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MAYOR



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ENGINEERING DIVISION  
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January 27, 2020

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Re: DOJ Case No. 90-5-1-1-09000  
Submittal of Annual Progress Report and Quarterly Progress Report

Gentlemen and Madam:

In accordance with the provisions of the Consent Decree, Section XIX (Reporting Requirements), Subsection B, herewith we are transmitting the 2019 Annual Report, which covers the time period from January 1, 2019 through December 31, 2019.



If you need assistance or an accommodation, please contact Metro Water Services,  
at 615-862-4862, 1600 Second Avenue North, Nashville, Tennessee 37208.

In addition, in accordance with the provisions of the Consent Decree, Section XIX (Reporting Requirements), Subsection A, herewith we are transmitting the Quarterly Progress report which covers the time period from October 1, 2019 through December 31, 2019.

A copy of each of these reports is concurrently being placed in the Public Document Repository (PDR).


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.

If you have any questions concerning this report please contact me.

Sincerely,



Scott A. Potter, P.E.  
Director



Ron C. Taylor, P.E.  
Overflow Abatement Program Director  
Engineering Division

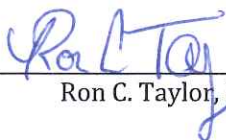
Cc: Mr. David Tucker, Assistant Director, Operations  
Mr. Cyrus Q. Toosi, P.E., Assistant Director / Chief Engineer, Engineering  
Mr. Gregory A. Ballard, P.E., Engineer 3  
Mr. Thomas G. Cross, Associate Director, Metropolitan Department of Law

## Clean Water Nashville Overflow Abatement Program

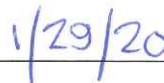
**Metropolitan Government of Nashville and Davidson County  
Department of Water and Sewerage Services**

# CONSENT DECREE 2019 ANNUAL REPORT

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.



Ron C. Taylor, P.E., Program Director



Date

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## Appendix A - Update to the *CMOM Self-Assessment Report*

# Consent Decree 2019 Annual Report

On March 12, 2009, the Metropolitan Government of Nashville and Davidson County, Tennessee (Metro), entered into a Consent Decree with the United States and the State of Tennessee. As required by Section XIX.B. of the Consent Decree, Metro has prepared this *Annual Report* covering the period from January 1 through December 31, 2019, which includes the following information:

1. Summary of the Capacity, Management, Operation, and Maintenance (CMOM) programs implemented
2. List of projects required by the Consent Decree
3. Trend analysis of Sanitary Sewer Overflows (SSOs) for 2018 and 2019
4. Trend analysis of dry weather Combined Sewer Overflows (CSOs) for 2018 and 2019

Each of these items is discussed in the following sections.

## 1. CMOM Programs

As described in the Consent Decree, in addition to items identified through Metro's CMOM Self-Assessment, the following programs are elements of Metro's CMOM program:

- *Spill and Overflow Response Plan* (Section VII.C.2) – MWS continues to operate under the current *Spill and Overflow Response Plan* (SORP). A review of the SORP is conducted annually with any proposed changes submitted to EPA prior to June 1 each year. No changes were requested in 2019.
- *Inter-jurisdictional Agreement Program* (Section VII.C.3) – All required inter-jurisdictional agreements are in place, and Metro will continue to operate under these agreements, including monitoring peak flows received.
- *Capacity Assurance Plan* (Section VII.C.4) – The *Capacity Assurance Plan* will continue to be applied as a tracking/approval tool for new development/flow in the sanitary sewer system (SSS).
- *Pump Station Operation Plan for Power Outages* (Section VII.C.5) – All projects identified in the *Pump Station Operation Plan for Power Outages* were completed prior to 2019.

In addition to these programs, Metro's *CMOM Self-Assessment Report* established multiple recommendations and performance measures that Metro continues to track. In 2019, Metro conducted a review of their CMOM requirements to determine what aspects of their CMOM should be updated or augmented to better meet the goal of reducing overflows. That effort is summarized in the technical memorandum, *Update to the CMOM Self-Assessment Report*, which is included as an appendix to this report. The memorandum also established the reporting items listed in **Table 1**. These will be included in future *Annual Reports* to illustrate Metro's on-going CMOM implementation.



**Table 1 – CMOM Reporting Items and Benchmarks**

Reporting Item	Annual Benchmark
Monthly summary of overflows, including cause, volume, and duration	Tracking only
Review SORP and update as needed	1/year
Conduct Quarterly Compliance Meetings	4/year
Pump station capacity evaluations / drawdown testing	100%/year
Review pump station procedures and update as needed	1/year
Inspection of ARVs	100%/year
Number of force mains cleaned	Tracking only
Length of gravity sewer inspected	10%/year
Length of gravity sewer cleaned	Tracking only
Number of manholes inspected	Tracking only
Length of stream walks completed	Tracking only
Review gravity sewer procedures and update as needed	1/year
Inspection of permitted food service establishments with grease control equipment	75%/year
Number of new permits for food service establishments	Tracking only
Volume of FOG removed from the system	Tracking only
Number of FOG-related notifications mailed, distributed, or called out to customers	Tracking only
Review FOG control procedures and update as needed	1/year
Number of sewer point repairs completed	Tracking only
Length of pipe replaced or new pipe installed (excluding extension of service)	Tracking only
Length of sewer rehabilitated such as via CIPP lining	Tracking only
Number of manholes rehabilitated	Tracking only
Number of service connections replaced or rehabilitated	Tracking only
Review of <i>Capacity Assurance Plan</i> and update as needed	1/year

## 2. Project Updates

Approval of the *Corrective Action Plan / Engineering Report* (CAP/ER) was granted by the U.S. Environmental Protection Agency (EPA) on August 10, 2017, with the Tennessee Department of Environment and Conservation (TDEC) copied on the approval. Since submittal of the CAP/ER in 2011, information from additional flow monitoring data collection, constructability reviews, and hydraulic analysis has resulted in adjustments to several CAP/ER projects, as well as the identification of additional projects to remediate SSOs. A summary of those changes was presented to EPA and TDEC in the *Addendum to the CAP/ER*, dated September 27, 2017. Through ongoing efforts to maintain the system, Metro identified several overflow locations, outside of those identified in the CAP/ER, that warrant additional field investigations and/or improvements. As requested by TDEC in a letter dated July 15, 2019, Metro prepared *Addendum #2 to the CAP/ER*, which was submitted on August 30, 2019. That Addendum describes those overflow locations, summarizes actions taken, and presents Metro's plan for identifying and addressing conditions causing those overflows. Metro submitted the *Long Term Control Plan* (LTCP) to EPA and TDEC on September 11, 2011. On June 18, 2018, Metro presented to EPA and TDEC an *Addendum to the LTCP* which summarizes the updates and modifications to projects described in the LTCP since its submittal. In a February 11, 2019, letter, EPA provided review comments to Metro on the LTCP and *Addendum to the LTCP*. On March 6, 2019, Metro

provided a letter in response to those comments, and Metro continues to work with EPA and TDEC to obtain approval of the LTCP.

