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VIA ELECTRONIC CORRESPONDENCE

October 6, 2015

CCN: 59779
File No: 8.DC.20.19

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RE: Consent Decree (Case: No. 1:12-cv-24400-FAM)
Reference DOJ Case No. 90-5-1-1-4022/1
Section VI – Sewer System Asset Management Program, Paragraph 19(d)

Dear Sir/Madam:

In accordance with the provisions of Paragraph 19(d) of the above referenced Consent Decree, on behalf of Miami-Dade County, the Miami-Dade Water and Sewer Department (WASD) submits to the Environmental Protection Agency (EPA) and the State of Florida Department of Environmental Protection (FDEP) the Sewer System Asset Management Program.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering such information, the information submitted is, to the best of my knowledge and belief, true, accurate

and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Should you have any questions regarding this matter, please call me at (786) 552-8120.

Sincerely,

Bertha M. Goldenberg, P.E., LEED® Green Associate
Assistant Director, Regulatory Compliance and Planning

Attachment: Sewer System Asset Management Program

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CMOM Program
Sewer System Asset Management Program

October 6, 2015

Prepared by

The Miami-Dade Water and Sewer Department and the Consent Decree CMOM Program Team

Prepared for

United States Environmental Protection Agency and
Florida Department of Environmental Protection

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Sewer System Asset Management Program

PREPARED FOR:
Miami-Dade Water and Sewer Department (MDWASD)

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Quality Information

Status: Draft 1

Document	Sewer System Asset Management Program		
Ref	Draft 1	Date	August 7, 2015
Prepared by	Steve Schwabe, John Przybyla, Ed Singer	Reviewed by	Alberto Pisani, Kent Veech, Jane McLamarrah

Revision History

				Authorized by:	
Revision	**Revision Date**	**Status**	**Revised by:**	Name/Position	Signature
1.0	June 22, 2015	For Initial Review	John Przybyla, Steve Schwabe	Bill Sukenik/Project Manager	William Sukenik
2.0	August 7, 2015	For Review	Steve Schwabe, John Przybyla, Ed Singer	Bill Sukenik/Project Manager	William Sukenik
3.0	September 25, 2015	For Review	Steve Schwabe, John Przybyla, Ed Singer	Bill Sukenik/Project Manager	William Sukenik
4.0	October 1, 2015	Updates per page turn review	Steve Schwabe, John Przybyla	Bill Sukenik/Project Manager	William Sukenik

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00. Acronyms/Glossary

00.01 Acronyms

Table 00.1
Abbreviations Used in the SSAMP

Abbreviation	Description
AMLG	Asset Management Leadership Group
APTTC	Adequate Pumping Transmission & Treatment Capacity Program
BRE	Business Risk Exposure
CAFR	Comprehensive Annual Financial Report
CC&B	Customer Care and Billing
CCTV	Closed Circuit Television
CD	Consent Decree
CIP	Capital Improvement Program
CMOM	Capacity, Management, Operations, and Maintenance
CoF	Consequence of Failure
COTS	Commercial-off-the-Shelf (software)
County	Miami-Dade County
CWA	Clean Water Act
EAMS	Enterprise Asset Management System
FDEP	Florida Department of Environmental Protection
FEMA	Federal Emergency Management Agency
FMOPMARP	Force Main Operations, Preventative Maintenance, and Assessment / Rehabilitation Program
FMTS	Force Main Transmission System
FOG	Fats, Oils, and Grease
FY	Fiscal Year
GIS	Geographic Information Systems
GSS	Gravity Sewer System
GSSOMP	Gravity Sewer System Operations and Maintenance Program
IAM	Institute for Asset Management
IMS	Information Management System
IS	Information Systems
ISO	International Organization for Standardization
IT	Information Technology
KPI	Key Performance Indicator
LOS	Level of Service
MDWASD	Miami-Dade Water and Sewer Department
MGD	Million gallons per day

Table 00.1
Abbreviations Used in the SSAMP

Abbreviation	Description
MMSG	Maintenance Management Support Group
MOM	Management, Operations, and Maintenance
MYCIP	Multi-Year Capital Improvement Program
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and Maintenance
OOL	Ocean Outfall Legislation
PAS 55	Publicly Available Standard 55
PMCM	Program Management and Construction Management
PoF	Probability of Failure
Program	Consent Decree Program or Program Management and Construction Management Services Program
PSD	Pump Station Division
PSIP	Pump Station Improvement Program
PSOPMP	Pump Station Operations and Preventative Maintenance Program
QA/QC	Quality Assurance/Quality Control
R&R	Rehabilitation and Replacement
RAP	Remedial Action Plan
RER-DERM	Miami-Dade Department of Regulatory Economic Resources – Division of Environmental Resource Management
SCADA	Supervisory Control And Data Acquisition
SIMPLE	Sustainable Infrastructure Management Program Learning Environment
SOP	Standard Operating Procedures
SORP	Sewer Overflow Response Plan
SPP	Spare Parts Program
SSES	Sanitary Sewer Evaluation Survey
SSO	Sanitary Sewer Overflow
SSAMP	Sewer System Asset Management Program
USACE	U.S. Army Corps of Engineers
WERF	Water Environment Research Foundation
WWCTLD	Wastewater Collection and Transmission Line Division
WCTS	Wastewater Collection and Transmission System
WWTMD	Wastewater Treatment and Maintenance Division
WWTP	Wastewater Treatment Plant
WWTP OMP	Wastewater Treatment Plant Operations and Maintenance Program
VSC	Volume Sewer Customer
VSCO	Volume Sewer Customer Ordinance

00.02 Glossary

Building Backup: A wastewater release or backup into a building or private property that is caused by blockages, flow conditions, or other malfunctions in Miami-Dade's wastewater collection and transmission system (WCTS) and which is considered a Sanitary Sewer Overflow under the Consent Decree. A wastewater backup or release that is caused by blockages, flow conditions, or other malfunctions of a Private Lateral or internal building plumbing is a Private Building Backup, not a Public Building Backup, and is not considered a Sanitary Sewer Overflow.

Capacity, Management, Operations, and Maintenance (CMOM): A program of accepted industry practices to properly manage, operate, and maintain sanitary wastewater collection, transmission, and treatment systems, investigate capacity constrained areas of these systems, and respond to sanitary sewer overflow (SSO) events.

Closed-circuit Television (CCTV): Technology by which Miami-Dade inspection crews and/or its outside contractors use a video camera to visually inspect the internal condition of pipes and sub-surface structures.

Consent Decree (CD): The Consent Decree, Case: 1:12-cv-24400-FAM, entered between Miami-Dade County, Florida (Defendant), the State of Florida, the Florida Department of Environmental Protection, and the U.S. Environmental Protection Agency (Plaintiffs).

Consent Decree Program Management and Construction Management Team (CD PMCM): The professional services consulting team competitively selected by the County to support MDWASD in the implementation of the requirements of the CD.

Environmental Protection Agency (EPA): United States Environmental Protection Agency and any of its successor departments or agencies.

Fats, Oils, and Grease (FOG) Control Program: "FOG" refers to fats, oils, and grease, which are generated by residents and businesses processing or serving food and other products. A FOG Control Program aims to prevent FOG accumulation in sewer systems.

Florida Department of Environmental Protection: State of Florida Department of Environmental Protection and any of its successor departments or agencies.

Force Mains: Any pipe that receives and conveys, under pressure, wastewater from the discharge side of a pump. A force main is intended to convey wastewater under pressure.

Force Main Operations, Preventative Maintenance, and Assessment / Rehabilitation Program (FMOPMARP): The Consent Decree stipulated CMOM deliverable that sets forth the protocols and procedures associated with the operations and maintenance of the force main transmission system (FMTS).

Geographic Information System (GIS): A system consisting of hardware, software, and data that is designed to capture, store, and analyze geographically-referenced information.

Gravity Sewer Line or Gravity Sewer: Pipes that receive, contain, and convey wastewater not normally under pressure, but are intended to flow unassisted under the influence of gravity.

Gravity Sewer System Operations and Maintenance Program (GSSOMP): The Consent Decree stipulated CMOM deliverable that sets forth the protocols and procedures associated with the operations and maintenance of the gravity sewer system (GSS).

Infiltration: As defined by 40 CFR § 35.2005(b)(20) shall mean water other than wastewater that enters the WCTS (including sewer service connections and foundation drains) from the ground through such means as defective pipe, pipe joints, connections, or manholes.

Inflow: As defined by 40 CFR § 35.2005(b)(21) shall mean water other than wastewater that enters the WCTS (including sewer service connections) from sources such as, but not limited to, roof leaders, cellar drains, yard drains, area drains, drains from springs and swampy areas, manhole covers, cross connections between storm sewers and sanitary sewers, catch basins, cooling towers, storm water, surface runoff, street wash waters, or drainage.

Infiltration and Inflow (I/I): The total quantity of water from inflow, infiltration, and rainfall-induced infiltration and inflow without distinguishing the source.

Lift Station: A facility in the WCTS (not at the wastewater treatment plants) comprised of pumps which lift wastewater to a higher hydraulic elevation, including related electrical, mechanical, and structural systems necessary to the operation of the lift station (referenced in this document as pump station). As defined in MDWASD's 1996 O&M Manual, lift stations discharge to a downstream gravity main.

Manhole or Junction Box: Part of the gravity sewer system. A structure that provides a connection point for gravity lines, private service laterals, or force mains, as well as an access point for maintenance and repair activities.

Miami-Dade: Miami-Dade County, Florida, including all of its departments, agencies, instrumentalities such as the Water and Sewer Department and the Department of Regulatory and Economic Resources, and any successors thereto.

NPDES: The National Pollutant Discharge Elimination System (NPDES) authorized under Section 403 of the Clean Water Act (CWA).

Nominal Average Pump Operating Time (NAPOT): The NAPOT is defined as the daily average total pump operating hours for the previous twelve months divided by one less than the total number of pumps installed in the station. The criteria from the First Partial Consent Decree and the Second and Final Partial Consent Decree requires that each pump station operate at a nominal average pump operating time of less than or equal to 10 hours per day, or the equivalent based on power usage, with exceedances of the criteria requiring a Remedial Action Plan and no building permits issued for connection to the WCTS upstream of that station. The NAPOT requirement is currently part of the local Volume Sewer Customer Ordinance (VSCO).

Private Lateral: The portion of a sanitary sewer conveyance pipe that extends from a single-family, multifamily, apartment or other dwelling unit, or commercial or industrial structure to which wastewater service is or has been provided up to the property line of such structure or to a public sewer in a proper easement.

Prohibited Bypass: The intentional diversion of waste streams from any portion of a treatment facility which is prohibited pursuant to the terms set forth at 40 CFR § 122.41(m).

Public Document Repository (PDR): The Miami-Dade Water and Sewer Department (MDWASD) is required to make a copy of CD designated deliverables available within one business day from the submission of the deliverable to EPA/FDEP in a PDR. MDWASD's PDR is located at 3071 SW 38th Ave and the Miami-Dade Water and Sewer Department's website, http://www.miamidade.gov/water.

