

SD1

Managing Northern Kentucky's
Wastewater and Storm Water



September 4, 2018

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

Mr. Daniel J. O'Lone, Acting Chief
NPDES Permitting and Enforcement Branch
U.S. Environmental Protection Agency, Region 4
Atlanta Federal Center
61 Forsyth Street, S.W.
Atlanta, Georgia 30303

Re: Consent Decree Case No. 2:05-cv-00199-WOB

To Whom It May Concern:

Pursuant to the above-referenced Consent Decree, Sanitation District No. 1 (SD1) was required to document its compliance with the Nine Minimum Controls (NMC), including proposed projects to be performed to ensure that compliance with the NMC is achieved, by no later than twenty-four months after entry of the Consent Decree. SD1's NMC Compliance Report was submitted on March 12, 2008 to the EPA and Cabinet and received regulatory approval on July 6, 2008.

SD1 is required to submit an annual report on its implementation of the NMCs within sixty days after the anniversary date of the approved NMC Compliance Report. The enclosed report serves as the tenth annual report, which covers calendar year 2017.

A certification as required by the Consent Decree is also enclosed (Consent Decree paragraph 38).

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

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Sanitation District No. 1
September 4, 2018

Nine Minimum Controls 2018 Annual Compliance Report



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CERTIFICATION

Nine Minimum Controls 2018 Annual Compliance Report
Consent Decree Case No. 2:05-cv-00199-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

9/4/18

Date

COMMONWEALTH OF KENTUCKY

)ss.

COUNTY OF Kenton

The foregoing instrument was acknowledged before me this 4 day of September, 2018 by Adam Chaney, Executive Director of Sanitation District. No. 1.



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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NINE MINIMUM CONTROLS 2018 ANNUAL COMPLIANCE REPORT

September 4, 2018



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

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Summary of 2017 RWI Controls Study

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Summary of Dry Weather CSOs that Occurred in 2017

LIST OF ACRONYMS AND ABBREVIATIONS

CSAP	Continuous Sewer Assessment Program
CSO	Combined Sewer Overflow
CSS	Combined Sewer System
DWO	Dry Weather Combined Sewer Overflow
EPA	United States Environmental Protection Agency
GIS	Geographic Information Systems
KDEP	Kentucky Department of Environmental Protection
KYTC	Kentucky Transportation Cabinet
MS4	Municipal Separate Storm Sewer System
NMC	Nine Minimum Controls
ORSANCO	Ohio River Valley Water Sanitation Commission
O&M	Operations and Maintenance
RWI	River Water Intrusion
SD1	Sanitation District No. 1
SIU	Significant Industrial User
S&F	Solids and Floatables
USACE	United States Army Corps of Engineers
WWTP	Waste Water Treatment Plant

SECTION 1. INTRODUCTION

1.1 Overview

On April 18, 2007, Sanitation District No. 1 (SD1) entered into a Consent Decree with the U.S. Environmental Protection Agency and the Kentucky Energy and Environment Cabinet to address sanitary sewer overflows and combined sewer overflows (CSOs) in an effort to improve water quality throughout SD1's service area. As part of this agreement, SD1 was required to document its compliance with the Nine Minimum Controls (NMC) for CSOs as set forth in the CSO Control Policy, including proposed projects to be performed to ensure that compliance with the NMC is achieved by no later than twenty-four months after entry of the Consent Decree.

SD1's NMC Compliance Report was submitted on March 12, 2008 to the EPA and Cabinet and received regulatory approval on July 6, 2008.

1.2 Report Objective

Pursuant to the Consent Decree, SD1 is required to submit an annual report on its implementation of the NMCs within sixty days after each anniversary date of the approval of the NMC Compliance Report. The enclosed report serves as the tenth annual report to demonstrate SD1's continued implementation of the NMCs, from January 1, 2017 to December 31, 2017.

SECTION 2. NINE MINIMUM CONTROLS

The following sections present detailed descriptions of SD1's continued compliance efforts during 2017. These compliance efforts are in direct response to the Consent Decree requirements, to the guidance provided in the CSO Control Policy, and EPA's Guidance for Nine Minimum Controls.

2.1 NMC #1: Proper Operation and Regular Maintenance Programs for the Sewer System and CSO Outfalls

The purpose of this control is to establish operation, maintenance, and inspection procedures to ensure that the combined sewer system (CSS) and treatment facility will perform as effectively as possible to maximize treatment of combined sewage and reduce the magnitude, frequency, and duration of CSOs.

SD1 tracks its operation and maintenance (O&M) activities using its computerized maintenance management system, Lucity. Appendix A provides an overview of the major activities performed in both the separate sewer system and CSS through implementation of regularly scheduled O&M activities and SD1's formal Continuous Sewer Assessment Program (CSAP). The data in Appendix A represents approximate amounts of work completed by both internal and external crews, and is continuously updated in Lucity with thorough quality control procedures.

2.1.1 Information Management Tools

In 2017, SD1 made multiple process improvements in information management by utilizing its Lucity software to eliminate data redundancies and department silos. Below are examples of the improved data management processes that were implemented:

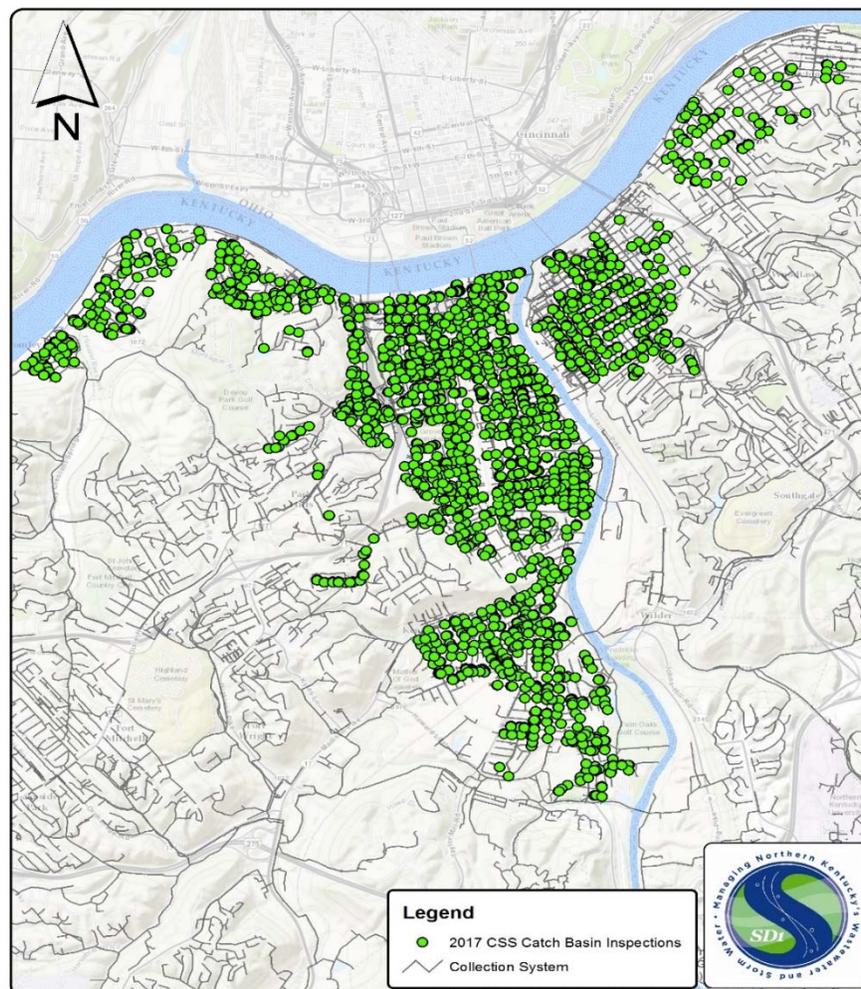
- Eliminated paper-based work orders and maps for Collection Systems field crews. All work order processing can now be performed on digital Lucity work order forms that are accessed by laptop or tablet. All open work orders are viewable as live layers in the map. See Figure 2.1.
- Inspectors in Engineering use Lucity digital forms for all new development and construction inspections of pre-mapped assets, eliminating paper-based inspections and data entry by GIS staff.
- Seven Microsoft Access databases related to Reservation of Capacity Requests and Connection Permits have been streamlined and centralized in Lucity, providing SQL reporting and models for automated GIS mapping of new requests and connections.
- Nine data silos (databases, smart sheets, Excel sheets, Google Docs, and payroll allocation sheets) related to New Developments have been consolidated into a single Lucity workflow that centralizes data and makes all project information

2.1.2 Asset Operation and Maintenance

CSS Catch Basin Inspections

Historically, SD1 inspected each catch basin in the combined system at least once per year to evaluate structural condition and the accumulation of grit and debris. Recent modifications to annual catch basin inspection frequencies, based on the extensive knowledge acquired in the first seven years of the program, were documented in the NMC 2016 Annual Report, as well as the CMOM Fiscal Year 2016 Annual Report. In 2017, SD1 inspected approximately 2,457 catch basins in the CSS. Figure 2.2 illustrates the catch basins that were inspected.

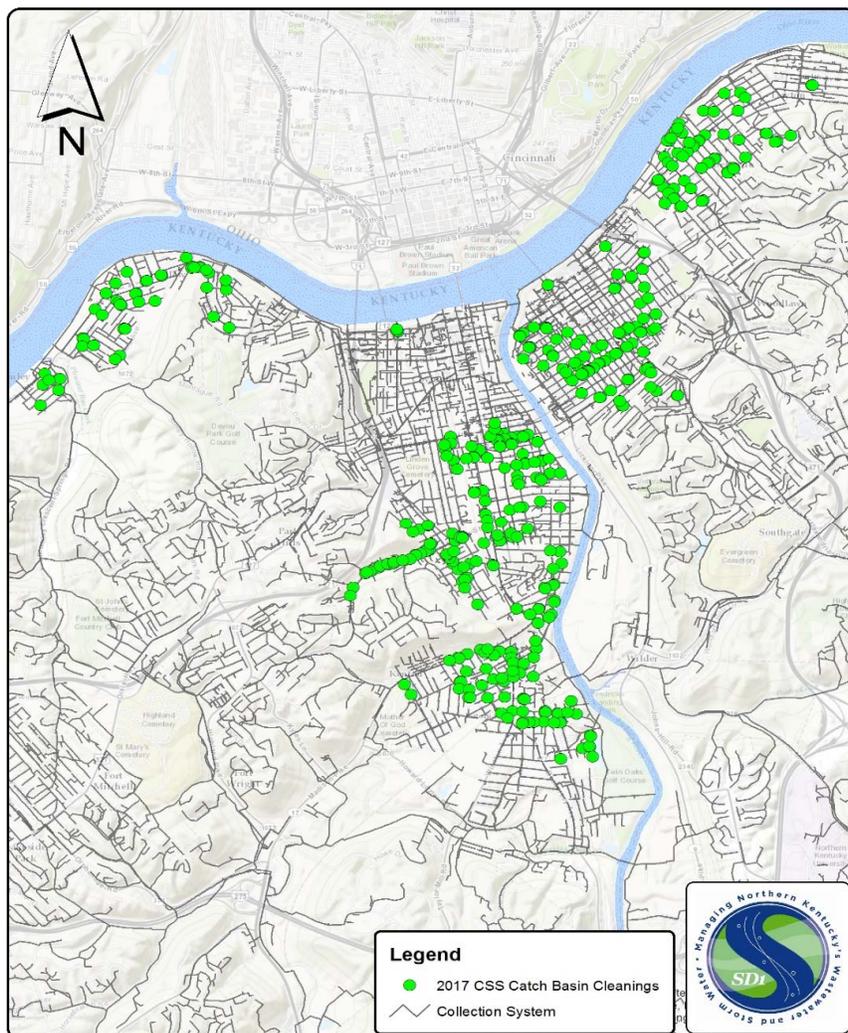
Figure 2.2 Locations of CSS Catch Basin Inspections in 2017



CSS Catch Basin Maintenance

SD1 performed approximately 507 cleanings at approximately 405 catch basins in the CSS, in 2017. Figure 2.4 is a map of the 405 catch basins that were cleaned.

Figure 2.3 Locations of CSS Catch Basin Cleanings in 2017



Diversion and CSO Outfall Inspection and Maintenance

SD1 routinely inspects CSO diversions following wet-weather events that exceed half of an inch of rain. Additionally, dry-weather inspections are performed at CSO diversions that have demonstrated a history of maintenance needs that may lead to blockages. Cleanings are performed on an as-needed basis. Locations that have solids and floatables controls installed at the diversion manhole or the outfall are also cleaned during inspections.

Throughout 2017, SD1 performed approximately 5,230 inspections at 136 CSO diversions. Approximately 24 percent of the inspections were performed during dry weather, 26 percent during wet weather, and 50 percent during the 48-hour period immediately following a wet-weather or high-river event. SD1 found evidence of wet-weather CSO activations with approximately 54 percent of the total inspections performed in 2017. The information gathered from these inspections is used to identify and respond to conditions that may lead to dry-weather overflows and to confirm model predicted wet-weather activations.

2.2 NMC #2: Maximum Use of Collection System for Storage

The purpose of this control is to maximize the use of the collection system by making relatively simple modifications to the CSS to enable the existing sewers to store wet weather flows until capacity is available in the downstream collection and treatment systems in order to reduce CSO volume.