Milestone dates for projects and activities associated with the CAP/ER and the LTCP achieved during 2019 and those anticipated to occur during 2020 are shown in **Table 2**.

### 3. Sanitary Sewer Overflow Trends

The trend analysis for SSOs includes three graphs, each with the average rainfall from all the Metro rain gauges included. **Figure 1** shows monthly SSO events in the system as a result of the following causes:

- Excessive flow
- Blockage
- Repairs/Mechanical Problems
- Power Outage
- Rainfall Induced
- Other

The following months each experienced more than 40 SSO events: February 2018, February 2019, and December 2019. In each of the months experiencing more than 40 events, the majority of SSOs were the result of significant rainfall events. The majority of non-rainfall induced SSOs were caused by blockages from roots, grease, and debris.

**Figure 2** shows monthly SSO volumes within the system from 2018 through 2019 reported in million gallons (MG), while **Figure 3** shows monthly SSO durations within the system from 2018 through 2019. The durations shown are a summation of the total amount of time overflows were occurring within the system at all overflow locations. This data is provided in the units of overflow equivalent hours, meaning that, for any month, the total number of hours for the duration of overflows could exceed the actual number of hours in a given month. For instance, if a rainfall event results in three overflows that occur concurrently for two hours each, the overflow duration for that day is six overflow equivalent hours.

The data in **Figures 2** and **3** indicates large overflow volumes and durations during months with significant rainfall events. The average rainfall, as measured within the Metro system, is included on both graphs to show the relationship between rainfall and overflow events.

**Table 2 – Design/Construction Project Updates**

Project Number	Project Name	Design Start Date	Design End Date	Construction Start Date	Construction Substantial Completion
93-SC-34T	Whites Creek Pump Station Improvements	11/2009	3/2011	2/2012	11/2013
10-SG-0083	Lakewood Rehabilitation - Area 1 - Sewer	7/2011	8/2013	1/2014	3/2016
11-SG-0078	2011 Collection System Structural Defect Repair	6/2011	9/2012	2/2013	8/2013
11-SC-0067	Driftwood Equalization Facility	8/2011	4/2012	7/2012	6/2013
99-SC-009L	Dodson Chapel Equalization Facility	9/2011	1/2012	5/2012	11/2013
11-SC-0101	West Park Equalization Facility Phase II	5/2012	12/2014	4/2015	8/2018
11-SC-0102	Mill Creek / Opryland Equalization Facility - Phase II	8/2012	5/2013	1/2014	5/2015
11-SC-0106	Neely's Bend Rehabilitation	9/2012	6/2013	12/2013	12/2014
11-SC-105A	Shelby Park Rehabilitation - Area 1 - Virginia Avenue	10/2012	6/2013	1/2014	4/2015
11-SC-0104	Dodson Chapel Pipe Improvements	10/2012	10/2014	1/2015	11/2015
11-SC-0148	Joelton Rehabilitation	1/2013	6/2013	10/2013	6/2014
11-SC-103A	Cowan Riverside Rehabilitation - Area 1 - Jones Avenue	2/2013	9/2013	1/2014	4/2015
11-SC-0121	Apex Sewer Corrections	3/2013	10/2013	2/2014	7/2014
13-SC-0001	Annual Rehabilitation FY2013	6/2013	6/2014	10/2014	1/2016
11-SC-105B	Shelby Park Rehabilitation - Area 2 - Norvel Avenue	7/2013	1/2014	5/2014	10/2015
11-SC-103B	Cowan Riverside Rehabilitation - Area 2 - Dickerson Pike	7/2013	3/2014	7/2014	9/2015
11-SC-144C	Westchester Drive Rehabilitation	7/2013	3/2015	7/2015	11/2015
11-SC-144A	Brick Church Pike Pipe Improvements	7/2013	4/2016	8/2016	2/2018
11-SC-147A	Highway 100 / Tyne Boulevard - Trimble Rehabilitation	9/2013	4/2014	8/2014	9/2015
11-SC-105C	Shelby Park Rehabilitation - Area 3 - Greenland Avenue	12/2013	8/2014	2/2015	4/2016
11-SC-0143	Davidson and Brook Hollow Sewer Improvements	4/2014	6/2015	10/2015	8/2016
14-SC-0041	Annual Rehabilitation FY2014 - Whites Creek Trunk	10/2014	8/2015	1/2016	11/2017
11-SC-105D	Shelby Park Rehabilitation - Area 4 - Brush Hill Road	10/2014	4/2015	7/2015	6/2016
11-SC-103C	Cowan Riverside Rehabilitation - Area 3 - West Trinity Lane	11/2014	5/2015	10/2015	9/2016
11-SC-103D	Cowan Riverside Rehabilitation - Area 4 - Pages Branch	1/2015	2/2016	8/2016	12/2017
11-SC-120A	Smith Springs Rehabilitation - Area 1 - Priest Lake Meadows	2/2015	10/2015	2/2016	1/2017
11-SC-135A	28th Avenue Rehabilitation - Area 1 - Clifton Avenue	2/2015	12/2015	4/2016	3/2017
11-SC-0111	Davidson Branch Pump Station and Equalization Facility	5/2015	12/2017	8/2020	5/2022
14-SC-153A	Central WWTP Capacity Improvements and CSO Reduction – A	9/2015	See note 2	See note 2	See note 2
14-SC-153B	Central WWTP Capacity Improvements and CSO Reduction – B	9/2015	See note 2	See note 2	See note 2



