SD1
Managing Northern Kentucky's
Wastewater and Storm Water

August 29, 2020

Director of the Division of Enforcement
Department for Environmental Protection
300 Sower Blvd.
Frankfort, KY 40601

Chief, Environmental Enforcement Section
Environmental and Natural Resources Division
U.S. Department of Justice
601 D Street NW
Washington, DC 20005
DOJ Case No. 90-5-1-1-08591

Mary Jo Bragan, Chief
Water Enforcement Branch
Enforcement & Compliance Assurance Division
U.S. Environmental Protection Agency, Region 4
61 Forsyth Street, S.W.
Atlanta, Georgia 30303

Re: Amended Consent Decree Case No. 2:05-CV-199-(WOB)

To Whom It May Concern:

Pursuant to the above-referenced Amended Consent Decree, Sanitation District No. 1 (SD1) is required to submit annual reports that demonstrate SD1's compliance with the Amended Consent Decree:

> **48. Annual Reports.** The District shall submit each year to the Cabinet/EPA an Annual Report that describes the District's progress in complying with this Amended Consent Decree during the previous fiscal year ending June 30. The Annual Report shall be submitted no later than 60 days after the end of each fiscal year period.

Information contained within the enclosed Annual Report No. 2 describes SD1's compliance with Amended Consent Decree Case No. 2:05-CV-199-(WOB) for the period of July 1, 2019 through June 30, 2020.

To the best of my knowledge and belief, the enclosed report is true, accurate, and complete, and further demonstrates SD1's commitment to the mission of protecting and enhancing the water resources and quality of life in Northern Kentucky.

If you have any questions or concerns, do not hesitate to contact me at 859-578-7465 or by e-mail at achaney@sd1.org.

Best regards,

Adam Chaney
Executive Director

AC/wck
Enclosures

Sanitation District No. 1
August 29, 2020

Amended Consent Decree Annual Report No. 2

(July 1, 2019 through June 30, 2020)

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CERTIFICATION

Amended Consent Decree Annual Report No. 2
Consent Decree Case No. 2:05-CV-199-(WOB)

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.

Adam Chaney
Executive Director

8/28/20
Date

COMMONWEALTH OF KENTUCKY

)ss.

COUNTY OF Kenton

The foregoing instrument was acknowledged before me this 28 day of Aug, 2020 by Adam Chaney, Executive Director of Sanitation District No. 1.

Angela M Cook
NOTARY PUBLIC

Kenton County, Kentucky

My commission expires: 9.1.20

Angela M. Cook
Notary Public
Kentucky, State at Large
Comm. Exp. 09-01-2020
Notary ID 562735

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AMENDED CONSENT DECREE
ANNUAL REPORT NO. 2

August 29, 2020

Sanitation District No. 1
1045 Eaton Drive
Ft. Wright, KY 41017

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LIST OF ACRONYMS AND ABBREVIATIONS

ACD	Amended Consent Decree
Cabinet	Kentucky Energy and Environment Cabinet
CIPP	Cured In Place Pipe
CSAP	Continuous Sewer Assessment Program
CMOM	Capacity, Management, Operations, and Maintenance
CSO	Combined Sewer Overflow
CSS	Combined Sewer System
District	Sanitation District No. 1
EPA	U.S. Environmental Protection Agency
EQ	Equalization
FOG	Fats, Oils, and Grease
FSE	Food Service Establishment
FY	Fiscal Year
GCE	Grease Control Equipment
I/I	Inflow and Infiltration
MG	Million Gallons
MGD	Million Gallons per Day
MH	Manhole
NOV	Notice of Violation
PM	Preventative Maintenance
PS	Pump Station
SD1	Sanitation District No. 1
SL-RAT	Sewer Line Rapid Assessment Tool
SIU	Significant Industrial User
SSO	Sanitary Sewer Overflow
TCF	Total Combined Flow
TY	Typical Year
USWP	Updated Watershed Plan

SECTION 1. INTRODUCTION

This Annual Report is submitted to fulfill the requirements of Sanitation District No. 1's (SD1) Amended Consent Decree, as entered on May 22, 2019. The Amended Consent Decree is a legal agreement with the U.S. Environmental Protection Agency (EPA) and the Kentucky Energy and Environment Cabinet (Cabinet). The purpose of the Amended Consent Decree is to address sanitary sewer overflows (SSOs) in SD1's sanitary sewer system and combined sewer overflows (CSOs) in the combined sewer system, in an effort to improve water quality throughout SD1's service area. Specifically, Section V Reporting Requirements, states that:

> **48. Annual Reports.** The District shall submit each year to the Cabinet/EPA an Annual Report that describes the District's progress in complying with this Amended Consent Decree during the previous fiscal year ending June 30. The Annual Report shall be submitted no later than 60 days after the end of each fiscal year period.

Information contained within this report describes SD1's compliance with Amended Consent Decree Case No. 2:05-CV-199 (WOB) for Fiscal Year (FY) 2020.

SECTION 2. COMPLETED PROJECTS IN FY 2020

The first reporting requirement of the Annual Report, per paragraph 48 of the Amended Consent Decree, is to provide:

> **48. (a)** A description of the projects and activities conducted during the previous year to comply with the requirements of the Amended Consent Decree, in Gantt chart or similar format.

2.1 Completed Projects Listed in the Amended Consent Decree

Table 2.1 provides updates on projects listed in Appendix C of the Amended Consent Decree, which have been completed or partially completed during FY 2020.

Table 2.1 Completed Projects Listed in Amended Consent Decree Appendix C

Project Title	Project Description	ACD Estimated Completion Date	Actual Completion Date	On-going Activity for FY21
COMBINED SEWER OVERFLOW CONSTRUCTION PHASE PROJECTS				
Jacob Price Sewer Separation	2,700' of 12" thru 30" pipe. This project will install new pipe on 9th and 10th Streets in Covington from Greenup to the Licking river. This project will reduce CSOs along the Licking river by approximately 8 million gallons (MG) in the typical year.	12/31/19	06/30/19	COMPLETE
Aqua on the Levee Sewer Separation	1,500' of 48" and 30" pipe sewer separation and direct flow to the Ohio River. Pipe installation is primarily on Washington Street. This project will reduce CSOs on the Ohio River east of the Licking River by approximately 5 MG in the typical year.	12/31/20	1/15/19	COMPLETE
Church Street Sewer Separation	Approximately 2,000' sewer separation. New pipe on Gail, Janet, Valley View, Primrose, and sunset Streets. This project will reduce CSOs along the Banklick Creek near the Licking River, by approximately 5 MG in the typical year.	03/31/19	10/25/18	COMPLETE
SEPARATE SEWER OVERFLOW CONSTRUCTION PHASE PROJECTS				
Lakeside Park Sewer Capacity Upgrade	2,500' of 24" and 18" pipe installation on Hudson Ave from Dixie Hwy to the dead end of Hudson. Improvement is expected to address deteriorated infrastructure.	06/30/19	04/30/19	COMPLETE
Bullitsville Force Main Capacity Upgrade Phase I & II	2000' of existing 12" force main will be replaced (PH I) and10,000' of existing force main will be cleaned on the interior (PH II) to increase flow capacity. Improvements address deteriorated infrastructure.	12/31/19	PH I: 07/05/19	PH I: COMPLETE PH II: ONGOING
Richwood Pump Station and Force Main	Capacity increase of pump station and installation of 17,800' of new 20" force main. The project will redirect flow from the Lakeview Pump Station to the Western Regional Facility and is expected to reduce TY SSO volume by approximately 1.58 MG in at MHs 2300123 and 2300121.	03/31/19	07/20/18	COMPLETE: Post-Construction Monitoring & Model Calibration
Elsmere Corridor Capacity Upgrade	8,700' of 30", 24", and 18" pipe installation. This project is located in Kenton County upstream of the Narrows Rd Pump Station. Gravity upgrade of existing infrastructure will eliminate 3.41 MG of TY SSO and multiple Recurring SSO locations: 2100106, 2100129, 2100002, 2070019, 2090063, 2090008, and 2110001.	12/31/20	6/1/20	COMPLETE: Post-Construction Monitoring & Model Calibration
Wilder Pump Station Upgrade	Increase capacity of existing pump station and replace deteriorated infrastructure. Replace pumps to increase total pumping capacity from 1.1 MGD to 1.7 MGD.	12/31/20	6/30/19	COMPLETE: Post-Construction Monitoring & Model Calibration

Project Title	Project Description	ACD Estimated Completion Date	Actual Completion Date	On-going Activity for FY21
SEPARATE SEWER OVERFLOW CONSTRUCTION PHASE PROJECTS				
Allen Fork Pump Station Upgrade	Increase capacity of existing pump station. Replace pumps to increase total pumping capacity from 3.2 MGD to 4 MGD. Project impacts MH 2390002. Reduction of TY SSO volume of 0.01MG.	12/31/20	10/1/18	COMPLETE

2.2 Completed Projects Not Listed in the Amended Consent Decree

Diversion Improvement of CSO Outfall No. 091

In July of 2019, SD1 replaced a diversion structure and approximately 190 feet of pipe associated with CSO 0540157, KPDES Outfall No. 091, in the City of Bellevue. The dry weather diversion line to the interceptor pipe that runs along Covert Run Creek was undersized and susceptible to blockages of debris. Approximately 15 feet of 6-inch clay pipe and 175 feet of 8-inch clay pipe was replaced with approximately 175 feet of 12-inch plastic pipe. This improvement reduces the chances of dry weather CSOs caused by blockages in the underflow pipe at the diversion, and allows for more wet weather flow to be conveyed to the interceptor. The model predicted benefit to the upgraded pipe is a system wide reduction in typical year CSO volume of 0.29 MG.