2.2.1 River Water Intrusion Mitigation

River water intrusion (RWI) during wet-weather events has the potential to occupy in-line storage volume that would otherwise be available to combined sewers flows. Therefore, controlling river intrusion in the CSO outfalls increases the available storage volume and maximizes storage of wet-weather flows.

SD1 has identified where CSO diversion inverts are at or below the river stage of 47 feet on the Ohio River, and have made these locations the highest priority for RWI mitigation. See the NMC 2015 Annual Report for a map of the locations that are currently protected at this stage.

In the past, SD1's main approach to protecting against RWI relied on the installation of rubber duckbill-shaped Tideflex check valves at the end of CSO outfalls. After the first phase of installations, SD1 has evaluated the long-term viability of the rubber duckbill check valves and found that the rate of failure is high at the large diameter outfalls. In 2017, SD1 completed a study of appropriate alternatives and found that the conventional cast iron flap gates are preferable to the rubber duckbill Tideflex valves, even though they require more routine maintenance.

Table 2.1 provides a brief summary of SD1’s industry survey and the prevailing perceptions of the two main alternatives for RWI control.

Table 2.1 Summary of 2017 RWI Controls Study

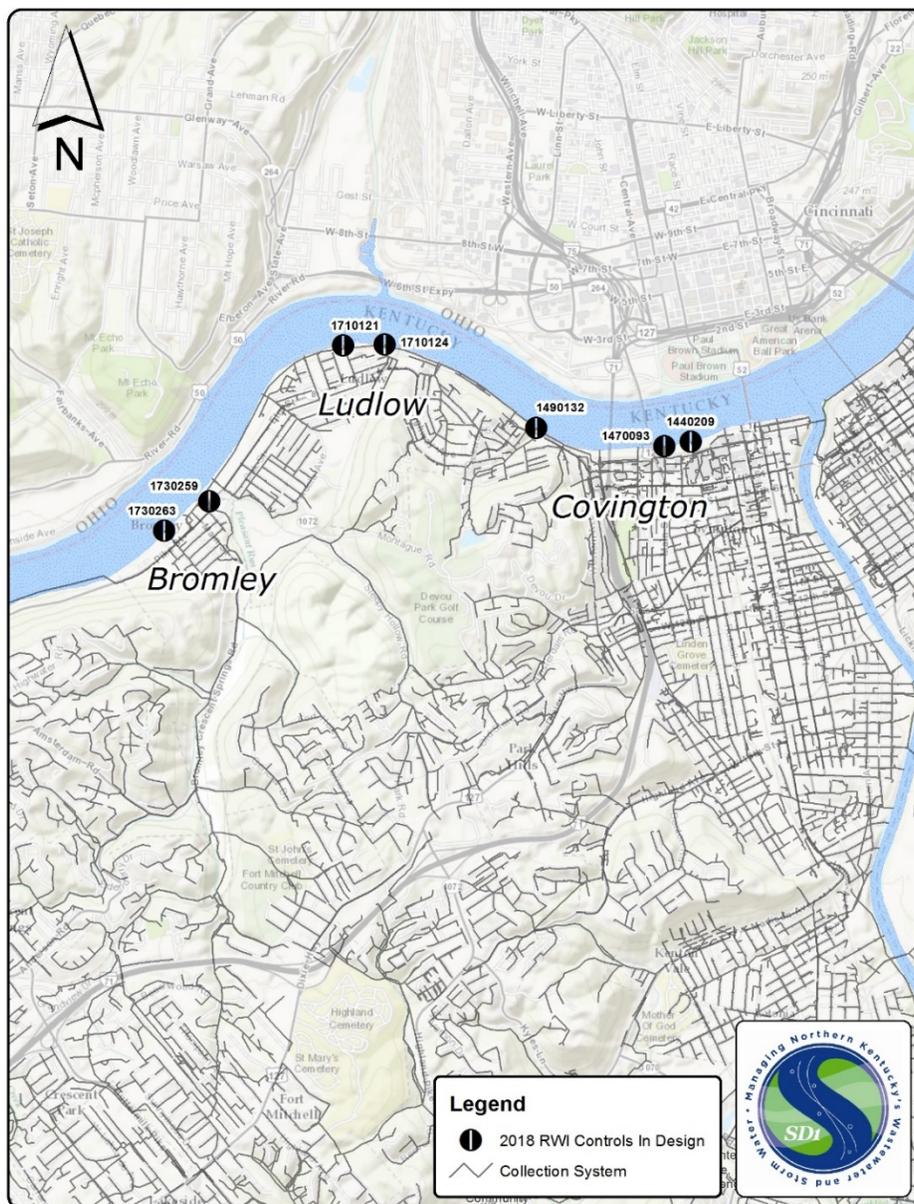
	External Tideflex Valve	Cast Iron Flapgate
Advantages	<ul style="list-style-type: none"> ▪ Can generally seal over smaller debris ▪ No need to lubricate or exercise 	<ul style="list-style-type: none"> ▪ Can withstand very high backpressures
Disadvantages	<ul style="list-style-type: none"> ▪ Some utilities report issues with breakdown over time due to UV exposure ▪ Some utilities report issues with Tideflex not sealing properly around debris ▪ May permanently deform if exposed to backpressures higher than designed for ▪ For outfalls on a river, some utilities report that debris tends to get caught between the wing walls and the valve during periods of high flow 	<ul style="list-style-type: none"> ▪ Cannot seal around small debris, more likely to be stuck open ▪ Regular lubrication and exercise required to prevent sticking and corrosion

During the study, SD1 was also advised by the Louisville District of US Army Corps of Engineers (USACE) that it prefers the cast iron flap gates on outfalls associated with levee systems that are under the jurisdiction of its Safety Group. USACE also advised that it will no longer permit duckbill Tideflex valves to be installed where they may interfere with the oversight responsibilities of USACE’s Safety Group.

With the information obtained from the 2017 RWI study and the guidance from USACE, SD1 is currently designing a set of seven cast iron flap gates for five CSO outfalls and two chambers. Construction is anticipated to begin in 2019 and end in 2020.

Figure 2.4 is a map of the seven locations where SD1 is currently implementing new RWI controls.

