services Director

After the distribution is complete, the CMOM Program Manager will ensure the elements of the plan are implemented properly. The targeted training will be with:

- District telephone operators to ensure that the phone call routing is clear
- CCS operators to be sure the division of responsibility and lines of communication are clear
- Contract operator management to ensure response procedures are adequate, properly followed and documentation is completed
- District monitoring staff to ensure proper data collection and documentation of results
- District Contract Compliance staff to ensure internal response and documentation of actions

#### **4.2.4.2 Annual Awareness Training**

Annual awareness training will be conducted after the annual review is completed. The training will review the responsibilities of personnel at the District and the contract operator and highlight changes that have been made. District and contract operator staff that will be included are those listed above in the initial plan implementation targeted training.

#### **4.2.5 Overflow Response Plan Updates**

There will be an annual review of:

- Overflows, failures and other emergencies
- Responses to and notifications of overflows, failures and other emergencies
- Issues encountered that affected timely response and notification
- Methods of addressing the issues
- Implementation of the methods
- The contract operator's Emergency Response Plan or Overflow Response Control Plan (required in the operation and maintenance (O&M) contract agreement beginning March 2008).

The CMOM Program manager, along with an internal Overflow Response Plan review team will review: 1) The above items; 2) The District ORP; 3) The contract operator's Emergency Response Plan and/or Overflow Response Control Plan; and 4) Documentation of past overflows. The review will occur during February of each year. From this review, the team may recommend changes to the District ORP. Any action items required, due to changes recommended during the review, will be completed, including additional training, by the end of March of the same year.

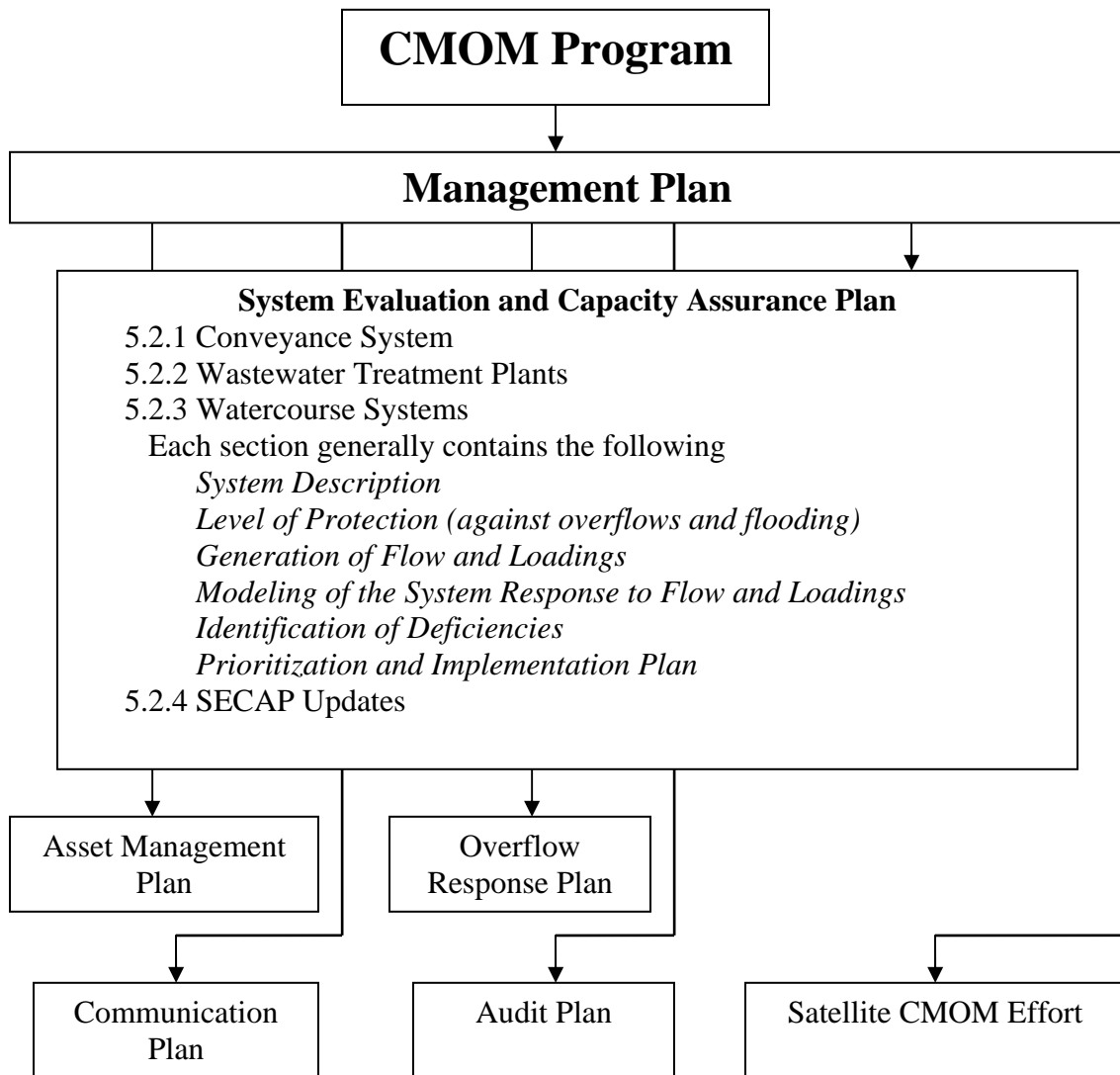
The CMOM program manager will be responsible for:

- Planning the review
- Gathering the necessary information
- Coordinating team input
- Documenting updates to the ORP
- Implementing updates to the ORP
- Completing training as required

The documentation of changes to the ORP will be included in the CMOM Program Annual Report, which will be submitted by June 30<sup>th</sup> of each year, beginning in 2008.

For further information, see the Communication Plan (Chapter 6, section 6.2.1.2 of this document) and the Audit Plan (Chapter 7, section 7.2.1 of this document).

# System Evaluation and Capacity Assurance Plan



## 5.1 System Evaluation and Capacity Assurance Plan Development

The Milwaukee Metropolitan Sewerage District (MMSD or District) has prepared this System Evaluation and Capacity Assurance Plan (SECAP) in response to a stipulation agreement (Stipulation) entered into between the District and the State of Wisconsin in May of 2002. The SECAP describes the actions that the District has taken and will take to evaluate system capacity and undertake capacity enhancement measures.

Capacity, Management, Operation, and Maintenance (CMOM) principles were proposed by the United States Environmental Protection Agency (USEPA) as a part of the draft Sanitary Sewer Overflow (SSO) rule that was subsequently withdrawn. The withdrawn SSO rule, although never formally adopted, was considered in the development of the District SECAP. However, the language regarding CMOM in the Stipulation and the District's objectives were the primary considerations.

This SECAP is a further development of the SECAP Strategy that was documented in the *MMSD CMOM Readiness Review and Implementation Strategy Development (CMOM Strategic Plan)* completed in December 2005. There are many items that were identified during the readiness review and strategy development and documented in the *CMOM Strategic Plan* that have been partially or completely addressed as of the completion of this document. These items are still included to provide background information and continuity to the evolution of the SECAP from readiness review to strategy development to final plan. In addition, the activities described in this Plan will be subject to change and refinement as the District continues implementing and gains experience with the CMOM Program.

The Stipulation requirements, withdrawn SSO rule and District objectives are discussed below.

### 5.1.1 Stipulation Requirements

The 2002 Stipulation agreement between the State of Wisconsin and the Milwaukee Metropolitan Sewerage District (Stipulation) requiring the CMOM program contains a SECAP requirement. The Stipulation states:

“7. While sanitary sewer overflows in the District's system have been significantly reduced, there are still sanitary sewer overflows within the District's and its satellite municipalities' sanitary sewer systems. To continue the District's program to reduce with the goal of eliminating all non-permitted sanitary sewer overflows, the District shall implement the regional Capacity, Management, Operation and Maintenance (CMOM) program. The regional CMOM shall be comprised of four integrated components:”

The third component listed is:

“C. *System Evaluation and Capacity Assurance Plan*. A Plan for system evaluation and capacity assurance for peak flow conditions. This plan shall identify necessary capital improvements to meet the projected flows and an implementation plan that describes timing and responsibilities for implementing each capital project.”

The actions listed here are satisfied by the District SECAP, mainly through completion of the 2020 Facilities Plan.

### **5.1.2 Principles from Withdrawn SSO Rule**

In the withdrawn SSO rule that had been proposed by the USEPA, a SECAP must be prepared and implemented if peak flow conditions are causing SSOs. The following is the text of § 122.42 (e) (2) (viii) of the withdrawn SSO Rule:

“System Evaluation and Capacity Assurance Plan. You must prepare and implement a plan for system evaluation and capacity assurance if peak flow conditions are contributing to an SSO discharge or to noncompliance at a treatment plant unless you have already taken steps to correct the hydraulic deficiency or the discharge meets the criteria of paragraph (f) (2) [Discharges Caused by Severe Natural Conditions] of this section. At a minimum the plan must include:

- A) Evaluation. Steps to evaluate those portions of the collection system which you own or over which you have operational control which are experiencing or contributing to an SSO discharge caused by hydraulic deficiency or to noncompliance at a treatment plant. The evaluation must provide estimates of peak flows (including flows from SSOs that escape from the system) associated with conditions similar to those causing overflow events, provide estimates of the capacity of key system components, identify hydraulic deficiencies (including components of the system with limiting capacity) and identify the major sources that contribute to the peak flows associated with overflow events.
- B) Capacity Enhancement Measures. Establish short- and long-term actions to address each hydraulic deficiency including prioritization, alternatives analysis, and a schedule.
- C) Plan Updates. The plan must be updated to describe any significant change in proposed actions and/or implementation schedule. The plan must also be updated to reflect available information on the performance of measures that have been implemented.”

