What does "sustainable" mean? Simply stated, it means meeting the needs of the current generation without compromising the ability to meet future generations’ needs. When used in the context of a water or wastewater utility – a sustainable utility -- it means providing a represented level of service expected by regulatory agencies and current utility rate payers, also referenced as key stakeholders, without compromising the level of service that will be provided to future system users as they occupy or purchase existing and newly developed properties.

To provide an established level of service and ensure its continuation requires a proactive program of renewal and replacement of critical assets of a wastewater utility including pipes, pump stations, and treatment facilities. Additionally, provisions have to be accommodated for storing spare parts for critical assets and having on hand the equipment and tools necessary to install spare parts when needed for preservation of reliable, uninterruptable service. This can only occur with visionary long term planning to gradually and continually replace all infrastructure assets supported by a stable revenue stream for uninterrupted support of needed future investments.

Common characteristics of utilities that manage a sustainable operation include:

- Awareness that the outcome of well-intended activities cannot necessarily be predicted warranting the observance of an adaptive management style,
- Inclination to grasp flexible operating organizations,
- Embracing the concept of integrating operations across various organizational divisions,
- Understanding the benefits and power of sharing information,
- Valuing the collaboration with partners external to the organization,
- Setting organizational goals and objectives that also support relevant community goals,
- Analyzing a range of alternative financial, social and environmental considerations – “triple bottom line” – while minimizing life-cycle costs, and
- Implementing a financial strategy focused on sufficient funding for operational, maintenance and replacement needs over time.

Even with the best intentions, cyclical regional and nation-wide economic conditions arise periodically challenging utilities in adequately funding their operations and debt service obligations. Such was the case for many utilities resulting from the 2007-2009 Great Recession and subsequent years of relatively weak recovery where hard decisions had to be made with regard to balancing the annual funding of operating costs and long term debt servicing under persistently scarce funding resources. Miami-Dade Water and Sewer Department (MDWASD), Miami Dade County’s water and wastewater utilities
department, like many utilities across the country, found itself in this quandary. In the midst of this funding crisis, the United States Environmental Protection Agency (EPA) and the Florida Department of Environmental Protection (FDEP) began enforcement action against the County under the Clean Water Act.

As part of the 15-year compliance period under an April 2014 negotiated settlement of EPA/FDEP’s lawsuit against Miami-Dade County, Consent Decree (CD) requirements include that the County prepare new Capacity, Management, Operations and Maintenance (CMOM) programs to more effectively address sanitary sewer overflows (SSOs) and improve system performance. Compliance with these CD provisions will put the County on track for establishing a sustainable wastewater utility.

**Background**

MDWASD’s Wastewater Collection and Transmission System (WCTS) consists of approximately 6,300 miles of pipelines (gravity sewers and force mains), 1,028 pump stations, 19 pump stations maintained under maintenance agreement with other agencies and departments, and three Wastewater Treatment Plants (WWTPs) with total permitted capacity of 368 million gallons per day (MGD). The service area includes 13 wholesale customers and approximately 323,600 retail customers. The annual average wastewater flow received at the three MDWASD regional wastewater treatment plants averages about 296 MGD.

In the early 1990s, MDWASD entered into compliance agreements with EPA under the First Partial CD and Second Partial CD. As a result of required actions by MDWASD under these agreements, the number and volume of SSOs, particularly those related to system capacity, have been greatly reduced. To support realization of the goal of further reducing, preventing, or otherwise controlling SSOs and prohibited discharges to waters of the United States, the latest CD stipulates the continuation of existing CMOM programs established in the 1990s and the development of new CMOM programs across all areas of wastewater, collection, transmission, and treatment systems, including: pump stations, force mains, gravity sewers, and wastewater treatment plants.