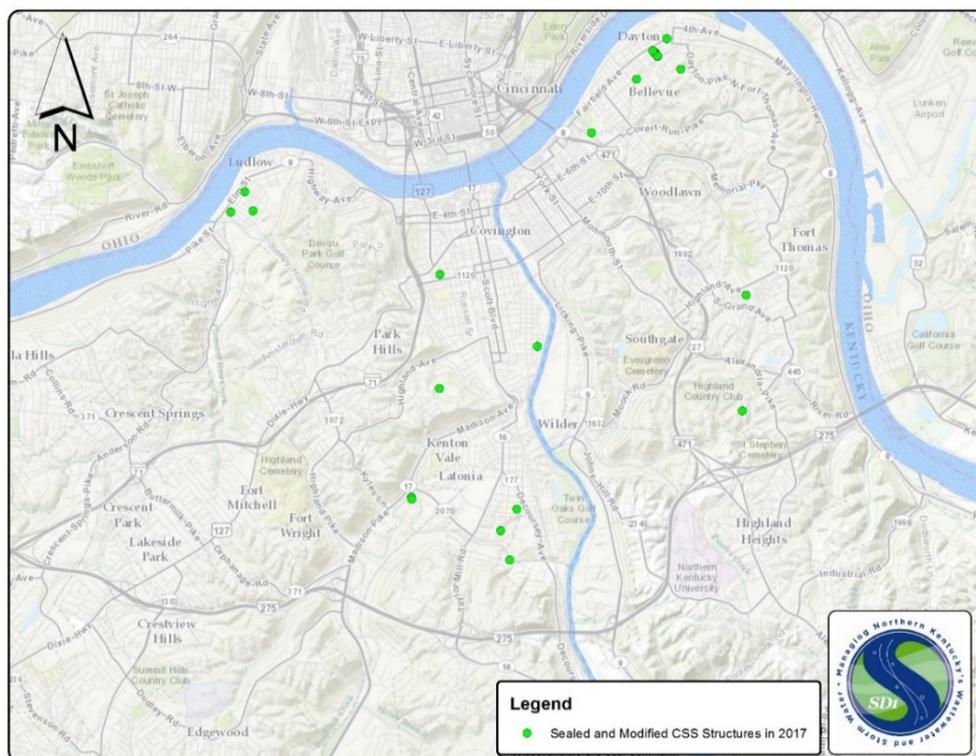
Figure 2.4 Locations of RWI Controls Currently in Design



2.2.2 Repaired and Modified Manholes in the Combined System

In 2017, SD1 continued to rehabilitate and modified structures to prevent excessive inflow and infiltration (I/I) to the CSS. Approximately 31 low lying structures were sealed, grouted, or fit with watertight frames and lids in the CSS. These repairs and modifications keep excessive I/I from entering the CSS and reducing capacity in the interceptors during wet weather. Figure 2.5 is a map of the approximately 26 structures that were rehabilitated in the CSS in 2017.

Figure 2.5 Manholes Sealed or Modified to Prevent I/I in the CSS in 2017



2.2.3 Interceptor Cleanings

SD1 cleaned approximately seven large interceptor pipes along the Licking River in 2017. Large rocks, debris, roots, and grit were removed from approximately 1,100 feet of the 4th Street interceptor in Newport, in order to maximize the in-line storage capacity during wet weather.

Figure 2.6 illustrates the large interceptors that were cleaned in 2017.

Figure 2.6 Large Interceptor Cleanings in 2017

2.3 NMC #3: Review and Modification of Pretreatment Requirements

The purpose of this control is to minimize the impacts of discharges into the CSS from non-domestic sources during wet weather events, and to minimize CSO occurrences by modifying inspection, reporting and oversight procedures within the approved pretreatment program.

Standard Permits

SD1 had a total of 56 permitted significant industrial users (SIUs) in its service area, as of December 31, 2017. Newly Weds Foods, Rumpke of Kentucky, Inc, and Valicor Environmental Services, LLC were added to the pretreatment program in 2017. None of the newly permitted SIUs are within the CSS.

Wet Weather Permit Conditions

Three SIUs have special conditions in their permits, requiring zero discharges during wet weather, due to their locations within the CSS. SD1 conducts an annual surprise

inspection during wet weather to ensure that the SIUs are in compliance with their permits. In 2017, no SIUs in the CSS were found to be discharging during wet weather.

The three SIUs in the CSS, during 2017, with special conditions in their permits are:

- US Nonwovens – Ludlow
- Imperial Sugar Company – Ludlow
- McGinnis Incorporated – Ludlow

Compliance Monitoring

In 2017, one short term discharge permit was issued to Duke Energy for hydrostatic testing of lines

Enforcement

SD1 issued the following enforcement actions in 2017:

- 58 Notice of Violations; 15 in the CSS (US Nonwovens).
- \$3,000 in administrative fines issued with four of the Notice of Violations

US Nonwovens was issued 15 NOVs (two written, five verbal, and eight formal with fines). Enforcement was taken due to parameter violations (zinc, mercury, and pH), as well as for failure to submit required reports, failure to respond to enforcement, and bypassing the pretreatment system. US Nonwovens was published for significant non-compliance for failure to submit required self-monitoring reports for the third quarter of the year. Fines totaled \$2,000. To ensure permit compliance, SD1 has installed flow meters in its collection system to continuously monitor discharges from US Nonwovens.

Pretreatment Modifications

No modifications were made to the pretreatment program in 2017.

2.4 NMC #4: Maximization of Flow to POTW for Treatment

The purpose of this control is to maximize flow to the treatment plant by making simple modifications to the CSS and treatment plant to enable as much wet-weather flow as possible to reach the treatment plant, thereby minimizing the magnitude, frequency, and duration of CSOs that flow untreated into receiving waters.

In 2017, SD1 did not implement or identify any new processes that will maximize flow to the treatment plant.

The best opportunity to implement improvements related to NMC #4 has been identified in previous NMC Annual Reports. The opportunity includes mechanical and electrical upgrades to the Bromley Pump Station that will take advantage of available wet well capacity and start/stop controls on the pumps. SD1 has completed a major study of this opportunity to increase wet-weather flows to the Dry Creek Wastewater Treatment Plant and has committed to design the improvements by December 31, 2022.

SD1 will also begin analyzing the best opportunities to implement real-time controls in the CSS with its second round of Watershed Plans, which are anticipated to begin in 2019.

2.5 NMC #5: Elimination of CSOs during Dry Weather

The purpose of this control is to ensure dry-weather overflows (DWOs) do not occur in the CSS during dry-weather conditions by implementing measures that focus on proper and efficient collection system operation.

Investigations to Identify Potential Dry-Weather Overflow Locations

In conjunction with the routine CSO diversion inspections described in Section 2.1, inspectors visually look for debris and blockages that may trigger DWOs, or would affect the ability of the diversions to maximize the flows entering the interceptors during rainfall. Diversion structures that have existing DWO records or have the potential to overflow during dry weather are evaluated in further detail to determine a recommended course of action, which may include more frequent monitoring. Diversions where multiple DWOs have occurred are further evaluated for additional actions, which may include:

- Catch basin modifications to reduce solids that may cause dry-weather overflow risk at the downstream diversion
- Permanent modifications to the diversion, such as removing a weir plate, removing the bar rack over the diversion or upsizing the diversion pipe
- Targeted cleaning upstream or at diversions to address solids deposits
- More frequent inspections for diversions with a configuration considered susceptible to dry-weather overflow or for previously modified locations to confirm that the issue has been sufficiently addressed

- Permanent monitoring for early warning at locations where measures have failed to address the issue
- Installation of wireless flow meters or level sensors in the diversion's bypass pipe that provide email alarms to SD1 staff if a dry-weather CSO is occurring

Dry-Weather CSO Inspection Frequency

Historically, SD1's CSO investigation crews have inspected every CSO diversion once per week and after every rainfall event greater than half of an inch. The information gathered from these diversion inspections over the past decade have been used to characterize the activity of CSOs during wet weather, and to identify locations susceptible to DWOs.