Although the withdrawn SSO rule was never promulgated, these principles were considered, in the absence of other guidance, in developing the SECAP.

### **5.1.3 District Objectives**

Chapter 1 – Facilities Plan Report of the District’s 2020 Facilities Plan contains background information related to previous facilities plans (that include system evaluations) and the reasons for preparing the 2020 Facilities Plan.

The CMOM Program Management Plan (Chapter 2 of this document) has several strategies and tactics listed to achieve objectives that are related to the SECAP.

#### *Conveyance strategies and tactics*

- ✓ Adopt rule changes as discussed in the 2020 Facilities Plan that provide for improved management of municipal discharges during peak wet weather flow conditions

- ✓ In collaboration with the Technical Advisory Team (TAT), establish a Wet Weather Peak Flow Management Program
- ✓ Implement the recommended studies and projects from the 2020 Facilities Plan for the conveyance system as defined by the 2020 Implementation Plan

*Treatment Plant Objectives, Strategies and Tactics*

- ✓ Continue to minimize process diversion events, consistent with the discharge permit
- ✓ Continue to optimize effectiveness of wet weather treatment capacity
- ✓ Continue to provide effluent quality that meets or exceeds WPDES [Wisconsin Pollutant Discharge Elimination System] permit requirements and effluent quality goals
- ✓ Implement the recommended studies and projects from the 2020 Facilities Plan for the treatment plants as defined by the 2020 Implementation Plan

*Watercourse Objectives, Strategies, and Tactics*

- ✓ Undertake updates to the District's Watercourse Management Plans (WMPs) on a scheduled basis
- ✓ Develop and implement design and construction of solutions that ensure watercourse conveyance and storage capacities will minimize the damage from the one-percent probability flood event
- ✓ Ensure that new development and redevelopment do not result in habitable structures being added to the one-percent probability floodplain or diminish the protection provided by District watercourse projects
- ✓ Continue to acquire ownership or conservation easements on land identified as providing natural water quality and quantity benefits

The wastewater conveyance, storage and treatment system has been addressed by the 2020 Facilities Plan. The watercourse system has been addressed by the WMPs that were completed in 2000. Further discussion of the WMPs is included below in section 5.2.3.

### **5.1.4 SECAP components**

The District has recognized that CMOM principles apply to all of its service areas. Because of this, the CMOM Program and the SECAP chapter include sections on: 1) Wastewater collection, conveyance, and storage (conveyance) (5.2.1); 2) Wastewater treatment (5.2.2); and 3) Watercourse systems (5.2.3). The SECAP will be divided up by these three service areas. For each area, there will be included a section on:

- A description of the system/service area
- The Level of Protection
- Generation of flows and loadings
- Modeling of the system response to flows and loadings
- Identification of deficiencies
- Prioritization and implementation plan

There will also be a section describing the updates to the SECAP (5.2.4).

## 5.2 System Evaluation and Capacity Assurance Plan

The System Evaluation and Capacity Assurance Plan (SECAP) contains a section for each of the District service areas of Conveyance (5.2.1), Treatment (5.2.2), and Watercourse (5.2.3), and a section on SECAP updates (5.2.4).

### 5.2.1 Conveyance System

The MMSD conveyance system serves 29 satellite sanitary and combined sewer system owners (28 municipalities plus Milwaukee County) in the counties of Milwaukee, Ozaukee, Washington, Waukesha and Racine. The MMSD service area is largely developed and will not require significant expansion of facilities to serve new areas. New facilities are generally constructed to eliminate conveyance restrictions, reduce overflows and replace aging facilities.

#### 5.2.1.1 System Description

The MMSD conveyance system consists of the Metropolitan Interceptor Sewer (MIS) system, Near Surface Collector (NSC) system, Inline Storage System (ISS) and the Combined Sewer Outfall system. The MIS system collects flow from both combined sewers and separate sanitary sewers and conveys it to the MMSD wastewater treatment plants. The NSC system collects flow that exceeds the capacity of the MIS system from both the combined and separate sewer service areas and delivers it to drop shafts where the flow enters and is stored in the ISS. Sewage stored in the ISS can be pumped to either of the two MMSD wastewater treatment facilities as capacity is available. The combined sewer outfall system lets flow out of the system and into the rivers and lake during wet weather events that exceed the system capacity.

The 2020 Facilities Plan – Conveyance Report (6) Chapter 2 contains a more detailed description of the MMSD conveyance system.

#### 5.2.1.2 Level of Protection

The 2020 Facilities Plan – Facilities Plan Report Chapter 9 Appendix F contains the complete discussion of Level of Protection (LOP), including definitions. The discussion includes a review of the LOP used by other wastewater utilities in Wisconsin and the United States, as well as the projected impact to local water quality for different District Levels of Protection. The 2020 Facilities Plan is recommending the adoption of a 5-year wastewater recurrence interval for the LOP as a criterion for designing and operating the District conveyance, storage and treatment system (Wastewater System).

Two related topics that are being addressed are the District's Wet Weather Peak Flow Management Program and Satellite system SECAP requirements. Each is discussed below.

##### 5.2.1.2.1 Wet Weather Peak Flow Management Program

Also as part of the 2020 Facilities Plan, there is a recommendation to continue the development of the Wet Weather Peak Flow Management Program (WWPFMP), with the input of the Technical Advisory Team (TAT – includes District, satellite, and

regulatory representatives). As taken from the 2020 Facilities Plan – Facilities Plan Report, Chapter 10, section 10.2.2, “The WWPFPMP will establish peak wet weather flow standards, outline provisions for the repair of deteriorated sewersheds, and incorporate other activities that will serve to keep I/I [infiltration and inflow] from growing beyond current levels.” The implementation and enforcement of this program is intended to maintain the District’s ability to provide the desired LOP.

The 2020 Facilities Plan – Facilities Plan Report Chapter 10, section 10.2.2 discusses the WWPFPMP.

### **5.2.1.2.2 Satellite SECAP**

The District has completed a limited SECAP for each satellite system to provide information for the 2020 Facilities Plan. The limited SECAP included most sanitary sewer lines 12 inches and larger and any systems with known capacity issues or overflows. The objectives of this effort were to:

- Identify satellite municipality system capacity deficiencies;
- Estimate satellite system bypass volumes and flow rates for a selection of wet weather events that are relevant to the 2020 Facilities Plan analysis; and
- Summarize peak flows delivered to the District’s system for the same wet weather conditions.

The first item was used to estimate the cost to the region related to elimination of overflows (whether they are District or satellite). The last two items are the most important relative to the District’s SECAP. Understanding additional detail regarding peak flow sources improves the District’s ability to plan necessary facilities and implement actions to avoid District overflows. In addition, local overflow volumes were used in water quality calculations.

The District may require a satellite system to prepare a SECAP for a portion of or for their entire sewer system, as described in District Rules, Chapter 3, section 3.105. The limited SECAP that was completed by the District would serve as a starting point for this work.

### **5.2.1.3 Flow Generation**

The District service area, for the 2020 facilities planning effort, is divided up into sewersheds. For each sewershed, the District has obtained projected land use and population from the communities and from the Southeastern Wisconsin Regional Planning Commission (SEWRPC). The District uses a two part method for determining total modeled flows into the MIS system. The first part is the sanitary flows which are determined based on population in residential and commercial areas and acreage in industrial areas. The second part is the wet weather related flows, both in combined and sanitary sewer systems. To generate these, the District first uses a model built with the Hydrologic Simulation Program – Fortran (HSPF) to generate surface and sub-surface flows. The surface and sub-surface flows are then input into the District’s Flow Forecasting System (FFS), which generates total flow into the MIS system.

The 2020 Facilities Plan – Conveyance Report Chapter 3 contains a more detailed discussion of the generation of wastewater flows in the conveyance system.

#### **5.2.1.4 Hydraulic Modeling**

The District has built hydraulic models in three levels of detail of the entire system. The simplest model is called MACRO and is a water balance for estimating total overflow volumes. This model uses the outputs directly from the HSPF model. The other two models are built using the Modeling of Urban Sewers (MOUSE) software with medium (Mini-MOUSE) and high (Streamline-MOUSE) levels of detail. These models use the outputs of the FFS. Mini-MOUSE is used for long-term simulation, whereas Streamline-MOUSE is used for single event simulation. They can both be used for determining hydraulic grade lines (water levels) and overflow volumes at various locations throughout the system.

The 2020 Facilities Plan – Conveyance Report Chapter 3 contains more detailed discussion of the hydraulic modeling of wastewater flows in the conveyance system

#### **5.2.1.5 Identification of Deficiencies**

The conveyance system was modeled with 2020 conditions for a 5-year and 10-year LOP (estimated by particular historic events). This analysis resulted in the identification of locations where the MIS system had a hydraulic deficiency (did not provide an adequate outlet for local connections or resulted in a conveyance-related SSO) based on the particular LOP. Problems caused by the Inline Storage System filling and closing were not considered hydraulic deficiencies. These locations were based on the projected flows for 2020 growth and are not necessarily deficient for existing conditions.