Project Number	Project Name	Design Start Date	Design End Date	Construction Start Date	Construction Substantial Completion
11-SC-0110	Ewing Creek – Brick Church Pike Equalization Facility	8/2015	12/2016	5/2017	12/2018
11-SC-0140	Gibson Creek Rehabilitation - Area 1 - Dupont Avenue	7/2015	4/2016	9/2016	10/2017
11-SC-0117	Langford Farms - Madison Heights Rehabilitation	2/2016	9/2016	2/2017	12/2017
11-SC-120B	Smith Springs Rehabilitation - Area 2 - Castlegate	2/2016	8/2016	1/2017	6/2018
16-SC-0009	Annual Rehabilitation FY2016 - South Hurricane Creek	3/2016	12/2016	5/2017	12/2017
11-SC-0116	Hurricane Creek Pipe Improvements	7/2016	6/2020	2/2021	10/2022
11-SC-105E	Shelby Park Rehabilitation - Area 5 - Cooper Lane	6/2016	3/2017	8/2017	11/2018
11-SC-0139	Gibson Creek Equalization Facility	9/2016	5/2020	11/2020	5/2022
11-SC-108A	Loves Branch Rehabilitation	10/2016	6/2017	12/2017	2/2019
11-SC-141A	Hidden Acres Rehabilitation	10/2016	8/2017	4/2018	11/2018
11-SC-109A	Vandiver Rehabilitation	12/2016	8/2017	3/2018	11/2019
11-SC-105F	Shelby Park Rehabilitation - Area 6 - Shelby Trunk	2/2017	10/2017	9/2020	12/2021
17-SC-017A	Annual Rehabilitation FY2017 - Dry Creek	3/2017	9/2017	3/2021	3/2022
11-SC-120B	Smith Springs Rehabilitation - Area 3 - Harbour Town	6/2017	11/2017	11/2020	11/2021
11-SC-017B	Annual Rehabilitation FY2017 - Shepherd Hills	8/2017	10/2017	2/2021	12/2021
11-SC-118A	Mill Creek / Seven Mile Creek Rehabilitation - Area 1	7/2018	3/2019	2/2021	4/2022
11-SC-135B	28th Avenue Rehabilitation - Area 2 - Batavia Street	4/2020	10/2020	10/2021	12/2022
11-SC-145A	Cleeces Ferry Rehabilitation - Area 1 - Summerly Drive	5/2020	11/2020	8/2021	10/2022
11-SC-0151	Mill Creek Trunk Improvements and Equalization Facility	7/2020	4/2023	11/2023	11/2027
Not Established	Annual Rehabilitation FY2020	6/2020	12/2020	8/2021	10/2022
11-SC-0153	Lakewood Rehabilitation - Area 2	9/2020	3/2021	10/2021	12/2022

## Note:

1. Design phase shown includes activities associated with permitting and easement acquisition.
2. Metro is completing the Central WWTP Capacity Improvements and CSO Reduction project via a Construction Manager at Risk, which is underway. Numerous construction packages are anticipated to complete this work.