EPA's 1995 Guidance for Nine Minimum Controls for the fifth minimum control allows for trends to be analyzed in order to determine where inspection frequency adjustments may be appropriate. According to the NMC Guidance, greater scrutiny should be given to areas where DWOs have been known to occur. Diversions that have never experienced a DWO, are in good repair, and have no known hydraulic capacity issues, may be inspected less frequently.

SD1 modified its dry-weather CSO inspection routines in 2013. Based on historical inspections, modeled data, targeted CCTV inspections of upstream pipes, and EPA's 1995 NMC Guidance, SD1 determined that approximately 37 diversions require frequent dry-weather inspections. Approximately 96 diversions have no evidence of structural or maintenance issues, or capacity issues that would contribute to DWOs . Monthly inspections of such locations may be suitable, per EPA's NMC Guidance, but SD1 inspects the 96 locations on a bi-weekly basis.

2017 Dry-Weather CSOs

SD1 recorded five DWOs during 2017. Four of the DWOs were related to maintenance issues and one was related to a closed flood gate.

Table 2.2 provides a summary of the DWOs that occurred in 2017, and the actions taken to prevent the overflows from reoccurring.

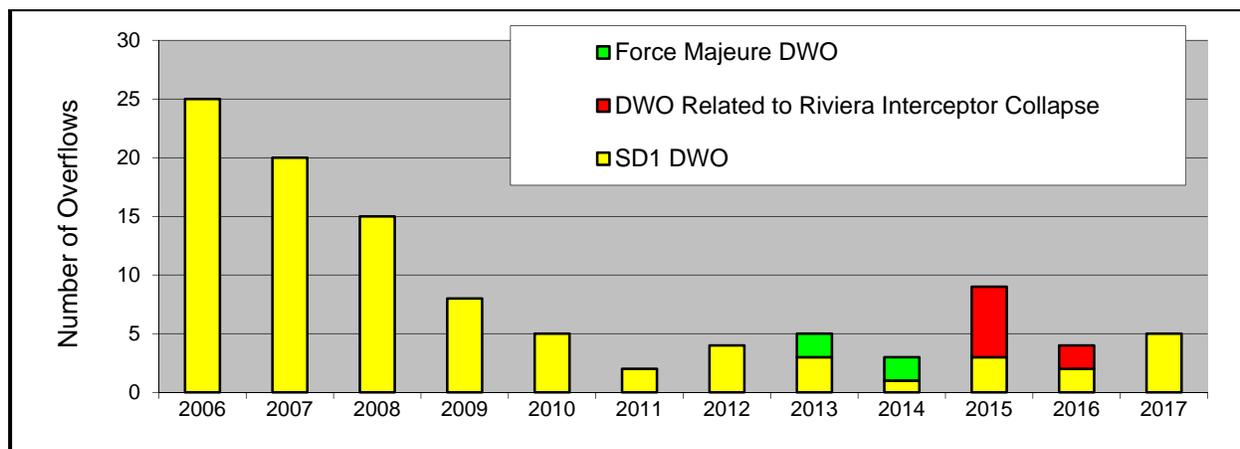
Table 2.2 Summary of Dry Weather CSOs that Occurred in 2017

Date	Manhole ID#	Location	Overflow Cause	Volume Estimate	Corrective Action Taken
01/23/17	Diversion 0870052 KY0021466 - Outfall 34	Covington E 38 th Street	Blockage of debris	73,500 gallons	The line was jettted. Plywood, rags, and floatables were removed. The diversion will continue to be inspected weekly and the line is in a regular CSAP cleaning program.
03/13/17	Diversion 0620031 KY0021466 - Outfall 23	Bellevue Patchen Street	Blockage of grease	4,600 gallons	The line was jettted. Blockage was broken and flow was returned to the pipe. Approximately 240 FOG letters were mailed to residents and businesses upstream of the dry-weather CSO to educate customers on proper disposal of fats, oils, and grease.
03/16/17	Diversion 1470003 KY0021466 - Outfall 62	Covington Philadelphia Street	Blockage of debris	1,000 gallons	Made an entry into the pipe to remove bricks and rocks by hand. Jettted remaining debris and returned flow to the pipe.
06/08/17	Diversion 1440146 Unpermitted CSO 1440207	Covington Kennedy Street	Flood gate left shut after USACE inspection	40,000 gallons	The closed flood gate caused flows from an adjacent apartment building to discharge to CSO 1440207 from April 12 to June 8. It was determined that during the annual USACE inspection of the flood control system that the valve was accidentally left shut, because it has reversed threads. SD1 has developed an SOP for exercising all of the flood gates to clarify which gates close clockwise and which close counter-clockwise.
10/19/17	Diversion 0540009 Unpermitted CSO 0540157	Bellevue Berry Avenue	Blockage of debris	2,000 gallons	Blockage of debris cleared by vactor truck and surrounding pipes televised to ensure no debris remained. SD1 is currently replacing the 6" clay underflow pipe with a 12" PVC pipe to reduce the risk of blockages and increase wet weather flows to the interceptor.

Annual Frequency of Dry-Weather CSOs

The frequency of DWOs remains low, as summarized in Figure 2.7. In 2017, SD1 recorded four fewer DWOs than the 11-year average.

Figure 2.7 Occurrences of Dry Weather CSOs (2006 through 2017)



DWO Force Majeure Findings in 2013 and 2014

In a letter dated November 24, 2014, from the Kentucky Department for Environmental Protection (KDEP) and the United States Environmental Protection Agency (EPA), it was determined that two of the three recorded dry-weather CSOs in 2014 were probable Force Majeure events, pursuant to Paragraph 61 of the Consent Decree. Additionally, two dry-weather CSOs from 2013 were determined to be probable Force Majeure events.

Riviera Interceptor DWOs in 2015 and 2016

In 2015 and 2016, approximately nine DWOs occurred as a result of prolonged complications with an emergency construction project to repair a collapsed interceptor. SD1 will seek Force Majeure consideration of some of the DWOs related to the project.

2.6 NMC #6: Control of Solid and Floatable Materials in CSOs

The purpose of this control is to reduce the amount of solid and floatable (S&F) material discharged to water bodies through wet-weather CSOs through the implementation of simple measures such as: baffles, screens, catch basin modifications, and nets.