Public Lateral: The portion of a sanitary sewer conveyance pipe that extends from the private lateral, which typically has a cleanout located at the property line or at the easement line, to the sewer main.

Pump Station: A facility in the WCTS (not at the WWTPs) comprised of pumps which transport wastewater from one location to another location, including all related electrical, mechanical, and structural systems necessary to that pump station. As defined in MDWASD's 1996 O&M Manual, pump stations discharge to a force main, to a booster station, or to a WWTP.

Pump Station Operations and Preventative Maintenance Program (PSOPMP): The Consent Decree stipulated CMOM deliverable that sets forth the protocols and procedures associated with the operations and maintenance of the sewer pump station system.

Sanitary Sewer Overflow (SSO): Any discharge of wastewater to waters of the United States or the State from Miami-Dade's WCTS through a point source not permitted in any NPDES permit, as well as any overflow, spill, or release of wastewater to public or private property from the WCTS that may or may not have reached waters of the United States or the State, including building backups. A wastewater overflow, backup, or release that is caused by blockages, flow conditions, or other malfunctions of a Private Lateral or internal building plumbing is not a SSO. MDWASD refers to SSOs that are roughly 50,000 gallons or more, on-going, or endanger public health or the environment as "major spills," with the Water Quality Impact Committee (WQIC) making the determination as a group as to which spills are considered major spills requiring public notifications.

Sewer Overflow Response Plan (SORP): The SORP provides structured guidance, including a range of field activities to choose from, for a generalized uniform response to overflows, backups, or releases.

Sewer System: The Wastewater Collection and Transmission System (WCTS) and the Wastewater Treatment Plants (WWTPs).

Supervisory Control and Data Acquisition (SCADA) System: A system of automated sensory control equipment that monitors the operation of a portion of the lift stations (or pump stations) within the collection system. The SCADA system is designed to convey alarms when predetermined conditions occur. Monitoring parameters may include, but are not limited to, power failures, high wet well levels, pump failures that could potentially cause overflows, excessive pump runtimes, or other alarm set points as may be determined by system operators.

Wastewater Collection and Transmission System (WCTS): The municipal wastewater collection, and transmission system, including all pipes, force mains, gravity sewer lines, pump stations, manholes, and appurtenances thereto, which are owned or operated by Miami-Dade Water and Sewer Department designed to collect and convey municipal sewage (domestic, commercial, and industrial) to Miami-Dade's WWTPs.

Wastewater Treatment Plant (WWTP): Devices or systems used in the storage, treatment, recycling, and reclamation of municipal wastewater and include all facilities owned, managed, operated, and maintained by Miami-Dade Water and Sewer Department, including but not limited to the North District WWTP, the Central District WWTP, and the South District WWTP, and all components of those plants.

WWTP Operations and Maintenance Program (WWTP OMP): The Consent Decree stipulated CMOM deliverable that sets forth the protocols and procedures associated with the operations and maintenance of the wastewater treatment plants.

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01. Introduction

The Miami-Dade Water and Sewer Department (MDWASD) prepared this Sewer System Asset Management Program (SSAMP) in compliance with Paragraph 19(d) of the Consent Decree (CD) between Miami-Dade County (County) and the plaintiffs, the United States of America, the State of Florida (State), and the Florida Department of Environmental Protection (FDEP), adjudicated by the United States District Court for the Southern District of Florida in Case No. 1:12-cv-24400-FAM. The CD requires MDWASD to develop, submit, finalize, and implement plans for the continued improvement of its wastewater collection and transmission system (WCTS) and wastewater treatment plants (WWTPs) to eliminate, reduce, prevent, or otherwise control sanitary sewer overflows (SSOs).

01.01 Overview of the Existing Asset Management Program

MDWASD's existing SSAMP centers around the Infor EAM® software solution, developed by Infor Global Solutions. Infor EAM serves as the Department's Enterprise Asset Management System (EAMS) and is used to track assets, spare parts inventory, and the maintenance work performed on their assets within the Wastewater Collection and Transmission Line (WWCTLD), Pump Station (PSD), and Wastewater Treatment and Maintenance (WWTMD) Divisions.

Other software solutions support and augment EAMS to deliver a more complete set of software tools within the context of asset management. A Geographical Information System (GIS) maintains an asset repository in parallel with EAMS for sewer system assets managed by MDWASD. Under the requirements of the CD Paragraph 19(c)(x), MDWASD is actively collecting data and creating missing assets in its GIS. Several modules in the Oracle Financials system are also employed to various degrees in Asset Management. The Oracle Customer Care and Billing (CC&B) module is integrated with EAMS and sends actionable service orders to EAMS as work orders. The Oracle Procurement module is also integrated with EAMS. Procurement activities are executed in Oracle with the purchase information being passed to EAMS so that users can accurately track quantities and unit prices of available parts. Work schedules are predicated on part availability, and work costs rely on accurate repair part costing, making this integration integral to asset management decisions. A Spills Database is

used to record SSO spills. The spills data is not stored in the EAMS database, but is accessible via EAMS and should be used in asset management program decisions.

Infor EAM includes the following software capabilities (those of which are used by MDWASD are bolded):

- **Asset hierarchy management. Keeps track of where assets are located and what they cost with the help of a "family tree" that connects equipment, systems, and locations.**
- Budget management. Automates everything relating to an organization's annual budget, from creation to calculating what it takes to maintain.
- Inspection management. Generates automatic notification of an asset problem when an inspection exceeds a preset limit, and allows the user to troubleshoot the problem.
- **Purchasing management. Requisitions spare parts and tracks delivery times, vendor payments, and receipt of goods.**
- **Work management. Tracks and manages all asset work requests, labor, planning, and scheduling.**
- **Materials management. Monitors and controls storeroom inventories with tools that include economic order quantity with class calculations and assignments, support parts receipts, issues, returns, and cycle counts.**
- **Mobile tools. Tools that can be used in either field or office environments to facilitate ease of data input and updating, along with sophisticated reporting.**

It is intended that implementation of the SSAMP will continue to leverage the significant investments in data and technology that MDWASD has already made in EAMS.

While the technology components required to support an Asset Management Program are largely in place, MDWASD has not fully leveraged them to support the development of tools and methodologies that focus on whole-life asset cost analysis, reduction of downtime, minimizing costs, maximizing resources and making repair / rehabilitation / replacement decisions as required by the CD. Each division performs periodic activities to analyze the data within these

systems, but none has any dedicated staff whose main focus is to drive improvement across the organization.

01.02 Regulatory Drivers

Compliance with the requirements of the Clean Water Act (CWA) is the primary regulatory driver for the SSAMP. MDWASD negotiated the terms of the CD with EPA and FDEP in response to violations of the CWA, which consisted of unpermitted discharges of untreated sanitary sewage into waters of the United States from the WCTS and which are referred to as SSOs.

To support realization of the CD's goal of reducing, preventing, or otherwise controlling SSOs and prohibited discharges to waters of the United States, Paragraph 18 of the CD requires MDWASD to continue programs initiated under previous CDs; and Paragraph 19 stipulates the development of new Capacity, Management, Operations, and Maintenance (CMOM) programs across all areas of the wastewater collection, transmission, and treatment systems, specifically including: pump stations, force mains, gravity sewers, and wastewater treatment plants. Paragraph 18 "existing" programs and Paragraph 19 "new" programs are listed below. The CD Programs listed in ***bold italics*** have direct impact on elements and requirements of the SSAMP.

1. 18 (a) Adequate Pumping, Transmission and Treatment Capacity Program (APTTC);
2. 18 (b) Pump Station Remote Monitoring Program (PSRM);
3. ***18 (c) WCTS Model;***
4. ***18 (d) Spare Parts Program (SPP);***
5. 18 (e) Volume Sewer Customer Ordinance (VSCO) Program;
6. 19 (a) Fats, Oils, and Grease (FOG) Control Program;
7. ***19 (b) Sewer Overflow Response Plan (SORP);***
8. ***19 (c) Information Management System (IMS) Program;***
9. ***19 (e) Gravity Sewer System Operations and Maintenance Program (GSSOMP);***
10. ***19 (f) Pump Station Operations and Preventative Maintenance Program (PSOPMP);***

11. ***19 (g) Force Main Operations, Preventative Maintenance and Assessment / Rehabilitation Program;***
12. ***19 (h) WWTP Operations and Maintenance Program (WWTP OMP);***
13. ***19 (i) Specific Capital Improvements Projects;*** *and*
14. ***19 (j) Financial Analysis Program.***

Paragraph 19(d) requires MDWASD to develop a SSAMP that maintains a desired level of service for Miami-Dade's sewer system considering life cycle cost to ensure compliance with regulatory requirements and this CD. Within twenty-two months after the Effective Date of the CD, Miami-Dade shall submit to EPA and FDEP for review and comment a SSAMP, including a schedule for full implementation of the program. The SSAMP shall include the following components:

- Paragraph 19(d)(i). "A current condition assessment of all sewer system components, including, but not limited to; pump station components, gravity sewer lines, manholes, siphons, aerial crossings, force mains, etc. Miami-Dade may use data gathered from its latest round of Infiltration/Exfiltration/Inflow sewer assessments as a baseline conditional assessment to meet this component";
- Paragraph 19(d)(ii). "A statement of the level of service Miami-Dade intends to provide the customers it serves considering life cycle cost to ensure compliance with regulatory requirements and this CD";
- Paragraph 19(d)(iii). "The identification of critical assets within the sewer system that are absolutely necessary to have in service to maintain the developed level of service";
- Paragraph 19(d)(iv). "The identification of minimum life cycle costs for each critical asset"; and
- Paragraph 19(d)(v). "A long-term funding plan to fully implement and be able to pay for all identified life cycle costs for each critical asset. The long-term funding plan shall include all potential sources of revenue and the likelihood of securing funding from each source."

In addition to the specific requirements of Paragraph 19, the CD references specific guidance tools which support the incorporation of industry CMOM "best-practices" in municipal wastewater utility operations. Industry CMOM best-practices are those core WCTS management attributes commonly found in highly performing utilities and often include adoption of asset and life cycle cost management concepts through implementation of preventative and predictive management policies and procedures. Reductions in reactive and emergency maintenance and repair activities leading to reductions in SSOs demonstrate the effectiveness of these best-practices. The CD requires concurrent development and implementation of fifteen separate management programs (i.e., the fourteen listed above plus this SSAMP). The programs' inherent interdependencies require an interdisciplinary and integrated approach to wastewater system management, operations, and management.

