

ANNUAL REPORT

# KANSAS CITY'S OVERFLOW CONTROL PROGRAM

REPORTING PERIOD: JANUARY 1, 2017 TO DECEMBER 31, 2017



KANSAS CITY  
MISSOURI

# Office of the City Manager

CITY OF FOUNTAINS  
HEART OF THE NATION



KANSAS CITY  
MISSOURI

11<sup>th</sup> Floor, City Hall  
414 East 12<sup>th</sup> Street  
Kansas City, Missouri 64106

(816) 513-0304  
Fax: (816) 513-0543

March 30, 2018

Greetings,

Please find enclosed the seventh annual report related to Kansas City's overflow control program. This report covers the annual reporting period from January 1, 2017, to December 31, 2017. Pursuant to the Consent Decree, this report has a required submittal date of no later than March 30, 2018.

Additionally, and as required by the Consent Decree, any report, plan, or other submission that the City is required to submit, including documents as required by its current NPDES Permits, shall be signed and certified by an official or authorized agent of the City.

By signing below, I certify under penalty of law that the document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted, and that 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.

Please contact me if you have questions.

Best regards,

A handwritten signature in blue ink that reads "Andy Shively". The signature is written in a cursive, flowing style.

Andy Shively, P.E.  
Special Assistant City Manager

cc: Troy Schulte, City Manager, City of Kansas City, Missouri  
Matthew J. Gigliotti, Assistant City Attorney, City of Kansas City, Missouri  
Terry Leeds, Director of Water Services, City of Kansas City, Missouri

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## I. ANNUAL REPORT PURPOSE AND SCOPE

On September 27, 2010, the United States District Court for the Western District of Missouri entered a consent decree in the case *U.S. vs. The City of Kansas City, Missouri*. The Consent Decree was amended for the first time by the parties and approved by the court on January 9, 2015. This Annual Report is submitted in accordance with Section IX.B of the Consent Decree and reflects the status of program implementation that occurred between January 1, 2017, and December 31, 2017.

In accordance with the Consent Decree's Section IX.A, this Annual Report also includes Kansas City's Semi-Annual Report on the progress of implementing control measures defined in Appendix A of the Consent Decree, as well as all other related activities.

## II. KANSAS CITY'S OVERFLOW CONTROL PROGRAM

Individual elements of the City's Overflow Control Plan (Plan) became part of an enforceable document with the entry of a Consent Decree in United States District Court. The Consent Decree is a culmination of nearly a decade of negotiation between the City, U.S. Environmental Protection Agency (USEPA) and the Missouri Department of Natural Resources (MDNR) related to reducing overflows. The Consent Decree includes requirements for capital construction, and management, operations and maintenance of the City's sewer systems.

The City and its regulatory partners have agreed to meet the objectives over a 25-year period from 2010 through 2035. The Plan involves a list of improvements that are structured to capture for treatment approximately 88 percent of total wet weather flow in the combined sewer system and eliminate separate sanitary sewer overflows during a five-year, 24-hour rainfall event. This implementation is referred to as the Overflow Control Program (OCP).

The occurrence of combined sewer overflows is not uncommon in combined sewer systems and is authorized pursuant to the terms of two of the City's National Pollutant Discharge Elimination System (NPDES) permits (Westside WWTP and Blue River WWTP). NPDES permits are issued by MDNR to Kansas City and implemented by the Water Services Department (Water Services) at each treatment facility. Consent Decree components include:

- Capital projects targeted at reducing overflows through Combined Sewer Overflow (CSO) Control Measures and Separate Sewer Overflow (SSO) Control Measures
- Nine Minimum Controls (NMC) Plan targeted at operationally reducing and addressing combined sewer overflows through a series of minimum control efforts
- Capacity, Management, Operation and Maintenance (CMOM) Plan targeted at reducing separate sewer system overflows by adequately operating and maintaining the sewer system
- Post-Construction Monitoring Plan aimed at long-term monitoring and assessment of overflow reduction
- Supplemental Environmental Project (SEP) Plan which includes the incorporation of best management practices and green infrastructure at two project locations, along with the initial SEP to reduce septic tank use in areas with public sewers
- Implementation of disinfection at all six wastewater treatment plants

### III. KANSAS CITY'S SEWER SYSTEM OVERVIEW

More than 150 years ago, Kansas City began building the basic sewer infrastructure that would allow the city to grow and prosper. Some of that infrastructure is still in use today.

Kansas City's overall sanitary sewer system comprises both combined and separate sewer systems totaling approximately 350 square miles. The combined sewer system consists of 58 square miles, primarily located in the oldest areas of the City. During moderate to heavy rainfall events, the system will reach capacity, overflow, and discharge a mixture of wastewater and rainwater directly to receiving streams and rivers. By implementing control measures in accordance with Kansas City's Consent Decree, the occurrence of overflows will be reduced over time.

The remaining 292 square miles of Kansas City's sewer system are a separate sanitary system. A separate sanitary sewer system is only intended to collect and convey wastewater. Rainwater can enter the system, however, through leaky sewer pipe joints, broken sewer pipes, manholes, and illicit stormwater direct connections causing the system to overload during rainfall events. When this system exceeds its capacity, it too overflows a mixture of wastewater and rainwater. Kansas City has one constructed sanitary sewer overflow (SSO) in the Blue Line Creek Basin, which is being eliminated as part of the Overflow Control Program. In addition, during the reporting period four SSOs were identified in a separate sanitary system located in the Brush Creek Basin, which the City is evaluating elimination of through inflow and infiltration reduction measures.