SECTION 3. ACCOUNTING OF TYPICAL YEAR OVERFLOWS

The second reporting requirement of the Annual Report, per paragraph 48 of the Amended Consent Decree, is to provide:

> **48. (b)** An accounting, both for the current calendar year and cumulatively, of the reduction in volume and in number of occurrences of SSOs and Unpermitted Discharges and the volumes of combined sewage in the CSS, including the District's progress towards achieving the requirements for percentage of volumes of combined sewage in the CSS eliminated and/or captured for treatment and the percentage of capacity-related SSO volumes eliminated as set forth in Paragraph 43 of this Amended Consent Decree.

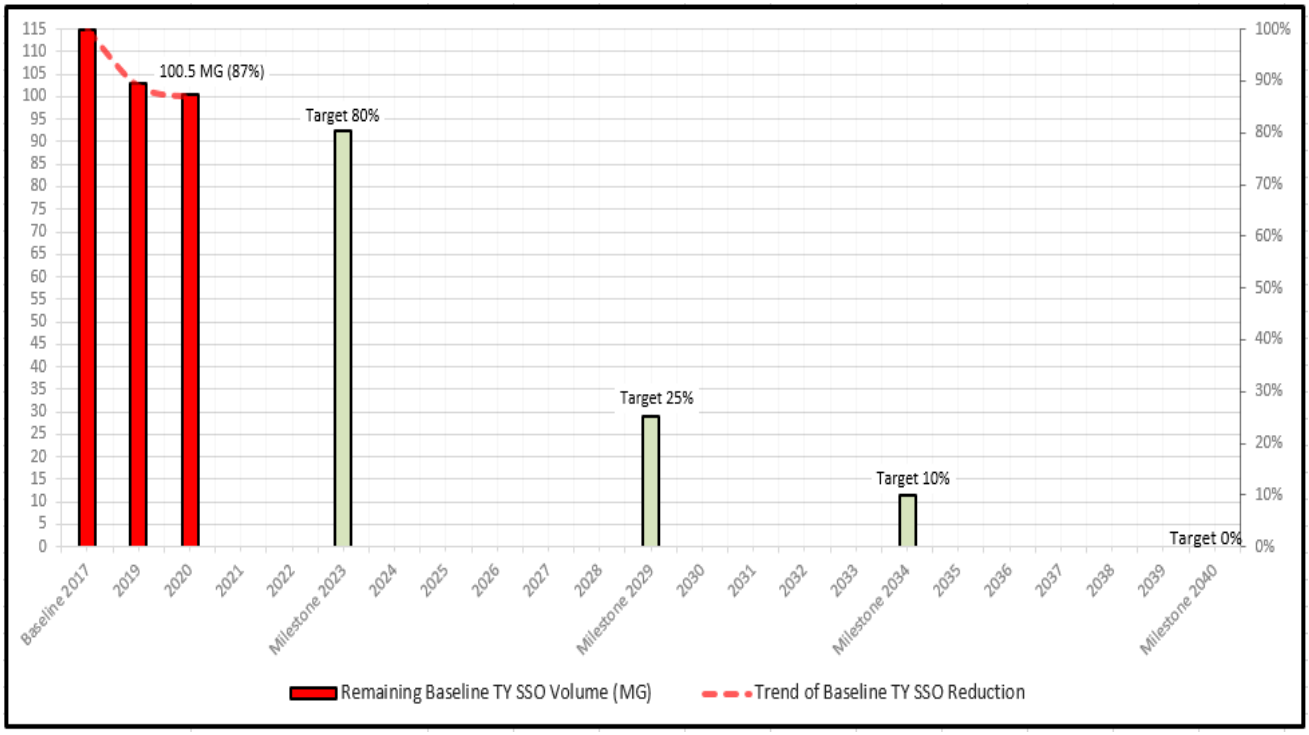
3.1 Typical Year SSOs

As described in the Amended Consent Decree (ACD), SD1's baseline SSO volume of 115.4 MG was established with the October 2017 hydraulic model and the 1970 typical year (TY) rainfall, adjusted with areal reduction factors.

Since the establishment of the baseline TY SSO volume, SD1 has upgraded its modeling software to the latest version, and completed multiple model calibrations of completed and planned capital projects in the separate sewer system. Figure 5.2 illustrates where model updates have been made in the past year. As of August 2020, SD1's hydraulic model predicts TY SSO volume to be 100.5 MG, or 87 percent of the established baseline in the ACD.

Figure 3.1 illustrates the current TY SSO volume, and the baseline volume reduction trend toward the milestones established in the ACD.

Figure 3.1 Remaining Baseline Typical Year SSO Volume



3.2 Typical Year CSOs

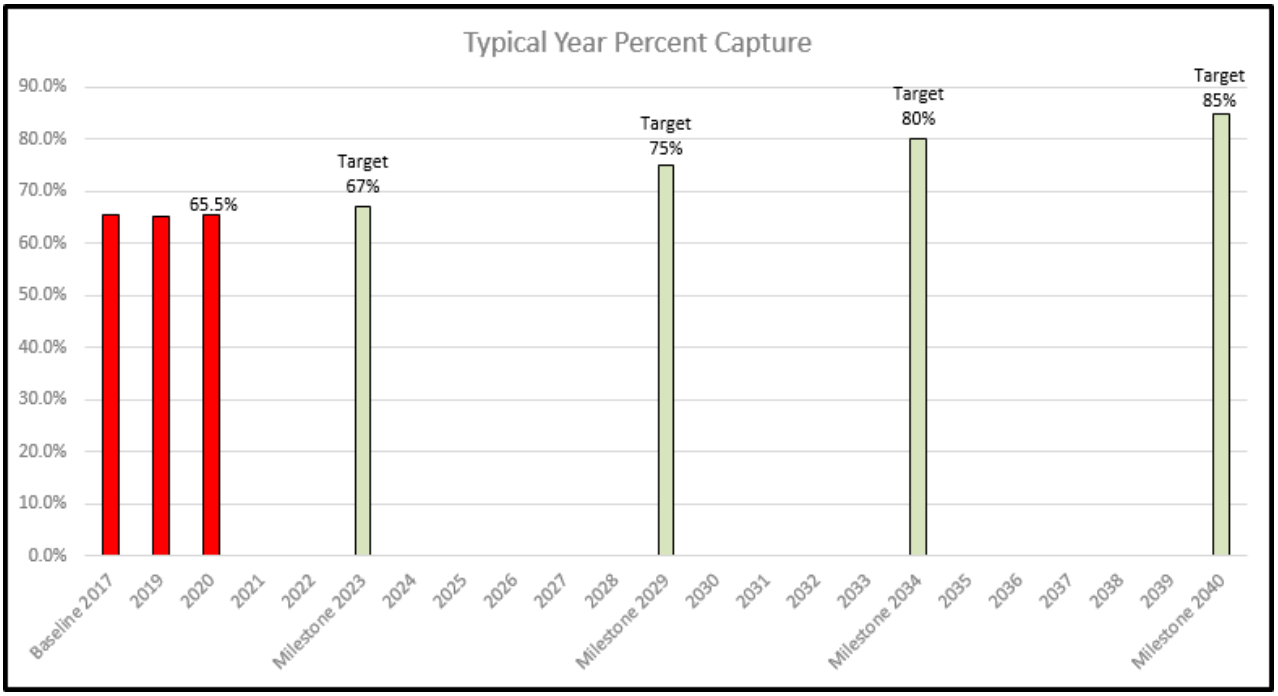
As described in the Amended Consent Decree (ACD), SD1's baseline CSO volume of 1,516 MG was established with the October 2017 hydraulic model and the 1970 typical year rainfall, adjusted with areal reduction factors.

Since the establishment of the baseline TY CSO volume, SD1 upgraded its modeling software to the latest version and completed multiple model calibrations of completed and planned capital projects in the combined sewer system. With the software upgrade, a necessary improvement in the model's calculation of groundwater infiltration shifted the initial estimate of Total Combined Flow (TCF) from 4,388 MG to 4,659 MG. Additionally, the initial estimate of total TY CSO volume shifted from 1,516 MG to 1,621 MG. This critical software upgrade resulted in a revised percent capture of 65.2 percent in FY 2019, slightly down from the initial baseline of 65.4 percent.