The 2020 Facilities Plan – Conveyance Report Chapter 9 contains a map and list of all of these identified locations for both the 5-year LOP (Figure 9-1 and Table 9-3 in the Conveyance Report) and 10-year LOP (Figure 9-2 and Table 9-4 in the Conveyance Report).

#### **5.2.1.6 Prioritization of Deficiencies and Implementation Plan**

The 2020 Facilities Plan – Conveyance Report Chapter 10 contains the recommended conveyance facilities, programs, operational improvements and policies (FPOPs). Because all of the locations identified with hydraulic deficiencies are dependent upon the growth in flow due to development, the implementation plan will be based on monitoring of growth, development, and system flows.

The 2020 Facilities Plan – Facilities Plan Report Chapter 11 discusses the implementation of the recommendations.

## **5.2.2 Wastewater Treatment Plants**

The District has two regional treatment plants, the Jones Island Wastewater Treatment Plant (JIWWTP) and South Shore Wastewater Treatment Plant (SSWWTP). The District service area is divided into areas tributary to JIWWTP, areas tributary to SSWWTP, and areas tributary to both plants. The areas that are tributary to both plants can be diverted during wet weather, for maintenance purposes or for capital improvement projects.

### **5.2.2.1 System Description**

JIWWTP serves the combined sewer system, located in the central portion of the City of Milwaukee and the eastern portion of the Village of Shorewood, as well as portions of separate sewer systems from the other satellite systems. It has a maximum daily flow capacity of 300 million gallons per day (MGD).

The SSWWTP primarily serves satellite systems that have separate sewers, although combined sewer flow can be diverted to the SSWWTP. It has a maximum daily flow capacity of 250 MGD. Both treatment plants utilize primary treatment, secondary treatment and disinfection. The treatment processes differ though, and result in different classes of the resulting biosolids.

The 2020 Facilities Plan – Treatment Report Chapter 2 contains an in-depth description of the District wastewater treatment facilities and unit processes.

### **5.2.2.2 Level of Protection**

Working in conjunction with the conveyance and storage systems, the wastewater treatment plants must have sufficient capacity, for hydraulics and processing, to provide for a 5-year Level of Protection against sanitary sewer overflows from the Wastewater System. While processing these flows, the District also has the objectives (see the Management Plan, Chapter 2 of this document) of minimizing process diversion events (used to increase JIWWTP capacity to 360 MGD) and maximizing wet weather treatment capacity (to avoid filling the ISS). The District must at all times comply with permit effluent quality requirements, whether a diversion is occurring or not.

The 2020 Facilities Plan – Treatment Report, Chapter 10 includes a discussion of Level of Protection as it relates to the treatment plants.

### **5.2.2.3 Flow and Wasteload Analysis**

In order to begin the analysis to determine if the JIWWTP and SSWWTP have adequate facilities for 2020 conditions, a prediction of the flow and wasteloads to each plant was projected. The wasteload is determined using the Biochemical Oxygen Demand (BOD) and Total Suspended Solids (TSS) parameters.

The 2020 Facilities Plan – Treatment Report Chapters 4 and 5 and the associated appendices contain the full discussion of the flow and wasteload analysis for year 2000 and year 2020 conditions.

#### **5.2.2.4 Unit Hydraulic and Process Capacity Analysis**

A review and analysis of the JIWWTP and SSWWTP unit process capacities has been conducted as part of the 2020 Facilities Plan. These values were compared to year 2000 and year 2020 flows and wasteloads to determine deficiencies (relative to the selected Wastewater System LOP) at the treatment plants.

The 2020 Facilities Plan – Treatment Report Chapters 4 and 5 and the associated appendices contain the full discussion of the capabilities and deficiencies of the treatment plants for year 2000 and year 2020 conditions.

#### **5.2.2.5 Prioritization of Deficiencies and Implementation Plan**

The two major items that are recommended to be addressed during the 2020 implementation horizon are increasing the capacity of the Inline Pump Station and additional secondary treatment capacity at the SSWWTP. Similar to the conveyance system, the implementation plan will be based on monitoring of growth and development in the area, as well as system flows.

The 2020 Facilities Plan – Treatment Report Chapter 10 contains the projects recommended for the treatment plants. The 2020 Facilities Plan – Facilities Plan Report Chapter 11 discusses the implementation of the recommendations.

### 5.2.3 Watercourse Systems

The District has discretionary authority to construct watercourse system improvements within its jurisdictional watercourses. There are approximately 124 miles of watercourse system within the District's jurisdiction.

The District completed a Phase I study of each of the watercourse systems under its jurisdiction in the year 2000. These studies are called the Watercourse Management Plans (WMPs) (7) and are documented in five volumes. The volumes are titled:

- 1) Milwaukee River tributaries and Fish Creek (Lake Michigan Direct Drainage) - Phase I Watercourse Management Plan
- 2) Menomonee River - Phase I Watercourse Management Plan
- 3) Kinnickinnic River - Phase I Watercourse Management Plan
- 4) Oak Creek - Phase I Watercourse Management Plan
- 5) Root River - Phase I Watercourse Management Plan

The Milwaukee River study only included the Brown Deer Park Creek tributary as all other tributaries had been addressed in previous District studies. It also did not include the Milwaukee River main stem (MMSD did not take jurisdictional authority of the Milwaukee River main stem until 2003). Each of the other studies included the main stem and all of the major tributaries. These studies were conducted in a manner similar to a capacity study for a sewerage system and satisfy the intent of the SECAP as it is being applied to the District's watercourse system. These studies are not available online but have been previously submitted to the Wisconsin Department of Natural Resources (WDNR).

#### 5.2.3.1 System Description

The District's jurisdictional watercourse systems include approximately 24 miles of improved channel and 100 miles of natural channel. These are located along the:

1. Milwaukee River and its tributaries (28.2 miles);
2. Menomonee River and its tributaries (37.5 miles);
3. Kinnickinnic River and its tributaries (12.8 miles);
4. Oak Creek and its tributaries (17 miles);
5. Root River and its tributaries (24.1 miles); and
6. Lake Michigan direct drainage area (3.9 miles).

Appendix 5-1 provides a listing of the District jurisdictional watercourse systems. This listing is taken from the District's Surface Water and Storm Water rule (Chapter 13, District Rules). The listing and all of the District's rules are available at [www.mmsd.com/rules/index.cfm](http://www.mmsd.com/rules/index.cfm).

#### 5.2.3.2 Level of Protection

The District's Level of Protection goal with respect to watercourse systems is to cost-effectively remove structures from the 100-year floodplain and minimize the damage from the one-percent probability flood event. The District recognizes that further development in upstream areas may impact the ability of current and future District

watercourse improvements to provide this Level of Protection. There are two programs to deal with future impacts: 1) Implementation of rules to limit stormwater runoff from new and redevelopment (District Rules, Chapter 13 - Surface Water and Storm Water rule); and 2) Purchasing key lands containing water absorbing soils (Greenseams program, see below).

### **5.2.3.2.1 Surface Water and Storm Water rule**

The District developed and implemented the Surface Water and Storm Water rule (Chapter 13 – District Rules) in 2001. The intent of the rule is to:

- Reduce the effects of flooding;
- Maximize the effectiveness of District watercourse systems and flood abatement facilities;
- Reduce the impacts of flooding to the sanitary sewerage system;
- Promote comprehensive watershed planning; and
- Restore and enhance the use of regional watercourses.

The rule applies to new developments and redevelopments within the District's service area that increase the amount of impervious surface by 0.5 acre or more, with some limitations and exclusions. All of the District's rules are available online at <http://www.mmsd.com/rules/index.cfm>

### **5.2.3.2.2 Greenseams Program**

The intent of the Greenseams program is to permanently protect key lands containing water absorbing soils and preserve land along stream corridors. The purpose of these protections is to preserve the land's natural abilities to assimilate storm water runoff, while simultaneously providing wildlife habitat and recreational opportunities. Further information on the Greenseams program is available at [www.mmsd.com/floodmanagement/greenseams.cfm](http://www.mmsd.com/floodmanagement/greenseams.cfm).

### **5.2.3.3 Flow Generation**

During the preparation of the WMPs, models were constructed using the Hydrologic Simulation Program – Fortran (HSPF). These models were then used to generate flows that reach the MMSD jurisdictional watercourses for various events, including the one-percent probability flood event. There was a model developed for each watershed (Milwaukee River, Menomonee River, Kinnickinnic River, Root River, Oak Creek and Fish Creek) that was composed of sub-watersheds and sub-basins. The inputs for the watershed models were meteorological time series, hydrologic and basin parameters. The models were based on 2020 land uses, and so are consistent with the planning horizon for the 2020 Facilities Plan.

Chapter 3 in each volume of the WMP describes the procedures used to construct the HSPF model, which was done in a similar fashion for each watershed. Chapter 3 from the Menomonee River WMP volume is included as Appendix 5-2.

#### 5.2.3.4 Hydraulic Modeling

The HSPF models that were built for each watershed provide flow hydrographs at certain locations along the length of the watercourse channels. These flow hydrographs then become the input into another model that represents the watercourse conveyance channels. These models were all built using the Hydrologic Engineering Center – River Analysis System (HEC-RAS) model. These models were also completed during the preparation of the WMPs. The HEC-RAS models require channel dimensional information, roughness coefficients, bridge opening data (and other restrictions along the watercourse reaches), and the input flow hydrographs and locations. The HEC-RAS models then calculate water surface profiles.