### IV. REPORTING PERIOD ACTIVITY

The following specific milestones, as laid forth in Consent Decree Appendices A and D, were met during the reporting period from January 1, 2017, through December 31, 2017. Work continued on several other projects that began in previous reporting periods, including the continuation of inflow/infiltration reduction activities in areas north and south of the Missouri River. To date, all Consent Decree scheduled milestone dates have been met.

Activities performed during the reporting period associated with Nine Minimum Controls (NMC) and Capacity, Management, Operations and Maintenance (CMOM) as laid forth in Consent Decree Appendices B and C, respectively, are documented in this annual report in accordance with Section IX.B. Requirements for NMC and CMOM were met for the reporting period.

#### 1. Appendix A – Performance Measures

##### **Middle Blue River Basin**

- Neighborhood Sewer Rehabilitation
  - Consent Decree Required Completion Date – December 31, 2017
  - Actual Completion Date – January 5, 2017
  
- Distributed Storage: Outfall 059
  - Consent Decree Required Completion Date – December 31, 2017
  - Actual Completion Date – November 17, 2017
  
- Distributed Storage: Remaining Area Tributary to Outfall 069
  - Consent Decree Required Completion Date – December 31, 2017
  - Actual Completion Date – November 30, 2017

### **Blue River South**

- 87<sup>th</sup> Street Pump Station (Phase 1)
  - Consent Decree Required Completion Date – December 31, 2017
  - Actual Completion Date – August 31, 2017

### **Turkey Creek**

- CID In-Line Gates at Santa Fe Pump Station
  - Consent Decree Required Completion Date – December 31, 2017
  - Actual Completion Date – November 6, 2017

## **2. Appendix D – Post Construction Monitoring Program**

Implement Flow Monitoring Program for the outfalls listed below. Flow monitoring was performed in accordance with the revised CSS Metering Plan approved by USEPA in December 2016.

- Outfall BR056 (suspended)
- Outfall BR039 (commenced)
- Outfall BR040 (commenced)
- Outfall BR059 (commenced following construction)
- Outfall BR069 (commenced following construction)

## **V. DATA MANAGEMENT AND PROJECT CONTROLS**

Managing the large amount of data generated by OCP is a primary focus of the City of Kansas City, MO. During the reporting period, the City continued to increase and diversify the functionality of its Management Information System (MIS) to capture data pertaining to work activities, schedules, and budgets for all OCP projects. The MIS is currently being used to create and update project status reports, provide program financial summary information, forecast project costs and schedule information.

During the reporting period, the City continued to utilize Primavera scheduling tools for schedule management. This software enabled staff to more readily identify, update and track project progress, recognize potential challenges and enhance project team coordination. The result of these proactive, problem-solving efforts is more effective project management to reduce situations that threaten project scope, schedule, budget and risk profile.

The accumulation of data related to sewer system network characterizations, manhole inspections, sewer cleaning, and CCTV work in nine basins throughout the City continued during the reporting period. Water Services continued the process of storing this data in a virtual cloud network, as well as organizing, categorizing and distributing this information to design professionals involved with OCP projects.

Updating the quality of the City's GIS data, related to OCP projects, also continued during the reporting period. As CCTV information in the OCP project areas was collected, it was subjected to a quality control check process before it was linked with the department's GIS information. These updates improved the quality of GIS information to provide more accurate accounting of where system assets are located. At the end of the reporting period, data for all



nine projects basins had been through this process and is being integrated into the City's GIS platform.

During the reporting period, the City fully utilized an application and website built for Keep Out the Rain, the City's Private Inflow and Infiltration (I/I) Reduction Program. This data tool enabled Design Professionals performing private property building plumbing evaluations to record inspection information and schedule appointments with citizens who are eligible for the disconnection of prohibited I/I sources located on private property that are cost-effective for the City to remove for the public's benefit. This application also provided real-time analytics data to track program performance.

The City's OCP Program utilizes Aconex, a web-based software as a service (SAAS) program, for document control on Smart Sewer projects. This tool is utilized to track all facets of project delivery associated with construction, including submittals, correspondence, daily reports and payment applications. This application was utilized by Design Professionals, Construction Contractors, and City staff involved in OCP projects.

## VI. PUBLIC OUTREACH

Below is a summary of public outreach activities for the City's OCP program completed during the reporting period. Additional information regarding these activities is in the discussion of NMC 7, which begins on page 35 in this report.

- Conducted 15 public meetings attended by more than 300 citizens about overflow control program related projects, which are discussed in more detail later in this report.
- Hosted 12 Scheduling Events reaching over 200 residents in support of Kansas City's Private Inflow and Infiltration Program, Keep Out the Rain.
- Published program-related information on the City's website at [kcmo.gov/smartsewer](http://kcmo.gov/smartsewer), through City of Kansas City, Missouri newsletter and social media channels and in neighborhood association newsletters.

## VII. IMPLEMENTATION OF OVERFLOW CONTROL MEASURES

### A. POST-CONSTRUCTION MONITORING PROGRAM

Post-construction monitoring activities completed in 2017, as defined in *Appendix D* of the Consent Decree, are outlined in this report beginning on page 75

### B. GREEN INFRASTRUCTURE

#### i. ADDITIONAL GREEN INFRASTRUCTURE PILOT

Additional green infrastructure pilot projects in the Lower Blue River Basin have moved forward from 30% design to final design. During the reporting period, 100% design drawings were completed at three sites:

- East High School
- Veterans Hospital and Linwood Green Park
- Avenues of Life Mattress Recycling Center

The first phase of green infrastructure is already under construction at East High School as a joint effort between Kansas City Public Schools and the City. The first phase of green infrastructure at East High School includes open bottom underground storage, removal of an asphalt parking lot, and a rain garden. The second phase of green infrastructure at East High School will be completed in 2018 with a series of three green infrastructure facilities.