In FY 2020, SD1 finalized post-construction monitoring and model calibrations related to four completed projects, including: Jacob Price Phase 2, Aqua on the Levee Phase 1, Saratoga Street Separation Phase 1, and the final phase of the Church Street Separation. The completed Water's Edge project, described in Table 6.1, has also been incorporated into the model, but post-construction monitoring and modeling has yet to be performed. Additionally, post-construction monitoring and model calibration was completed for the improvement of the diversion and underflow pipe at the CSO described above in Section 2.2. The model calibration updates that have been made in the past year are illustrated in Figure 5.2. Based on the most current model of the existing system in the typical year, these completed projects reduced the CSO volume approximately 19 MG. Over the past year, TY CSO volume is down from 1,620 MG to 1,601 MG, and model refinements have adjusted TCF down from 4,659 MG to 4,644 MG. The resulting percent capture from the TY CSO volume reduction and TCF volume reduction is 65.5 percent.

Figure 3.2 illustrates a timeline of the baseline and current TY percent capture, along with the milestone targets established in the ACD.

Figure 3.2 Increase in Percent Capture of Typical Year Total Combined Flow



SECTION 4. ANTICIPATED PROJECT ACTIVITY IN FY 2021

The third reporting requirement of the Annual Report, per paragraph 48 of the Amended Consent Decree, is to provide:

> **48. (c)** The anticipated projects and activities that will be performed in the successive calendar year to comply with the requirements of this Amended Consent Decree, in Gantt chart or similar.

On the following pages, Table 4.1 provides updates for ongoing projects that are listed in Appendix C of the Amended Consent Decree, which are currently under construction or in design.

Table 4.1 Projects Listed in the Amended Consent Decree that are Under Construction or in Design in FY 2021

Project Title	Project Description	Phase to be Completed by 12/31/20 per ACD	Current Status	Anticipated Activity by end of FY21
COMBINED SEWER OVERFLOW CONSTRUCTION PHASE PROJECTS				
Bromley Pump Station Capacity Increase - Mechanical and Electrical Upgrades	This project will reduce CSOs on the Ohio River west of the Licking River by making better use of wet well capacity and the start/stop controls for each of the pumps. 30 MG reduction in TY CSO anticipated.	Design	Design	90% Design of Upgrades & Redundant PS
Bromley Pump Station Capacity Increase – Additional Pumps	This project will increase the capacity of the Bromley PS to 60 MGD and will reduce multiple CSOs on the Ohio River west of the Bromley PS. Typical year CSO volume reduction to be determined.	Planning	Removed per UWSP	90% Design of Redundant PS See Table 6.2
River Water Intrusion Program Phase I	Outfall flap gates or gated chambers at 7 locations. This project will reduce CSOs on the Ohio River west of the Licking River. CSO diversions to receive RWI protection are: 1730008, 1730029, 1710084, 1710098, 1490027, 1470052, and 1440053.	Construction	Under Construction	Complete
Saratoga and Washington Sewer Separation	Remove sanitary laterals from each street and reconnect to a parallel pipe which is primarily sanitary. This project will extend the separation completed in 2019 with the Aqua on the Levee Separation project and further reduce CSOs on the Ohio River, east of the Licking River.	Design	Under Construction	Complete Construction & Begin Post-Construction Monitoring
SEPARATE SEWER OVERFLOW CONSTRUCTION PHASE PROJECTS				
US 27/AA Highway PH I	9,600’ of 12” and 14” force main, 7,000’ of 18” gravity sewer, Centerplex PS capacity upgrade. Initial phase along AA Hwy from Centerplex PS to the Riley Rd PS.	Planning and Design	Final Design	Construction
US 27/AA Highway PH II	6,200’ of 12” force main and New Rocky View PS. New gravity pipe from Cold Spring Crossing PS to the New Rocky View PS.	Planning	Detailed Design	Final Design
US 27/AA Highway PH III	3,900’ of 12” force main, 3,400’ of 12” gravity sewer, and upgrade Wolpert PS capacity and new force main and gravity pipe from the Wolpert PS to Cold Springs Crossing site.	Planning	Detailed Design	Final Design

Project Title	Project Description	Phase to be Completed by 5/1/21 per ACD	Current Status	Anticipated Activity in FY21
ASH ST CSO AND SSO ELIMINATION PROJECT TO BE COMPLETE BY 5/1/21				
Ash St CSO Elimination	7 MGD Pump Station and 27,000 feet of 20 inch force main. 1 MG TY CSO reduction at 0010220.	Complete	Removed per UWSP - Replaced with Ash St EQ. In Design.	See Table 6.1
Silver Grove SSO Elimination	7 MGD Pump Station and 27,000 feet of 20 inch force main. 15 MG TY SSO elimination at 0020008, 0020007, 0020006, 0020032.	Complete	Removed per UWSP - Replaced with Ash St EQ (In Design), and Highland Heights/Silver Grove EQ (Under Construction).	See Table 6.1

Additional anticipated project activity related to the Updated Watershed Plans (USWP) is covered in Section 6 of the Annual Report.

SECTION 5. FY 2020 CMOM UPDATES

The fourth reporting requirement of the Annual Report, per paragraph 48 of the Amended Consent Decree, is to provide:

> **48. (d)** A summary of the CMOM and asset management program implementation shall be included in the fiscal year report, including a comparison of actual performance measures that have been established in those programs.

5.1 CMOM Introduction

SD1 received regulatory approval of its Capacity, Management, Operations, and Maintenance (CMOM) programs on May 14, 2008 and has provided extensive annual reporting that covered 32 approved programs, since 2009. This report describes some of the more important CMOM program activities that are directly related to capacity assurance and asset management for FY 2020, which began on July 1, 2019 and ended on June 30, 2020.

5.2 Major Components of SD1's Collection and Treatment Systems

SD1's sanitary service area currently covers approximately 190 square miles, and its storm service area covers approximately 184 square miles. SD1 serves approximately 108,300 sanitary accounts and approximately 97,800 storm water accounts. SD1 manages a collection system that serves more than 296,000 residents and is approximately comprised of:

- 41,600 SD1 owned sanitary manholes
- 3,900 SD1 owned catch basins and inlets in the combined sewer system
- 1,600 miles of SD1 owned and operated gravity sewer lines and force mains
- 150 miles of additional Florence owned sewer lines and force mains
- 85 miles of additional privately owned sewer lines
- 428 miles of SD1 owned and operated separate storm water lines
- 126 pump stations
- 93 floodgate structures
- 15 flood pump stations
- 6 small wastewater treatment plants
- 3 regional water reclamation facilities

During FY 2020, SD1 acquired more than 42,500 feet of privately developed sewer and approximately 243 new manholes. All newly acquired assets passed inspection and met the technical specifications and construction standards of SD1.

5.3 Capacity Assessment & Assurance

The purpose of SD1's Capacity Assessment and Assurance Program is to continuously understand the overall capacity of the collection and treatment components of the system, and to identify problem areas that lack adequate wet-weather capacity, so solutions can be developed to provide sufficient service. This program provides staff with a comprehensive understanding of SD1's current capacity, which allows for better management, design, and control of the systems.

5.3.1 Overflow Inspections and Hydraulic Modeling

SD1's CSO investigation crew continues to perform routine CSO inspections after storms that produced more than half an inch of rain and routine dry-weather inspections at sites susceptible to blockages. SSO investigation crews also continue to perform routine inspections and clean-ups after qualifying rain events at known recurring or suspected wet-weather SSO locations. The purpose of these routine inspections is to verify overflow activity due to a lack of capacity, assess the causes of overflows, and initiate the proper procedures for overflow containment and cleanup. SD1's continuous effort to characterize, verify, and respond to overflows throughout its collection system ensures that CSOs and SSOs are appropriately categorized and prioritized for elimination. Additionally, proper overflow characterization from field inspections reinforces the accuracy of the hydraulic models that are used by SD1 to understand system capacity, and helps identify effective solutions for overflow reduction and elimination.

SD1 conducted approximately 4,756 CSO diversion inspections in FY 2020. Approximately 3,753 of the wet-weather CSO inspections were performed within 48 hours of a storm that produced at least half an inch of rain, or after a high-river event. Approximately 1,003 routine dry-weather CSO inspections were also performed. Additionally, following at least one inch of rain, SD1 performed approximately 756 inspections at known Recurring or Inactive SSO locations in FY 2020.

5.3.2 Flow Monitoring and Hydraulic Modeling

Flow Monitoring Activity

SD1's flow monitoring crew continuously utilizes remote-sensing devices, such as, flow meters, levels sensors, cameras, and rain gauges to collect various data in targeted areas of the collection system. These data are used to understand wet-weather impacts on the collection system, continuously improve model confidence, identify and confirm areas that are suspected of high inflow and infiltration (I/I), inform reservation of capacity decisions, and quantify the benefits of completed capital projects.