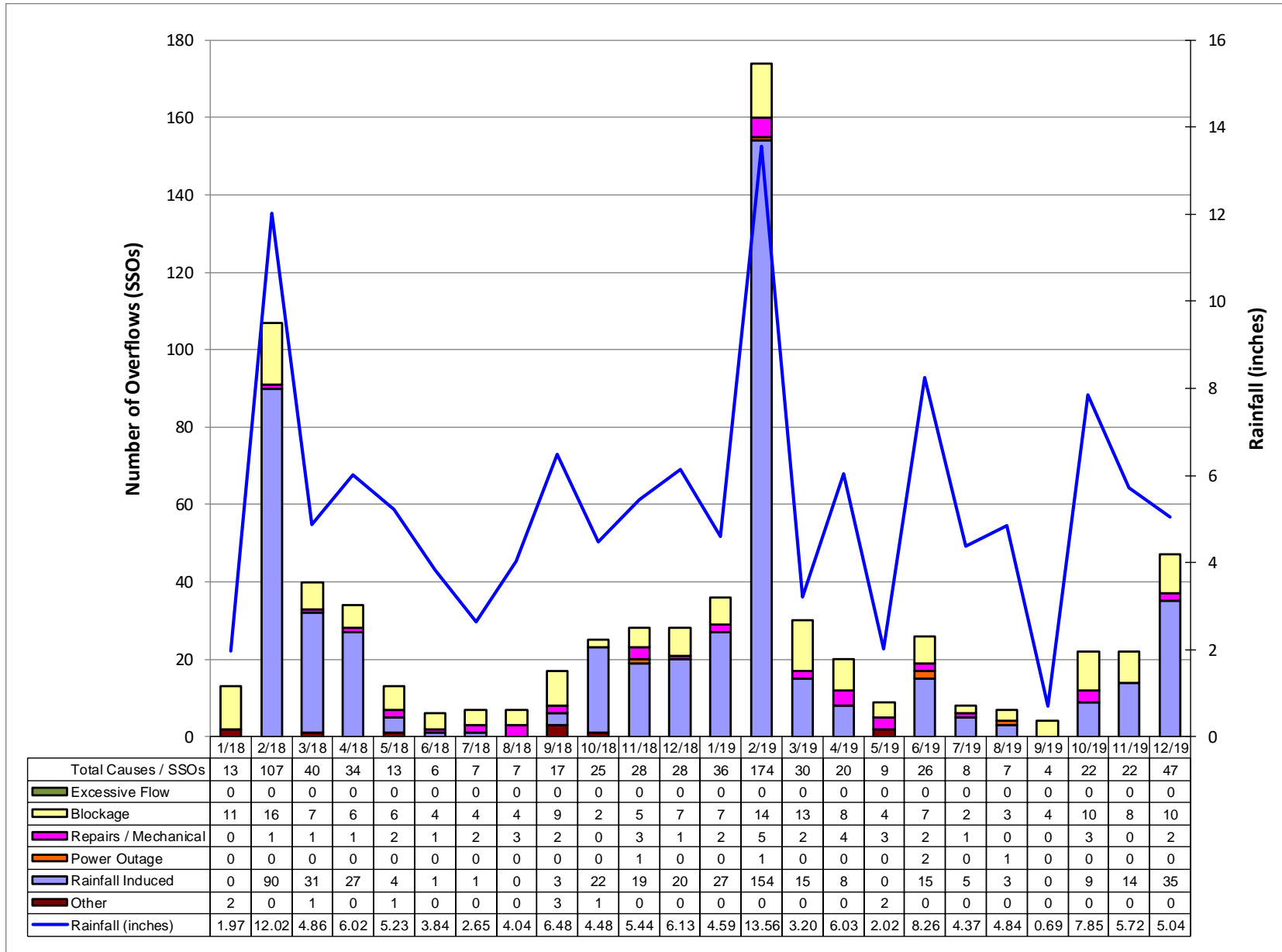


Figure 1 – SSO Events by Cause

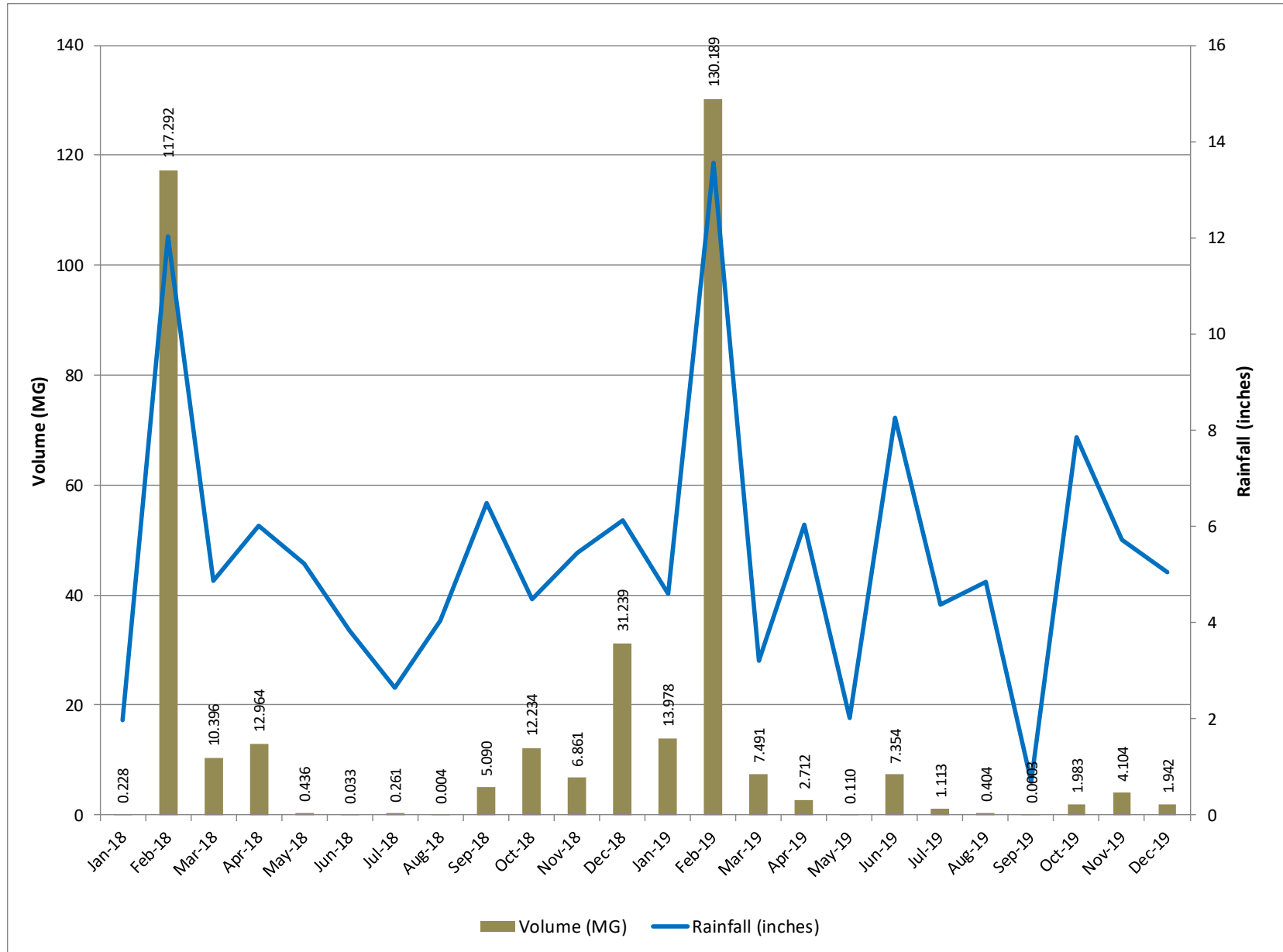


Figure 2 – Monthly SSO Volumes

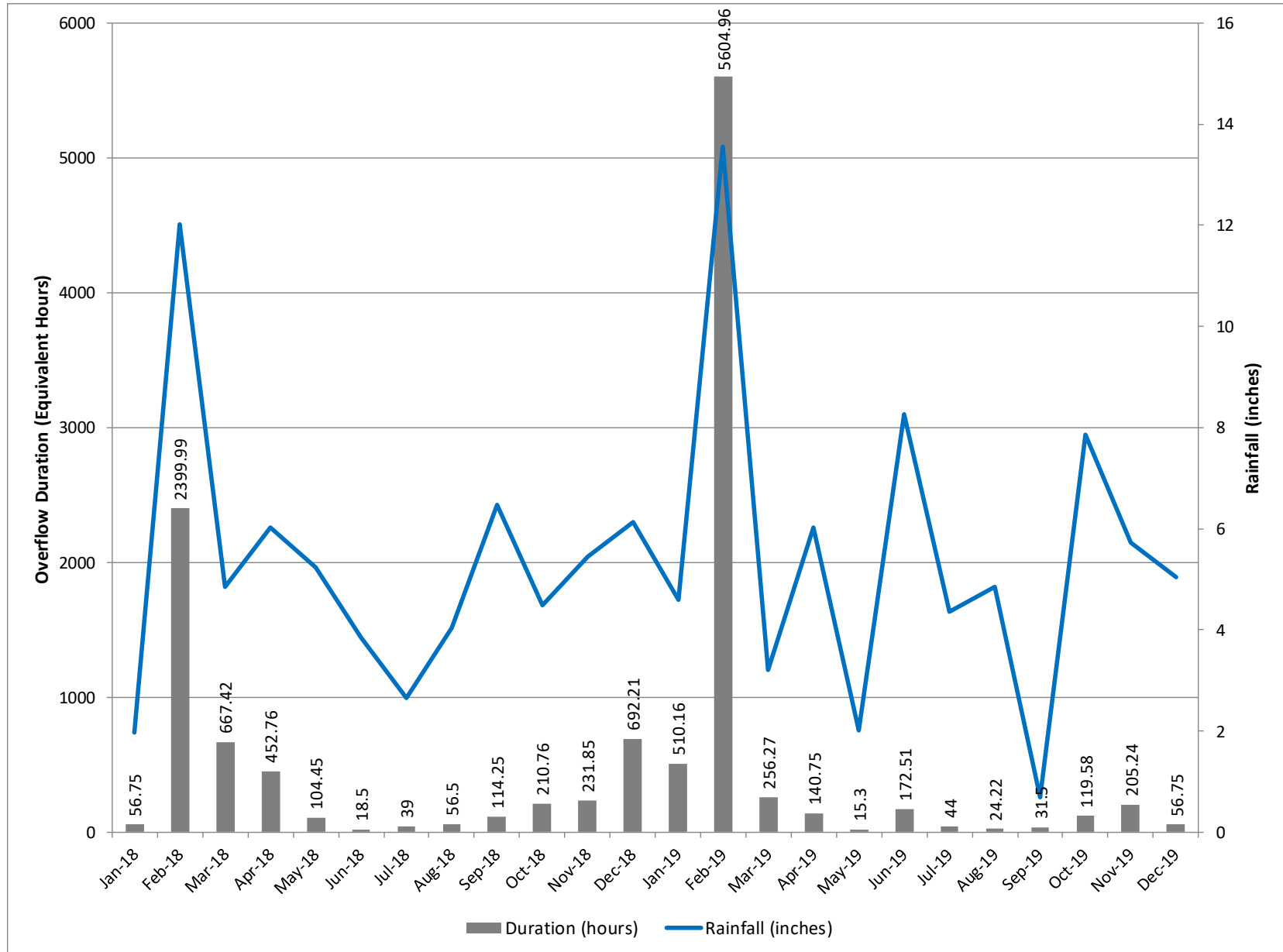


Figure 3 – Monthly SSO Durations

## 4. Combined Sewer Overflow Trends

There is not a trend analysis in this report for the dry weather combined sewer overflows (CSOs). No dry weather CSOs occurred in 2017. Two dry-weather CSOs occurred in August 2019 during a partial shutdown of the Central Wastewater Treatment Plant. Additional information on those events is presented in the *Quarterly Progress Report* for the 3<sup>rd</sup> Quarter of 2019.

# Appendix A

## Update to the *CMOM Self-Assessment Report*





PROGRAM OFFICE  
210 25th Avenue North, Suite 1104  
Nashville, Tennessee 37203  
Phone (615) 915-0384 • Fax (615) 891-2508

## Technical Memorandum

**DATE:** January 28, 2019

**TO:** Metro Water Services

**FROM:** Heather Housel, P.E., CDM Smith  
Kevin Colvett, P.E., Inflo Design Group

**RE:** Update to the *CMOM Self-Assessment Report*

**cc:** Ron Taylor, P.E., CWNOAP Director  
Greg Ballard, P.E., CWNOAP Deputy Director  
Janelle Rogers, Ph.D., P.E., BCEE, PMP, CWNOAP Manager  
Kimberly Martin, P.E., PMP, CWNOAP Deputy Manager  
Michael Krabacher, P.E., CWNOAP Controls Manager  
Paul Stonecipher, P.E., CWNOAP Design Manager

**No. of Pages:** 11

**Attachments:** None

### Executive Summary

In 2006, the Metropolitan Government of Nashville and Davidson County Tennessee (Metro) completed a self-audit of their wastewater collection system as part of the Environmental Protection Agency (EPA) Region IV's Capacity, Management, Operations, and Maintenance (CMOM) Program, culminating in the *EPA CMOM Self-Assessment Report, September 2006*. EPA's CMOM Program provides a flexible framework for municipalities to identify and incorporate information-based