01.03 Miami-Dade County Organization

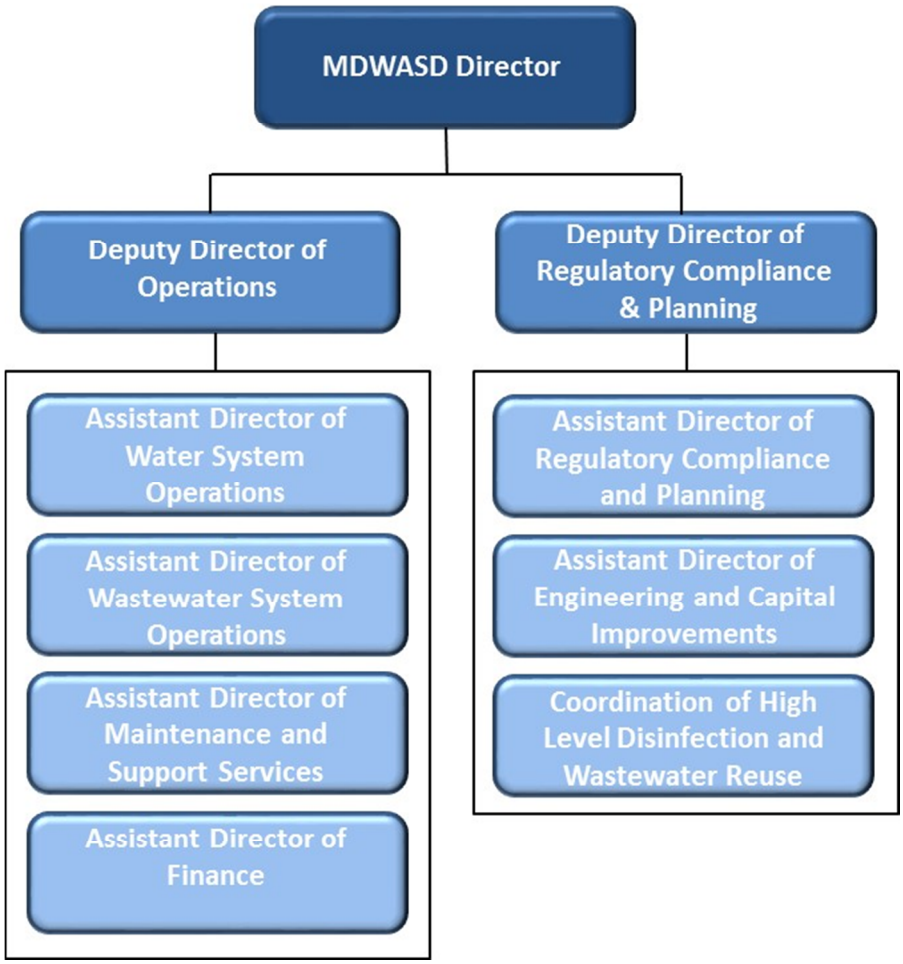
The County operates under Home-Rule Authority granted by the Florida State Constitution. The unincorporated areas of Miami-Dade County are governed by the 13-member Board of County Commissioners (Commission). The County government provides major metropolitan services countywide and city-type services for residents of the unincorporated areas. Miami-Dade County has a Mayor who oversees the day-to-day operations of the County. The County is organized into multiple Departments, each led by a Mayor-appointed Director.

The County's water and wastewater utilities are organized and managed under MDWASD. As shown in Figure 01.1, two Deputy Directors manage MDWASD under the authority of the Director: the Deputy Director of Operations and the Deputy Director of Regulatory Compliance and Capital Improvements.

The WWCTLD has the primary responsibility to respond to SSO events relating to gravity sewer and force main assets. The PSD has the primary responsibility to respond to SSO events relating to pump station assets. The WWTMD has the primary responsibility to respond to SSO events related to treatment plant influent pump station assets as well other discharges of partially treated sewage at the treatment plants. Each of these Divisions reports to the Assistant Director for Wastewater System Operations.

The Information Technology (IT) Division reports to the Deputy Director of Operations, and is responsible for supporting and managing MDWASD's computing systems.

Figure 01.1
MDWASD Organization Chart



01.04 SSAMP Organization

This SSAMP is organized to meet both the requirements of the CD as well as MDWASD'S business needs. The SSAMP organization is listed in Table 01.1. Where applicable, the corresponding CD Paragraph reference is listed adjacent to the section or subsection name and the associated document page number.

Table 01.1
Location of CD Requirements in the SSAMP

CD Paragraph	SSAMP Section	Page #
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02. SSAMP Purpose and Goals

In accordance with the CD requirement to establish a written, defined purpose and written, defined goals, Section 02.01 provides the SSAMP purpose and Section 02.02 provides the SSAMP goals. Additionally, Section 02.03 introduces industry best practices for implementing asset management programs.

02.01 SSAMP Purpose

The purpose of the SSAMP is to provide an asset management framework to include: 1) an asset management policy, 2) an asset management strategy, 3) asset management objectives, and 4) specific asset management plans. The asset management policy identifies and communicates MDWASD's asset management principles and CD requirements and guides the development and implementation of the asset management strategy and objectives. The asset management policy can be likened to a high-level, long-term action plan. The asset management strategy identifies and communicates MDWASD's long-term optimized approach to asset management, as derived from the principles established in the asset management policy. The asset management objectives identify and communicate the specific and measurable outcomes required of the sewer system assets to meet the overall asset management program defined levels of service. The asset management plans are those specific documents detailing the activities, resources, and timelines for the operation, management, rehabilitation, and replacement of the various sewer system assets in accordance with the defined levels of service. The asset management policy and strategy are strategic in nature while the asset management objectives and plans are tactical. As directed by the EPA and FDEP in the CD, MDWASD's SSAMP will:

- Define the expected level of service it intends to provide the customers it serves considering life cycle cost to ensure compliance with regulatory compliance and the CD;
- Develop a data and technology framework in which asset condition for sewer system components is maintained such that current asset condition is considered in asset operation, maintenance, rehabilitation, and replacement decisions;

- Develop a data and technology framework in which asset criticality for sewer system components is maintained such that the current asset criticality is considered in achieving the stated level of service;
- Develop a data and technology framework such that minimum life cycle costs can be developed for critical assets and future funding requirements can be projected into the future;
- Develop a sustainable process to determine the long-term funding plan for all identified life cycle costs for critical assets; and
- Develop a list of potential sources of revenue and the likelihood of securing funding from each source to fund the required infrastructure improvements in perpetuity.

02.02 SSAMP Goals

The goal of the SSAMP is to successfully implement an asset management program that is in compliance with the requirements of the CD and provides benefits to MDWASD. In order for the SSAMP to meet the CD requirements, MDWASD must establish asset management as a critical element of MDWASD's operations by providing the needed organizational structure, staffing, and technology, as follows:

- Develop an asset management culture based on industry best practices that is used for all asset-based decision making to minimize life cycle costs;
- Implement life cycle asset management balanced by current and future capacity requirements as a foundational premise for decision making related to asset acquisition, operations, renewal, and disposal; and
- Accurately plan for future asset renewal and replacement costs and develop a funding strategy to meet those financial requirements.

This document defines the implementation of the SSAMP and provides a schedule of specific recommendations intended to transition this program into full deployment.

03. Phased SSAMP Plan Development

SSAMP development and implementation will be phased to ensure cohesiveness and proper integration of the SSAMP with other CD-required CMOM Programs currently under development. The SSAMP relies upon the management and implementation efficiency gained through incorporation of specific knowledge area policies, procedures, activities, technologies, and tools inherent to other CMOM Programs. Portions of the SSAMP that are independent of other CD activities will be initiated per the implementation schedule upon approval of this document. Portions of the recommended SSAMP activities that will require integration of efforts to be performed as part of other CD components will be part of the phased implementation process. The phased implementation is summarized in Section 03.02, Planned Support Activities, below, as well as noted in the applicable detailed section of this document devoted to that particular implementation activity.

03.01 SSAMP Plan Review and Revision

In accordance with the CMOM philosophy of continuous improvement, MDWASD has developed internal performance measures as described in Section 04, SSAMP Performance Measures, to evaluate SSAMP progress toward established goals. Performance reports will be generated and evaluated on an annual basis.

As part of the annual performance reviews, the defined performance measures may be modified to better suit the business needs of MDWASD. Material changes to the SSAMP performance measures will be submitted to the EPA/FDEP for review and approval and documented in the Annual Report submitted to EPA/FDEP as part of CD reporting compliance.

During the annual review, a ‘lessons learned’ session will be conducted. MDWASD will consider the lessons learned and adjust any policy, strategy, objective, plan, procedure, task, metric, service level, or other program component to continuously improve the SSAMP and other affected programs. The annual review will also include a review of the effects of other CMOM Programs, changing conditions, revisions to regulatory requirements, and other factors that may impact the Asset Management Program. As the SSAMP matures, less frequent evaluations may

be recommended. The results will continue to be documented in the Annual Report to EPA/FDEP as part of CD reporting compliance.

03.02 Planned Supportive Actions

The proposed SSAMP depends on other CMOM Programs under development or previously submitted to EPA/FDEP and awaiting approval. The disparity between the required EPA/FDEP submittal dates for these CMOM Programs not only demonstrates a need for a phased implementation approach, but the need to consolidate the CMOM Program implementation schedules such that components that are common across programs are implemented simultaneously and components that are dependent upon one another are implemented in a logical order. After submittal to EPA/FDEP of other CMOM Programs, MDWASD will submit a proposed consolidated implementation plan and schedule to include all components across the interdependent CMOM Programs. This will facilitate the task of tracking implementation of CMOM programs, individual CMOM program elements, required resources, and schedules.

Implementation of the SSAMP is contingent upon distinct CD controlled and non-CD controlled predecessors. These include, but are not limited to:

- Submittal, and subsequent EPA/FDEP approval, of the Gravity Sewer System Operations and Maintenance Program (GSSOMP), Pump Station Operations and Preventative Maintenance Program (PSOPMP), Force Main Operations, Preventative Maintenance, and Assessment / Rehabilitation Program (FMOPMARP), Wastewater Treatment Plant Operations and Maintenance Program (WWTP OMP), and the Information Management System (IMS) Program;
- Implementation of portions of the GSSOMP, PSOPMP, FMOPMARP, and WWTP OMP components, each of which will generate updated asset inventories and condition assessment data;
- Allocation and acquisition of SSAMP staffing and funding resources to develop a team of asset management operational specialists; and

- Selection, acquisition, and implementation of the necessary software systems to manage the massive amount of asset data and implement the complex life cycle costing algorithms.

03.02.1 Phased Implementation Actions

The proposed staffing and associated funding for the phased implementation of the SSAMP is detailed in Section 11, Staffing and Funding Plan. Table 03.1 summarizes the key implementation activities. Implementation of these activities will require additional staff and equipment as detailed in Table 11.1 in Section 11 as well as the consultant/vendor resources.

03.02.2 Implementation Schedule

The SSAMP will be implemented in phases. Upon EPA/FDEP approval of this SSAMP and the other CMOM Programs for which SSAMP dependencies exist, the activities listed in Table 03.1 will be implemented.