Flow meters are used to gather detailed information on system response to varying antecedent moisture conditions and weather patterns. The data collected with the flow meters address specific conveyance analyses related to the reservation of capacity and the construction of capital improvements, which may alter the system capacity enough to warrant calibration of the models. SD1's flow metering program ensures that SD1's collection system models are continuously verified and up-to-date. A summary of the flow monitoring locations in FY 2020 is provided below:

- 41 pre-construction monitoring sites
- 36 capacity analysis and model calibration sites
- 22 post-construction monitoring sites
- 8 SSO monitoring sites
- 7 real time control detention pilot sites
- 3 CSO monitoring sites
- 2 pump station SSO bypass monitoring sites

On the following page, Figure 5.1 identifies the 119 locations that were monitored with flow meters and Figure 5.2 illustrates the related hydraulic model calibrations that were completed in FY 2020.

Figure 5.1 Flow Monitoring Locations in FY 2020

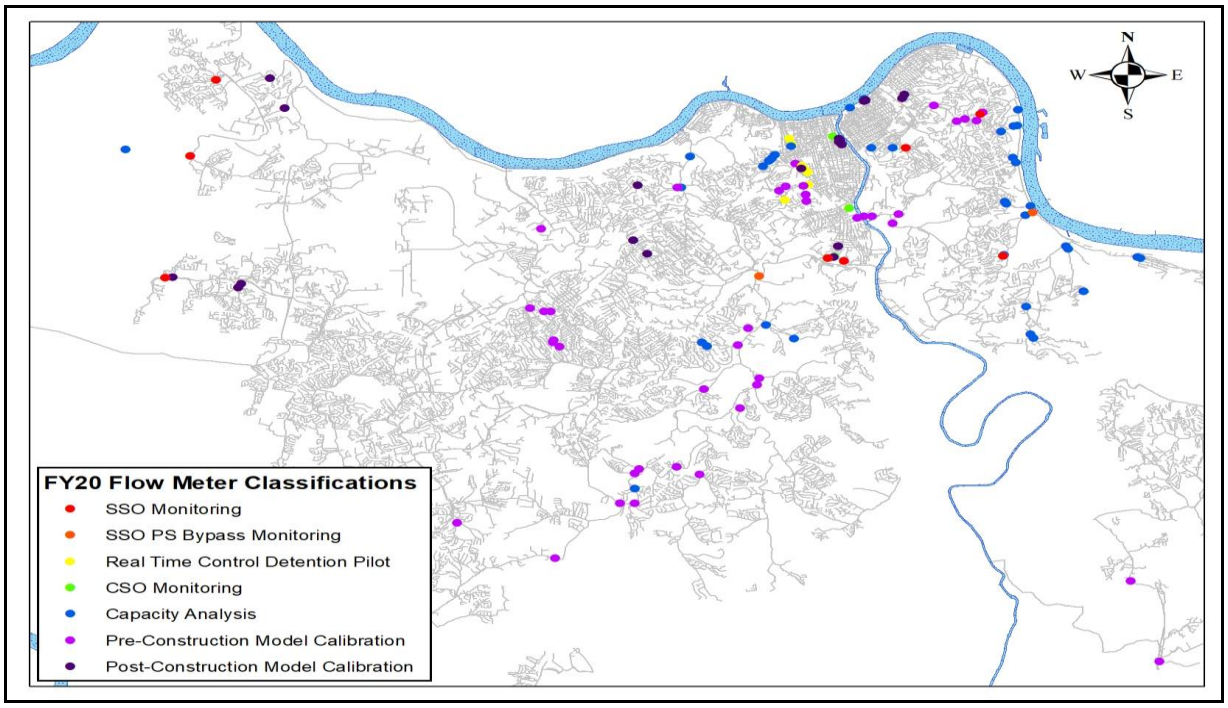
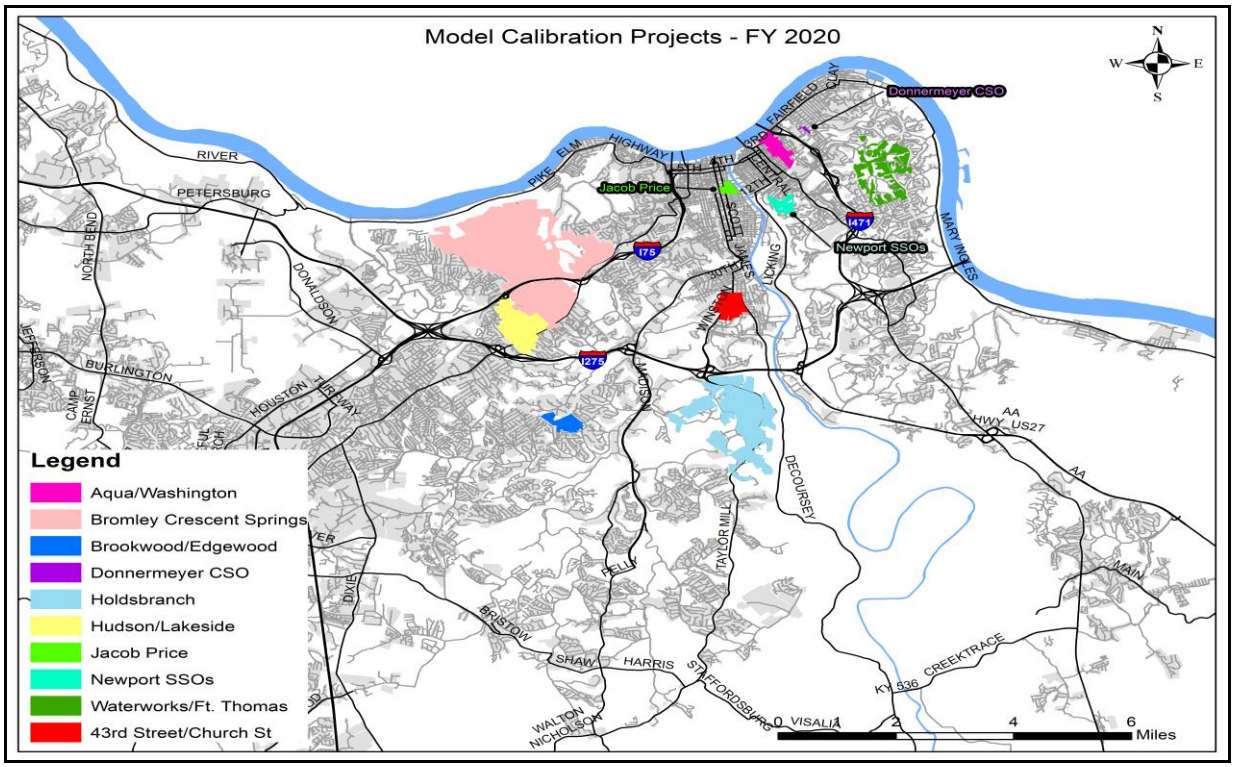


Figure 5.2 Completed Model Calibrations in FY 2020

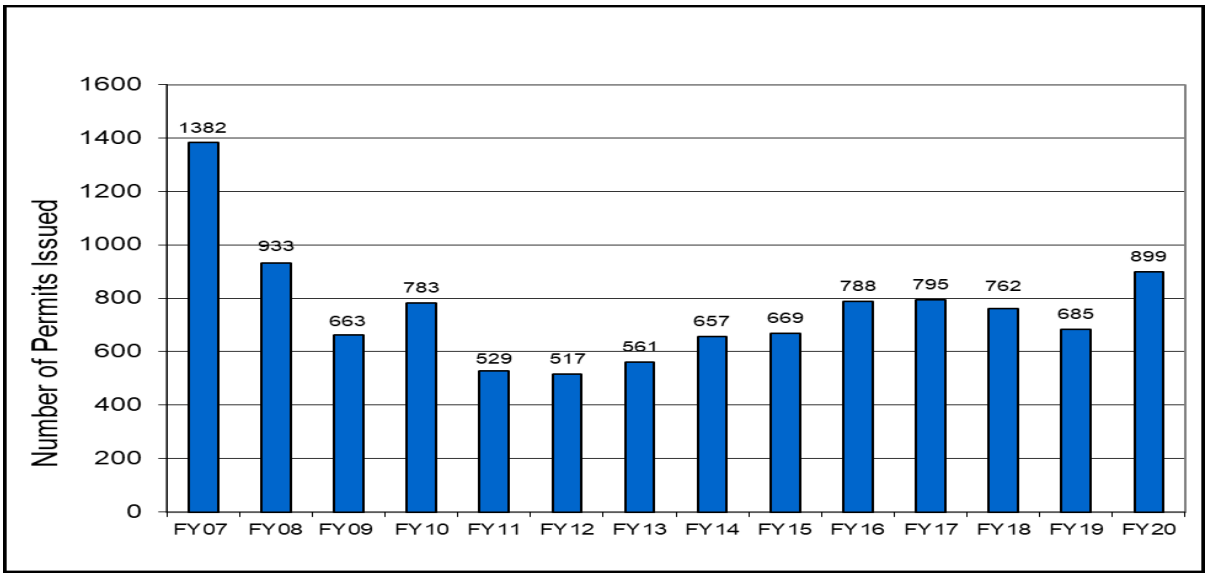


5.3.3 Reservation of Capacity

SD1's Rules and Regulations require developers to submit a written request for the reservation of sanitary sewer capacity, which is reviewed and considered for approval by SD1's Board of Directors.