**Summary of CMOM Programs**

In April 2011, MDWASD conducted a CMOM Program self-assessment to review its current programs, established under requirements of the above referenced CDs, to determine how these programs should be modified in order to more effectively address SSOs and improve system performance. Subsequently, MDWASD submitted to EPA a CMOM Report identifying program deficiencies which became the basis for CMOM requirements memorialized in the latest CD.

Those deficiencies are to be addressed in new CMOM Programs, including:

- Fats, Oils and Grease (“FOG”) Control Program
- Sewer Overflow Response Plan (“SORP”)
• Information Management System ("IMS") Program
• Sewer System Asset Management Program ("SSAMP")
• 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")
• WWTP Operations and Maintenance Program ("WWTPOMP")

**Sewer Overflow Response Plan.** The County is required to prepare a SORP that will establish timely and effective methods and means of responding to, cleaning up, and/or minimizing the impact of SSOs; timely reporting of the location, volume, cause, impact, and other pertinent SSO information to the appropriate regulatory agencies; and timely and effective notification of SSOs to potentially impacted public.

**Fats, Oils and Grease Control Program.** Under the previous CD the County approved a Grease Trap Ordinance and implemented a FOG Control Program which allowed the County to regulate industrial and commercial sources of oil and grease. Notwithstanding any improvements already achieved through the existing FOG Control Program, the County is required to review, evaluate and revise its Grease Trap Ordinance and FOG Control Program and submit to EPA and FDEP while continuing to implement the existing FOG Control Program as an enforceable obligation under the current Consent Decree until it implements a new FOG Control Program approved by EPA and FDEP.

**Information Management System Program.** The County is required to prepare an IMS Program that includes:

- A management IMS component to provide MDWASD managers with guidance and instruction to adequately evaluate operations, maintenance, customer service, and Sewer System rehabilitation activities so that overall Sewer System performance can be determined and utility planning can be conducted, utilizing management reports and standard management forms.
- An operations IMS component to provide MDWASD managers and field supervisors with guidance to adequately track scheduled operational activities and to enhance operational performance, utilizing operating reports and standard operation forms used by field personnel with field supervisor review.
- A maintenance IMS component to provide MDWASD managers and field supervisors with guidance to adequately track scheduled maintenance activities and to enhance maintenance performance, utilizing maintenance reports and standard maintenance forms used by field personnel with field supervisor review.

Furthermore, implementation of a Geographic Information Systems ("GIS") map of the entire wastewater collection and transmission system is required streamlining the GIS data entry process for new assets, including electronic as-built data and necessary standards so that all new assets are added to the GIS system within ninety (90) calendar days of their activation in the field. The determination via suitable as-built drawings, or
GPS or traditional surveying field measurements, elevations of all manhole rim elevations with inlet outlet piping invert elevations at each manhole are to be included.

**Sewer System Asset Management Program.** The County is required to submit to EPA and FDEP an Asset Management Program, including a schedule for full implementation of the program. For purposes of the Consent Decree, the term “Asset Management Program” means a management program 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 Consent Decree. The Asset Management Program will include the following components:

- A current condition assessment of all Sewer System components, including pump station components, gravity sewer lines, manholes, siphons, aerial crossings, force mains, etc,
- A statement of the level of service the County intends to provide the customers it serves considering life cycle cost to ensure compliance with regulatory requirements and this Consent Decree,
- The identification of critical assets within the sewer system that are absolutely necessary to have in service to maintain the developed level of service,
- The identification of minimum life cycle costs for each critical asset, and
- 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.