Table 03.1
Proposed SSAMP Phased Implementation Activities

Start Date (From Authorization)	Approximate Duration	Abbreviated Description
Implementation Effort to Execute Requirements of CD Paragraphs 19(d)(i-iv)		
0 months	6 months	Hire or Appoint an Asset Management Program Manager
6 months	2 months	Develop / Assemble Program foundational elements such as Policies, Strategies, Objectives and Plans
6 months	42 months	Oversee / guide / facilitate the implementation of the Sewer System Asset Management Program (SSAMP) activities
6 months	42 months	Oversee / guide / facilitate the implementation of the O&M Plans defined in the Gravity Sewer System Operations and Maintenance Program (GSSOMP)
6 months	42 months	Oversee / guide / facilitate the implementation of the O&M Plans defined in the Force Main Operations, Preventive Maintenance Assessment / Rehabilitation Program (FMOPMARP)
6 months	42 months	Oversee / guide / facilitate the implementation of the O&M Plans defined in the Pump Station Operations and Preventive Maintenance Program (PSOPMP)
6 months	42 months	Oversee / guide / facilitate the implementation of the O&M Plans defined in the Wastewater Treatment Plant Operations and Maintenance Program (WWTP OMP)
30 months	2 months	Define the organizational resource needs (skillsets and number of resources) to sustain the SSAMP and O&M Plans beyond their initial execution
32 months	6 months	Hire or assign resources to the Asset Management program Team
Implementation Effort to Execute Requirements of CD Paragraph 19(d)(v)		
6 months	9 months	Perform market research to identify the potential software tools/products that support asset-based life cycle costing and work with MDWASD's existing computing environment.
15 months	9 months	If necessary, develop and issue an RFQ, select a solution (new product or new functionality implemented on an existing product), and implement the solution on MDWASD systems.
24 months	18 months	Implement the life cycle costing product, one Division at a time. Replicate the effort across the entire MDWASD WCTS dataset. (Note that asset inventories, identification of critical assets, and condition assessments must be available for these analyses to be performed).
42 months	12 months	Use the software to perform multiple life cycle costing what-if scenarios.
54 months	3 months	Select one proposed life cycle costing scenario for future cost projections.
57 months	3 months	Develop long term life cycle cost projections for 5 to 50 year planning period.

04. SSAMP Performance Measures

In accordance with the CD requirement that MDWASD establish performance measures and develop written procedures for periodic review, Section 04.01 establishes the purpose for the performance measure program; Section 04.02 lists the performance measures which will be adopted by the SSAMP Team in the periodic measurement of its performance; and Section 04.03 describes the on-going evaluation and review activities.

04.01 Purpose of Performance Measures

Performance measures, which compare actual performance against an established performance standard, benchmark, target, or LOS, help identify the relative health of specific operational areas. As Asset Management is not an operating division, but rather a support group for the MDWASD operating divisions, traditional operational Key Performance Indicators (KPIs) are not appropriate to track the progress of the SSAMP. The performance measures that are relevant for the SSAMP will be those that track the progress of the SSAMP towards its goals. Therefore, MDWASD will develop performance measures (or leverage existing industry performance measures) to measure SSAMP progress.

04.02 Established Performance Measures

The Institute of Asset Management (IAM) offers an organizational maturity assessment tool that includes established industry best practice performance measures. MDWASD will use the IAM maturity assessment model to measure the state of this SSAMP against industry standard benchmarks. The IAM maturity assessment tool interviews individuals within the organization to rank the organization on a scale of 0 (low) to 4 (high) for 39 different criteria related to an asset management program. These criteria are listed in Appendix A. Responses from the interviewees are aggregated and reported within the tool via a radar chart and a bar chart.

As an initial task in implementing the SSAMP, a baseline asset management maturity score will be assessed for MDWASD's Wastewater Operations Divisions. Each of the divisions will be represented by at least two key divisional staff. Each representative will respond to the 39

criteria. Their results will be consolidated in a single assessment workbook. The aggregated results of the assessment will serve as the baseline for the SSAMP.

04.03 Performance Metric Reviews and Revisions

Since one purpose of MDWASD'S CMOM Programs is to achieve continuous improvement, MDWASD will periodically assess the maturity of the SSAMP. Re-assessment will be performed in the same manner that the baseline was set. If available, the same individuals who performed the assessment in the previous year will be interviewed for future assessments. When not available, the individual who succeeds the previously involved individual will be interviewed. Year-over-year improvement of the mean score will constitute improvement of the program. If MDWASD feels strongly that certain asset management functions have a greater impact than others, the Asset Management Program Team may elect to set specific improvement goals, such as a goal average score for select criteria that they wish to achieve in future years. The periodic reviews will be designed to identify areas where additional resources or attention is required to meet the target of continuous improvement.

MDWASD'S pool of individuals that will participate in the SSAMP assessment consists of individuals from four staff levels: Chiefs/Supervisors, Maintenance Staff, Treatment Plant Operators, and Support System Staff. Individuals within each of the four staff levels are listed below:

Chiefs/Supervisors:

- The WWCTLD Chief (or delegate);
- The PSD Chief (or delegate);
- The WWTMD Chief (or delegate);
- The IT Division Chief (or delegate);
- Engineering Division Chief (or delegate); and
- Planning Division Chief (or delegate)

Maintenance Staff:

- Assistant Superintendents (as assigned by the respective Division Chief);

- Maintenance Supervisors (as identified by the respective Assistant Superintendents); and
- Maintenance Technicians (as identified by the respective Maintenance Supervisors).

Treatment Plant Operators:

- WWTP Chief Operators; and
- WWTP Operators (as identified by the respective Plant Chief Operators).

Support System Staff:

- GIS Staff;
- EAMS Technical Team;
- EAMS Functional Team; and
- Procurement Personnel.

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05. Establishing an Asset Management Program

The CD Paragraph 19(d) requires MDWASD to establish a SSAMP. The SSAMP is to ensure that the WCTS maintains a desired level of service for MDWASD's sewer system considering life cycle cost to ensure compliance with regulatory requirements and the CD.

05.01 Asset Management Program Overview

The SSAMP portion of the CD requires a significant level of effort to satisfy. Not only does condition information need to be collected and maintained across a large spectrum of sewer system assets, but that data will need to be managed, disseminated, and analyzed in such a way that it supports level of service achievement, asset life cycle operations, asset / equipment maintenance, and asset management financing strategies across the organization as described in other requirements.

To meet the SSAMP requirements, MDWASD will establish a sustainable Asset Management Program that drives asset-related improvements across the various operational divisions. MDWASD will develop and maintain the following Asset Management Program system components:

- Asset management policy;
- Asset management strategy, objectives, and plans;
- Asset management enablers and controls;
- Asset management performance assessment metrics and improvement plans;
- Management review and program improvement process

MDWASD will execute the following data collection / development activities as defined in other CD documents prior to full implementation of the SSAMP as they are directly related to the development of foundational data required for making asset-related decisions:

- Perform Asset Condition Assessments
- Identification of Critical Assets

MDWASD will perform the following activities as necessary throughout the execution of the preceding data collection / development activities such that as the asset management foundational data becomes complete and usable, the Asset Management Program Team is staffed with the appropriate number of qualified resources to sustain the Program:

- Identify the organizational structure of the Asset Management Program Team within the MDWASD organization;
- Identify / hire / appoint / train the Asset Management Program staff

The development of the SSAMP organizational structure within MDWASD and the staffing of this organization is intentionally sequenced toward the end of the implementation of the SSAMP and various CMOM Programs. There are several reasons for this:

- During the SSAMP and O&M Programs' implementations, a set of foundational data will be developed upon which the asset management program will function. As the foundational data matures, the Asset Management Program Manager may elect to leverage existing Divisional staff to execute asset management activities in lieu of extensive up-staffing and new hires. Also, the new Asset Management Program Manager may elect to expand the responsibilities of the program to include more ISO-55000 standard functions, which may require even more staff.
- During the SSAMP and O&M Programs implementations the location of the Asset Management Program Team within the MDWASD organizational structure will be determined. The Asset Management Program Manager will provide input into this decision as it will be their responsibility to foster an environment receptive to a new way of thinking about assets. Additionally, MDWASD is currently developing a CMOM program for their water divisions which will also include an Asset Management Program. Once both Asset Management Programs are defined, MDWASD may see value in a consolidated AMP across all operating divisions instead of two stand-alone programs.

Pursuant to the CD requirements, MDWASD will develop the following asset management system components:

1. **Asset Management Policy.** MDWASD will authorize an overall asset management policy that identifies a set of principles and mandated requirements consistent with the

organization's strategic plan, providing a framework for the development and implementation of an asset management strategy and the establishment of the asset management objectives.

2. **Asset Management Strategy.** MDWASD Asset Management Team will establish, document, implement, and maintain an asset management strategy, to be authorized by senior management, that establishes a long-term approach to management of the sewer system assets / asset systems / equipment and is derived from and consistent with the asset management policy and the organization's strategic plan.

3. **Asset Management Objectives.** MDWASD Asset Management Team will establish, document, implement and maintain a set of asset management objectives that:

   a. Identify specific and measurable outcomes required of the sewer system asset systems in order to implement the organization's asset management policy and asset management strategy;

   b. Identify levels of performance and conditions required of the assets / asset systems / equipment; and

   c. Identify specific and measurable outcomes required of the overall asset management system.

4. **Asset Management Plans.** MDWASD Asset Management Team will establish, document, implement, and maintain a series of asset management plans specifying the activities, resources, responsibilities, required outcomes, and timescales for achieving CD compliance and delivering upon the asset management strategy and asset management objectives. The following CMOM Program related asset management plans are currently being developed and / or implemented per the CD requirements:

   a. Wastewater Treatment Plant Operations and Maintenance Program (WWTP OMP);

   b. Pump Station Operations and Preventative Maintenance Program (PSOPMP);

   c. Force Main Operations, Preventative Maintenance, and Assessment / Rehabilitation Program (FMOPMARP); and

   d. Gravity Sewer System Operations and Maintenance Program (GSSOMP).

Additionally, as part of the SSAMP requirements of the CD, MDWASD Asset Management Program Team will establish, document, implement, and maintain the following supportive asset management system components, as addressed elsewhere in this SSAMP:

- Authoritative condition assessment data repositories and condition assessment methodologies for each of the sewer system asset classes, leveraging work from other CD compliance activities, where possible and appropriate;
- Technology components required to perform the condition assessments; collect, manage, analyze, and disseminate the resulting asset condition data; and leveraging existing information management applications and system components where applicable;
- Dedicate the required staffing resources and invest in the appropriate competency development activities needed to manage and deliver the requirements of the CD, as well as the asset management policy, asset management strategy, asset management plans, and to provide overall asset management program support including continuous improvement monitoring and support;
- Dedicate, or contract, the staff needed to perform condition assessments and provide training as appropriate;
- Perform condition assessments of all sewer system components, as required by the CD, and populate the asset condition database(s). Note that asset criticality information will be dependent upon the asset record being populated in the EAMS and/or GIS; and
- Develop and implement a long-term, full asset life cycle capital and operational budgeting and financing strategy.

All of the work identified in this section, required to meet CD requirements and further implement MDWASD's asset management system components, will take place over multiple years, as defined in the implementation schedule in Section 03. Sewer system asset condition assessments will take place on a continuous basis once the asset management system is fully operational.