A sewer capacity connection permit must be obtained from SD1, prior to connecting to the system. Figure 5.3 shows the number of annual permits issued by SD1 since entering into the original Consent Decree in 2007. In FY 2020, SD1 issued 899 capacity connection permits.

Figure 5.3 Capacity Connection Permits Issued (FY 2007 – FY 2020)



5.4 Call Before You Dig

The purpose of SD1's Call Before You Dig Program is to protect underground assets by marking the ground where SD1 lines and easements exist, prior to construction activities by contractors, homeowners, or other utilities. By marking these assets prior to construction or any other land disturbance, SD1 prevents unintended damage that could lead to pipe failures and SSOs. In compliance with the American Public Works Association Uniform Color Code, SD1 uses green paint and flags to mark all sewers.

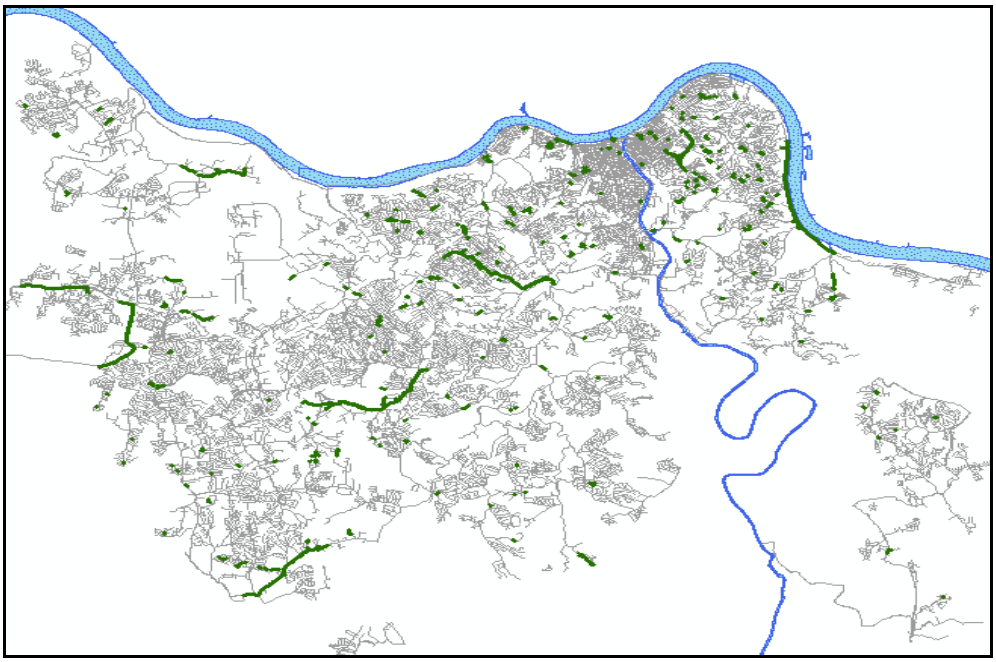
SD1 responded to approximately 1,200 external requests to locate underground assets in FY 2020. Approximately 1,191 work orders were generated from the requests and approximately 794 sanitary assets were marked.

Table 5.1 provides the approximate total of line location work orders and assets marked by SD1 in the past ten years. Figure 5.4 illustrates the sanitary assets, in green, that were marked in FY 2020.

Table 5.1 Line Locations

Fiscal Year	Work Orders Completed	Assets Marked
FY 2011	688	1,220
FY 2012	1,194	2,722
FY 2013	955	2,520
FY 2014	966	2,226
FY 2015	1,465	2,701
FY 2016	1,698	2,065
FY 2017	1,794	2,045
FY 2018	1,202	1,716
FY 2019	1,027	1,099
FY 2020	1,191	794
Total	**12,180**	**19,108**

Figure 5.4 Lines Located and Marked in FY 2020



5.5 New Connection Tap-In

The purpose of SD1's New Connection Tap-in Program is to ensure standard policies and procedures are in place to approve and perform connections to the sanitary and storm sewer systems. The objectives of this program are to:

- Accommodate economic development throughout the Northern Kentucky region
- Eliminate the number of illegal and improper taps made throughout the collection system
- Ensure all connection fees are paid and all new connections are put on billing
- Maintain the integrity of the sanitary sewer system by reducing the amount of I/I that can enter the system through bad taps or improper abandonment of service laterals
- Protect the integrity of the sanitary and storm sewer systems by enforcing the use of proper materials
- Provide an avenue for SD1 to keep certified tappers informed about changes to the Rules and Regulations or specifications for tapping the system
- Provide supplemental training on other critical SD1 programs, such as FOG, illicit discharge and confined space entry safety

5.5.1 Certified Tapper Program

SD1's formal Certified Tapper Program ensures that connections to the sanitary and storm sewer system are approved by SD1 personnel and are performed accurately based upon written specifications and procedures. Plumbers interested in becoming certified are required to attend training and pass a written exam. In addition, Certified Tappers must attend a recertification class offered by SD1 every three years. SD1 currently has 211 Certified Tappers representing 121 plumbing companies, two cities, one county, and one utility. Of these 211 Certified Tappers, 16 became newly certified during FY 2020.

5.5.2 Violations and Fines

SD1 issued six violations with fines in FY 2020.

Table 5.2 provides the total amount of documented violations and fines issued for unpermitted connections since FY 2009.

Table 5.2 Capacity Connection Violations and Fines

Fiscal Year	Total Violations	Total Companies	Total in Fines
FY 2009	6	6	$3,000
FY 2010	8	7	$5,250
FY 2011	9	6	$5,500
FY 2012	7	3	$2,000
FY 2013	19	8	$10,500
FY 2014	23	14	$15,250
FY 2015	3	3	$1,500
FY 2016	7	7	$3,500
FY 2017	14	10	$8,250
FY 2018	10	10	$5,000
FY 2019	0	0	$0
FY 2020	6	6	$3,000
Total	**112**	**80**	**$62,750**

5.6 Lateral Repair Program

In 2016, a formal policy was adopted by the SD1 Board of Directors to assist homeowners with the rehabilitation of failed service laterals that are in the public right-of-way. A full summary of the legal authority, the community's need for this program, and the program eligibility requirements was documented in the CMOM FY 2016 Annual Report.

Table 5.3 provides the total number of reviewed and repaired service laterals in the public right-of-way, since the formal establishment of the program.

Table 5.3 SD1 Repairs of Failed Private Laterals in the Public Right-of-Way

Fiscal Year	Lateral Failures Reviewed	Lateral Repairs Approved
FY 2016	114	94
FY 2017	92	45
FY 2018	69	61
FY 2019	68	55
FY 2020	65	53
Total	**408**	**308**

5.7 Continuous Sewer Assessment

The purpose of the Continuous Sewer Assessment Program (CSAP) is to provide a proactive and coordinated asset management-based approach to assessing the condition and life cycle of SD1's infrastructure and managing a cost-effective rehabilitation/replacement of the system. Implementation of this program has enabled SD1 to more effectively and proactively prioritize and implement system inspection, cleaning, and rehabilitation/replacement of its assets.

SD1's CSAP classifies pipes by using the Sewer Condition Risk Evaluation Analysis Model™ (SCREAM) to generate structural and maintenance scores for each pipe inspected. The structural and maintenance scores are used to identify appropriate schedules for recommended next actions, such as: re-inspection, cleaning, repair,

rehabilitation, or replacement. The remaining portions of this section highlight the collective progress of various SD1 operations and maintenance programs in meeting the performance goals and projected targets of the overall CSAP.

5.7.1 Collection System Condition Assessment

Sewer Inspections

On the following page, Table 5.4 provides the amount of the collection system that has been assessed since the implementation of the CSAP through the end of the current reporting period. The table provides the initial and follow-up inspection footages of pipe inspected over eleven years. Initial inspections reflect the amount of the system that has been inspected for the first time. Follow-up inspections are for pipes that have already been initially inspected and found to need maintenance, which required follow-up inspections for post-maintenance assessment scoring.

Table 5.4 Sewer Inspection Footage

	Initial Inspection Footage	Follow-Up Inspection Footage	Total Cumulative Footage
FY 2008	374,068	46,898	420,966
FY 2009	1,340,874	498,113	1,838,987
FY 2010	421,130	589,519	1,010,649
FY 2011	600,306	583,389	1,183,695
FY 2012	501,160	483,494	984,654
FY 2013	622,585	788,311	1,410,896
FY 2014	716,278	629,179	1,345,457
FY 2015	1,070,089	623,860	1,693,949
FY 2016	1,304,103	450,934	1,755,037
FY 2017	475,850	654,491	1,130,341
FY 2018	53,048	813,171	866,219
FY 2019	56,132	995,717	1,051,848
FY 2020	49,660	816,250	865,910
Total	**7,585,283**	**7,973,362**	**15,558,608**

Sewer Line Rapid Assessment Tool (SL-RAT)

The Sewer Line Rapid Assessment Tool (SL-RAT) is a portable and efficient assessment tool composed of one transmitter and one receiver, which sends, receives, and interprets acoustic signals in a pipe. The SL-RAT is designed to listen for and assess the presence of blockages in pipes that are 12 inches or less in diameter. Typical assessments take less than three minutes to perform. During FY 2016, SD1 began using the SL-RAT to manually adjust the automated scheduling of maintenance next actions as determined by the CSAP. The SL-RAT provides a more efficient method of adjusting the CSAP scheduling than the conventional deployment of resource-intensive and time-intensive CCTV crews. Additionally, since FY 2018, the SL-RAT inspection records have been incorporated into the CSAP logic to improve the automation of next action scheduling, based on the results of acoustic scores.