The green infrastructure design for Veterans Administration (VA) Hospital and Linwood Green Park site was completed in 2017. Final construction contract documents will be completed in 2018 with construction scheduled to begin in mid-2018. The green infrastructure design for the Avenues of Life site was also completed in 2017. Final construction contract documents will be completed with construction scheduled to begin in 2018.

## ii. CONSENT DECREE GREEN INFRASTRUCTURE PROJECTS

During the reporting period, the city made progress on two green infrastructure pilot projects located in the Northeast Industrial District and the Turkey Creek/Central Industrial District basins as required by the Consent Decree. A Request for Qualifications/Proposals was issued in December 2015 for each project.

For the Northeast Industrial District project, a Design Professional was selected in 2016 to complete green infrastructure conceptual designs for two green infrastructure locations. One of the locations, Admiral Plaza, was abandoned as a viable site due to physical site constraints and cost. The City is now considering an alternative site at 10<sup>th</sup> and Main Street. In 2017, a concept design was completed for the 10<sup>th</sup> and Main Street site. Pending public stakeholder input on the concept design and property acquisition, this site is anticipated to move forward into preliminary design in 2018. The other green infrastructure site, along Gardner Avenue, was completed to a 60 percent level in 2017. Final design for the Gardner Avenue site is scheduled for completion in 2018 and construction for the Gardner Avenue project is scheduled to begin in 2018.

For the Turkey Creek/Central Industrial District project, a Design Professional was selected in 2016 to complete conceptual design of green infrastructure solutions at three locations. The concept design and preliminary design of green infrastructure solutions at all three locations were completed in 2017. Final design is scheduled to be completed in the second quarter of 2018 with construction scheduled to begin in late 2018.

See *Table 1* on page 10 for more information.

## iii. MIDDLE BLUE RIVER BASIN GREEN SOLUTIONS PILOT PROJECT

During the reporting period, Water Services' in-house green solutions maintenance crew continued maintenance work for the pilot project area. The crew provided routine and seasonal maintenance as required under the site maintenance plan. In



addition, seven concrete forebays were retrofitted to eliminate standing water and increase performance. In 2017, Water Services contracted with Bridging the Gap (BTG), a non-profit organization, to administer a Green Stewards program that will perform some of the routine maintenance activities in the pilot project area as part of a green workforce development program.

### c. Compliance with Permits

The City strives to continuously maintain compliance with its current wastewater treatment plant NPDES permits, and to properly maintain the capacity, management, operation and maintenance of the City's collection system.

#### i. DISCHARGE MONITORING REPORTS

A collection of the required discharge monitoring reports for the City's wastewater treatment plants, submitted to MDNR during the reporting period, is included in *Attachment A* of this report. The Wastewater Treatment Division of the Water Services Department submitted these reports, which are a part of the Missouri State Operating Permits MO-0024911, MO-0024929, MO-0024961, MO-0048305, MO-0049531, and MO-0048313.

#### ii. MONTHLY OPERATING REPORTS

The City's Monthly Operating Reports, submitted as part of the City's current NPDES permits, are included in *Attachment B* of this report.

## VIII. COMBINED SEWER OVERFLOW CONTROL MEASURES – APPENDIX A

Combined sewer systems (CSS) make up approximately 58 square miles of the city’s sewer system, running from the Missouri/Kansas state line on the west, 85th Street on the south, the Blue River on the east, and the Missouri River on the north. The area served by the CSS is subdivided into six principal basins: Brush Creek, Lower Blue River, Middle Blue River, Northeast Industrial District (NEID), Town Fork Creek, and Turkey Creek/Central Industrial District (TC/CID).

Field investigation activities for neighborhood sewer rehabilitation projects are being completed through the City’s OCP Program Management Services contract and two city-wide sewer cleaning and closed-circuit television (CCTV) inspection contracts. The combined work consists of sewer system network characterization and manhole inspections, sewer cleaning, and CCTV inspection of sanitary sewers in the NEID, Lower Blue River, and TC/CID combined sewer system basins. For more details on the quantities of these field investigations see *Section XI. Nine Minimum Controls-Appendix B*.

The City’s 25-year Overflow Control Program is being implemented in three stages, each with a primary control strategy. The early years of the program include repairs to the existing sewer systems and pilot projects with a focus on developing and evaluating green infrastructure solutions. The middle years of the program will focus on maximizing the capacity within the existing system and analyzing the results of source volume reductions and pilot projects. The later years of the program will address necessary improvements to the City’s wastewater treatment plants and construction of structural storage solutions which are currently planned as deep storage tunnels.

The status of the projects in the combined sewer system basins is summarized in *Table 1*. The combined sewer system has 22 active projects. Nine (9) projects are under design, and 13 projects are either advertising for construction bids, under construction, or construction was recently completed.