05.02 Asset Management-Related Organizational Changes

MDWASD will formalize, organize, and staff an Asset Management Program Team that will be tasked with sustaining the planned SSAMP, developing additional asset management program capabilities, as necessary, and fostering a collaborative decision-making process that includes the MDWASD divisions and individuals whose roles are to support the acquisition, operation, maintenance and disposal of MDWASD assets. The Asset Management Program Manager will be identified. That individual will establish a complete Asset Management Team and recommend a location of that team within the MDWASD organizational structure. There are many activities across several CD-required programs which must be executed before the Asset Management Program Team can be defined in terms of number of staff positions and fit within the MDWASD organizational hierarchy. Activities within this SSAMP as well as within the GSSOMP, FMOPMARP, PSOPMP and WWTP OMP will develop the foundational data upon which the Asset Management Program functions. As these data collection / development activities near completion, MDWASD staff requirements and organizational structure will be finalized.

MDWASD will staff an Asset Management Program Manager to oversee and facilitate the execution of these activities. At the appropriate time, the Asset Management Program Manager will define the Asset Management Team's staffing needs and recommend a fit within the organization such that their team can successfully evolve into a sustainable asset management program. During the time when the Asset Management Program Manager is overseeing and facilitating the execution of the various activities that necessarily precede the establishment of the Asset Management Program Team, they will be able to evaluate the current MDWASD asset management system and process support teams as well as the new staff positions and teams established under the four (4) O&M Programs for Gravity Sewers, Force Mains, Pump Stations and Wastewater Treatment Plants. MDWASD envisions that the following skillsets will be part of the final Asset Management Program Team:

- **Leadership**. Leaders from the Asset Management Program Team, Wastewater Collection and Transmission Line Division (WWCTLD), Pump Stations Division (PSD), Wastewater Treatment and Maintenance Division (WWTMD), Engineering Division, and Planning Division, at a minimum, will provide leadership to the Asset Management Program Team.

- **Process Support.** Individuals with in-depth knowledge of MDWASD asset-related processes such as asset acquisition, operation, maintenance and disposal as well as tangential processes such as repair material procurement and work contracting, will provide support to existing users on the execution and optimization of these existing processes. These individuals will also provide process training and re-training to new and existing MDWASD staff.
- **System Support.** Individuals with expertise in the use and configuration of the information systems used to capture asset-related data such as Infor EAM, Esri GIS and MORS will provide support to existing users on the use and improvement of these existing systems and any new systems introduced in the future. These individuals will also provide system training and re-training to new and existing MDWASD staff.
- **Reliability Engineering.** Individuals with expertise in reliability engineering and asset optimization will provide decision-making guidance, tools and analysis to the divisions that require support related to repair / rehabilitate / replace decisions, capacity analysis, asset operation, preventive / predictive maintenance plan development and frequencies, asset maintenance strategies, capital planning and other asset-related decisions.
- **Financial Analysts / Economists**. Individuals with expertise in financial analysis such as net present value, internal rate of return, future cost projections, sensitivity analysis, effect on level of service, and other complex data-driven financial analyses as required by the organization.

05.03 Asset Management-Related Staffing Requirements

In order to successfully implement and maintain its planned asset management program, MDWASD may need to allocate several new resources / staff positions within its Asset Management Program Team. A description of the skillsets that MDWASD anticipates will be part of the Asset Management Program Team are included in the previous section. MDWASD will identify the specific positions, staffing levels, training, and organizational reporting structures needed to support the organization's asset management system objectives at the appropriate time during the execution of the data collection / development activities defined in this SSAMP and the four O&M Programs.

06. Condition Assessment of Sewer System Components

Per the CD, Paragraph 19(d)(i) the SSAMP shall include the following component:

(i) A current condition assessment of all sewer system components, including, but not limited to, pump station components, gravity sewer lines, manholes, siphons, aerial crossings, force mains, etc. MDWASD may use data gathered from its latest round of Infiltration/Exfiltration/Inflow sewer assessments as a baseline conditional assessment to meet this component.

The structure of MDWASD and the structure of the CD have led to multiple documents which define independent efforts for asset inventory and condition assessment of assets based on asset type, including:

- GSSOMP - Gravity Sewer System, including sewer lines, manholes, siphons, etc.
- PSOPMP - Pump Stations
- FMOPMARP - Force Mains
- WWTP OMP - Wastewater Treatment Plants

Under the SSAMP, the condition assessment processes in each of these four programs will be unified, as much as is reasonable, such that the divisions adopt similar condition assessment scoring methodologies and condition inspection tools.

06.01 Gravity Sewer System Asset Condition Assessment

Gravity sewer system (GSS) assets (gravity lines, siphons, manholes, etc.) are inventoried and maintained in detail in MDWASD's GIS, and each GIS record that represents a discrete maintainable asset is also represented in EAMS. The GIS / EAMS data repositories have not been kept fully up to date; however, an effort is in progress to address the deficiencies. A ten-year backlog of as-built drawings is being digitized in the GIS with the intent that all of the GIS / EAMS data will be up to date by the CD compliance deadline of June 6, 2017. Neither GIS nor EAMS currently contain any condition assessment data for GSS assets and the data update effort currently in progress is not collecting this information.

As documented in the GSSOMP, MDWASD has committed to performing condition assessment for their GSS assets. A condition score for GSS assets is calculated from the assessment of various attributes of the asset. As part of the SSAMP, tools will be developed to integrate the condition score with the asset repository in GIS or EAMS. For assets whose condition score cannot be generated by an inspection, the condition inspection scoring system will be evaluated and considered for inclusion in EAMS. At a minimum, the SSAMP will develop a process such that the scoring results from condition inspections can be imported into EAMS and posted to the EAMS asset record. Periodic asset condition inspections will be developed into a sustainable program by developing a routine within EAMS to generate inspection work orders as a regularly scheduled task.

06.02 Pump Station Asset Condition Assessment

Pump station asset hierarchy as represented in EAMS is a logical breakdown of the pump stations into asset systems and groupings. The EAMS hierarchy defines the asset framework; however, the specific asset records within the asset hierarchy are not currently maintained in the EAMS database. None of the pump station asset data in EAMS contains condition information. As part of the PSOPMP, a full asset inventory data collection effort will be performed. This effort will be focused on the collection of nameplate data and other static asset attributes. It is not intended to collect asset condition scores.

The PSOPMP does not explicitly propose to perform condition assessment of the components of MDWASD's pump stations, because it is not required by the pump station portion of the CD, but is rather required by the SSAMP portion of the CD. A PSOPMP asset condition assessment task is predicated on a full field asset inventory task in the PSOPMP to be completed first. Until the assets are discovered and set up in the EAMS system, the condition assessment cannot be performed.

MDWASD will conduct a field condition assessment of pump stations at the asset level as part of the SSAMP. A set of condition-indicating attributes will be identified for each type of asset and the attributes will be assigned a weight in terms of their importance to the condition score and a formula for aggregating the condition-inspection attribute results into a single condition score. At a minimum, the asset condition scores will be imported into EAMS and posted to the

EAMS asset record. In addition, developing the condition inspection scoring system within EAMS such that the attribute conditions are entered directly into EAMS, the condition score is calculated within EAMS, and the condition score recorded to the inspected asset will be evaluated. Future periodic asset condition inspections will be developed into a sustainable program by developing a routine within EAMS to generate inspection work orders as a regularly scheduled task.

06.03 Force Main Asset Condition Assessment

Force main system assets are shown in detail in MDWASD's GIS, and each GIS record that represents a maintainable asset is also represented in EAMS. The GIS / EAMS data repositories have not been kept fully up to date; however, an effort is in progress to address the deficiencies. As part of MDWASD's GIS improvements, the existing ten-year backlog of as-built drawings is being digitized in the GIS with the intent that all of the GIS / EAMS data, including the force main data, will be up to date by the CD compliance deadline of June 6, 2017. Neither GIS nor EAMS currently contains any condition assessment data for force main assets and the data update effort currently in progress is not collecting this information.

As documented in the FMOPMARP, MDWASD has committed to performing condition assessments of their force main assets. The condition score, referred to in the FMOPMARP as a Probability of Failure (PoF) score, is calculated using a scoring system in which key condition-indicating attributes are weighed in terms of their influence on the PoF and scored individually. The attributes identified in the FMOPMARP as having effect on an asset's PoF are age, material, operating pressure, previous assessments, and past reported failures. Once aggregated, a condition score is assigned to the asset and assets can be compared objectively. At a minimum, the SSAMP will develop a process such that the scoring results from condition inspections can be imported into EAMS or GIS and posted to the EAMS / GIS asset record. Periodic asset condition inspections will be developed into a sustainable program by developing a routine within EAMS to generate inspection work orders as a regularly scheduled task.

06.04 Wastewater Treatment Plant Asset Condition Assessment

The Wastewater Treatment and Maintenance Division's asset hierarchy in EAMS is a logical breakdown of the plant asset into processes and systems. The EAMS hierarchy defines the asset framework; however, only certain asset records within the asset hierarchy exist. Asset records exist for equipment that can be uninstalled, rebuilt / rehabilitated, and reinstalled into another system and that asset's repair history must be tracked to the asset. Where the equipment does not warrant an asset record, the EAMS equipment hierarchy terminates with a position record. The position represents the asset that functions in that spot in the system. As assets are cycled through the position, the work orders written to the position record the complete history of the assets that have been installed in that position in the system.

MDWASD has recently completed full condition assessments of each WWTP to prioritize equipment renewals and update each plant's capital improvement projects. However, this condition assessment was performed to ascertain specific projects that should be undertaken. No condition scoring system was established and no comparable condition scores were developed for specific assets or process / system.

The WWTP OMP commits to performing a criticality analysis, which includes a condition assessment, as part of the Asset Register Management Plan. MDWASD will conduct a condition assessment of WWTPs at the process / system level. As part of the SSAMP, a set of condition-indicating attributes will be identified for each type of process / system. The attributes will be assigned a weight in terms of their importance to the condition score and a formula for aggregating the condition-indicating attribute results into a single condition score will be developed. At a minimum, the condition scores will be imported into EAMS and posted to the appropriate EAMS record. In addition, developing the condition inspection scoring system within EAMS such that the attribute conditions are entered directly into EAMS, the condition score is calculated within EAMS, and the condition score recorded to the inspected record will be evaluated. Future periodic condition inspections will be developed into a sustainable program by developing a routine within EAMS to generate inspection work orders as a regularly scheduled task.

06.05 Asset Condition Assessment Implementation Approach

Three of the asset-related CD components (GSSOMP, FMOPMARP, and WWTP OMP) have within them, to varying degrees, a process to determine asset condition. The fourth (PSOPOMP) will require an asset-condition scoring system to be created within the SSAMP. However, each of those activities was defined to meet the specific needs of that program. Therefore, the SSAMP will merge and consolidate these activities to accomplish the following:

- Develop common condition rating schemes, definitions, and standards so that results will be consistent across operational boundaries;
- Add functionality to the EAMS asset tables and screens to store criticality information on a per-asset basis;
- Lead the development of asset condition assessment tools, preferably an EAMS-centric assessment tool, and ensure that the condition score is loaded into the EAMS databases. Note that condition information will be dependent on the asset record being present in EAMS for each asset;
- Develop and manage business processes to update asset condition on an ongoing basis;
- Determine staffing and provide training needed to perform condition assessments; and
- Develop a business process team to perform continuous monitoring, innovate improvements and provide support to the assessment teams.