Table 5.5 provides approximate annual footages of the acoustic inspections that are used to confirm or adjust CSAP next actions.

Table 5.5 SL-RAT Inspections

Fiscal Year	Footage of SL-RAT Acoustic Inspections
FY 2016	290,000
FY 2017	267,087
FY 2018	256,570
FY 2019	312,032
FY 2020	681,957
Total	**1,807,646**

Catch Basin and Manhole Inspections

SD1 continually reviews its collected inspection data to adjust maintenance strategies. In the past, SD1 aimed to inspect all public combined sewer system catch basins at least once per year, as recommended in the Nine Minimum Controls Guidance. With the data collected over the past twelve years, SD1 can confidently target catch basins for inspections and cleanings where there are known recurring maintenance issues, without performing annual inspections of all catch basin. Catch basins that are known to not experience recurring maintenance issues are now inspected on a less frequent

schedule. Catch basins are cleaned on an as-needed basis, as determined by inspection. Regardless of inspection frequency, crews clean a set of approximately 400 catch basins that are assigned to a permanent preventive maintenance schedule.

Table 5.6 summarizes the number of catch basins and manholes inspected since the onset of CSAP.

Table 5.6 Catch Basin & Manhole Inspections

Fiscal Year	Number of Catch Basin Inspections	Number of Manhole Inspections
FY 2008	986	2,050
FY 2009	1,774	7,238
FY 2010	4,168	1,933
FY 2011	3,401	1,783
FY 2012	4,019	901
FY 2013	4,247	889
FY 2014	3,745	824
FY 2015	3,569	208
FY 2016	986	0
FY 2017	1,937	0
FY 2018	1,103	0
FY 2019	1,160	59
FY 2020	25	0
Total Inspections	**31,120**	**15,885**

5.7.2 Collection System Maintenance

Sewer Cleaning

Cleaning is critical in maintaining the capacity of the sewer system and preventing overflows. SD1's prioritization process ensures that cleaning activities are done in a cost-effective manner and only on pipes in need of cleaning. The cleaning program classifies pipes by using SCREAM™ maintenance scores and identifies appropriate schedules for re-inspections, cleaning, and when the pipe should be reviewed for a permanent solution to recurring maintenance issues.

Table 5.7 provides an overview of the total length of pipe cleaned, in accordance with the CSAP cleaning program logic.

Table 5.7 Sewer Cleaning Footage

Fiscal Year	Footage of Pipe Cleaned
FY 2008	113,695
FY 2009	439,191
FY 2010	737,613
FY 2011	382,352
FY 2012	370,296
FY 2013	632,825
FY 2014	568,551
FY 2015	600,302
FY 2016	325,798
FY 2017	347,030
FY 2018	368,108
FY 2019	364,570
FY 2020	298,795
Total Feet Cleaned	**5,549,126**

Catch Basin and Grit Pit Cleaning

In January 2009 SD1 began tracking the amount of debris removed during catch basin and grit pit cleanings. In FY 2020, SD1 removed approximately 93 cubic yards of debris from catch basins and 225 cubic yards of debris from grit pits. Table 5.8 provides the estimated total cubic yards of debris removed from the collection system since 2009.

Table 5.8 Cubic Yards of Debris Removed from Catch Basin & Grit Pit Cleanings

	Cubic Yards Removed from Catch Basins	Cubic Yards Removed from Grit Pits	Total Cubic Yards of Grit Removed
FY 2009	149	237	386
FY 2010	433	362	795
FY 2011	629	330	959
FY 2012	527	400	927
FY 2013	367	468	835
FY 2014	455	355	810
FY 2015	486	210	696
FY 2016	985	33	1,018
FY 2017	315	20	335
FY 2018	246	94	340
FY 2019	93	225	318
FY 2020	585	86	671
Total	**5,270**	**2,820**	**8,090**

Rehabilitation and Replacement

The Asset Renewal group within the SD1 Collection Systems Department manages the internal construction crews and external maintenance contractors that perform repair, replacement, and rehabilitation work. The work schedule is determined by various criticality factors and asset scoring procedures. Pipes requiring emergency work are scheduled for immediate repairs upon discovery. Additional considerations that determine if the rehabilitation schedule should be accelerated are:

- proximity to known building backups
- proximity to recurring overflows
- lack of hydraulic capacity
- proximity to other assets in need of repair
- high consequence of failure

Table 5.9 provides the rehabilitation and replacement activities performed by SD1's internal construction crews and contractors since the onset of the CSAP through the

end of the FY 2020. These activities do not include capital improvements managed by SD1's Engineering Division or O/M activities related to MS4 assets.

Table 5.9 Rehabilitation & Replacement Activities

	Feet of Sewer Lines Repaired or Replaced	Feet of Sewer Lines Rehabbed (CIPP)	Number of Manhole Repairs	Number of Manhole Replacements	Number of New Manhole Installations	Number of CSS Catch Basin Repairs	Number of CSS Catch Basin Replacements	Number of New CSS Catch Basin Installs
FY 2008	11,608	1,081	548	35	16	68	81	0
FY 2009	17,944	3,204	370	63	53	115	209	4
FY 2010	29,239	12,872	317	80	40	71	203	2
FY 2011	19,500	64,715	321	60	36	209	116	3
FY 2012	18,508	65,757	774	89	57	292	100	3
FY 2013	21,051	38,129	299	33	34	21	54	3
FY 2014	6,122	43,026	258	19	14	56	28	6
FY 2015	6,371	28,237	154	10	9	63	23	0
FY 2016	6,893	41,185	277	22	30	65	13	0
FY 2017	7,168	58,232	263	10	21	84	15	2
FY 2018	9,877	44,788	241	15	21	35	9	1
FY 2019	8,383	49,078	206	6	29	21	20	0
FY 2020	6,052	29,077	224	15	23	23	15	3
Total	**168,716**	**479,381**	**4,252**	**457**	**383**	**1,123**	**886**	**27**

5.8 Pump Station Operations

The purpose of SD1's Pump Station Operations program is to ensure reliable operations of the pump stations throughout the service area. Routine inspections and preventative maintenance are preformed to ensure that all stations are operating at maximum efficiency.

SD1 routinely performs operational inspections and preventative maintenance at all pump stations, flood stations, and associated facilities throughout the service area. This is done to ensure reliable and efficient operation of the pump stations.

5.8.1 Pump Station Inspections

In FY 2020, SD1 completed approximately 5,228 pump station operational inspections and approximately 390 flood station operational inspections. These routine inspections can vary based on stations size, odor control chemical feed systems, and the back-up power plan. Operational inspections include the following:

- Data Collection - Inspect and record pertinent information on respective inspection forms for equipment, pumps, and facilities, including pump run time, flow meter readings, chemicals remaining, and amp and voltage readings.
- Building, Grounds, and Security - General inspections and cleaning of facilities and grounds, including valve pits, vactor pits, and wet wells.
- Critical Systems Checks – Physical inspection of equipment, including valves, barscreens, gates, motors, level control, trash baskets, HVAC systems, and telemetry systems.
- Backup Power - Inspect and record pertinent information on respective inspection forms for generators and back-up pumps, including fuel gauges, coolant, and oil levels, as well as condition of belts, cables, and batteries.
- Odor Control – Inspect odor control chemical feed system for proper operation.

5.8.2 Pump Station Preventative Maintenance

In FY 2020, SD1 completed approximately 5,184 mechanical and electrical preventative maintenance work orders on pumps and equipment. These preventative maintenance work orders generally follow the manufacturer's recommended maintenance guidelines. Pump station preventative maintenance includes, but is not limited to:

- Generator assessments
- Stand-by pumps
- Heating, ventilation, air conditioning
- Electrical components
- Air release valves, gate valves, plug valves
- Motors and motor controls
- Wet wells
- Pneumatics and bubblers
- Float switches for level control

- Telemetry equipment associated with SCADA

5.9 Compliance

The purpose of SD1's Compliance Program is to identify and control residential, commercial, and industrial sources of flow that could adversely affect the collection system. This program encompasses both the Industrial Pretreatment Program and Grease Control Program. This program meets the Clean Water Act pretreatment regulations and complies with the National Pollution Discharge Elimination System permit.

5.9.1 Permitting

The Compliance Program provides the authoritative measures necessary to permit and monitor discharges from commercial and industrial users that may cause corrosion or blockages in the collection system. SD1 ended FY 2020 with a total of 53 permitted Significant Industrial Users (SIU) in its collection system.