practices that allow better management of resources, and reduce the risk of regulatory non-compliance (i.e. overflows). In 2019, CDM Smith and Inflo Design Group were requested to perform a review of Metro's current CMOM activities and determine potential areas for improvement.

To meet the intent of this evaluation, existing data and system information were reviewed, including the *CMOM Self-Assessment Report* and *Annual Reports* submitted to EPA, and discussions with Metro Water Services (MWS) personnel were conducted. The purpose of this effort was to provide an impartial review of the original CMOM requirements and determine what aspects of MWS's CMOM should be updated or augmented to better meet the goal of reducing overflows.

Some topics that were included in the *CMOM Self-Assessment Report* were not reviewed as part of this update, including the following:

- Organization
- Training
- Safety
- Financial analysis
- Customer Service
- Legal support
- Water quality monitoring
- *Contingency Plan for Utility Infrastructure*
- Nine Minimum Controls or other combined sewer system (CSS) related items

While these items are important to MWS's day-to-day operations, they were determined to have minimal impact on the primary CMOM goals of preventing, identifying, and addressing overflows.

The purpose of this technical memorandum is to provide an updated *CMOM Self-Assessment Report* to reflect MWS's performance of existing management, operations, and maintenance procedures; identify deficiencies and potential corrective actions; and establish revised reporting items to track and include in the *Annual Report* to EPA.

## 1.0 Collection System Components

Metro's wastewater collection system includes both combined sewers and separate, sanitary sewers. A summary of the current collection system components is presented as **Table 1** below.