Table 1: Project Status - Combined Sewer System Basin (through December 31, 2017)

COMBINED SEWER SYSTEM		Pre-Design	Design	Construction	CD Due Date
Project Name	Description	Percent Complete through 12/31/2017		Planned Completion Date	
<i>Brush Creek Basin</i>					
Neighborhood Sewer Rehabilitation	Neighborhood sewer rehabilitation work in the Brush Creek Basin has been split into two projects due to the size of the basin. These projects are being implemented to improve the reliability and performance of the combined sewer collection system and reduce basement backups. The projects involve identification of sewer system defects and the preparation of construction contract documents to rehabilitate sewer pipes that are 12 inches and smaller in diameter within the collection system. Work also includes the rehabilitation of sewer pipes and manholes in a separate sewer system area located within the Brush Creek basin to reduce I/I flows contributing to SSOs.	<u>100%</u>	<u>100%</u>	September 2019	12/31/2020
<i>Lower Blue River Basin</i>					
Neighborhood Sewer Rehabilitation	Neighborhood sewer rehabilitation work in the Lower Blue River Basin has been split into two projects due to the size of the basin. These projects are being implemented to improve the reliability and performance of the combined sewer collection system and reduce basement backups. The projects involve identification of sewer system defects and the preparation of construction contract documents to rehabilitate sewer pipes that are 12 inches and smaller in diameter within the collection system.	<u>100%</u>	<u>20%</u> May 2019	June 2021	12/31/2021
<i>Middle Blue River Basin</i>					
Distributed Storage: Outfall 059	Green infrastructure solutions were implemented to reduce combined sewer overflows at Outfall 059.	<u>100%</u>	<u>100%</u>	<u>100%</u> November 2017	12/31/2017
Distributed Storage: Outfall 069	Green infrastructure solutions were implemented to reduce combined sewer overflows at Outfall 069.	<u>100%</u>	<u>100%</u>	<u>100%</u> November 2017	12/31/2017

COMBINED SEWER SYSTEM		Pre-Design	Design	Construction	CD Due Date
Project Name	Description	Percent Complete through 12/31/2017		Planned Completion Date	
<i>Middle Blue River Basin, continued</i>					
Neighborhood Sewer Rehabilitation	This project was implemented to improve the reliability and performance of the combined sewer collection system and reduce basement backups. Two construction contracts were issued for rehabilitation of manholes and sewer pipes that are 12 inches and smaller in diameter within the collection system.	<u>100%</u>	<u>100%</u>	<u>100%</u> January 2017	12/31/2017
Sewer Consolidation: Outfall 063	The project involves the consolidation of piping, disconnection of inlets from the combined sewer system, and elimination of 17 of 19 diversion structures upstream of Outfalls 063 and 064. The overall goal is to eliminate typical year overflows at Outfall 063 and to reduce the number of overflows at Outfall 064. The project scope has been expanded to achieve full separation of storm inlets and sanitary sewers upstream of the 16 diversion structures to be removed and integration of water main replacement work. Due to the size of the project, it has been split into two phases to facilitate construction. City requested a time extension from EPA for this project due to the expanded scope of the project involving the replacement of watermains and combining this project with the adjacent Sewer Separation Diversion Structure 099 project. EPA approval was granted.	<u>100%</u>	<u>100%</u>	<u>85%</u> April 2018	12/31/2018
Sewer Separation: Outfalls 066 and 067	Design documents were completed and a construction contract awarded for separation of approximately 270 acres of the combined sewer system. The Consent Decree does not mandate separation of combined sewers upstream of Outfall 066; however, this 10-acre area was added to the Project because of its proximity to Outfall 067, its small size, and the relatively small number of known stormwater inflow connections. Upon completion of separation work, both outfalls will become stormwater outfalls only.	<u>100%</u>	<u>100%</u>	<u>0%</u> Oct 2019	12/31/2019

COMBINED SEWER SYSTEM		Pre-Design	Design	Construction	CD Due Date
Project Name	Description	Percent Complete through 12/31/2017 Planned Completion Date			
<i>Middle Blue River Basin, continued</i>					
Sewer Separation: Diversion Structure 099	Design documents were prepared for separation of 50 acres of combined sewers upstream of Diversion Structure 099. Green infrastructure best management practices (BMPs) have been incorporated to improve water quality of the separated stormwater flows. Because of this project, Diversion Structure 099 will be eliminated. This project was combined with the adjacent Sewer Consolidation: Outfall 063 project into a single construction project.	<u>100%</u>	<u>100%</u>	85% April 2018	12/31/2018
Diversion Structure 068 Storage Basin (formerly Relief Sewer Diversion Structure 068 to Blue River Sewer)	The project is being designed to reduce combined sewer overflows by eliminating typical year overflows at Outfall 068. A conceptual alternatives evaluation recommended an open storage basin in lieu of a relief sewer. WSD requested a time extension from the EPA Region 7 for this project due to a landfill investigation near the recommended open storage basin and sewer pipeline. An Environmental Assessment of the landfill was completed along with a reevaluation of the conceptual alternative. As a result, the new open storage basin is the recommended alternative and will be constructed in lieu of a relief sewer to reduce overflows at Diversion Structure 068.	<u>100%</u>	<u>30%</u> September 2018	July 2020	12/31/2020
Manhole Modifications: Middle Blue River	This project is being implemented to prevent typical year overflows from occurring by raising or sealing approximately four (4) manholes on the main interceptor sewer in the Middle Blue River Basin.	<u>N/A</u>	<u>75%</u> April 2018	August 2018	12/31/2018
Diversion Structures 065 and 073 Consolidation (formerly Dry Weather Sewer Line: Outfall 056)	Design and construction of a new diversion structure and approximately 1400 linear feet of larger dry weather and wet weather sewer lines (estimated at 18-inch through 60-inch) to connect the new diversion structure to manholes S097-059 and S097-095 and to the Blue River Interceptor (BRIS) at manhole S097-062.	<u>100%</u>	<u>85%</u> March 2018	November 2018	12/31/2018