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07. Establish Level of Service

Per the CD, paragraph 19(d)(ii) the Asset Management program shall include the following component:

(ii) A statement of the level of service Miami-Dade intends to provide the customers it serves considering life cycle cost to ensure compliance with regulatory requirements and this CD.

07.01 Level of Service Statement

The following LOS Statement has been developed for the MDWASD divisions that are affected by the current CD:

- Operate sewer system infrastructure to meet all county, state, and federal policies and regulations to provide a safe and sustainable environment;
- Construct and sustain a sewer system infrastructure to meet present and future demands;
- Maintain financial strategies which meet long-term needs at the minimum life cycle cost;
- Provide emergency response service to customers 24 hours/day, 7 days a week;
- Maintain a highly trained and safe work force that meets or exceeds county, state, and federal requirements; and
- Maintain work area safety and minimize adverse impacts to the public from sewer system operations.

07.02 Alignment of LOS to Divisional Performance Measures

Each of the three wastewater maintenance divisions (WWCTLD, PSD, and WWTMD) have developed CMOM Programs (GSSOMP, PSOPMP, WWTP OMP, and FMOPMARP) that include a section on O&M-related Performance Measures that will be used to guide management decisions and evaluate performance. These CMOM Programs were developed prior to the SSAMP's development and adoption of sewer system LOS. Each set of metrics was evaluated and determined to align with the LOS statement. However, not every LOS requirement is represented by a metric in every division. As the individual divisional KPIs are periodically reviewed and updated, additional KPIs will be added to these CMOM programs to cover all of the elements of the LOS, as appropriate.

07.03 Operational Impacts of LOS

The operational impacts of this LOS are:

- A SSAMP management team must be designed to respond to the ever-changing external environment. County, state and federal policies and regulations must be addressed in the SSAMP's operational metrics. As these policies and regulations change, the SSAMP must ensure that the affected divisions adapt accordingly.
- Engineering, Planning, and Operations must work collaboratively to conduct asset management decisions on the sewer system. As necessary, these divisions must coordinate repair, rehabilitation, and replacement decisions in a timely manner and the divisions must achieve, as much as is possible, alignment with all stated LOS. Where different possible responses align with different portions of the LOS statement, a defined strategy or set of priorities must be applied to guide the decision.
- Operational performance of assets, especially for similar equipment across divisions, must be evaluated such that all equipment is operating at its lowest possible life cycle cost. Assets not operating at, or within an acceptable range of its lowest possible life cycle cost, should be deemed unacceptable and a plan to return the equipment to operating at an acceptable level or replacement of the equipment should be considered.
- Emergency response capabilities must be evaluated to ensure that 24 hour/day, 7 day/week response is achievable.
- Divisional staffing and staff training must be evaluated to ensure that all positions are filled within a reasonable amount of time and all staff are adequately trained to county, state, and federal requirements.
- All assets will be designed, constructed, operated and maintained, in a manner that minimizes adverse impacts from the operation of those assets to the public.

08. Identification of Critical Assets

Per the CD, paragraph 19(d)(iii) the Asset Management program shall include the following component:

(iii) The identification of critical assets within the sewer system that are absolutely necessary to have in service to maintain the developed level of service.

08.01 Asset Criticality Rating Schemes

The Asset Criticality Rating Schemes are described, to varying degrees of sophistication, in each of the four previously developed O&M CMOM Programs, as described in the following subsections. MDWASD intends to adopt, as applicable, the EPA-recommended Business Risk Exposure (BRE) equation as the measure of each discreet asset's criticality. However, there are certain types of assets for which a full BRE evaluation is unnecessary or overly-cumbersome. For those assets, MDWASD has identified alternative criticality rankings. As part of the SSAMP, all BRE determinations will adhere to a common scale which will be developed such that asset criticality scoring yields values that are normalized, and can be analyzed and compared across asset classes and across divisions.

08.01.1 Gravity Sewer System Asset Criticality Schema

GSS asset criticality will be evaluated using the standard EPA-recommended definition of criticality; BRE. In order to calculate the BRE for each asset, MDWASD will determine the Consequence of Failure (CoF) and Probability of Failure (PoF) by developing standard calculations including, as appropriate and available, the asset's physical attributes, operating and maintenance history, and condition inspections.

Inspections of gravity sewers, manholes, inverted siphons easements and other GSS components will be implemented under the GSSOMP. Prior to execution of this inspection effort, the SSAMP will ensure that the inspected attributes are identified, a defined list of possible responses is developed, and the attributes and responses scored and weighted such that an equation can be applied which calculates a BRE.

08.01.2 Force Main System Asset Criticality Schema

Force main system asset criticality will be evaluated using the standard EPA-recommended definition of criticality; BRE. In order to calculate the BRE for each asset, MDWASD will determine the CoF and PoF by developing standard calculations including, as appropriate and available, the asset's physical attributes, operating and maintenance history, and condition inspections.

The attributes that factor into the PoF and CoF for force main system assets are identified in the FMOPMARP. These attributes may be determined without field inspections. The exercise for aggregating these attributes and calculating a BRE is a desktop exercise. Prior to the execution of this effort, the SSAMP will ensure that defined scores for each potential attribute value exist and that the attributes are weighted so that the BRE can be calculated from the results.

08.01.3 Pump Station Asset Criticality Schema

Pump station asset criticality will be evaluated using the standard EPA-recommended definition of criticality; BRE, for all assets other than the SCADA monitoring and controlling assets. In order to calculate the BRE for each asset, MDWASD will determine the CoF and PoF by developing standard calculations including, as appropriate and available, the asset's physical attributes, operating and maintenance history, and condition inspections. For SCADA equipment, the PoF is not easily determined from the physical or operating characteristics. As such, only a CoF will be determined for the SCADA assets.

Collection of asset information for all of the assets at each pump station will be implemented under PSOPMP. This effort will collect many attributes which contribute to either the PoF or CoF component of BRE. Prior to this field data collection effort, the SSAMP will ensure that the attributes which factor into either PoF or CoF are part of the collection effort. To achieve this, the full BRE equation will be determined including identifying the applicable attributes, defining list of possible responses and their scores, and developing the equation which calculates a BRE.

08.01.4 Wastewater Treatment Plant Asset Criticality Schema

Wastewater treatment plant asset criticality assignment is a requirement in the WWTP OMP at the asset level; but only to the level that the equipment is “critical”, “semi-critical” or “non-critical” based upon an evaluation of the impacts of the loss of use or failure of each piece of WWTP equipment. Those asset-level criticality designations currently exist and are stored on the appropriate records within the EAMS. To be consistent with the criticality assessments that will be conducted as part of the SSAMP for the Gravity Sewer, Force Main and Pump Station assets, which will calculate a BRE for each asset, MDWASD will perform a similar, albeit somewhat less comprehensive assessment on WWTP equipment. Due to the fact that the WWTPs are complex and have many different types of equipment as compared to Gravity Sewer, Force Mains and Pump Stations, the BRE will be evaluated at the process level (as opposed to the asset level), effectively measuring risk for groups of assets that fulfill a common purpose, otherwise known as systems within the WWTPs. In order to calculate the BRE for each process, MDWASD will determine the CoF and PoF by developing standard calculations including, as appropriate and available, the asset’s physical attributes, operating and maintenance history, and condition inspections.

Currently within the EAMS solution, each of the WWTP assets has been assigned a criticality rating from 1 to 5, with 1 being the least critical and 5 being the most critical. Those criticality assignments are more fully described in the WWTP OMP. In summary, those ratings do not incorporate an analysis of CoF and PoF at the attribute level. They are a broad-brush evaluation as to whether the assets are part of the wastewater treatment process, wastewater treatment support systems, or general plant overhead, such as plant grounds. As such, these ratings do not align with the future BRE-style criticality values that will be determined as a result of the SSAMP efforts.

Included in the WWTP OMP is an effort to collect asset information for the critical assets at each WWTP. This effort will collect many attributes which contribute to either the PoF or CoF component of BRE. Prior to this field data collection effort, the SSAMP will ensure that the attributes which factor in to either PoF or CoF are properly defined. To achieve this, the full BRE

equation will be determined including identifying the applicable attributes, defining list of possible responses and their scores, and developing the equation which calculates a BRE.

08.01.5 Storing Asset Criticality Data in EAMS

MDWASD's existing EAMS software solution is intended to store and manage a record for every maintainable asset employed by MDWASD. Currently, most of the maintainable assets are represented in EAMS as asset records. Several divisions affected by this CD have committed to projects to identify missing asset records and collect missing information about all assets. The end result will be a complete and accurate asset repository. MDWASD will identify an existing field or modify the EAMS asset data structure by adding a field to house the BRE value for each asset.

08.02 Perform Criticality Analysis and Populate EAMS Database

A task to identify critical assets exists in each of the four programs, GSSOMP, FMOPMARP, PSOPMP, and WWTP OMP. Regardless of the methods and tools developed within each of these individual programs to establish a criticality value, the resulting value will be associated to each asset record within the EAMS. MDWASD will establish a methodology to ensure regular and on-going asset criticality analysis will be performed for the assets operated and maintained within each of the divisions. The methodology will ensure that certain assets will have their criticality re-evaluated periodically. The frequency to re-evaluate an asset's criticality will vary depending on factors that may include the previous criticality value, the consequence if the asset were to fail, or other factors as to be determined within the SSAMP.

08.03 Develop Process to Manage and Update Criticality

As part of the SSAMP, a set of processes and software tools to maintain the asset criticality value will be established. The tools will either be developed as added functionality within the existing EAMS software solution or as third-party tools which are integrated with EAMS such that the resulting criticality value is populated in EAMS against the individual asset records. Since the asset condition component of asset criticality evaluations are made in the field, the

new tools will be developed for operation on light-weight, portable devices and employ simple user interfaces so that data entry by the assessor can be performed with minimal complexity.

08.04 Develop Staffing and Perform Training to Perform Criticality Analysis

The efforts to perform the criticality analyses for the Gravity Sewers, Force Mains, Pump Stations and Wastewater Treatment Plants are defined in the respective CD O&M Programs. No new staff will be added per the SSAMP to perform this work.

08.05 Assessment Approach

Each of the asset-related CD components (GSSOMP, PSOPMP, FMOPMARP, and WWTP OMP) has within them a process to determine critical assets. However, each of those activities was defined to meet the specific needs of that component. Therefore, the SSAMP will merge and consolidate these activities to accomplish the following:

- Develop common condition rating schemes, definitions, and standards so that results will be consistent across operational boundaries;
- Add functionality to the EAMS asset tables and screens to store criticality information on a per-asset basis;
- Perform criticality analyses and populate the EAMS database. Note that criticality information will be dependent on the asset record being present in EAMS for each asset;
- Develop and manage ongoing business processes to update criticality analyses on an ongoing basis;
- Develop a business process team to provide continuous improvement monitoring and support.

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09. Identification of Minimum Life Cycle Costs for Each Critical Asset

Per the CD, paragraph 19(d)(iv) the SSAMP shall include the following component:

(iv) The identification of minimum life cycle costs for each critical asset.