**Table 1 Existing Collection System Components**

Parameter	Value
<b>Gravity Lines (miles)</b>	
8-inch diameter or less	2,363
10-inch to 24-inch diameter	466
> 24-inch diameter	140
<b>Force Main (miles)</b>	
8-inch diameter or less	86
10-inch to 24-inch diameter	54
> 24-inch diameter	25
<b>Number of Manholes</b>	83,576
<b>Number of Pump Stations</b>	116

## 2.0 CMOM Program Review and Update

Since completion of the *CMOM Self-Assessment Report* in 2006, MWS has continued to review and revise its CMOM-related activities to respond to changes in staffing and resources, implement new technologies, and respond to the rapid population growth in Nashville. This update to the *CMOM Self-Assessment Report* describes how several CMOM-related practices have evolved over the past 13 years and provides general information on current CMOM-related practices. However, the *CMOM Self-Assessment Report* was a more comprehensive analysis following all aspects of the EPA guidance document, while the primary focus of this update is on the causes of overflows in the sewer system and how these overflows are addressed. The following list delineates the areas of focus for the update:

- *Spill and Overflow Response Plan (SORP)*, including overflow reporting
- Pump station operations and maintenance (O&M)
- Force main O&M
- Gravity sewer O&M
- Fats, Oils, and Grease (FOG) Control Program
- Infrastructure rehabilitation
- *Capacity Assurance Plan*

Utilizing the *CMOM Self-Assessment Report* as a baseline, discussions with key MWS personnel were conducted to determine how each CMOM area listed above is currently being implemented and to what extent some items may have changed. The primary goals of the review included the following:

- Affirm how CMOM-related practices benefit MWS in meeting CMOM goals
- Identify areas that might be considered for improvement
- Identify a revised list of reporting items for the *Annual Reports* to EPA

Current CMOM-related practices and proposed adjustments are discussed in **Sections 2.1** through **2.7**. General recommendations are presented in **Section 3**. Revised reporting items for the *Annual Report* are summarized in **Section 4**.

### 2.1 SORP and Overflow Reporting

The *Spill and Overflow Response Plan (SORP)*, which was last updated in 2015, describes MWS's approach to responding to overflows, including confirming that an overflow occurred, identifying the cause of the overflow, mitigating its impact, and notifying regulatory agencies and the public, as needed.

Although the SORP is maintained by System Services, it affects multiple groups, with each group having an important role in MWS's response to overflows. Generally, the Wastewater Operations Division - Routes Services initially responds to overflows related to pump stations, while System Services responds to overflows within the gravity sewer system. When overflows appear to be

caused by grease, those are routed to the Wastewater Operations Division - Environmental Compliance for additional review. Additionally, the National Pollutant Discharge Elimination System (NPDES) Section of the Stormwater Division may be requested to assist in the investigation, remediation, and public notification of overflows.

While the SORP describes the initial response to and reporting of overflows, MWS also conducts a monthly overflow meeting where each overflow is reviewed, its cause is discussed, and the need for additional activities to prevent the recurrence of overflows is evaluated. This meeting helps to finalize the monthly overflow report which is submitted to TDEC and posted on the Clean Water Nashville website. Action items from the monthly meetings are further tracked and discussed in quarterly compliance meetings which MWS began in late 2019. These quarterly compliance meetings allow additional discussions about overflow trends, the status of investigations and repairs, the need for capital improvement projects, and the prioritization of compliance-related activities.

To capture MWS's efforts responding to and reporting overflows, the following items will be tracked on an annual basis and included in the *Annual Report*:

- Monthly overflow summary, including cause, estimated overflow volume, and overflow duration, as required by the Consent Decree.
- Review of the SORP and update, as needed. The SORP will continue to be reviewed on an annual basis, and any revisions will be submitted to EPA and TDEC by June 1 as described in the Consent Decree.
- Confirmation that compliance meetings were held on a quarterly basis.

## 2.2 Pump Station O&M

Since development of the *CMOM Self-Assessment Report*, the number of pump stations operated by MWS has increased from 101 to 116. All pump stations have been connected to a supervisory control and data acquisition system (SCADA) since 1987; however, not all pump stations have flow monitors installed. Remote monitoring of each pump station is conducted at the Omohundro Water Treatment Plant's control room which is staffed 24 hours per day, 365 days per year.

As previously detailed in the *CMOM Self-Assessment Report*, pump station O&M activities include monitoring of current operations at each pump station, responding to station alarms as needed, upgrading pump station components as needed, and evaluating pump station performance and adequacy. Pump station O&M activities are the primary responsibility of Route Services.

The following items will be tracked on an annual basis and included in the *Annual Report*:

- Number of pump station capacity evaluations / drawdown tests that occurred. MWS's goal is to assess the capacity of each pump at each pump station at least annually. If the station is equipped with a flow monitor, the capacity evaluation may consist of a comparison of the station's rated capacity to observed flows. For stations without flow monitoring, a drawdown test will be performed to assess the station's capacity. Any station determined

to be operating significantly under its expected capacity will be evaluated for further improvements.

- Review of pump station O&M procedures. Pump station O&M procedures will continue to be reviewed on an annual basis and revised as needed.

### 2.3 Force Main O&M

Although pump station O&M activities are primarily the responsibility of Route Services, force main O&M activities are a shared responsibility between Route Services and the System Services Division. The inspection and maintenance of air release/vacuum valves (ARVs) are the responsibility of Route Services, while cleaning, repair, and other maintenance activities for force mains are the responsibility of System Services.

As established in the *CMOM Self-Assessment Report*, MWS has a goal of inspecting ARVs on an annual basis with parts being replaced as required.

Force main cleaning is primarily conducted when determined to be necessary based on the performance of the pump station. As such, it requires close coordination between Route Services and System Services to determine when cleaning may be necessary. In 2020, MWS plans to formalize this interaction through development of a Force Main O&M Program that further describes the steps necessary to identify and correct potential issues with sewer force mains.

Although reporting items may be adjusted as the Force Main O&M Program is formalized, the following items will be tracked on an annual basis and included in the *Annual Report*:

- Percentage of ARVs inspected. MWS will continue their goal of inspection of each ARV on an annual basis.
- Number of force mains cleaned. Since MWS performs this maintenance activity when necessary to restore system capacity, no annual cleaning benchmark is proposed, and it is anticipated that the number of force mains cleaned may vary considerably from year to year.

### 2.4 Gravity Sewer O&M

As detailed in the *CMOM Self-Assessment Report*, maintenance activities for the gravity sewer system included dyed-water testing, corrosion defect identification of manholes, flow monitoring, closed circuit television (CCTV) inspection, gravity system defect analysis, smoke testing, cleaning, and service lateral investigations. MWS has continued to utilize those tools for maintaining the gravity sewer system and in 2009 began utilizing the Sewer Line Rapid Assessment Tool (SL-RAT) to identify potential locations of blockages. MWS's System Services Division is the primary group responsible for gravity sewer O&M activities.