The water surface profiles are used to determine the extent of the floodplain and the structures that will be impacted by an event, which is the one-percent probability flood event as the District's Level of Protection.

Chapter 3 in each volume of the WMP describes the procedures used to construct the HEC-RAS model, which was done in a similar fashion for each watershed. Chapter 3 from the Menomonee River WMP volume is included as Appendix 5-2.

#### 5.2.3.5 Identification and Prioritization of Deficiencies

The result of the Phase I WMPs, which included the modeling described above, alternatives analysis and cost considerations, was a recommended list of watercourse projects for each watershed. Included in the scope of projects are:

- Watercourse conveyance improvements
- Surface water storage facilities
- Floodproofing structures
- Purchasing structures
- Implementing watershed-wide stormwater management regulations
- Preserving existing natural storage

The specific recommendations for each watershed from the WMPs are included in the Appendices:

- Appendix 5-3 – Milwaukee River tributaries and Fish Creek
- Appendix 5-4 – Menomonee River
- Appendix 5-5 – Kinnickinnic River
- Appendix 5-6 – Oak Creek
- Appendix 5-7 – Root River

The projects that were the result of earlier studies and are not in the WMPs, such as Lincoln Creek improvements and storage facilities along Southbranch Creek and Indian Creek are not included in the appendices.

#### 5.2.3.6 Implementation Plan

Beyond the previously completed WMPs, the District has been implementing further studies, which include:

1. Additional Phase I studies (of watercourses not previously completed)

2. Phase II studies (detailed analysis and investigation of the proposed projects and flood management facilities proposed in the WMPs)
3. Sediment transport and geomorphic studies

The further studies include:

- Milwaukee River main stem – Phase I Watercourse Management Plan (in progress)
- Menomonee River – Phase II Watercourse Management Plan (completed)
- Menomonee River – Sediment Transport Study (completed)
- Kinnickinnic River – Phase II Watercourse Management Plan (completed)
- Kinnickinnic River – Sediment Transport Study (budgeted)
- Oak Creek – no further watercourse management studies planned
- Root River – Phase II Watercourse Management Plan (in progress)
- Root River – Sediment Transport Study (in progress)
- Fish Creek – Geomorphic Study

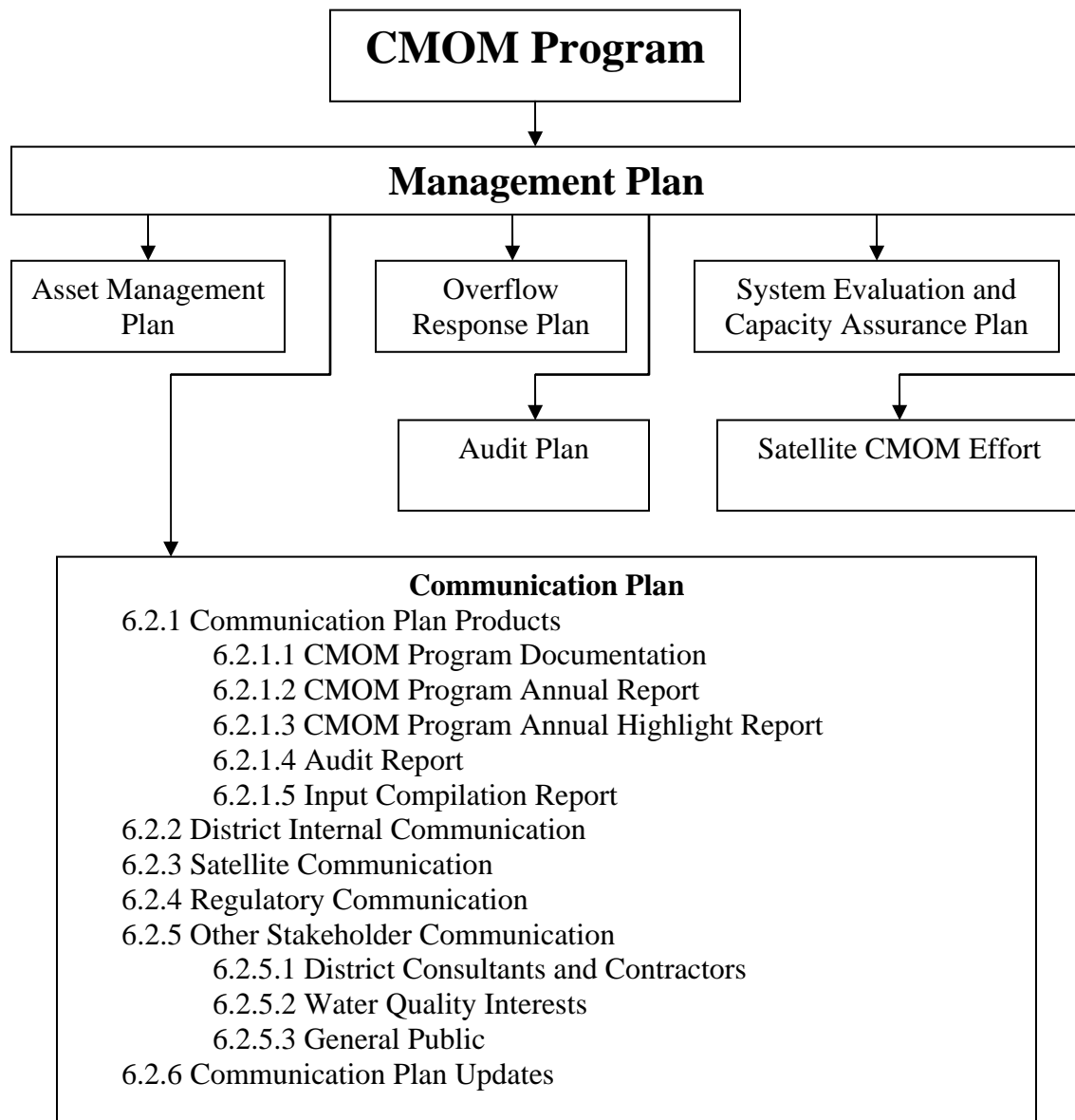
The majority of the watercourse improvement projects that were identified in the Phase I Watercourse Management Plans have either been studied further with a phase II plan, implemented a preliminary engineering phase, or both. Design and Construction contracts have been awarded for the following projects:

1. Valley Park levee, storm water pump station and floodwall (completed)
2. Hart Park floodplain modifications (in progress)
3. County Grounds floodwater management basins (in progress)
4. Timmerman Field detention basin (completed)

### **5.2.4 SECAP Updates**

The SECAP is a major effort for the District. As the 2020 Facilities Plan and the Watercourse Management Plans have used the year 2020 as the planning horizon, there should not be a need to undertake additional efforts until after the CMOM Program Audit is completed in 2012. The CMOM Program Audit Report will contain information on the timing of planning efforts that are being considered at that point.

# Communication Plan



## 6.1 Communication Plan Development

The Communication Plan developed and documented here is a requirement of the 2002 Stipulation Agreement (Stipulation) (1) between the State of Wisconsin and the Milwaukee Metropolitan Sewerage District (MMSD or District). The Communication Plan serves to document the types and frequency of communications that will be prepared and distributed regarding the implementation of the Capacity, Management, Operations and Maintenance (CMOM) Program.

CMOM principles were proposed by the United States Environmental Protection Agency (USEPA) as a part of the draft Sanitary Sewer Overflow (SSO) rule (2) that was subsequently withdrawn. The withdrawn SSO rule, although never formally adopted, was considered, in the absence of other guidance, in developing the District Communication Plan. However, the Stipulation requirements and District CMOM objectives were the primary considerations.

This Communication Plan is a further development of the Communication Plan Strategy that was documented in the *MMSD CMOM Readiness Review and Implementation Strategy Development (CMOM Strategic Plan)* (3) completed in December 2005. There are many items that were identified during the readiness review and strategy development and documented in the *CMOM Strategic Plan* that have been partially or completely addressed as of the completion of this document. These items are still included to provide background information and continuity to the evolution of the Communication Plan from readiness review to strategy development to final plan. In addition, the strategies, tactics and performance measures described in this Plan will be subject to change and refinement as the District continues implementing and gains experience with the CMOM Program.

The withdrawn SSO rule, Stipulation requirements and CMOM objectives are discussed, respectively, below.

### 6.1.1 Stipulation Requirements

The Stipulation requiring the CMOM Program is the primary driver of the Communication Plan. The Stipulation states:

“7. While sanitary sewer overflows in the District’s system have been significantly reduced, there are still sanitary sewer overflows within the District’s and its satellite municipalities’ sanitary sewer systems. To continue the District’s program to reduce with the goal of eliminating all non-permitted sanitary sewer overflows, the District shall implement the regional Capacity, Management, Operation and Maintenance (CMOM) program. The regional CMOM shall be comprised of four integrated components:”

The fourth component listed is:

“D. *Communication and Program Audit Plan.* On a regular basis the District shall report to the Department on the implementation and performance of the CMOM program. The communication and program audit plan shall allow for public input during the development and implementation of the CMOM.”

Although the communication and audit portions of the CMOM program are listed together in the stipulation, they are addressed in separate plans. The communication portion is addressed in this plan and the audit portion is addressed in Chapter 7 of this document.