09.01 Life Cycle Costing Methodology

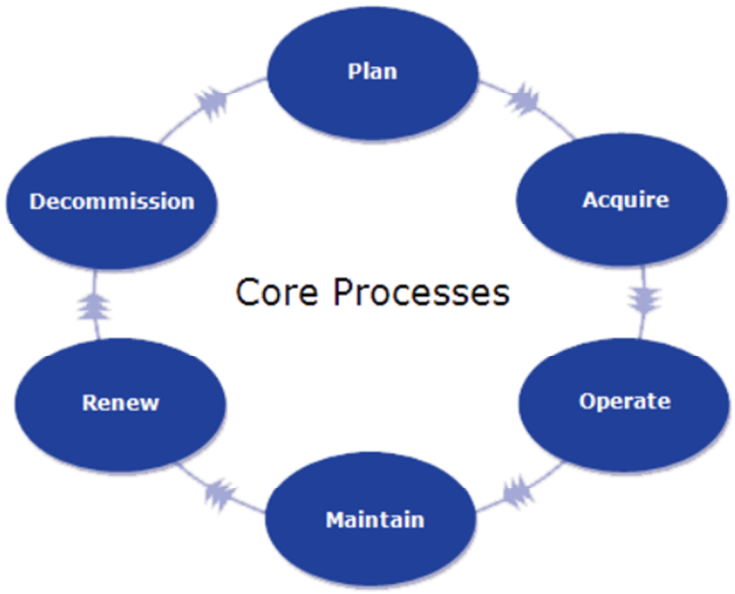
There are many differing methodologies and techniques available for determining minimum life cycle asset costs. For the purposes of this SSAMP, MDWASD has adopted the methodology of the Water Environment Research Foundation's (WERF) Sustainable Infrastructure Management Program Learning Environment (SIMPLE) Asset Management tool – but not the tool itself. SIMPLE is widely used by the wastewater community and is listed as a Partner Resource on the EPA website at: http://water.epa.gov/infrastructure/sustain/am_resources.cfm.

09.01.1 SIMPLE Methodology

The SIMPLE methodology for life cycle costing is designed to cover the entire life cycle process of an asset. The core processes as defined by SIMPLE are shown in Figure 09.1[1].

[1] Water Environment Research Foundation, http://simple.werf.org/Books/Contents/What-is-SIMPLE-/Vision , August 5, 2015.

Figure 09.1
SIMPLE Representation of Life Cycle of an Asset



Each asset passes through these core processes in a different way and at a different rate. Predicting life cycle costs requires an understanding of where each asset is within this cycle and when it will move to the next stage.

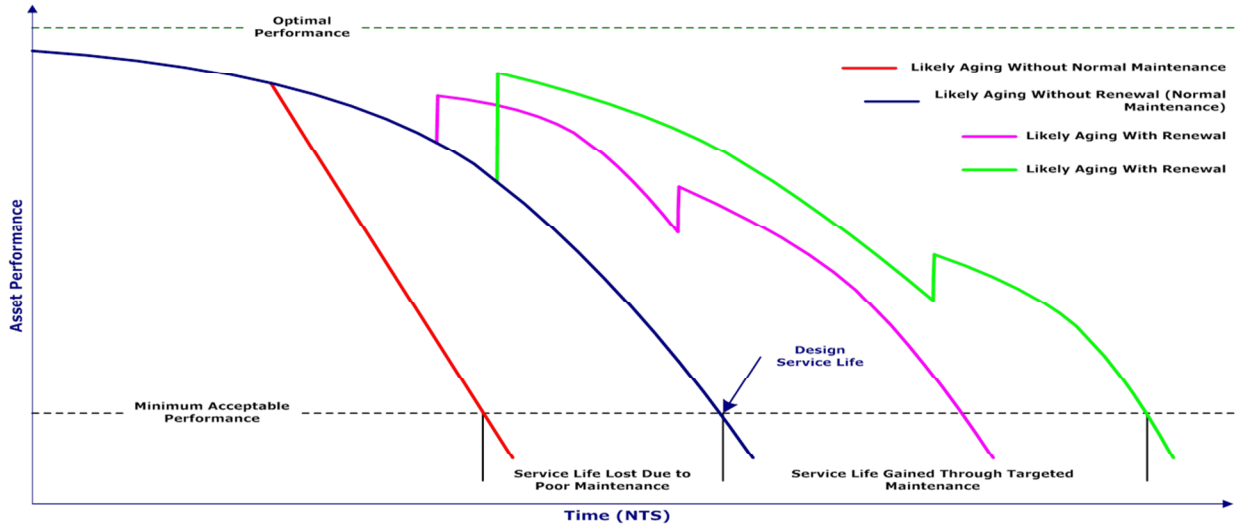
09.01.2 Asset Decay

Each of MDWASD's sewer system assets is placed into service with an anticipated (or expected) useful life. Each of these assets also has a 100 percent probability that it will fail at some point during its life-span. The timing and consequence of asset failure is impacted by many interrelated factors such as manufacturing processes, design and construction standards, operational parameters, and environmental conditions, to name a few. Every single asset within MDWASD's infrastructure inventory (unique length of pipe, individual valve, individual pump motor, etc.) has its own probability and consequence of failure which is determined by operational and environmental factors.

A generalized representation of the decay of any individual asset and associated terminology is shown in Figure 09.2. The blue decay curve in this figure shows the normal degradation of the asset with normal reactive and recommended preventive maintenance. An asset that receives

improper reactive maintenance or a lesser level of preventive maintenance would see a sharper decay curve and a shorter life, as indicated by the red decay curve. Various asset renewal options are depicted by the pink and green decay curves. Each renewal curve indicates that the asset performance significantly improves as a result of the renewal activities and extends the overall life of the asset.

Figure 09.2
Generalized Decay of an Asset



09.01.3 Developing Useful Life and Remaining Life

Some assets will reach their useful life sooner than others. Many factors determine when an item has or will reach its useful life such as type of use, age of item, soil and groundwater conditions in the immediate vicinity or amount of service. Through the application of appropriate preventative maintenance or rehabilitation, the condition of an asset can be improved such that its remaining life can be extended. An assessment, considering the date of installation, material, and current condition will be paired with other available information to determine the approximate location of an asset along its condition decay curve. Through this correlation, and the application of respective decay indexes and curves, useful life criteria can be developed and based on the current condition of the program assets, a remaining useful life can be estimated.

09.01.4 Estimating Rehabilitation and Replacement Unit Costs

The deterioration of most assets is complicated as shown in Figure 09.2. In many cases, assets can be renewed or rehabilitated as they age, thereby improving their performance and extending their life. MDWASD's asset management program is designed to address the potential for renewal and replacement of assets and optimize decision making regarding the most appropriate expenditure of R&R funds.

To support this process, a series of strategies will be developed for key assets and Capital Improvement Program (CIP) processes. As CIP projects are being reviewed, issues related to asset management must be incorporated into the evaluation processes, such as looking at the required level of service, the demand that drives the CIP need, and the condition of the assets that might be replaced. MDWASD will develop generalized unit costs by asset or process class, by size, by construction method, and by installation and operating conditions as a basis for performing these analyses. These unitized costs will then be applied to the various R&R and CIP scenarios to determine the lowest life cycle cost alternative for each asset or process.

09.02 Implementation Approach

Given the large number of critical sewer system assets that are owned and managed by MDWASD, the only practical way to implement a life cycle costing process across a dataset of this size and complexity is via the use of software that standardizes and automates the processes. The SIMPLE tool is not designed to handle the number of assets owned by MDWASD and will not be suitable to perform these analyses. However, there are alternatives to this tool. Multiple Commercial-off-the-Shelf (COTS) software products are available in the marketplace that are designed to address this need. Additionally, organizations have modified the Infor EAM product and developed reports to provide this type of information. Whether the solution is new to MDWASD or an extension of an existing solution, it will be designed to work with large GIS and external asset registry databases, automate the processes of applying the various strategies across one or more asset classes, and generate tabular and graphical results.

Once this plan is approved, MDWASD will implement a tool to manage the life cycle costing process as follows:

- Perform market research to identify the potential software tools/products that support asset-based life cycle costing and work with MDWASD's existing computing environment;
- If necessary, develop and issue an RFQ, select a solution (new product or new functionality implemented on an existing product), and implement the solution on MDWASD systems;
- Implement the life cycle costing product, one Division at a time. Replicate the effort across the entire MDWASD WCTS dataset. (Note that asset inventories, identification of critical assets, and condition assessments must be available for these analyses to be performed);
- Use the software to perform multiple life cycle costing what-if scenarios;
- Select one proposed life cycle costing scenario for future cost projections; and
- Develop long term life cycle cost projections for 5 to 50 year planning period.

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10. Develop Long Term Funding Plan

Per the CD, Paragraph 19(d)(v) the SSAMP shall include the following component:

(v) A long-term funding plan to fully implement and be able to pay for all identified life cycle costs for each critical asset. The long-term funding plan shall include all potential sources of revenue and the likelihood of securing funding from each source.

10.01 Current Operating and Maintenance Expenses and Revenues

MDWASD prepares an audited Comprehensive Annual Financial Report (CAFR) which provides detailed information on the generation of revenues and the use of funds for operations and maintenance expenses.

The operating and maintenance expenses for MDWASD's sewer system (in thousands) from the 2014 CAFR are characterized as shown in Table 10.1[1].

Table 10.1
MDWASD Sewer System 2014 Expenses

Operating and Maintenance Expense Category	Amount (1000s)
Collection system	$22,500
Pumping	$35,444
Treatment	$86,772
Customer accounting and service	$10,155
General and administrative	$44,951
Total	**$199,822**

The operating revenues for MDWASD's sewer system (in thousands) from the 2014 CAFR are characterized as shown in Table 10.2[1].

[1] "Comprehensive Annual Financial Report", September 30, 2014, MDWASD.

Table 10.2
MDWASD Sewer System 2014 Operating Revenues

Operating Revenue Category	Amount (1000s)
Retail	$245,167
Wholesale	$56,956
Other	$13,114
Total	**$315,237**

As shown, sewer rate charges are by far the largest source of revenue for the wastewater system. Other sources of revenue include investment income, connection fees, and at times, grants, but these other sources are typically less than 5 percent of the overall wastewater system revenue.

10.02 Budget Development and Multi-Year Capital Improvement Program

Annual budgets are developed by MDWASD staff using the CAFR as a starting point. Also included in annual budget development is continued development and updating of the Department's Multi-Year Capital Improvement Program (MYCIP), which typically projects CIP costs twenty years into the future, and provides detailed project implementation schedules five years into the future. The projects included in the MYCIP originate from many needs, but some of them are created to address the defined needs for asset R&R based on the existing asset's condition, age, expected useful life, or performance.

The MYCIP is projecting expenditures of over $3 billion in sewer system capital projects in the 2014 to 2020 timeframe as shown in Table 10.3[2].

[2] "Adopted FY 2014 to 2020 Capital Budget and Multi-Year Capital Plan", September 18, 2014, MDWASD.