Additionally, the Watershed Group of MWS's Stormwater Division evaluates visible portions of the gravity sewer system that are within streambanks as part of their annual stream walks. Any anomalies are reported to System Services for additional investigation and repair, as needed.

In the *CMOM Self-Assessment Report*, cleaning and CCTV inspection goals were established for each cleaning and inspection crew. The monthly cleaning goal was 40,000 linear feet of sewer per crew, and the monthly CCTV inspection goal was 30,000 linear feet of sewer per crew. However, with changes in staffing and equipment levels, in 2009 MWS began to rely more heavily on outside contractors to complete preventative maintenance work on the gravity sewer system, and that approach has continued to date. As a result, MWS has shifted their annual reporting metric to the footage of gravity sewer that undergoes CCTV inspection and SL-RAT inspection. The footage of sewer cleaned is also reported, although cleaning occurs only when needed to restore the capacity of the sewer system.

MWS continues to maintain lists of gravity sewers that are susceptible to blockages caused by either roots or grease. Although the long-term goal is to address source(s) of grease and correct defects that allow roots or grease to accumulate in the system, the listed sewers are inspected on an annual basis (or more frequently, if needed) to determine the need for cleaning.

Currently, the number of “root letters” sent to customers with service lines where roots are observed is included in the *Annual Report* to EPA. While the policies for resolving root intrusion in service lines are anticipated to remain the same, inclusion of this reporting item was determined by MWS to have only limited value and will no longer be included in the *Annual Report*.

The following items will be tracked on an annual basis and included in the *Annual Report*:

- Footage of gravity sewer that underwent CCTV inspection and SL-RAT inspection. MWS’s inspection goal is to complete inspections on a 20-year cycle, targeting inspections of approximately 10 percent of the system each year on average. For years when large diameter sewers are targeted for inspection, the annual footage completed may vary considerably because these sewers are costly to inspect.
- Footage of gravity sewer that was cleaned. Since MWS only cleans when necessary to restore system capacity, no annual cleaning benchmark is proposed.
- Number of manhole inspections completed. Note, this includes only inspections where the inspection is documented in a report. Every manhole that is accessed for sewer maintenance activities is checked to confirm that it is free of blockages, significant defects, or other items that require repair; however, in most cases an inspection report is not completed.
- Footage of streams walked. During the stream walks, visible portions of the gravity sewer system within the streambanks are evaluated, and any anomalies are identified for additional investigation and repair, as needed.
- Review of gravity sewer O&M procedures. Gravity sewer O&M procedures will continue to be reviewed on an annual basis and revised as needed.



## 2.5 FOG Control Program

Initiated in April 2003, the FOG Control Program was developed with the goal of reducing the volume of FOG discharged in the sewer system and eliminating FOG-related overflows. This program is the responsibility of Environmental Compliance, although since the program's inception, MWS has utilized a contractor to assist with the implementation. The FOG Control Program includes educating the public on proper disposal of FOG, consistent and thorough inspections of Food Service Establishments (FSEs), issuing of FOG permits to FSEs, certification of grease interceptors and grease traps, enforcement actions when FSEs fail to meet permit requirements, maintenance of the FOG permit database, sewer maintenance and overflow response to FOG-related issues, and analysis of performance indicators.

Since development of the *CMOM Self-Assessment Report*, additional annual certifications are now required for each FSE, and a review of grease control is now included in the permitting requirements. Additionally, a warning system was developed allowing FSEs 45 to 90 days to address FOG-related issues prior to receiving a Notice of Non-Compliance.

Currently, the only item related to FOG that is included in the *Annual Report* is the number of notifications sent to residential customers regarding grease blockages in the sewer system, and MWS will continue to report this item on an annual basis.

The following items will be tracked on an annual basis and included in the *Annual Report*:

- Number of FSEs with grease control equipment that were inspected. MWS's goal is to inspect each FSE every 12 to 16 months and to target inspections of approximately 75 percent of the system each year on average.
- Number of new permits issued for FSEs
- Volume of FOG removed from the sewer system
- Number of notifications mailed, distributed, or called out to customers when grease-related blockages or overflows are identified in the system
- Review of FOG Control O&M procedures. FOG Control O&M procedures will be reviewed on an annual basis and revised as needed

## 2.6 Infrastructure Rehabilitation

In addition to cleaning and inspection of the gravity sewer system, MWS also repairs and rehabilitates the gravity sewer system to address structural and maintenance defects, including addressing sources of infiltration and inflow. These repairs may be conducted through one of the following three mechanisms:

1. Defects that require immediate attention (i.e., those that threaten to interrupt service or have resulted in an overflow) are repaired by either internal crews within System Services or through emergency contracts managed by System Services.

2. The *Corrective Action Plan / Engineering Report, September 2011 (CAP/ER)*, developed to address recurring wet-weather overflows in the sanitary sewer system, identified several areas where high wet-weather flows contribute to sanitary sewer overflows. These areas are targeted for comprehensive evaluation and rehabilitation to address sources of infiltration and inflow. The design and construction of those improvements are managed by Clean Water Nashville, under MWS's Engineering Division.
3. MWS established an annual sewer rehabilitation program in 2011 to address sanitary sewers not covered under CAP/ER projects to meet the assumption that the condition of those sewers, particularly under wet-weather flow conditions, will not worsen. Through annual rehabilitation projects, sewers are evaluated to the extent that data is available in terms of both criticality (consequence of failure) and condition (probability of failure) for both structural and infiltration-related defects. This allows sewers to be prioritized in terms of their risk of failure and the potential for RDII. Project areas are then defined based upon the density of high-risk sewers, and areas are selected by System Services and Clean Water Nashville. The design and construction of those improvements are managed by Clean Water Nashville.

To capture MWS's efforts towards infrastructure rehabilitation, the following items will be tracked on an annual basis and included in the *Annual Report*:

- Number of point repairs completed. This value will include repairs made by System Services and those completed as part of CAP/ER and annual rehabilitation projects.
- Footage of pipe replaced or new pipe installed to provide additional capacity or address structural or O&M defects. This excludes pipe installed at extensions to the existing sewer system.
- Footage of pipe rehabilitated via cured-in-place pipe (CIPP) lining or other methods.
- Number of manholes rehabilitated.
- Number of sewer service connections rehabilitated or replaced, including cleanout repairs.