### **6.1.2 Principles from Withdrawn SSO Rule**

In the withdrawn SSO rule that had been proposed by the USEPA in 2001, communications requirements were listed as shown below (taken from §122.42 (e) (3) of the withdrawn rule).

“Communications. – The permittee should communicate on a regular basis with interested parties on the implementation and performance of its CMOM program. The communication system should allow interested parties to provide input to the permittee as the CMOM program is developed and implemented.”

Although the withdrawn SSO rule was never promulgated, these principles were considered, in the absence of other guidance, in the development of the CMOM Program, including the Stipulation-required Communication Plan.

### **6.1.3 District Objectives**

The second objective listed in the District CMOM Management Plan (Chapter 2, section 2.2.1.1.2 of this document) is to “Communicate the goals and objectives of the CMOM program to internal and external stakeholders, monitor the CMOM program implementation, and institute program modifications.”

The items discussed in the Management Plan include:

- Preparing an annual CMOM report
- Having a web page for internal District use to distribute CMOM-related information and reports and receive feedback and suggestions from District staff
- Annual memoranda to the District Commission
- Annual presentations to the Technical Advisory Team (TAT), District Consultants, and District Contractors
- Maintaining a publicly accessible web page that includes the CMOM Program documentation, annual reports and a portal for providing suggestions and input

### **6.1.4 Communication Plan Components**

The Communication Plan will first describe the products that will be generated as part of the CMOM Program (section 6.2.1 below). These products will be delivered to four targeted groups. The groups and the associated part of the plan where the communications are addressed are:

- Internally to District staff (6.2.2)
- District Satellite system owners (6.2.3)
- District Regulators (6.2.4)
- Other Stakeholders (6.2.5)

## 6.2 Communication Plan

The Communication Plan includes:

- A description of the reports and summaries that will be prepared by the District related to CMOM implementation
- The targeted audiences for the reports and information
- The methods of delivering the information to the targeted audiences
- The methods for receiving input regarding the CMOM Program

The report products will be discussed first (section 6.2.1 below), followed by the targeted audiences (sections 6.2.2 through 6.2.5). Included in each section for the targeted audiences will be the methods of delivery and receiving input.

### 6.2.1 Communication Plan Products

The products that will result from the District CMOM Program are:

- CMOM Program documentation (this document)
- CMOM Program annual reports
- CMOM Program annual highlight reports
- CMOM Program Audit Report
- Input Compilation Report

Each is discussed further below.

#### 6.2.1.1 CMOM Program Documentation

The District CMOM Program is described by this document. It will contain all of the plans that are part of the CMOM Program as separate chapters. The plans are the Management Plan (Chapter 2 of this document), the Asset Management Plan (Chapter 3 of this document), the Overflow Response Plan (Chapter 4 of this document), the System Evaluation and Capacity Assurance Plan (Chapter 5 of this document), the Communication Plan (Chapter 6 of this document), the Program Audit Plan (Chapter 7 of this document), and the Satellite CMOM Effort (Chapter 8 of this document).

The CMOM Program documentation will be made accessible from the District's internal and publicly accessible ([www.mmsd.com](http://www.mmsd.com)) web sites.

#### 6.2.1.2 CMOM Program Annual Report

The CMOM Program Annual Report will include seven sections; a summary section and one section for each of the six plans that make up the District CMOM Program. The first section will be an overview of the Program, Program highlights from the reporting year and any changes to the Program.

The second section will focus on the performance measures (see the Management Plan, Chapter 2, section 2.2.6 of this document). The values of the performance measures will be documented and trended. In addition, there will be a discussion of the trends, whether they indicate the District is meeting its goals, and any changes to the strategies or tactics the District will employ to meet its goals. Also in the second section will be a discussion

of any changes to the District organizational structure or Rules that impact the CMOM Program.

The third section will focus on the Asset Management strategies and tactics that have been added, deleted or modified, specifically as they relate to meeting asset management objectives. During the first few years of the CMOM Program, the focus will be on the near-term objectives of the asset management plan (see the Asset Management Plan, Chapter 3, section 3.2.2 of this document).

The fourth section will include discussion of the Overflow Response Plan (ORP), overflows that occurred during the reporting year, and any updates to the ORP. As the District enters a new agreement with a contract operator in 2008, the main items regarding the ORP will be the communications between the District and the contract operator and the contract operator's response procedures.

The fifth section will include discussion of the System Evaluation and Capacity Assurance Plan and any additional items that have been addressed or modified since the completion of the 2020 Facilities Plan.

The sixth section will address the Communication Plan, including changes to any of the communication products, communication methods, or targeted audiences (stakeholders) of the CMOM Program.

The final section will address any issues relating to the Audit Plan.

The CMOM Program Manager is responsible for completing and submitting the annual report to the Wisconsin Department of Natural Resources (WDNR) by the end of June each year, beginning in 2008. The Annual Report will go through the District's internal review process prior to submittal. The annual report will be made accessible from the District's internal and publicly accessible web sites.

### **6.2.1.3 CMOM Program Annual Highlight Report**

The CMOM Program Annual Highlight Report is the executive summary for the CMOM Program Annual Report. It will list the larger issues related to the CMOM Program implementation and have short discussions on these issues.

The CMOM Program Manager is responsible for completing the highlight report by the end of June each year, beginning in 2008. The Highlight Report will be made accessible from the District's internal and publicly accessible web sites.

### **6.2.1.4 Audit Report**

The Audit Report will begin with a focus on the performance measures that have been identified as benchmarks (can be compared to other utilities and agencies). The trending of the benchmarks, as well as their value relative to other comparable agencies will be considered and discussed. In addition to trending the benchmarks, a review will also be conducted similar to the annual review of District performance measures.

Following the trending of the District benchmarks and performance measures, a complete review of the CMOM Program will be completed. By having trended the performance measures first, the review will be able to focus on the results obtained through

implementation of District strategies and tactics. Successful strategies can continue to be employed and strategies that were not successful can be modified, replaced, or eliminated. All of the strategies must be directed towards contributing to the District's current goals and regulatory requirements. After the District has defined the strategies that will be employed to achieve its goals, the plans will be modified, as necessary, to align with the goals.

The end result will be a revised District CMOM Program. Included with the Audit Report will be a summary of the changes to the CMOM Program. For further information, see the Audit Plan (Chapter 7 of this document).

The Audit Report will be completed under the direction of the CMOM Program Manager by September 30, 2012. The Audit Report and revised CMOM Program documentation will be made available from the District's internal and publicly accessible web sites.

### **6.2.1.5 Input Compilation Report**

The Input Compilation Report will be a listing of the suggestions, comments, and feedback that have been received from District staff, regulators, satellite system owners and the general public regarding implementation of the CMOM program. The compilation will include those submitted by the web portal, by direct communication with the CMOM program manager and any documented communication with the CMOM program manager (i.e. e-mail, memo).

The Input Compilation Report will be updated on an ongoing basis, as large blocks of comments are received. It will be made accessible from the District's internal and publicly accessible web sites.

## **6.2.2 District Internal Communication**

Internally at the District, there will be three methods of distributing information and receiving input regarding the CMOM Program:

- The District's internal web site
- Division meetings
- Memoranda

### **6.2.2.1 District Internal Web Site**

The District currently has an internal web site that allows for departments to have their own web pages and share information relative to each department's mission and functions. The CMOM Program will have its own page on this internal web site. The web page will have a short description of the CMOM Program, the personnel to contact with questions, current issues and links to various items. The links will be to:

- CMOM Program documentation (this document)
- CMOM Program annual reports
- CMOM Program annual highlight reports.
- CMOM Program Input Compilation Report
- A portal for inputting suggestions and feedback regarding the CMOM Program

- The CMOM Program Audit Report

Each of these links will be established and where information is not yet available, anticipated dates will be provided.

### **6.2.2.2 Division Meetings**

The CMOM Program Manager works in the Technical Services Division of the District. The Water Quality Protection Division is also very involved in many CMOM Program tactics. The CMOM Program Manager will make presentations to these two divisions after each annual report and the Audit Report are prepared to highlight successes, new strategies and tactics, and the CMOM Program in general. See the Management Plan, Chapter 2, section 2.2.2 of this document for the organizational structure of the District.

### **6.2.2.2 Commission Memoranda**

The CMOM Program documentation, annual reports, and Audit Report will each be transmitted to the District Commission via a memorandum from the Executive Director. The memoranda will include a summary description of the program or report and impacts to the District.

### **6.2.3 Satellite Communication**

On an annual basis, the CMOM Program manager will present to the TAT, which includes representatives of the satellite system owners:

- 1) The District CMOM Program highlights;
- 2) Implications of the CMOM Program to the satellite system owners;
- 3) The District's publicly accessible web site with links to the District CMOM information
- 4) Emergency contact information related to District facilities (see the Overflow Response Plan, Chapter 4, section 4.2.1.3 of this document).
- 5) The Audit Report (when it is completed).

### **6.2.4 Regulatory Communication**

The annual report for District CMOM activities will be completed under the direction of the CMOM Program Manager and sent to the District's WDNR Permit Administrator by the end of June, each year, beginning in 2008.

The Audit Report will be completed under the direction of the CMOM Program Manager and sent to the District's WDNR Permit Administrator within 30 calendar days of its completion.

### **6.2.5 Other Stakeholder Communication**

Other stakeholders to be included in communications related to the District CMOM Program are the consultants and contractors that perform work for the District, citizens and groups interested in water quality and the general public.