Catch Basin Modifications

In 2017, SD1 continued replacing catch basins and retrofitting catch basins with bells and grated inlets to reduce the amount of S&F materials entering the CSS. The following factors are considered when determining if a bell installation is appropriate:

- The catch basin is in need of structural repair and does not have a bell
- The catch basin is in need of total rehabilitation and can be replaced with a new catch basin that has both a grated inlet and a bell
- An untrapped catch basin directly upstream of a dry-weather CSO that appears to be a potential source of debris will be retrofitted with a bell
- Odor control of gases escaping the main line through an untrapped catch basin

In 2017, SD1 repaired 44 catch basins and replaced 17 catch basins in the CSS. The newly replaced catch basins were equipped with bells. Of the 5,980 known public, private, and state-owned catch basins and inlets in the CSS, there are approximately 2,688 structures that are known to be equipped with a trap or bell for control of solids and floatables.

In-line and End-of-Pipe Controls

The program consists of approximately 40 controls, including:

- 17 static weirs
- 12 outfall nets
- 4 baffles
- 4 baffle chambers
- 1 bar rack
- 1 combination weir and baffle
- 1 combination weir and screen

During 2017, no new in-line or end-of-pipe S&F controls were installed. Regular maintenance of the existing controls, such as baffle chamber cleanings and netbag replacements, were performed on an as-needed basis, in conjunction with the regular CSO diversion inspections outlined in Section 2.1. Detailed descriptions of SD1's existing S&F control program have been provided in previous NMC Annual Reports.

SD1 is currently designing a new S&F control for CSO 0630061 (KY0021466 – Outfall 83) with the planned rehabilitation of the CSO outfall. The two alternatives being considered are a bar rack at the existing diversion chamber or a new baffle chamber on the CSO outfall. Construction is anticipated to be complete in 2019.

2.7 NMC #7: Pollution Prevention

The purpose of this control is to minimize various forms of pollution from entering into the CSS, and compromising the water quality of the receiving water body and/or SD1's conveyance and treatment infrastructure. As the Northern Kentucky regional storm water agency, many components of SD1's approach to pollution prevention is implemented as required by EPA National Pollutant Discharge Elimination System Phase II Municipal Separate Storm Sewer System (MS4) regulations and reported in SD1's storm water annual reports. In that regard, SD1 uses a wide-ranging approach to pollution prevention from public education and programmatic initiatives to physical efforts such as catch basin cleaning and facility audits.

In 2017, SD1 collected and disposed of approximately 312 cubic yards of grit and debris from CSS catch basins and approximately 225 cubic yards of grit and debris from grit pits. In addition, street sweeping operations occur on a regular basis in 21 communities throughout SD1's service area, which vary in frequency from annually to weekly.

The following sections describe some of the other major activities that demonstrate SD1's continued commitment to this minimum control.

2.7.1 Pollution Prevention Audits of SD1 and Municipal Facilities

In November of 2017, SD1 once again completed pollution prevention audits on all of its facilities, as a minimum control requirement of the Kentucky Pollutant Discharge Elimination System (KPDES) Phase II Storm Water Permit. Facilities audited by SD1 staff include: SD1 Main Office, Employee Development Center, Dry Creek Wastewater Treatment Plant, Eastern Regional Water Reclamation Facility, Western Regional Water Reclamation Facility, and more than 130 pump stations. Additionally, SD1 audited its pollution prevention signs at its facilities to ensure proper disposal instructions and emergency contact information is easily available.

SD1 also sent reminders to all of its MS4 co-permittees, including all of the municipalities in the CSS, to complete their required facility audits. Proper audit methods were also provided to all of the co-permittees during two training sessions that were attended by 29 municipalities and counties.

Additionally, SD1 developed a template audit form for its co-permittees. This form allows SD1 to annually monitor and track audit results of the municipalities and counties. The link to SD1's Laserfiche-based audit form for Storm Water Pollution Prevention Site Assessment is <https://forms.sd1.org/Forms/v3DGo>.

2.7.2 Public Education Programs

Public Service Park

Dedicated to those who enhance Northern Kentucky's quality of life through public service, Public Service Park is an example of SD1's leadership in water pollution prevention practices, also known as best management practices. The park is an aggressive approach to empower and educate the public on the vital importance of protecting the waterways for future generations. Featuring storm water best management practices, a wide range of green infrastructure, and cutting edge public educational programming, SD1's Public Service Park targets many audiences, ranging from the development community and water professionals, to students and the general public who can follow a self-guided tour.

In 2017, SD1 conducted 9 Public Service Park field trips for local public and private schools that reached approximately 500 students. Additionally, 26 tours were provided to local civic groups and universities that reached approximately 465 participants.

Classroom Presentations

SD1 is committed to empowering students to protect the environment and has reached many students with interactive school presentations. SD1 uses an interactive landscape model called Enviroscape to teach the negative impact of polluted storm water runoff on local waterways. During 2017, 56 Enviroscape lessons were delivered to approximately 1,370 students in classroom settings.

Public Presentations

In 2017, SD1 also participated in 29 stormwater education events and reached approximately 2,400 students and adults, beyond the formal programs covered above.

2.7.3 Land Disturbance/Sediment and Erosion Control

SD1's Storm Water Rules and Regulations established a land disturbance permit process, which is applicable for any land disturbance activity greater than or equal to one acre that occurs in the separate system, or an area of 10,000 square feet or more in the combined system. All construction activities within SD1's service area that disturb one acre of land or more in the separate system, or an area of 10,000 square feet or more in the combined system, are required to receive a permit from SD1 prior to the commencement of the activity. SD1's plan review process includes examination of storm water runoff from construction sites and post-construction storm water management for new developments and re-developments. Appropriate sediment and erosion control best management practices must be properly cited to control erosion from the site before plans are approved.

Post-construction storm water runoff treatment controls are required in the separate storm sewer system, as well as the combined sewer system to reduce the pollution associated with the storm water runoff. Property owners are required to enter into a long term maintenance agreement for post-construction water quality and volume reduction controls.

During 2017, SD1 routinely inspected 204 permitted construction sites within its service area. Based on the results of inspections conducted at those sites, SD1 issued 82 Correction Notices, 131 Notices of Violation, and 10 Administrative Fines for issues of non-compliance. Additionally, SD1 hosted an erosion control workshop on September 28 that was attended by 160 people from the construction and engineering communities of Northern Kentucky and Southwest Ohio.

2.7.4 Sponsored Events

Household Hazardous Waste Collection Event

SD1 continues its partnership with the Northern Kentucky Household Hazardous Waste Action Coalition. This unique coalition is comprised of local governments and

organizations and is sponsored by area businesses. SD1 serves as the chair of the coalition, which meets quarterly.

As a way to inform the public about the proper disposal methods of household hazardous waste, SD1 worked with the Household Hazardous Waste Action Coalition to create and promote the website www.nkyhhw.org. The website provides viewers with disposal and recycling methods for household items, especially those considered hazardous waste. By informing people how to properly dispose of the hazardous waste, SD1 is actively influencing the community to reduce the amount of contaminants that may enter the CSS.