Each of the above items will be tracked on an annual basis, but no annual benchmark is proposed. It is anticipated that the annual values may vary considerably from year to year, depending on the number of projects underway.

## 2.7 Capacity Assurance

Originally developed in August 1990 and last amended in June 2007, MWS's *Capacity Assurance Plan* was created to address how to allocate sewer capacity to accommodate growth and not allow future conditions to develop which could cause overflows in the sewer system.

All proposed developments within MWS's service area require a determination of the availability of sewer service. This determination is made by the Engineering Division as described in the *Capacity Assurance Plan* and considers information provided by the developer, such as the intended use of the development, projected wastewater flows, etc.

With the rapid growth over the last several years in MWS's service area, minor adjustments have been made to clarify assumptions in the *Capacity Assurance Plan*, and MWS has utilized geographic information systems (GIS) to better track the location of capacity requests. In 2020, MWS plans to formalize these changes via an update to the *Capacity Assurance Plan*. Following that update, the *Capacity Assurance Plan* will be reviewed on an annual basis and revised as needed.

### 3.0 Additional Recommendations

Through discussions with MWS staff to complete this review, several additional areas for improvement or clarification were noted. Although not necessary to meet the primary CMOM goals of preventing, identifying, and addressing overflows, the following recommendations may improve operational efficiency and consistency amongst various groups and should be considered for completion prior to the end of 2020.

- Review and clarify the protocol for assigning work orders and tracking progress between groups. Although work orders are consistently tracked within individual groups, transferring work between groups (e.g., from System Services to Clean Water Nashville) is primarily accomplished verbally or via e-mail. This may lead to work orders being missed or uncertainty regarding responsible parties. A standardized protocol between primary groups should be developed to ensure more streamlined communication, particularly regarding the initiation and eventual closure of a work order. As part of this, MWS may also want to evaluate the feasibility of developing a standardized work order program across MWS which would allow one group to create or transfer a work order to another group.
- Revamp the overflow database to improve overflow reporting and analysis. MWS maintains a Microsoft Access database that contains overflow records for the past 30 years, including date/time of occurrence, duration, volume lost, cause, and location. Although this has served MWS well and provides valuable historical information, the database can be cumbersome to use and update. A revamped database, or a dashboard that integrates with the database, could potentially automate overflow mapping, preparation of quarterly and annual report data, and trend analyses, each of which currently occurs outside of the database. Additionally, this updated approach would be more accessible by more MWS users to further enhance collaboration.
- Look for opportunities to better leverage GIS. Transitioning from tracking via lists, databases, or reports to spatial mapping of datasets facilitates sharing and review of information, allowing for a more mobile workforce in the future. For instance, tracking blockage-related overflows in GIS allows MWS to target hot spots for additional inspection and cleaning which is more effective than focusing on individual manhole locations. Items mentioned for possible inclusion in GIS include sewer segments on the roots list, sewer segments on the grease list, and locations of permitted FSEs. Additional items that would be beneficial for inclusion in GIS should also be evaluated as part of this effort.
- Review the approach to private service laterals. While private service laterals are the responsibility of the property owner from the structure to the main sewer, MWS typically

repairs the portion of the private lateral that is located within the ROW or easement (i.e., the lower lateral) as part of rehabilitation projects. In limited cases, MWS has also obtained rights-of-entry to complete work outside the ROW/easement (i.e., the upper lateral) for residential customers where significant sources of RDII are observed. Outside of rehabilitation projects, MWS may assist customers with repairs/ cleaning for the lower lateral if there is an access point at the ROW/easement that delineates where the issue is located. Reviewing the existing approaches and establishing a more formalized program may help provide more consistency across groups in the response to customer service requests and help ensure that significant sources of RDII are addressed when outside of MWS's ROW/easement.

- Review the process for new sewer connections. The MWS service area has experienced rapid growth in new residential housing, much of which has been redevelopment of low-density areas to higher-density units. Although MWS's Development Services has a procedure for new service connections, this should be reviewed for consistency with approaches utilized by Clean Water Nashville and other groups, particularly for connections made to sewers with CIPP lining.

## 4.0 Summary and Recommendations

Discussions with MWS staff about CMOM-related practices indicated that most facets of the program continue to be implemented as described in the *CMOM Self-Assessment Report* although some modifications and refinements have been made as the program continues to evolve. However, several of the items that are currently tracked in the *Annual Report* were determined to have little relevance to the primary CMOM goals of preventing, identifying, and addressing overflows.

**Table 2** summarizes the revised CMOM reporting items and the proposed benchmarks, where applicable. Tracking of these items will begin in 2020, and these items will be included in the Annual Report for 2020. Beyond these specific items, MWS also remains committed to regular reviews of current and potential CMOM activities to establish relevant reporting items used to track CMOM progress.

**Table 2 Recommended Reporting Items and Benchmarks**

Reporting Item	Annual Benchmark
Monthly summary of overflows, including cause, volume, and duration	Tracking only
Review SORP and update as needed	1/year
Conduct Quarterly Compliance Meetings	4/year
Pump station capacity evaluations / drawdown testing	100%/year
Review pump station procedures and update as needed	1/year
Inspection of ARVs	100%/year
Number of force mains cleaned	Tracking only
Length of gravity sewer inspected	10%/year
Length of gravity sewer cleaned	Tracking only
Number of manholes inspected	Tracking only
Length of stream walks completed	Tracking only
Review gravity sewer procedures and update as needed	1/year
Inspection of permitted FSEs with grease control equipment	75%/year
Number of new permits for FSEs	Tracking only
Volume of FOG removed from the system	Tracking only
Number of FOG-related notifications mailed, distributed, or called out to customers	Tracking only
Review FOG control procedures and update as needed	1/year
Number of sewer point repairs completed	Tracking only
Length of pipe replaced or new pipe installed (excluding extension of service)	Tracking only
Length of sewer rehabilitated such as via CIPP lining	Tracking only
Number of manholes rehabilitated	Tracking only
Number of service connections replaced or rehabilitated	Tracking only
Review of <i>Capacity Assurance Plan</i> and update as needed	1/year