**Gravity Sewer System Operations and Maintenance Program (GSSOMP).** The County is required to prepare a Gravity Sewer System Operations and Maintenance Program to address SSOs, particularly those caused by FOG, roots and/or debris obstructions. Key features of this Program include:

- Written preventative operations and maintenance schedules and procedures,
- An engineering evaluation of potential sulfide and corrosion control options and a summary report of findings,
- Prioritization for evaluating the gravity sewers based upon the size of the pipe (e.g., starting with the larger pipes and work back to smaller pipes), location of SSOs, community input or other criteria it finds appropriate,
- Inspection of gravity sewers, manholes, and inverted siphon easements, including inspection of creek crossings, canal crossings, stream bank encroachment toward gravity sewers, manholes and inverted siphons, and easement accessibility,
- A schedule for the maintenance of easements,
- A staffing and funding plan sufficient in structure, skills, numbers and funding to allow completions of the operation and maintenance activities,
- Data attributes for GIS allowing program data to be compared in the County’s IMS against other pertinent data such as the occurrence of SSOs, including repeat SSO locations and permit violations,
- An inventory management system, and
- List of critical equipment and critical spare parts.
Pump Station Operations and Preventative Maintenance Program (PSOPMP). The County is required to prepare a Pump Station Operations and Preventative Maintenance Program to facilitate proper operation and maintenance activities associated with the approximate 1,047 pump stations within the WCTS. Key aspects of the Program include:

- Identification of the means and modes of communication between Pump Stations, field crews, and supervising staff,
- Technical specifications of each Pump Station within the WCTS,
- A description of each Pump Station monitoring system which will continuously monitor, report, and transmit information for each Pump Station,
- Written preventative operations and maintenance schedules and procedures which shall be scheduled appropriately,
- Written standard emergency/reactive operations and maintenance procedures. Miami-Dade, subject to its discretion, may use portable pumps, portable generators or alternative power sources as it deems appropriate,
- An inventory management system for critical spare parts and critical equipment and tools to install spare parts,
- Reports which list equipment problems and the status of work orders generated during the prior month, and
- A staffing and funding plan sufficient in structure, skills, numbers and funding to allow completion of the operations and maintenance activities.

Force Main Operations, Preventative Maintenance and Assessment/Rehabilitation Program. The County is required to prepare a Preventative Maintenance and Assessment/Rehabilitation Program to facilitate proper operations and maintenance activities associated with Force Mains within the WCTS. Key aspects of the Program will include:

- Assessment of Force Mains, including an evaluation of potential sulfide and corrosion control options,
- Inspection of Force Main easements, including inspection of canal crossings, stream bank encroachment toward Force Mains, and easement accessibility,
- Schedule for the maintenance of easements.
- Staffing and funding plan sufficient in structure, skills, numbers and funding to allow completion of the prescribed activities, and
- Inventory management system.

Additionally, a Force Main Criticality Assessment and Prioritization Report is to be prepared setting forth results of the County’s assessment of the structural integrity of its Force Mains and the risk of Force Main critical failure. A Force Main Assessment Program will be implemented in accordance with the schedule set forth in the Force Main Criticality Assessment and Prioritization Report.

Finally, a Force Main Rehabilitation/Replacement Program will be prepared including:
• Standard procedures for **repairing** each force main in the WCTS that is deemed to be in need of repair,
• Standard procedures for rehabilitating each force main in the WCTS that is deemed to be in need of rehabilitation, and
• Standard procedures for **replacing** each force main in the WCTS that is deemed to be in need of replacement.

The County will implement the Force Main Rehabilitation/Replacement Program in accordance with the prioritization of the Force Main Criticality Assessment and Prioritization Report and based on the results and finding of its implementation of the Force Main Assessment Program.

**WWTP Operations and Maintenance Program.** The County is required to prepare the WWTP Operations and Maintenance Program to facilitate proper operation, maintenance and equipment replacement activities associated with its three (3) WWTPs. It will include:

• Prioritization of WWTP equipment as critical, semi-critical or noncritical based upon an evaluation of the impacts of the loss of use or failure of each piece of WWTP equipment,
• Schedule for preventative maintenance activities,
• Maintenance information management system that shall have the capability of scheduling and tracking both preventative and reactive maintenance activities,
• Inventory of spare parts identifying which critical spare parts are to be maintained in inventory and providing a schedule to purchase critical spare parts that are not in inventory,
• Spare parts inventory control system,
• Staffing and funding plan sufficient in structure, skills, numbers and funding to allow completion of the activities, and
• Active control program for hauled wasteloads (e.g., septage, FOG) to the WWTP.