COMBINED SEWER SYSTEM		Pre-Design	Design	Construction	CD Due Date
Project Name	Description	Percent Complete through 12/31/2017 Planned Completion Date			
<i>Northeast Industrial District Basin</i>					
Sewer Separation: Diversion Structure 006	The project involves separation of 260 acres of combined sewer system by constructing approximately 12,600 feet of new sanitary sewers and eliminating Diversion Structure 006. It will eliminate typical year overflows at Outfall 006. The project now requires the inclusion of a pump station and force main and has been separated into three (3) design/bid/build projects: 1) Sewer Separation, 2) Private Sewer Separation, and 3) Pump Station and Force Main. WSD has requested a time extension from EPA Region 7 for this project due to the expanded scope of the project involving the construction of a new pump station.	<u>100%</u>	<u>100%</u>	<u>98%</u> February 2018	12/31/2019
NEID Green Infrastructure Pilot Project	This project is being designed to reduce combined sewer overflows and provide aesthetic, social, and economic enhancements within the Northeast Industrial District. The design will include bioretention along Gardner Avenue and a gravel wetland at Nicholson Park and will address water quality issues.	<u>100%</u>	<u>50%</u> June 2018	January 2020	12/31/2020
Gooseneck Arch Sewer Gates and Pump Station Improvements	The project consists of the design of an adjustable crest gate inside a new gate structure situated over the 18 ft. by 21 ft. arch sewer to provide in-line storage of combined sewer flows utilizing a real-time control (RTC) system. A new 4-MGD pump station will deliver the stored volume to the Blue River Interceptor through a new force main. City requested a time extension from EPA for this project due to the expanded scope of the project involving condemnation of property. EPA approval was granted.	<u>100%</u>	<u>100%</u>	0% March 2019	12/31/2019
Neighborhood Sewer Rehabilitation	This project is being implemented to improve the reliability and performance of the combined sewer collection system and reduce basement backups. This project involves field investigations to identify and quantify sewer system defects and the preparation of construction contract documents to rehabilitate sewer pipes 12 inches and smaller in diameter within the collection system.	<u>100%</u>	<u>60%</u> May 2018	March 2020	12/31/2020



COMBINED SEWER SYSTEM		Pre-Design	Design	Construction	CD Due Date
Project Name	Description	Percent Complete through 12/31/2017 Planned Completion Date			
<i>Town Fork Creek Basin</i>					
Neighborhood Sewer Rehabilitation	This project is being implemented to improve the reliability and performance of the combined sewer collection system and reduce basement backups. This project involves identification of sewer system defects and the preparation of construction contract documents to rehabilitate sewer pipes 12 inches and smaller in diameter within the collection system.	<u>100%</u>	<u>100%</u>	70% May 2018	12/31/2018
<i>Turkey Creek/Central Industrial District Basin</i>					
Turkey Creek Pump Station Modifications	This project involved modifications to an existing pump station, including removal of five existing pumps and appurtenances; installation of three new pumping systems, including pumps to provide a firm capacity of 30 MGD; 480-volt motors and variable frequency drives, piping, and other mechanical and electrical controls and equipment. In addition, new bar screens and a new debris removal system (rock box) will be constructed.	<u>100%</u>	<u>100%</u>	<u>100%</u> November 2016	12/31/2016
CID In-Line Gates at Santa Fe Pump Station	This project was implemented to modify the existing sluice gates at the Santa Fe Pump Station as necessary to facilitate the storage of wet weather flows in the existing upstream combined sewer system and to reduce the number of combined sewer overflows from Outfall 003 to the Missouri River. Construction documents were prepared for modification of the in-line (sluice) gates, including the addition of real-time SCADA control capabilities and establishment of gate operational criteria.	<u>100%</u>	<u>100%</u>	<u>100%</u> November 2017	12/31/2017
CID Green Infrastructure Pilot Project	This green infrastructure pilot project is being designed to reduce combined sewer overflows and to provide aesthetic, social, and economic enhancements within the Central Industrial District. The design work includes preliminary and final design, preparation of construction contract documents, bid phase services, and the preparation of opinions of probable cost.	<u>100%</u>	<u>85%</u> March 2018	November 2019	12/31/2020

COMBINED SEWER SYSTEM		Pre-Design	Design	Construction	CD Due Date
Project Name	Description	Percent Complete through 12/31/2017 Planned Completion Date			
<i>Turkey Creek/Central Industrial District Basin, continued</i>					
Neighborhood Sewer Rehabilitation	This project is being implemented to improve the reliability and performance of the combined sewer collection system and reduce basement backups. Two construction contracts will be issued for rehabilitation of manholes and sewer pipes that are 12-inches and smaller in diameter.	<u>100%</u>	<u>10%</u> October 2018	September 2020	12/31/2021
In-Line Storage: OK Creek Gates	This project involves the design of a new sluice gate structure, with automatic control from water-level sensors upstream of the structure, to store up to 20 million gallons of combined sewer flow in the existing 17 ft. high x 18 ft. wide double-box culvert.	<u>100%</u>	<u>100%</u>	25% July 2018	12/31/2018
<i>Westside WWTP</i>					
Westside Wastewater Treatment Plant	This project involves wet weather treatment for 32 mgd through secondary treatment and disinfection utilizing chemical enhanced primary treatment and an additional secondary clarifier. Additional improvements are a new combined pump station, replacing existing power system, and splitter structure for aeration basin effluent.	<u>100%</u>	<u>30%</u> June 2018	October 2020	12/31/2020

## IX. SEPARATE SEWER OVERFLOW CONTROL MEASURES – APPENDIX A

Kansas City's Separate Sanitary System (SSS) comprises nine drainage basins covering 292 square miles of the City. The four SSS basins north of the Missouri River are the Northern and Northwestern watersheds and the Line Creek/Rock Creek and Birmingham/Shoal Creek basins. The five SSS system basins south of the Missouri River are the Blue River North, Round Grove, Blue River Central, Blue River South and Little Blue River basins.