### **6.2.5.1 District Consultants and Contractors**

The District currently holds annual meetings with its consultants and contractors. At future meetings, the CMOM Program Manager is responsible for presenting information regarding CMOM Program highlights and inviting discussion. The discussion will focus on the portions of the CMOM Program that are impacted by consultant and contractor work. The items will be centered on asset management and may include using District asset numbering schemes, preparing and submitting asset plans, submitting asset data equipment forms and updating O&M manuals.

### **6.2.5.2 Water Quality Interests**

Groups and citizens that are particularly interested in water quality in the Milwaukee area, especially as it relates to District initiatives and overflow incidents can be included on a list maintained by the District's Public Information Manager. Being on this list, they will be provided with immediate notification of overflows via the 24-hour notification e-mail (see the Overflow Response Plan, Chapter 4, section 4.2.3.1 of this document).

Beyond the overflow notifications, these groups can access the District web site and obtain the same information regarding the CMOM Program as the general public (see section 6.2.5.3 below).

### **6.2.5.3 General Public**

The District currently has a publicly accessible web site ([www.mmsd.com](http://www.mmsd.com)) that includes information on the District's history, current District programs (including the 2020 Facilities Plan/Water Quality Initiative), District Requests for Proposals and construction contracts, etc. The CMOM Program will have a page on this web site. The web page will have a short description of the CMOM Program, the personnel to contact with questions, current issues and links to various items. The links will be to:

- CMOM Program documentation
- CMOM Program annual reports
- CMOM Program annual highlight reports
- CMOM Program Input Compilation Report
- A portal for inputting suggestions to the CMOM program
- The CMOM Program Audit Report

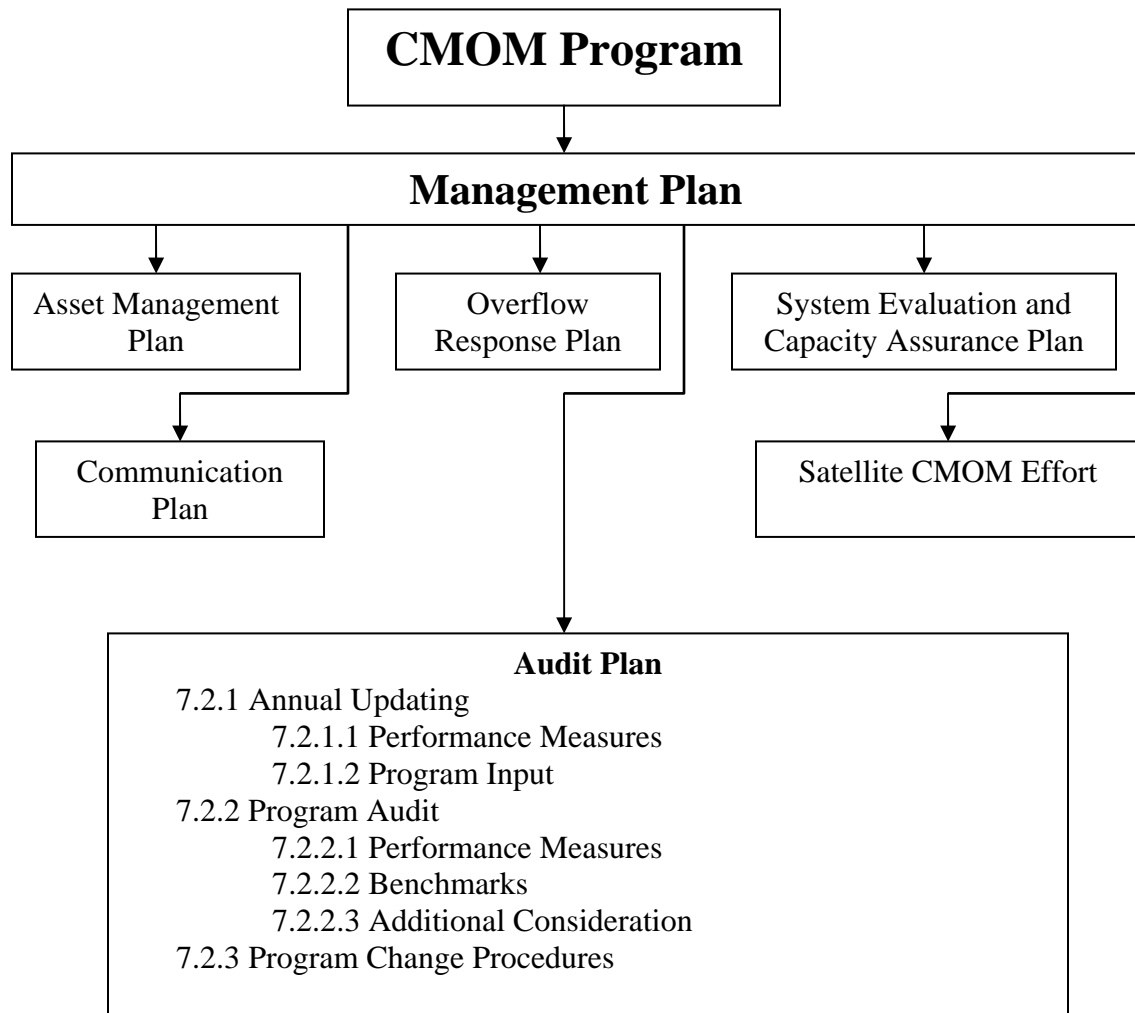
Each of these links will be established and where information is not yet available, anticipated dates will be provided.

## **6.2.6 Communication Plan Updates**

The Communication Plan will receive annual updates, if required, after the annual review of the performance measures relating to communications has been completed. Any changes to the Communication Plan will be documented in the CMOM Program Annual Report.

For further information, see section 6.2.1.2 above and the Audit Plan (Chapter 7, section 7.2.1 of this document).

# Audit Plan



## 7.1 Audit Plan Development

The Audit Plan developed and documented here is a requirement of the 2002 Stipulation Agreement (Stipulation) (1) between the State of Wisconsin and the Milwaukee Metropolitan Sewerage District (MMSD or District). The Audit Plan serves to define the method, responsibilities, timeline, and documentation that will be used to complete an audit of the MMSD Capacity, Management, Operation, and Maintenance (CMOM) Program.

CMOM principles were proposed by the United States Environmental Protection Agency (USEPA) as part of the draft Sanitary Sewer Overflow (SSO) rule (2) that was subsequently withdrawn. The withdrawn SSO rule, although never formally adopted, was considered, in the absence of other guidance, in developing the Audit Plan. However, the Stipulation requirements and District CMOM Program were the primary considerations.

This Audit Plan is a further development of the Audit Plan Strategy that was documented in the *MMSD CMOM Readiness Review and Implementation Strategy Development (CMOM Strategic Plan)* (3) completed in December 2005.

The Stipulation requirements, withdrawn SSO rule, and District CMOM objectives are discussed below.

### 7.1.1 Stipulation Requirements

The Stipulation, which requires the District to develop and implement a CMOM program, is the primary driver of the Audit Plan. The Stipulation states:

“7. While sanitary sewer overflows in the District’s system have been significantly reduced, there are still sanitary sewer overflows within the District’s and its satellite municipalities’ sanitary sewer systems. To continue the District’s program to reduce with the goal of eliminating all non-permitted sanitary sewer overflows, the District shall implement the regional Capacity, Management, Operation and Maintenance (CMOM) program. The regional CMOM shall be comprised of four integrated components:”

The fourth component listed is:

“D. *Communication and Program Audit Plan.* On a regular basis the District shall report to the Department on the implementation and performance of the CMOM program. The communication and program audit plan shall allow for public input during the development and implementation of the CMOM.”

Although the communication and audit portions of the CMOM program are listed together in the stipulation, they are addressed in separate plans. The audit portion is addressed in this plan. The communication portion is addressed in the Communication Plan, Chapter 6 of this document.

### **7.1.2 Principles from Withdrawn SSO Rule**

Auditing requirements are included in the withdrawn SSO Rule that had been proposed by the USEPA in 2001. The auditing requirements were listed in §122.42 (e) (2) (ix) of the withdrawn SSO Rule, as shown below:

“CMOM Program Audits. – As part of the NPDES permit application, you must conduct an audit, appropriate to the size of the system and the number of overflows, and submit a report of such audit, evaluating your CMOM and its compliance with this subsection, including its deficiencies and steps to respond to them.”

Although the withdrawn SSO rule was never promulgated, in the absence of other guidance, the District has considered this withdrawn rule in developing its CMOM Program, including the Stipulation-required Audit Plan.

### **7.1.3 District Objectives**

CMOM Management Plan Overall Objective 2 (Chapter 2, section 2.2.1.1.2 of this document) is to “Communicate the goals and objectives of the CMOM Program to internal and external stakeholders, monitor the CMOM Program implementation and institute Program modifications.”

Most of this objective is addressed by the Communication Plan. However, the Audit Plan will specifically address monitoring the CMOM Program implementation and instituting Program modifications.

### **7.1.4 Audit Plan Components**

As part of the CMOM Program Communication Plan (Chapter 6 of this document), a CMOM Program annual report will be produced. The annual report will include updates to the Program. The audit will include a review of the entire CMOM Program. Any large scale and structural changes found to be necessary to the CMOM Program will be completed and documented during the audit. There will therefore be a section of the Audit Plan for Annual Updating (7.2.1), the CMOM Program Audit (7.2.2), and also a section for the documenting and processing of Program changes (7.2.3).