Table 10.3
MDWASD Sewer System 2014 to 2020 Projected Capital Expenditures

Fiscal Year (FY)	Amount (1000s)
FY 2014-2015	$186,480
FY 2015-2016	$413,689
FY 2016-2017	$635,863
FY 2017-2018	$594,513
FY 2018-2019	$698,652
FY 2019-2020	$862,697
Total	**$3,391,894**

10.03 CD Financial Analysis Program

MDWASD delivered the Financial Analysis Program to the EPA/FDEP on December 5, 2014 pursuant to CD Paragraph 19(j). The Financial Analysis Program projects future revenues, Capital Improvement requirements, and operating expenses across all of MDWASD's Divisions through FY 2018-2019. Projections in the Financial Analysis Program are based on the Adopted FY 2014 to 2020 Capital Budget and MYCIP prepared by MDWASD. These projections show that MDWASD anticipates retail rate increases ranging from 5 percent to 15 percent each year through FY 2018-2019. With these rate increases, annual wastewater revenues are expected to rise to $424 million by FY 2018-2019. Projected sewer system O&M expenses are projected to rise to $237million by FY 2018-2019. Additionally, the Financial Analysis Program shows additional annual expenditures for sewer system R&R growing over this time period from $25 million to $40 million as shown in Table 10.4[3].

[3] "Financial Analysis Program Submittal", December 6, 2014, Black and Veatch.

Table 10.4
MDWASD Sewer System 2014 to 2019 Projected R&R Expenditures

Fiscal Year (FY)	Amount (1000s)
FY 2014-2015	$28,000
FY 2015-2016	$40,000
FY 2016-2017	$40,000
FY 2017-2018	$40,000
FY 2018-2019	$40,000
Total	**$188,000**

These annual R&R cost values in the Financial Analysis Program are based on MDWASD staff experience and are in addition to the specific capitalized projects identified in the MYCIP. The combination of specific asset management-based CIP projects, plus the non-capital R&R expenditure budgets, show that MDWASD has adequately projected the costs needed to support asset management needs in the 2015 to 2019 timeframe.

The Financial Analysis Program shows a projected financial analysis for MDWASD that the rates and charges developed by MDWASD will successfully meet the financial obligations as projected. So the conclusion that can be drawn from the Financial Analysis Program is that, for the period of 2015 to 2019, the overall budget does provide sufficient funding to meet the asset management requirements for the immediate 2015 to 2019 timeframe.

10.04 Long Term Critical Life Cycle Asset-Based Funding Plan

As described above, short term (through FY2018-2019) funding to support critical asset life cycle costs are already incorporated into MDWASD's Financial Analysis. However, looking beyond 2019, the life cycle costing of critical assets must be incorporated in as an essential component of projected future budgets. The process described below will allow MDWASD to predict the impact of critical asset life cycle costs on the overall budgets for the next 50 years and beyond. Note that these steps cannot begin until the processes listed in the Sections 10.01, 10.02, and 10.03 have been completed and life cycle costing is being performed across the entire MDWASD sewer system asset portfolio.

The proposed approach to developing a Critical Asset-based Funding Plan for the years beyond 2019 is as follows:

- Develop the summarized critical life cycle operational costs using the processes as described in Section 09 above for each year;
- Incorporate the critical asset costs into the projected overall budget for the target year, including costs for operations and maintenance, debt service, and other significant charges;
- Estimate the total operational revenue for the target year, including projected sewer rate charges, investment income, connection fees, and other sources of income;
- If the overall budget is adequate, then no action is needed;
- If the critical asset costs are a significant negative impact on the overall budget, then perform a sensitivity analysis to determine the impact on the overall financial situation of MDWASD; and
- If the impact on the overall financial situation is significant, then evaluate potential options to obtain the necessary additional funding. Options might include:
    - Higher annual rate increases;
    - Increasing connection charges;
    - Internal transfers from reserve funds;
    - Optimizing the blend of capital investment funded with cash and long-term debt;
    - Implementation of infrastructure replacement or asset management specific charges;
    - Cost sharing for projects that benefit regional and inter-jurisdictional partners; and
    - Applying for / obtaining grant funds.

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11. SSAMP Staffing and Funding Plan

This section identifies the required staffing and resources and describes the preparedness training conducted by MDWASD to ensure effective implementation of the SSAMP.

11.01 Staffing and Resources

MDWASD staff and resources are required for effective implementation of the SSAMP. The following position will be staffed immediately:

- Asset Management Program Manager

The recommended additional staff requirements to be added over a period of time are summarized in Table 11.1.

Table 11.1
Recommended Staffing Additions for SSAMP-Related Activities

Position	Personnel	Abbreviated Description
AM Program Manager	1	Provide guidance and leadership to the SSAMP and O&M Program activities related to development / collection of asset-related data. Define the AM Team staffing needs and organizational fit.
Process Support	TBD	Individuals with in-depth knowledge of MDWASD asset-related processes such as asset acquisition, operation, maintenance and disposal as well as tangential process such as repair material procurement and work contracting, will provide support to existing users on the execution and optimization of these existing processes. These individuals will also provide process training / re-training to new / existing MDWASD staff.
System Support	TBD	Individuals with expertise in the use and configuration of the information systems used to capture asset-related data such as Infor EAM, Esri GIS and MORS will provide support to existing users on the use and improvement of these existing systems and any new systems introduced in the future. These individuals will also provide system training / re-training to new / existing MDWASD staff
Reliability Engineering	TBD	Individuals with expertise in reliability engineering and asset optimization will provide decision-making guidance, tools and analysis to the divisions that require support related to repair / rehabilitate / replace decisions, capacity analysis, asset operation, preventive / predictive maintenance plan development and frequencies, asset maintenance strategies, capital planning and other asset-related decisions
Financial Analyst / Economist	TBD	Individuals with expertise in financial analysis such as net present value, internal rate of return, future cost projections, sensitivity analysis, effect on level of service, and other complex data-driven financial analyses as required by the organization

APPENDIX A ISO 55000 Maturity Assessment Evaluation Criteria

The following 39 criteria are used to evaluate the maturity of an Asset Management Program against ISO 55000 standards:

Item	Area Evaluated	Evaluation Criteria
1	Understanding the organization and its context	How does the organization determine external and internal issues relevant to its purpose that impact on its ability to achieve the intended outcomes of its asset management system?
2	Understanding the organization and its context	How does the organization ensure that asset management objectives are aligned with organizational objectives?
3	Understanding the needs and expectations of stakeholders	How does the organization identify and determine the needs and expectations of stakeholders
4	Understanding the needs and expectations of stakeholders	How are stakeholder requirements determined for recording of financial and non-financial information relevant to asset management and reporting on this information internally and externally?
5	Understanding the needs and expectations of stakeholders	How does the organization determine the criteria for asset management decision making?
6	Determining the scope of the asset management system	How has the organization determined the boundaries and applicability of the asset management system in order to establish and document its scope?
7	Asset management system	What has the organization done to establish, implement, maintain and continually improve an asset management system?
8	Asset Management system	How does the organization develop, update and document its SAMP?
9	Leadership and commitment	How has top management demonstrated leadership and commitment in relation to the asset management system?
10	Policy	What has top management done to establish, communicate, implement, periodically review and, if required, update an asset management policy.
11	Organizational roles, responsibilities and authorities	How has top management ensured that the responsibilities and authorities for relevant roles are assigned and communicated within the organization?
12	Actions to address risks and opportunities for the asset management system	How does the organization demonstrate that risks and opportunities that could affect the ability of the asset management system to achieve its intended outcomes are adequately considered and processes put in place to assure that the desired outcomes are achieved and undesired effects are mitigated?

Item	Area Evaluated	Evaluation Criteria
13	Asset management objectives	How has the organization established and documented asset management objectives, at relevant functions and levels, to align with and enable the achievement of the organizational objectives and asset management policy.
14	Planning to achieve asset management objectives	How does the organization determine and document its planning processes, methods and decision criteria for developing the asset management plan(s) to achieve its asset management objectives?
15	Planning to achieve asset management objectives	How does the organization establish, document and maintain asset management plans to achieve the asset management objectives ensuring alignment with the asset management policy and the SAMP?
16	Resources	How does the organization ensure that resources required to establish, implement maintain and improve the asset management system are determined and provided?
17	Resources	How can the organization demonstrate that the resources required to meet the asset management objectives and to implement activities specified in the asset management plans will be provided?
18	Competence	To what extent has the organization determined the necessary competence of persons doing work under its control that affects performance of assets, asset management or asset management systems?
19	Awareness	How does the organization ensure that persons doing work under the organizations control are aware of the how they impact on the achievement of the asset management objectives
20	Communication	How has the organization determined internal and external communication requirements related to assets and asset management system?
21	Information requirements	What has the organization done to determine what asset management information is required to support its management of assets, the AM System and organizational objectives.
22	Documented information general	To what extent has the organization documented information determined as being necessary for the effectiveness of their asset management system?
23	Creating and updating documented information	When creating and updating documented information, how does the organization ensure that information is appropriately identified, formatted, reviewed and approved, and appropriate media is used?
24	Control of documented information	Is documented information required by the asset management system controlled, available and suitable for use where and when it is needed?
25	Operational planning and control	What processes has the organization developed to control the implementation of asset management plans?
26	Operational planning and control	Can the organization demonstrate it is controlling the processes for implementing its asset management plans, in accordance with the criteria it has established for them?

Item	Area Evaluated	Evaluation Criteria
27	Management of change	How does the organization ensure that risks associated with any planned change that can have an impact on achieving asset management objectives are assessed and managed before the change is implemented?
28	Management of change	How does the organization control planned changes, which can have an impact on achieving the organization's asset management objectives, and mitigate any adverse effects?
29	Outsourcing	How does the organization assess risks associated with outsourcing of asset management activities, determine and document how the activities and processes will be controlled and integrated into the AM system, and ensure the performance of the outsourced activities is monitored?
30	Monitoring, measurement, analysis and evaluation	How has the organization determined what needs to be monitored and measured?
31	Monitoring, measurement, analysis and evaluation	How has the organization determined what information generated via its monitoring and measurement processes needs to be analyzed, evaluated and reported?
32	Internal audit	How does the organization ensure that internal audits are carried out which objectively evaluate whether its AM system conforms to its own requirements and the requirements of ISO 55001, and that the system is effectively implemented and maintained?
33	Management review	What has the organization's top management done to demonstrate that it reviews the asset management system?
34	Management review	How does the organization's top management ensure that its reviews of the asset management system consider the relevant inputs and record the results and outputs?
35	Nonconformity and corrective action	When a nonconformity or incident occurs in its assets or AM system, how does the organization respond and (as applicable) take action to control and correct it and deal with the consequences?
36	Nonconformity and corrective action	Following the occurrence of a nonconformity or incident, how does the organization evaluate and document whether there is a need for action(s), appropriate to the effects, to ensure that it does not occur or recur elsewhere?
37	Nonconformity and corrective action	Following evaluations which have determined there is a need for corrective or preventive actions, how does the organization implement and document the identified actions (including changes to the AM system), record their results and review their effectiveness?
38	Preventive action	How does the organization proactively monitor potential failures in asset performance and evaluate the need for preventive action
39	Continual improvement	How does the organization demonstrate that it continuously improves the suitability, adequacy and effectiveness of its asset management and asset management system?


MIAMI-DADE
COUNTY