Much of the early projects and program strategy in the separate sanitary sewer basins involve reducing the amount of inflow and infiltration (I/I) entering the SSS to reduce overflows from the system. This reduction in I/I is achieved by reducing or eliminating points of direct inflow into the system and reducing infiltration through collection system defects. A combination of wet weather storage and treatment will be utilized to address system needs as outlined in the City's Overflow Control Plan. The subsequent planned departure of Johnson County Wastewater as a wholesale customer to Kansas City, MO will eliminate the need for storage at the 87<sup>th</sup> Street pump station site in the Blue River South Basin.

Field investigation activities for the I/I reduction projects are being completed through the City's OCP Program Management Services contract and two City-wide Sewer Cleaning and Closed-Circuit Television (CCTV) Inspection contracts. The combined work consists of sewer system network characterization and manhole inspections, sewer cleaning, and CCTV inspection of sanitary sewers in the Line Creek/Rock Creek, Little Blue River, and Birmingham/Shoal Creek separate sewer system basins. For more details on the field investigations for the separate sewer systems see subsections *b. – Collections Systems Operation* and *c. – Collection Systems Maintenance in Section XII*. The status of the projects in the SSS basins is summarized in *Table 2*. The separate sanitary system has 16 active projects. Three (3) projects are currently in pre-design, meaning that the Request for Proposals/Qualifications is in development or the contract with Design Professional is under negotiation. Three (3) projects are currently in design, and ten (10) projects are advertising for construction bids, construction is underway, or was completed in 2017.

On December 22, 2017, and in accordance with Section VII.A.1.d.ii. of the modified decree, the City submitted a Justification Document supporting an appropriate Date of Achievement of Full Operation of no later than December 31, 2024, for the Phase I storage project associated with the 87th Street Pumping Station control measure.

Table 2: Project Status – Separate Sanitary Sewer System Basin (through December 31, 2017)

SEPARATE SANITARY SEWER SYSTEM		Pre-Design	Design	Construction	CD Due Date
Project Name	Description	Percent Complete through 12/31/2017		Planned Completion Date	
<i>Blue River Central Basin</i>					
I/I Reduction Area 1	The project consists of field investigations, data analysis, preparation of construction contract documents, and rehabilitation of sewers, manholes and service lateral connections to achieve targeted infiltration and inflow (I/I) reduction.	100%	<u>100%</u>	25% September 2018	12/31/2018
I/I Reduction Area 2	The project consists of field investigations, data analysis, preparation of construction contract documents and rehabilitation of sewers, manholes and service lateral connections to achieve targeted infiltration and inflow (I/I) reduction.	100%	<u>100%</u>	25% September 2018	12/31/2018
<i>Blue River North Basin</i>					
I/I Reduction	The project consists of field investigations, data analysis, preparation of construction contract documents and rehabilitation of sewers, manholes and service lateral connections to achieve targeted infiltration and inflow (I/I) reduction.	100%	<u>100%</u>	99% February 2018	12/31/2018
<i>Blue River South Basin</i>					
87th Street Pump Station Rehabilitation	The project consists of rehabilitation of the pump station to restore capacity to 85 MGD. Work being performed includes replacement of bar screens, duty pumps and motors, controls, and multiple structural, mechanical, and electrical modifications to the pump station.	100%	<u>100%</u>	<u>100%</u> August 2017	12/30/2017
I/I Reduction - Areas 1 and 2	The project consists of the construction of approximately 5,000 feet of sewer replacement, installation of approximately 45,000 linear feet of CIPP, 800 feet of point repairs, 750 service lateral connections, 16,000 feet of service line CIPP, two new manholes, and manhole rehabilitation. Construction of the rehabilitation measures will achieve targeted infiltration and inflow reduction.	100%	<u>100%</u>	<u>95%</u> April 2018	12/31/2021

SEPARATE SANITARY SEWER SYSTEM		Pre-Design	Design	Construction	CD Due Date
Project Name	Description	Percent Complete through 12/31/2017 Planned Completion Date			
<i>Blue River South Basin, continued</i>					
I/I Reduction Area 3	The project consists of field investigations, data analysis, preparation of construction contract documents and rehabilitation of sewers, manholes and service lateral connections to achieve targeted infiltration and inflow (I/I) reduction.	100%	<u>100%</u>	<u>30%</u> May 2018	12/31/2021
I/I Reduction Area 4	The project consists of field investigations, data analysis, preparation of construction contract documents and rehabilitation of sewers, manholes and service lateral connections to achieve targeted infiltration and inflow (I/I) reduction. This project was combined with Blue River South I/I Reduction Area 5 for bidding and construction.	100%	<u>100%</u>	<u>0%</u> Phase 1: April 2019 Phase 2: February 2021	12/31/2021
I/I Reduction Area 5	The project consists of field investigations, data analysis, preparation of construction contract documents and rehabilitation of sewers, manholes and service lateral connections to achieve targeted infiltration and inflow (I/I) reduction. This project was combined with Blue River South I/I Reduction Area 4 for bidding and construction.	100%	<u>100%</u>	<u>0%</u> Phase 1: April 2019 Phase 2: February 2021	12/31/2021
<i>Line Creek/Rock Creek</i>					
I/I Reduction Area 1	The project consists of field investigations, data analysis, preparation of construction contract documents and rehabilitation of sewers, manholes and service lateral connections to achieve targeted infiltration and inflow (I/I) reduction. This project has been combined with I/I Reduction: Line Creek/Rock Creek Basin Project Area 2 for the construction bid package.	100%	<u>100%</u>	90% March 2018	12/31/2023
I/I Reduction Area 2	The project consists of field investigations, data analysis, preparation of construction contract documents and rehabilitation of sewers, manholes and service lateral connections to achieve targeted infiltration and inflow (I/I) reduction. This project has been combined with I/I Reduction: Line Creek/Rock Creek Basin Project Area 1 for the construction bid package.	100%	<u>100%</u>	10% December 2018	12/31/2023