## 7.2 Audit Plan

The Audit Plan will be comprised of the following three sections:

- Annual updating - completed and reported through the CMOM Program Annual Report
- Program Audit - completed and reported through the CMOM Program Audit Report
- Program change procedures

### 7.2.1 Annual Updating

The annual updates to the CMOM Program will include a review of three areas. The first area will be the performance measures and the strategies that the District has in place to achieve the performance measures. The second area reviewed will be the suggestions that are provided through internal and external means for Program improvement. Lastly, the gaps that were identified during the CMOM readiness review that was completed before preparation of the *CMOM Strategic Plan* will be reviewed. Progress on gap closure will be determined and additional strategies that may be necessary for further gap closure will be analyzed and discussed.

The CMOM Program Manager will be responsible for completing the annual review and update, preparing the documentation (included in the CMOM Program Annual Report) and coordinating the District's internal review.

#### 7.2.1.1 Performance Measures

The Management Plan (Chapter 2, section 2.2.6 of this document) contains all of the District performance measures that will be measured as part of the CMOM Program. These performance measures are set-up to be evaluated and reviewed annually to provide immediate feedback on the effectiveness of District operations and the performance of the CMOM Program. The performance measures chosen were those that were readily available, easily determined and directly related to the aim of the objective.

During preparation of the CMOM Program annual reports, all of the CMOM performance measures will be evaluated and tracked over time. For each of these performance measures, a discussion will be provided to address:

1. The value of the measurement
2. The status of the measurement
3. The relevance of the measure to the objective
4. Any changes in strategy necessary to achieve further gains

#### 7.2.1.2 CMOM Program Input

The District will be soliciting input on the CMOM Program from stakeholders through a variety of means that are discussed in the Communication Plan. They include portals on District web sites for internal and external input, Division meetings, Technical Advisory Team (TAT) meetings, and Consultant and Contractor meetings. These suggestions will be compiled and documented in the Input Compilation Report.

For the purposes of the annual update, the suggestions will be grouped by the CMOM Plan that they involve. The suggestions will be reviewed as to: 1) Necessity for compliance with regulations; 2) Compliance with District objectives; and 3) Costs and benefits. The items will be discussed as a group and individually, as necessary, to provide a basis for including any of the suggestions into the Program.

### **7.2.1.3 Review of Original Gaps**

A listing of gaps was created during the District's CMOM readiness review, completed prior to the preparation of the *CMOM Strategic Plan*. This listing of gaps has been addressed through the implementation of this CMOM Program and undertaking of other District projects. Since completion of the readiness review, the District has completed many capital projects to address system deficiencies, begun preparations of a new agreement for the Operation and Maintenance (O&M) of District facilities, begun the implementation of the Geographical Information System (GIS) Vision and prepared the 2020 Facilities Plan. Many of the original gaps are in part being addressed through these items, making it necessary to review this list and ensure that the identified gaps are being properly addressed.

## **7.2.2 CMOM Program Audit**

The CMOM Program audit will occur during the first half of the year 2012 and the report will be prepared by September 30, 2012. This will allow sufficient time to review the report and consider the recommendations for the renewal of the District Wisconsin Pollutant Discharge Elimination System (WPDES) permit that will likely be reissued in 2013.

The audit will include a review of the District CMOM performance measures, District CMOM Benchmarks and additional considerations, each of which is discussed below. The audit process will be conducted under the direction of the CMOM Program Manager and may include outside consultants or representatives from comparable utilities on the review panel, working in conjunction with the CMOM work team.

### **7.2.2.1 Performance Measures**

The performance measures that are listed in the CMOM Program Management Plan (Chapter 2, section 2.2.6 of this document) will be reviewed as to the current value, status and trend for the past five years. This review will indicate whether the District objectives are being attained and whether the trend is better performance or not. Either may indicate that individual strategies should be reviewed and revised with the goal of continuing to meet the CMOM objectives into the future.

Discussion will include a broad look at the performance measures for the overall CMOM Program and the three District service areas of: 1) Conveyance; 2) Treatment; and 3) Watercourse. Where specific performance measures are not being attained, detailed discussion and commentary will be included. The result may be a recommended change to the program, which could take the form of a revised objective, a revised strategy, a revised tactic, different performance measures, or lower attainment criteria for the performance measure.

### **7.2.2.2 Benchmarks**

The benchmarks that are listed in the CMOM Program Management Plan (Chapter 2, section 2.2.5 of this document) will be reviewed in a manner similar to the performance measures. There will be a review of the value for the current year and of the trend over the past five years. In addition, the values and trends for similar agencies will be obtained and compared to the District's values and trends. The District will use the benchmarks to not only determine attainment of objectives, but to view the trends in the industry. This additional information is invaluable in helping the District to maintain an up-to-date, environmentally sound, and cost-effective status.

Discussion will include a broad look at the benchmarks that are listed in the CMOM Program by area. Where specific benchmarks are indicating that the District is not meeting an objective and/or not in the better half of similar wastewater utilities, a detailed discussion and commentary will be included. The result may be a recommended change to the program, which could take the form of a revised objective, a revised strategy, a revised tactic, or a revision to the benchmark.

### **7.2.2.3 Additional Considerations**

During the audit, several additional items will be considered that may affect a change in the CMOM Program. They are:

- Existing WPDES Permit Requirements
- Anticipated Regulatory Requirements
- MMSD Strategic Plan Goals

#### **7.2.2.3.1 Existing Permit Requirements**

The current District WPDES Permit (5) will expire in 2008. When the District receives the next permit, it may contain additional requirements, such as further monitoring, overflow reduction, changes in reporting requirements, etc. These may impact the goals and objectives that are stated in the CMOM program and the way the District measures performance. These will be discussed and addressed in the CMOM Program Audit Report.

#### **7.2.2.3.2 Anticipated Regulatory Requirements**

As mentioned previously, the audit will occur shortly before the permit renewal anticipated for 2013. During the period leading up to the audit, communications with the Wisconsin Department of Natural Resources (WDNR) may indicate that future permits will contain additional requirements. In addition, the USEPA may reintroduce the withdrawn SSO rules from 2001 or similar rules with requirements for wastewater agencies. These may all contain additional requirements for CMOM programs. These will be discussed and addressed in the CMOM Program Audit Report.

#### **7.2.2.3.3 District Strategic Plan Goals**

The District is currently on a three year cycle for preparing an overall strategic plan to meet its goals. The current strategic plan is for the years 2007 through 2009 (4). By the

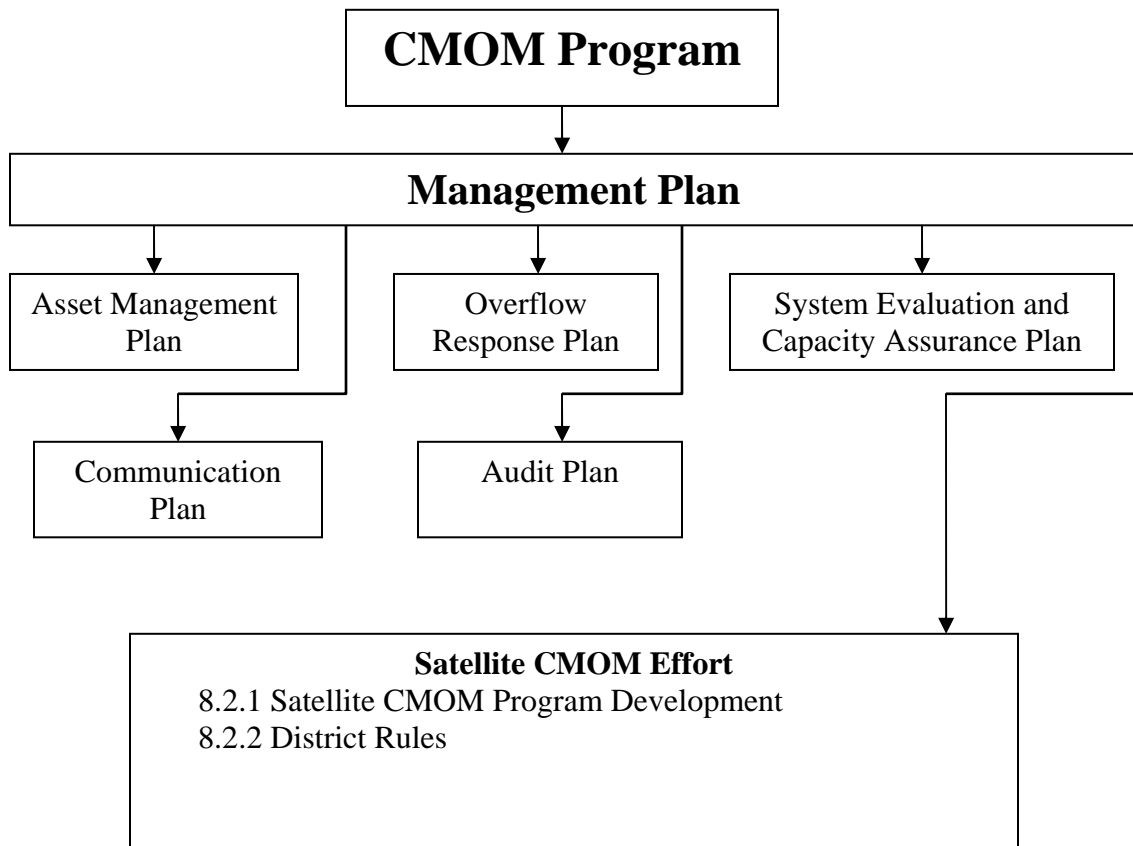
time of the CMOM Program Audit, another strategic plan will have been prepared and mostly implemented. The District may alter policies, programs and procedures that will affect the elements of the CMOM Program. These issues will be discussed and addressed in the CMOM Program Audit Report.