**Incorporating Existing MDWASD Programs in New CMOM Programs**

In order to ensure that the development of new CMOM Programs took maximum advantage of existing MDWASD practices, procedures and processes, a “15 Step Process” (see figure below) was adopted to guide the development of each of the new Programs. With the support of a consultant, this process was repeated for each of the new CMOM Program areas. Close participation by MDWASD staff including management and senior operations and maintenance supervisory personnel during the initial assessment phase of existing conditions led by a consultant allowed the accurate and thorough understanding of existing CMOM programs. Furthermore, any modifications and refinements that may have been implemented since MDWASD completed its “2011 CMOM Self-Assessment” but may have not been formally or fully documented, were identified.

Below is an overview of these steps.

**Step 1. Kick-off Meeting**

A meeting was conducted to introduce consultant team members to MDWASD team members, discuss roles and responsibilities, define the specific CMOM program, and review expectations for the Program.

**Step 2. Reaffirm Deliverables**

An outline of all deliverables for each CMOM Program was prepared for MDWASD’s review and concurrence.

**Step 3. Information Request**

A request for existing CMOM Program information and documentation was made for purposes of future presentation, discussion, and modification, as appropriate.

**Step 4. Compile Information**

Existing CMOM Program documents were collected and compiled in order to effectively conduct the remaining activities.

**Step 5. Review Information**

Information and documents were reviewed for completeness, cataloged and archived on an intranet share site allowing accessibility to all team members.

**Step 6. Schedule Interviews**

Cursory on-site interviews and observations were scheduled with more comprehensive interviewing and observing to be accomplished subsequently.

**Step 7. Conduct Interviews**

On-site interviews were conducted and field related observations were made of the normal daily routine of MDWASD personnel.

**Step 8. Prepare Interview and Observation Report**
A combined document review, interview, and observation report for each CMOM Program reflecting how MDWASD is carrying out that Program was prepared.

**Step 9. Verification**

The content of existing CMOM Programs was verified during a team meeting. Inconsistencies, errors, misstatements, or information gaps were resolved during the meeting, or possibly during a follow up meeting, as necessary.

**Step 10. Program Analysis (Preliminary)**

Using the Interview and Observation Report together with its supporting reference documents, the consultant analyzed sufficiency of MDWASD’s current CMOM program components with regard to meeting regulatory and enforcement requirements and expectation. Also, MDWASD’s strategic goals for regulatory compliance, customer service, asset management, and resource management were considered.

**Step 11. Business Practice Assessment**

An assessment of whether or not the CMOM Program contains minimum elements of an EPA/FDEP-approvable CMOM program was performed, specifically:

- Defined purpose,
- Specific written short-term and long-term goals that are aligned with strategic goals,
- Programs, practices, processes, and procedures that are documented,
- Proper training program for affected staff,
- Information that is managed,
- Resources that are managed,
- Established performance measures, and
- Process for continuous improvement.

**Step 12. Identify Business Practice Improvement Opportunities**

Recommended CMOM Program improvements were developed using the following framework:

- Develop and propose improvements,
- Define the benefit(s) to be achieved by each improvement,
- Test alignment of each improvement with strategic goals,
- Develop a protocol for establishing near-term, short-term, and long-term priorities for the proposed improvements,
- Suggest the organizational unit(s) that will be responsible for implementing each improvement,
- Estimate whether the improvement should be scheduled for implementation in the near term, short term, or long term, as specified by the Consent Decree, and
- Estimate whether the improvement is low cost, medium cost, or high cost.
Step 13. Improvement Opportunities Workshop

Improvement Opportunities Workshops were conducted at which time the new CMOM Program draft manuscript was presented for MDWASD review.