SEPARATE SANITARY SEWER SYSTEM		Pre-Design	Design	Construction	CD Due Date
Project Name	Description	Percent Complete through 12/31/2017 Planned Completion Date			
<i>Line Creek/Rock Creek, continued</i>					
I/I Reduction Area 3	The project consists of field investigations, data analysis, preparation of construction contract documents and rehabilitation of sewers, manholes and service lateral connections to achieve targeted infiltration and inflow (I/I) reduction.	<u>100%</u>	30% February 2019	February 2022	12/31/2023
I/I Reduction Area 4	The project consists of field investigations, data analysis, preparation of construction contract documents and rehabilitation of sewers, manholes and service lateral connections to achieve targeted infiltration and inflow (I/I) reduction.	<u>25%</u> May 2018	October 2020	January 2020	12/31/23
<i>Round Grove</i>					
Round Grove Pumping Station Capacity Improvements	This project involves expansion of the Round Grove Pump Station to provide wet weather capacity. The design phase will determine how best to expand the pump station capacity to meet the requirements of the Consent Decree. The City requested a time extension from EPA for this project to enable the I/I Reduction in Blue River Central Project to be completed to properly size new pumps. EPA approval was granted	100%	<u>5%</u> February 2019	October 2020	12/31/2022
<i>Little Blue River</i>					
I/I Reduction Area 1	The project consists of field investigations, data analysis, preparation of construction contract documents and rehabilitation of sewers, manholes and service lateral connections to achieve targeted infiltration and inflow (I/I) reduction.	<u>100%</u>	30% July 2019	February 2021	12/31/2021
I/I Reduction Area 2	The project consists of field investigations, data analysis, preparation of construction contract documents and rehabilitation of sewers, manholes and service lateral connections to achieve targeted infiltration and inflow (I/I) reduction.	<u>30%</u> May 2018	July 2019	November 2020	12-31-2021
<i>Birmingham</i>					
I/I Reduction Area 2	The project consists of field investigations, data analysis, preparation of construction contract documents and rehabilitation of sewers, manholes and service lateral connections to achieve targeted infiltration and inflow (I/I) reduction.	<u>25%</u> May 2018	January 2021	August 2022	12-31-2023



### a. Private Inflow/Infiltration Reduction Program

In 2017, Water Services continued to manage a Private I/I Reduction Program in conjunction with public sewer I/I reduction projects in select areas of each basin. The focus of the program is to disconnect illicit private I/I sources where it is cost-effective to remove excessive I/I flows into the sewer system. Approximately 55,000 properties are targeted for private I/I evaluation in the City's SSS.

Throughout 2017, three Design Professional firms continued to conduct building evaluations. Local plumbing contracts continued to perform disconnections of cost-effective I/I sources identified by the Design Professionals. New prequalified plumbing contractors were added to the program beginning in the fall of 2017.

During 2017, the following had been accomplished under the City's Private I/I reduction program through voluntary participation by property owners:

- Building plumbing evaluations had been attempted at approximately 13,500 private properties.
- Interior and exterior building plumbing evaluations had been completed at approximately 8,500 private properties.
- Exterior-only building plumbing evaluations had been completed at approximately 4,000 private properties.
- Approximately 1,700 cost-effective private I/I sources had been identified at approximately 1,300 private properties.
- Approximately 1,000 disconnection repairs had been completed by plumbing contractors on private properties where I/I sources had been identified.

## X. SCHEDULED ACTIVITY FOR THE NEXT REPORTING PERIOD

The activities listed below are expected to occur during the next reporting period between January 1, 2018 and June 30, 2018. This list, however, should not be interpreted as an explanation of all activities that will occur in the first half of 2018. Certain Consent Decree and OCP activities (e.g., program management, NMC, CMOM, public participation, project planning, and data management) will continue for the duration of the Consent Decree but are not explicitly discussed in this section.