### **7.2.3 Program Change Procedures**

As a result of the audit, the CMOM Program will be updated. The procedure for updating this will be similar to the preparation of the initial CMOM Program. The CMOM Program Manager is responsible for ensuring the reviews listed above are completed and documented. Internal review teams, consisting of appropriate representation from across the District, will be formed for each chapter of the program. The changes that are being considered will be discussed by the review team, in coordination with the CMOM Program Manager. The result of the discussions will be the recommended program changes.

The CMOM Program Manager will prepare the updated CMOM Program and send it through the internal review process at the District. After internal approval is complete, the updated Program will be forwarded to the District's Permit Administrator at the WDNR or another named WDNR representative.

# Satellite CMOM Effort



## 8.1 Satellite CMOM Effort Background

The Satellite Capacity, Management, Operations, and Maintenance (CMOM) Effort documented here includes a discussion of District activities that are required by the 2002 Stipulation Agreement (Stipulation) (1) between the State of Wisconsin and the Milwaukee Metropolitan Sewerage District (MMSD or District). Also included are activities taken to satisfy District objectives related to satellite system CMOM programs.

The Stipulation requirements and District objectives are discussed below.

### 8.1.1 Stipulation Requirements

The Stipulation, which requires the District to develop and implement a regional CMOM program, is the primary driver of the satellite CMOM effort. The Stipulation states under item 7:

“E. The approach to be used by the District to initiate and maintain the CMOM program shall include the following steps:”

The fifth step listed is:

“5) Open and maintain a CMOM dialog with the 28 satellite municipalities through the Technical Advisory Team with the goal of assisting the satellite municipalities with developing individual CMOM programs. The District shall develop prospective measures for the satellite systems that will reflect the requirements of the District’s CMOM program.”

In addition, paragraph 9 of the Stipulation includes language regarding the regional CMOM program:

#### “SATELLITE MUNICIPALITIES

9. Infiltration and inflow reduction efforts by the 28 satellite municipalities will continue to be required under District Rules, Chapter 3, Infiltration and Inflow Control. In addition, each satellite municipality shall be required, be District rules, to develop a local CMOM by no later than two years after completion of the District’s regional CMOM Program. Prior to promulgation of the District rules, the Department may issue WPDES discharge permits to individual satellite municipalities, as necessary to require, inter alia, I/I reduction efforts by fixed dates. Following promulgation of the District rules, the Department may issue WPDES discharge permits to individual satellite municipalities, as necessary to require, inter alia, CMOM development and I/I reduction efforts by fixed dates.”

Note that in the District Stipulation, there are 28 satellite municipalities referenced. Below, there are 29 satellite municipalities referenced. The difference is Milwaukee County, which, for the purposes of the CMOM Program, has been recognized as a satellite system to the District since the Stipulation was written.

### **8.1.2 District Objectives**

In the CMOM Management Plan (Chapter 2 of this document) the fifth Overall objective is to “Establish a regional CMOM program.”

### **8.1.3 Satellite CMOM Effort Documentation**

The District satellite CMOM effort is comprised of: 1) The development of CMOM programs for each satellite system and 2) District Rules regarding completion of satellite CMOM programs.

## 8.2 Satellite CMOM Effort

The District's effort regarding the satellite systems includes the following items that are intended to satisfy the District Stipulation requirement:

- Satellite CMOM program development
- District Rules regarding satellite systems

### 8.2.1 Satellite CMOM Program Development

The District began discussions with the satellite systems, as required by the Stipulation, in 2002. Since then, the District has continued meeting with each of the satellite systems and discussing the CMOM requirements a minimum of once per year.

In addition, the District has contracted with a consultant to work with each satellite system to:

- Complete a readiness review;
- Complete a gap analysis; and
- Prepare a report that includes;
  - Documentation of the readiness review and gap analysis; and
  - A strategic plan for complying with CMOM requirements.

The reports for each satellite are expected to be completed in 2007.

A readiness review is the initial stage in preparing a CMOM program. It involves interviewing personnel, reviewing records, conducting field visits, etc. to ascertain an organization's current status with regard to a set of business practices that should be considered when implementing a CMOM program.

The gap analysis is a detailed comparison for each business practice of: 1) The organization's current status; and 2) The organization's desired (or required) status. The business process areas include groups such as: sewer design; sewer maintenance; flow monitoring; and geographical information systems.

The strategic plan will provide each satellite with direction and a list of activities to investigate and complete in order to close the gaps identified and establish their CMOM program.

The satellite CMOM programs must be completed by June 30, 2009 according to paragraph 22 of the 2005 Stipulation that was entered into between the State of Wisconsin and the 29 satellite systems that are tributary to the District's regional facilities (12). The text of paragraph 22 is shown below:

**“MUNICIPAL CAPACITY, MANAGEMENT, OPERATION AND  
MAINTENANCE (“CMOM”) PROGRAM DEVELOPMENT AND  
IMPLEMENTATION**

22. No later than June 30, 2009, all Tributaries shall develop and implement Capacity, Management, Operation and Maintenance (CMOM) programs reflecting the requirements of MMSD's regional CMOM program, as contemplated by paragraphs 6-7

of the settlement stipulation in the case of *State of Wisconsin v. Milwaukee Metropolitan Sewerage District*, Milwaukee County Circuit Court Case No. 02-CV-2701.”

The District’s Rules, Chapter 3 also require that the satellite systems establish CMOM programs by June 30, 2009. Section 3.105 of the District’s Rules, Chapter 3 includes the details of the requirements. Further discussion of Chapter 3 of the District’s Rules is included below.

As mentioned above, the District has funded the readiness review and strategy development steps of the CMOM process for the satellite systems. In addition, templates for the management, overflow response, communication, audit, and system evaluation and capacity assurance plans have been provided to each satellite system owner.

Establishing the CMOM program and completing the documentation is the last step, which is to be completed by each satellite system by the established deadline.

### **8.2.2 District Rules**

The District has revised Chapter 3 of its Rules, which was previously titled *Infiltration and Inflow Control*, but is now *Management, Operation, and Maintenance of Tributary Sewers*. The revised Chapter 3 has been adopted by the District Commission on May 21, 2007, with an effective date of May 27, 2007. The revised version of District Rules, Chapter 3 is included as Appendix 2-3 of this document.

The revised rule contains CMOM requirements for all satellite system owners that discharge into District sewers (Chapter 3, section 3.202 in Appendix 2-3). The rule specifies that satellite system owners must have established systematic and proactive programs that include the following practices and activities:

- ✓ Maintaining sewer system plans
- ✓ Maintaining records of physical attributes and the condition of sewers
- ✓ Cleaning sewers and debris removal
- ✓ Condition monitoring programs
- ✓ Asset renewal programs
- ✓ Providing sufficient personnel
- ✓ Having and enforcing an inflow prevention ordinance

These activities and others regarding the satellite sewer systems are to be documented in the following set of plans that are required by the revised Chapter 3 of the District’s Rules:

- ✓ Management Plan;
- ✓ Overflow Response Plan;
- ✓ Communication Plan;
- ✓ Audit Plan;
- ✓ System Evaluation and Capacity Assurance Plan (SECAP) (if hydraulic information is necessary to evaluate a sewer design decision or understand sewer performance); and
- ✓ Infiltration and Inflow Management Plan.

The District has completed limited SECAP studies as part of its 2020 Facilities Planning process. If the District requires a satellite system owner to complete a SECAP, the

limited study can be used as a basis for the complete SECAP. See Chapter 5, section 5.2.1.2.2 of this document for further information.

## REFERENCES

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4. Milwaukee Metropolitan Sewerage District. *2007-2009 Strategic Plan*.
5. State of Wisconsin, Department of Natural Resources. *Permit to Discharge under the Wisconsin Pollutant Discharge Elimination System*. March 2003.
6. Milwaukee Metropolitan Sewerage District. *2020 Facilities Plan – Facilities Plan Report, Conveyance Report, Treatment Report, and State of the Art Report*. Draft version as of April 24, 2007.
7. Milwaukee Metropolitan Sewerage District. *Milwaukee River Tributaries and Fish Creek – Phase I Watercourse Management Plan, Menomonee River – Phase I Watercourse Management Plan, Kinnickinnic River – Phase I Watercourse Management Plan, Oak Creek – Phase I Watercourse Management Plan, Root River – Phase I Watercourse Management Plan*, August 2000.
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9. American Water Works Association. *Benchmarking Performance Indicators for Water and Wastewater Utilities: Survey Data and Analysis Report*, 2005.
10. Association of Local Government Engineering New Zealand Inc (INGENIUM). *International Infrastructure Management Manual*, 2006.
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12. State of Wisconsin, Milwaukee County Circuit Court. *Stipulation and Order for Judgment – State of Wisconsin v. Milwaukee Metropolitan Sewerage District, et.al.* Case No. 2005-CX-000013.