5.9.2 SIU Monitoring & Enforcement

The purpose of the Industrial Pretreatment Monitoring Program is to monitor discharges from industrial users throughout the service area to ensure compliance with Article 5 of SD1's Sanitary Rules and Regulations and protect SD1's sanitary sewer system, treatment plants, employees, and the receiving waters. All permitted industries are inspected annually and monitored semi-annually, with additional inspection and sampling performed as needed. In FY 2020, a total of 53 annual inspections were conducted.

SD1 has an Enforcement Response Plan in place to address each violation. Typically, the first Notice of Violation (NOV) issued is verbal. The second NOV is written. Each subsequent NOV includes a fine. Fines can range anywhere from $500 to $1000 depending upon the violation. Most issues are resolved before escalating to fines. If problems persist, an industry will be put on a compliance schedule. In FY 2020, SD1 issued 41 NOVs and with fines totaling $7,150.

5.9.3 Food Service Establishments and Grease Control Equipment

The purpose of SD1's Grease Control Program is to prevent the introduction of fats, oils, and grease (FOG) into the sanitary sewer system thereby reducing sewer overflows, maximizing sewer capacity and decreasing sewer maintenance costs. In addition, this program is intended to increase awareness of operators of local food service establishments (FSE) and homeowners about measures they can take to limit or prevent the introduction of FOG into the drains and sanitary sewer system.

SD1's permit requires that all discharges containing grease & oil pass through Grease Control Equipment (GCE) before entering the sanitary sewer. GCE refers to any equipment that removes fats, oils, and grease from wastewater, such as a grease trap which is installed inside the building, or a grease interceptor which is usually installed outside the building and is much larger in size. GCE must be well-maintained and in proper operating condition at all times. The design criteria for approved devices are defined in SD1's FOG Management Policy and are enforced with deadlines for installation with SD1's Sanitary Rules and Regulations, which were implemented on January 1, 2012.

Approximately 46 plans for GCE installations were reviewed and no new permits were issued by SD1 in FY 2020. Table 5.10 provides an annual summary of plans reviewed and permits issued, since the effective date of the FOG Management Policy.

Table 5.10 GCE Plans Reviewed & Permits Issued

Fiscal Year	Plans Reviewed	Permits Issued
FY 2012	10	23
FY 2013	53	52
FY 2014	45	58
FY 2015	36	50
FY 2016	29	30
FY 2017	26	4
FY 2018	9	15
FY 2019	46	11
FY 2020	41	0
Total	**295**	**243**

5.9.4 Grease Trap Disposal

All individuals or companies that haul waste to the Dry Creek Wastewater Treatment Plant must apply for and obtain a Domestic Holding Tank Waste Hauler Discharge Permit. Permits are issued on an annual basis and provisions of the permit must be adhered to at all times. Mobile waste haulers disposing grease trap waste at the treatment plant are required to submit a Domestic Holding Tank Waste Hauler Manifest, which provides a detailed description of each load on their truck. All FSEs in SD1's jurisdiction shall have an SD1-certified grease waste hauler complete a grease interceptor certification annually. SD1 monitors the method and location of disposal of grease removed from accepted grease control devices through the grease hauler manifest.

In FY 2020, SD1 received and disposed of 388,795 gallons of grease. A summary of the grease hauled and disposed of at the Dry Creek Wastewater Treatment plant since the beginning of the program is provided in Table 5.11.

Table 5.11 Grease Disposed at Dry Creek Wastewater Treatment Plant

Fiscal Year	Gallons of Grease
FY 2008	555,833
FY 2009	43,649
FY 2010	108,300
FY 2011	161,150
FY 2012	234,210
FY 2013	185,575
FY 2014	194,325
FY 2015	163,645
FY 2016	203,400
FY 2017	171,250
FY 2018	158,105
FY 2019	183,005
FY 2020	388,795
Total	**2,751,447**

5.9.5 FSE Compliance Inspections

SD1's Industrial Monitoring Department performs inspections of local FSEs that may be contributing to the buildup of FOG in the collection system. Random inspections are conducted to ensure compliance with the permit and with SD1's Rules and Regulations. Additionally, SD1 requires permitted FSEs to report proof of service or cleaning of its GCE. All documentation must be submitted to SD1 by the FSEs within 30 days of the actual cleaning and hauling of grease.

SD1 permitted no new FSEs in its the service area, and 15 existing FSEs closed during FY 2020, bringing the total of permitted FSEs to 173. One Notice of Violation (NOV) for non-compliance was issued in FY 2020.

5.9.6 Public Communication

SD1 uses various communication pieces throughout the year to inform and educate private residences and commercial customers on the harmful effects of FOG on sewers and the proper grease handling techniques that can be used to minimize the release of FOG into the collection system. This information is distributed through various channels such as: direct mailings, bill inserts, SD1's website, and community newsletters and newspapers. With the grease observations obtained from CCTV inspections and overflow responses, SD1 focuses its public education efforts primarily in areas that are showing signs of grease problems and applies the appropriate communication strategy to best fit the situation.

FOG Letters

In FY 2020, SD1 mailed 183 letters to residents upstream of areas that experienced overflows or building backups caused by excessive build-up of grease in SD1-owned pipes. The standard letter alerted customers that an overflow occurred, described the effects of FOG on the collection system, and clarified proper disposal methods.

5.9.7 Grease Control Performance Indicators

Table 5.12 provides a summary of the performance indicators that SD1 has been tracking in relation to its implementation of its formal Grease Control Program.

Table 5.12 Grease Control Program Performance Indicators

Performance Indicator	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20
Pipe Footage on PM Cleaning List, due to Grease	82,000	4,326	4,326	4,892	4,945	5,465	7,656	13,721	7,958	3,981	6,554	0	0
Number of SSOs due to Grease	4	17	10	7	5	4	6	12	7	8	8	2	2
Number of Building Backups due to Grease	2	5	7	7	7	6	4	8	6	1	1	1	1

In the past, SD1 routinely cleaned pipes that were known to be susceptible to grease build up with targeted cleanings on set schedules. However, in 2018, SD1 made significant programming updates to its CSAP logic, which fully automated prescribed maintenance actions of collection system assets, based on the historical behavior of the system. This was accomplished by leveraging the extensive condition assessment and work order history information of sanitary sewer assets, and refining the automated logic that dictates appropriate maintenance next actions and schedules for each assessed sewer. Additionally, new technologies, such as the SL-RAT acoustic inspections, were fully integrated into the automated CSAP logic. These technologies have improved the effectiveness and efficiency, providing more comprehensive maintenance scheduling of the collection system.

As demonstrated in Table 5.12, SD1 recorded only two SSOs due to grease blockages and one building backup in FY 2020, which is identical to the previous year's result. The past two years have produced the best results in the 13 years of evaluation and indicate the beginning of a trend in significant reduction of FOG related SSOs. This a strong indicator that SD1's grease control programs are working and its CSAP is

capable of predicting where maintenance is needed prior to blockages forming. It also demonstrates that SD1 has improved its level of grease control throughout the collection system with automated CSAP scheduling, without wasting resources on repetitive pipe cleanings that provide no additional level of control. In essence, the CSAP automation is capable of predicting where grease observations may lead to capacity restrictions and can address those risks appropriately through improved scheduling. This performance indicator will continue to evaluate the CSAP's ability to identify blockage risks and produce the desired results of predictive maintenance, relative to the less effective preventative maintenance approach used in the past.

SECTION 6. UPDATED WATERSHED PLANS

The fifth reporting requirement of the Annual Report, per paragraph 48 of the Amended Consent Decree, is to provide:

> **48. (e)** Any additional information necessary to demonstrate that the District is adequately implementing its Updated Watershed Plans.

SD1's Updated Watershed Plans (UWSP) were submitted to the Cabinet and EPA on May 5, 2020. The UWSP provides descriptions of high level planning for projects that will attain compliance with the typical year CSO and SSO mitigation requirements of the four milestone dates outlined in the Amended Consent Decree (ACD). In some cases, UWSP projects supersede projects outlined in Appendix C of the ACD, as better alternatives were identified during the development of the UWSP.

This section of the report provides status updates on all UWSP projects that are not listed in Appendix C of the ACD which are in design, under construction, or complete. Any UWSP projects that are in the planning phase will be covered in future Annual Reports, once they reach the design phase.

6.1 Updated Watershed Plan Project Activity

On the following pages, Table 6.1 provides status updates on UWSP projects that are to be completed by July 1, 2023 and Table 6.2 provides status updates on UWSP projects that are to be completed by January 1, 2029.