The consultant developed, refined or modified business practice descriptions for reflection in the new CMOM Program based on the outcome of the above workshop and MDWASD review comments.

Step 15. Create or Modify CMOM Program Business Practice Document

A final new CMOM Program document was created, or the existing CMOM Program was supplemented and modified, for submittal to EPA/FDEP. The document included, as necessary, references to new or modified standard management practices (SMgtP), standard operating practices (SOP), or standard maintenance practices (SMP) that would be subsequently prepared as part of an implementation plan; implementation schedules; organizational changes; training; and, human and funding resources requirements.

CMOM Program Implementation – Staffing and Funding

To date, five of the eight required CMOM programs prepared under the CD have been submitted to EPA/FDEP. Four of these, the SORP, the GSSOMP, the PSOPMP, and the WWTP OMP have staffing and funding implications for MDWASD. The fifth, FOG Control Program, will require close inter-departmental coordination between MDWASD and the County’s enforcement agency, Regulatory and Economic Resources-Division of Environmental Resources Management (RER-DERM), in order to achieve its goals.

Below are a few of the key components of the staffing and funding plans for these four CMOM programs.

SORP

Staff required to implement the activities detailed in the SORP are provided by MDWASD and RER-DERM. Most of the staff with assigned SORP-related responsibilities are not dedicated to SORP activities for 100 percent of their time, but divert from other duties on an as needed basis. During development of the SORP, it was determined that CD-required changes, particularly those related to repeat SSO identification and the need for more detailed calculations for SSO volume estimations, would necessitate augmenting MDWASD staff during the phased implementation of the SORP.

GSSOMP

Annual budgets are developed to enable MDWASD to adequately operate and maintain the expanding Gravity Sewer System (GSS) service area and to extend the in-service life of the GSS and other MDWASD assets. The GSSOMP Staffing and Funding Plan
recommends an aggressive initial investment in O&M, Capital, and outsourced maintenance and repair resource funding followed by steady increases of 5% annually to achieve the set performance goals.

**PSOPMP**

PSOPMP implementation will include a staff hiring plan and equipment recommendations to allow MDWASD’s Pump Station Division (PSD) to operate at a higher level. Currently, the PSD does not have dedicated night time or weekend (i.e., second shift) maintenance crews. There are only day crews in each trade, structural, mechanical, and electrical, that operate during a single day shift. These same crews are on call for the night and weekend shifts, and are summoned by the Communications Center whenever an alarm event and/or an emergency arise. Not having second shift crews severely limits the PSD’s ability to address issues timely in the evenings and on weekends putting MSWASD at risk for overflow situations. Additionally, the PSD currently mostly operates on a reactive basis. The PSOPMP implementation includes the addition of an operations group to perform predictive and preventative maintenance and to proactively monitor SCADA alarms.

**WWTP OMP**

Approximately 30% of MDWASD’s Wastewater Treatment Division staff of 350 is estimated to retire within the next 5 years. These employees possess the majority of leadership positions, experience, and institutional knowledge within the organization. The staffing and funding plans within the CMOM documents address workforce succession and development.

**Conclusions**

The large amount of senior staff among MDWASD’s operational divisions slated for retirement within the next 5 years, as well as additional staffing needs under the new CMOM Programs estimated at over 300, will require an efficient and effective recruitment and training program in order to meet resource demands. This will be a serious challenge for MDWASD and any shortfalls in augmenting human resources could threaten timely implementation of new activities mandated under the respective Programs upon EPA/FDEP approval. In turn, achieving sustainability of these new Programs could be delayed with consequences including control of SSOs not meeting performance metrics among others, and the represented level of service not being met.

MDWASD will have to seek partners in implementing its CMOM Programs. This will include alliances with higher learning institutions (Community Colleges, Universities, Technical Training Institutes, etc.) and others to support the development of training curricula and the training of its newest staff members. Exciting times await MDWASD when it will effectively reinvent itself under the CMOM Programs paradigm.