A household hazardous waste collection event for the residents of Boone, Campbell and Kenton counties was held November 4, 2017. The event was promoted through various media outlets including: websites, flyers, advertisements in newspapers and a community newsletter, and a press release distributed to local TV news stations. More than 2,800 citizens participated in the event. Participants dropped off items such as: antifreeze, oil, lead acid batteries, paint, solvents, pesticides, electronics, fluorescent light bulbs, propane tanks, paper, and aerosol cans. More than 190,000 pounds of household waste and more than 140,000 pounds of electronics were collected and disposed of properly.

River Sweep Event

SD1, once again, sponsored Ohio River Valley Water Sanitation Commission's (ORSANCO) annual River Sweep event, which took place on June 17, 2017. Volunteers from public organizations, civic groups, recreational clubs and the general public in six states bordering the Ohio River came together to collect more than 50 tons of trash and other debris from the banks of the Ohio River and its tributaries. Northern Kentucky provided 477 volunteers to the interstate effort.

2.8 NMC #8: Public Notification

The purpose of this control is to reduce exposure to potential health risks caused by CSOs by informing the public of the location of CSOs, the actual occurrences of CSOs, the possible health and environmental effects of CSOs, and the recreational or commercial activities curtailed as a result of CSOs.

SD1 maintains warning signage posted near CSO outfalls and public education signs located near public access to water to warn about unsafe conditions during and after rainfall events.

Wet Weather Advisory Emails

SD1 continues to issue wet-weather advisories to an email distribution list that weather conditions could potentially cause overflows. There are approximately 225 email accounts on the distribution list, which include members of the general public, Northern Kentucky community leaders, local Water Districts, regulators, local media outlets, and SD1's Watershed Community Council members. Individuals can sign up to receive this e-mail notification by filling out a request form on SD1's website or by e-mailing a request to info@sd1.org. In 2017, email notifications were sent to this group 50 times. SD1's website also includes other overflow related information, including a map of all known CSO locations.

2.9 NMC #9: Monitoring to Characterize CSO Impacts

The purpose of this control is to determine the occurrence and apparent impacts of CSOs through visual inspections and other simple methods, to gain an understanding on overflow occurrences and water quality problems that reflect use impairments caused by CSOs. Changes in such occurrences can provide a preliminary indication of the effectiveness of the NMC.

2.9.1 Hydraulic Modeling: Inspections and Flow Monitoring

In 2008, SD1 completed the development of a highly calibrated system-wide hydraulic model for its collection system to be used as an accurate planning tool for capital improvements, and to provide information about the current performance of SD1's system. To ensure that the model continues to provide the most accurate information about the systems' performance, SD1's wet-weather CSO and SSO investigation crews continue to perform routine inspections during and after rain events. Additionally more than 60 flow meters and 20 rain gauges are continuously deployed to monitor flows and calibrate the model to current conditions.

Inspections

As described previously, SD1's CSO investigation crew regularly inspects each CSO outfall and its associated diversions once per week or bi-weekly, as well as after wet-weather events that produce at least half of an inch of rain. The solids & floatables controls associated with CSO diversions and outfalls are inspected routinely, as a part of the regular CSO inspections. The solids and floatable controls are cleaned on an as-needed basis. These inspections and cleanings ensure proper operation and maintenance of the diversions, as described in Section 2.1, but are also support characterization and verification of the collection system models.

These efforts are part of SD1's on-going process of verifying the model results against actual field conditions by direct visual observation. Over time, these field verifications will continue to improve the collection systems model to better reflect observed conditions. The ongoing recalibration of SD1's collection systems model is critical to accurately assessing the CSO impacts on water quality.

Flow Monitoring

SD1's flow monitoring crew is involved in a number of monitoring efforts. Data are collected in specific areas of the collection system to confirm and update hydraulic modeling, identify areas susceptible to high inflow and infiltration (I/I), and evaluate the effectiveness of capital improvements.

In 2017, SD1 completed approximately two years of flow monitoring and model calibration in the CSS, along the Ohio River Interceptor, east of the Lick River. Additionally, smaller areas that required shorter flow monitoring and model calibration. Approximately 30 flow meters were used in Bellevue, Covington, Dayton, and Newport to improve seven sub-catchments of the CSS model.

Figure 2.9 illustrates the sub-catchments that were calibrated in SD1's model in 2017.