Table 6.1 Status Updates of UWSP Projects to be Completed by 2023

Project Title	Project Description	Current Status
COMBINED SEWER OVERFLOW SOLUTIONS		
Targeted Separation: State Route 9 (SR9)	In partnership with Kentucky Transportation Cabinet, construct a new separate storm outfall to the Licking River in the City of Newport, with an open cut of the levee at 4th Street. The new storm pipe will have a new flood gate installed to protect against river intrusion. This separation and other previous improvements associated with SR9 will allow for up to 193 acres to eventually be removed from the combined system, and will provide an immediate typical year CSO volume reduction of 10 MG upon completion.	Under Construction
Targeted Separation: Rivercenter Separation	Separate the intersection of Rivercenter Blvd and Johnson St in the City of Covington, by rerouting combined system catch basins off of the collection system and to the Main St CSO outfall pipe. Immediately removes 2.5 acres of impervious area for a 1.1 MG typical year CSO volume reduction, and allows for further separation of 20 acres with the future redevelopment of the IRS building.	Complete Post-Construction Monitoring to begin after redevelopment of IRS building
Targeted Separation: Water's Edge	Construct a new 36" separate storm sewer and disconnect existing catch basins on nine blocks of Taylor Ave in the city of Bellevue. Three phases of separation to Walnut St. Reduce typical year CSO volume at Taylor Ave CSO and other local CSOs by approximately 10 MG.	Complete Post-Construction Monitoring
Ash Street EQ Tank	Construct a 0.41 MG buried tank and gravity diversion in the City of Silver Grove to store CSO in excess of the downstream sewer capacity. The tank will be dewatered through a controlled drain vault at a rate of 0.25 MGD. Eliminated the TY CSO at Ash St and reduced TY CSO volume system wide by 1.5 MG.	Construction
SEPARATE SEWER OVERFLOW SOLUTIONS		
Highland Heights-Silver Grove EQ Tanks	Construct an above ground 1.4 MG EQ tank at the Highland Heights PS and an above ground 1.6 MG EQ tank at the Silver Grove PS to contain typical year SSOs that are a result of flows that exceed the pumping capacity of the stations. Each facility will utilized a wet weather pump station to pump excess flows to the EQ tanks, which will have controlled gravity lines back to the collection system. Combined, the EQ tanks will eliminate 22 MG of TY SSO at 0020006, 0020007, 0020008, 0020032, and 0050PS1 (Highland Heights PS).	Construction
Licking River Double Siphon	Construct a second 12-inch siphon under the Licking River to the combined system with horizontal directional drilling. The parallel siphon is required to accommodate future conveyance improvements in the Licking River Siphon sewershed and will work in conjunction with an EQ tank to be built by 2029. The new siphon alone will reduce TY SSO volume by 42 MG at 0860001.	Design

Table 6.2 Status Updates of UWSP Projects to be Completed by 2029

Project Title	Project Description	Current Status
COMBINED SEWER OVERFLOW SOLUTIONS		
Willow Run Pilot Detention Basins	Installation of dynamic coordinated controls on 10 detentions basins (9 existing and 1 proposed) in the Willow Run sewershed. Pilot projects will focus on establishing automated control logic to throttle an outlet valve by incorporating wet weather forecasting and downstream capacity sensors at the CSO regulators.	Dynamic controls established at one pilot basin and is currently operational, using only weather forecasting. Integration of downstream sensors in the controls is ongoing. See Section 6.2. Three additional pilot basins in planning for controls. The one proposed basin (Amsterdam Valley) is under construction.
Bromley Pump Station Upgrades	The initial plan described in Appendix C of the ACD called for pump replacements to increase pumping capacity to 60 MGD. The UWSP revised the target pumping capacity to 45 MGD by making upgrades to allow for two large pumps to run concurrently, which would reduce TY CSO by 60 MG. After further alternative analysis in the planning of the upgrades described in the UWSP, it has been determined SD1 can instead upgrade the existing Bromley PS to increase capacity from 40 MGD to 45 MDG, and build a diversion structure and second parallel pump station with an additional 30 MGD capacity. Each pump station will utilize the same forcemain. Therefore, when pumping together, there will be a combined 50 MGD pumping capacity. This major improvement will reduce TY CSO by 114 MG, provide greater operational resiliency in the event of failure, and will potentially allow for some smaller projects identified in the UWSP to be eliminated. The expected result will be 76.3 percent capture by 2029.	Design
SEPARATE SEWER OVERFLOW SOLUTIONS		
Waterworks Road Phase 2	Upgrade of conveyance pipe in the City of Fort Thomas in order to remove multiple SSOs from the vicinity of the Northern Kentucky Water District's reservoir and consolidate overflows to one location farther downstream. These improvements will be in conjunction with the future construction of the Phase 1 improvements downstream, which include additional conveyance upgrades and EQ. This project will reduce TY SSO by 1 MG and eliminate TY SSOs at 0370001, 0380005, 0400002, 0400034, 0410037, and 0410039.	Construction
Bromley Crescent Springs Road Conveyance	Upgrade approximately 6,000 feet of gravity sewer to improve safety of the road, where manhole lids are routinely displaced. Project will reduce TY SSO by 1.3 MG and impact manholes 1730085 and 1730086.	Design

6.2 Dynamic Coordinated Controls at Highland Ave Detention Basin

In July of 2020, SD1 completed the installation of dynamic coordinated controls at its first pilot detention basin for the Willow Run combined system. The Highland Avenue Detention Basin in the City of Covington has been retrofitted with a solar powered valve control that uses wet weather forecasts from the National Weather Service to throttle the valve in the outlet pipe of the basin, allowing for enhanced extended detention periods while the collection system recovers from wet weather. Currently, the automation of the controls are solely dependent on weather forecasts and programmed logic for controlled discharge during the subsequent dry weather. However, SD1 is currently working with its contractors to integrate an ultrasonic level sensor at the primary Willow Run CSO diversion structure, in order to adjust the automation logic of the valve controls to be more dependent on downstream capacity in the collection system. This improvement will optimize the post-wet weather detention periods and maximize basin capacity in between wet weather events. Once the integration of the first sensor is complete, SD1 will evaluate if strategically located level sensors within the collection system will allow for the potential to use coordinated controls at multiple detention basins in a series for compounded benefits.

SD1 is also currently updating its hydraulic model to include the dynamic controls at the Highland Avenue Detention Basin, in order to determine the typical year benefits of the fully operational controls. Initial modeling of the pilot basin during startup indicates that approximately 1 MG of CSO was mitigated at the Willow Run in the month of July using the dynamic controls.

Following the successful integration of the level sensors in the logic of the automated controls at the Highland Avenue pilot basin, SD1 will begin designing the controls at the remaining nine basins identified in the UWSP.

On the following pages, Figure 6.1 provides a diagram of the operating system for the dynamic controls, Figure 6.2 provides photographs of the newly installed equipment at the Highland Avenue Detention Basin, and Figure 6.3 provides a map of all the detention basins to receive the dynamic coordinated controls by 2029.

Figure 6.1 Diagram of Dynamic Coordinated Controls for Detention Basins

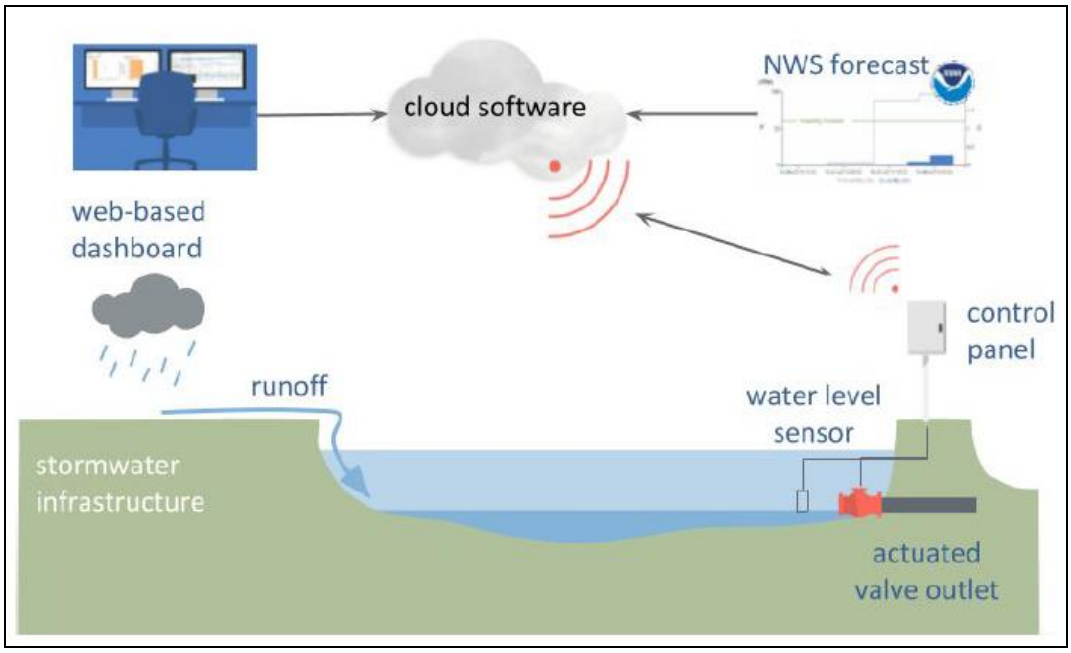


Figure 6.2 Photographs of Installed Controls at the Highland Ave Detention Basin

Figure 6.3 Map of Pilot Willow Run Detention Basins to Receive Dynamic Coordinated Controls