Figure 2.8 SD1 Flow Monitoring Locations in 2017

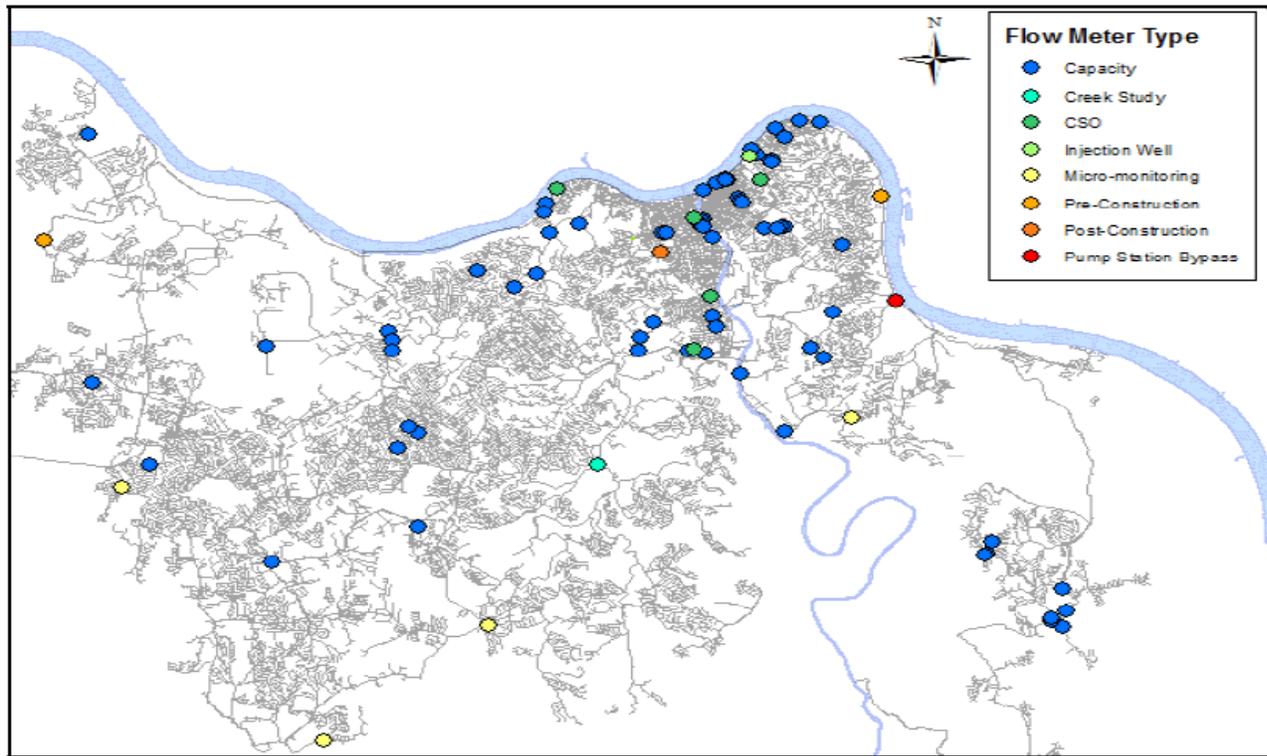
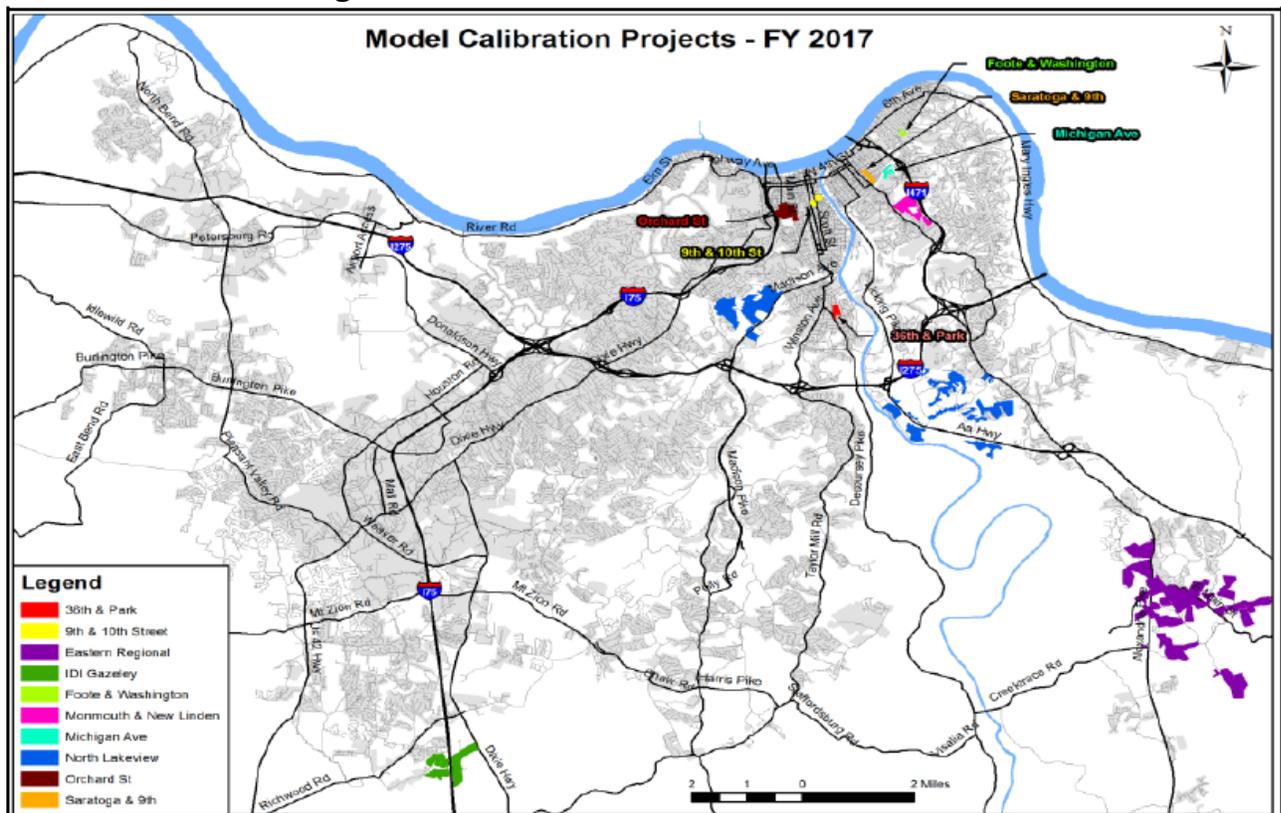


Figure 2.9 SD1 Model Calibrations in 2017



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APPENDIX A:
O&M and Repair Work (2008 through 2017)

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O&M and Repair Work (2008 through 2017)											
Activity	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total
Combined System Structures											
Catch Basins Cleanings	1,211	888	787	1,392	1,431	1,393	544	1,408	834	507	10,395
Catch Basin Cleaning (Yards of Debris Removed)	N/A	427	469	525	466	630	312	450	378	312	3,969
Catch Basin Inspections	2,057	3,328	4,070	4,125	3,750	4,072	2,971	2,066	0	2,457	28,896
New Catch Basin Installation	0	5	2	2	0	5	1	0	1	1	17
Catch Basins Replaced	159	224	140	90	61	59	28	18	10	17	806
Catch Basins Repaired	128	65	78	211	38	59	45	65	93	44	826
Grit Pit Cleaning (Yards of Debris Removed)	358	439	355	365	415	408	360	213	324	225	3,462
Manholes											
Manhole Inspections	5,985	4,688	1,254	1,841	814	1,258	524	0	0	0	16,364
Manholes Repaired	485	332	320	656	407	314	200	241	307	231	3,493
Manholes Replaced	55	59	96	30	38	33	12	20	16	11	370
New Manholes Installed	26	53	39	50	49	35	33	16	30	22	353
Sewer Cleaning											
Sewer Lines Cleaned – Feet (Length of Pipe)	706,441	530,303	451,877	375,303	462,281	613,968	683,140	409,167	366,237	312,667	4,911,384
Sewer Inspection											
Sewer Line Initial Inspection - Feet	1,126,198	855,962	463,299	504,488	623,277	721,736	761,720	1,394,999	999,878	267,809	7,719,366
Sewer Line Follow-up Inspection – Feet	288,605	555,856	631,781	473,996	581,711	801,503	673,824	544,188	526,529	739,566	5,817,559
Sewer Lines Inspected - Total Feet	1,414,803	1,411,818	1,095,080	978,484	1,204,988	1,523,239	1,435,544	1,939,187	1,526,407	1,007,375	13,536,925
Sewer Line Rehab/Replacement Stats											
Sewer Lines Rehabilitated (CIPP) - Feet	953	2,251	29,528	84,717	51,100	59,137	32,782	27,786	46,237	64,868	399,359
Sewer Lines Repaired/Replaced - Feet	18,442	17,658	27,157	11,392	31,391	12,680	8,323	6,347	7,296	8,820	149,506
Misc. Sewer Line Repairs - Count	45	40	8	9	15	0	0	0	0	0	117