- Requests for Qualifications/Proposals for the following OCP projects are scheduled to be developed and advertised for selection of Design Professionals:
  - Sewer Separation 31<sup>st</sup> Street and Broadway
  - Sewer Separation: 40<sup>th</sup> and Monroe
- Requests for bids proposals will be advertised for selection of Construction Contractors for the following OCP projects:
  - In-Line Storage: Gooseneck Arch Sewer Gate and Pump Station
  - Green Infrastructure Pilot: Additional Pilots Lower Blue River Basin
  - Neighborhood Sewer Rehabilitation: Northeast Area and Gooseneck Creek

- Diversion Structures 065 and 073 Consolidation (Formerly Dry Weather Sewer Line: Outfall 056)
- Green Infrastructure Pilot: Turkey Creek/Central Industrial District
- Water Services will issue a Notice to Proceed to Design Professionals or Construction Contractors for the following OCP projects:
  - City-Wide Sewer Infrastructure Rehabilitation within Waterways 1<sup>st</sup> Renewal (Construction)
  - Neighborhood Sewer Rehabilitation: Brush Creek – Area 1 West (Construction)
  - I/I Reduction: Blue River South Basin Project Area 4 & 5 Phase 1 (Construction)
  - Sewer Separation: Outfalls 066 & 067 (Construction)
  - Neighborhood Sewer Rehabilitation: Brush Creek – Area 2 Package 1 (Construction)
  - Neighborhood Sewer Rehabilitation: Brush Creek – Area 2 Package 2 (Construction)
  - SEP No. 3 - Blue River Trailhead at Blue Parkway (Construction)
  - Diversion Structures 065 and 073 Consolidation (Formerly Dry Weather Sewer Line: Outfall 056) (Construction)
  - I/I Reduction – Little Blue River Area 2 (Design)
  - I/I Reduction – Line Creek/Rock Creek Area 4 (Design)
  - I/I Reduction – Birmingham/Shoal Creek Area 2 (Design)
  - Manhole Modifications: Middle Blue River (Construction)
- Work will continue to implement the City’s Private Inflow/Infiltration Reduction Program in conjunction with other I/I reduction projects in the SSS.
- Work will continue on the active OCP projects shown in Table 1 and Table 2 that were not completed in 2017.
- Flow monitoring will continue in accordance with the CSS Metering Plan approved by USEPA in December 2016.

## XI. NINE MINIMUM CONTROLS – APPENDIX B

This section focuses on documenting Nine Minimum Controls (NMC) program accomplishments during the reporting period in the combined sewer system area. *Table 3* identifies each of the NMCs and summarizes work accomplished during the reporting period. Accomplishments for each control measure are explained in further detail in the applicable NMC section.

Table 3: 2017 NMC Accomplishments Summary

NMC	Description	Accomplishments
1	Proper Operation and Regular Maintenance Program	<ul style="list-style-type: none"> <li>✓ Conducted routine maintenance procedures</li> <li>✓ Conducted routine inspection schedules</li> <li>✓ Carried out the emergency response protocol and reported 77 dry weather overflows, 30 in the CSS</li> <li>✓ Inspected flow regulating structures</li> <li>✓ Conducted 105 miles of CCTV inspections in the CSS</li> <li>✓ Cleaned 272 miles of CSS interceptor and collection lines</li> <li>✓ Received and responded to 3,977 3-1-1 Action Center calls about the City's wastewater collection system</li> </ul>
2	Maximization of Storage in the Collection System	<ul style="list-style-type: none"> <li>✓ Began construction on 8 projects to reduce and/or eliminate inflows and encourage upstream detention</li> <li>✓ Rehabilitated Turkey Creek Pump Station to help reduce overflows to the Kansas River</li> <li>✓ Rehabilitated Milwaukee Flood Station and sluice gate at Prospect Flood Station to optimize interceptor sewer capacity</li> </ul>
3	Review and Modification of Pretreatment Requirements	<ul style="list-style-type: none"> <li>✓ Inventoried non-domestic CSS discharges</li> <li>✓ Inspected 66 non-domestic FOG sources</li> <li>✓ Assessed non-domestic CSO discharge impacts</li> <li>✓ Issued 20 citations for standards violations and self-reporting violations</li> </ul>
4	Maximization of Flow to the POTW for Treatment	<ul style="list-style-type: none"> <li>✓ Contracted an In-Line Storage and Conveyance Operational Analysis study using real-time control to optimize system storage and capacity</li> </ul>
5	Elimination of CSOs during Dry Weather	<ul style="list-style-type: none"> <li>✓ Conducted 10,842 inspections of the CSS diversion structures</li> <li>✓ Repaired 173 localized sewer defects in the CSS</li> <li>✓ Reported 30 dry weather overflows in the CSS</li> <li>✓ Reported 7 dry weather overflows from CSOs</li> <li>✓ Reported 2 pump station dry weather overflows</li> <li>✓ Performed routine preventative cleaning of system</li> </ul>
6	Control of Solids and Floatable Material in CSOs	<ul style="list-style-type: none"> <li>✓ Repaired or replaced 308 catch basins</li> <li>✓ Inspected and cleaned 12,505 catch basins</li> <li>✓ Conducted street sweeping of 15,909 lane miles</li> <li>✓ Performed construction site erosion control at 42 city-contracted construction sites</li> </ul>
7	Pollution Prevention Programs to Reduce Contaminants in CSOs	<ul style="list-style-type: none"> <li>✓ Conducted street sweeping of 15,909 lane miles</li> <li>✓ Carried out Oil and Grease Management Program</li> <li>✓ Conducted Solid Waste and Recycling activities</li> <li>✓ Conducted Household Hazardous Waste Program</li> </ul>

NMC	Description	Accomplishments
		<ul style="list-style-type: none"> <li>✓ Conducted Leaf and Brush Collection and Recycling Programs</li> <li>✓ Collected 78,351 tons of solid waste</li> <li>✓ Conducted Public Education and Outreach Programs</li> <li>✓ Made 20 presentations to more than 900 citizens and stakeholders</li> <li>✓ Conducted 15 public meetings with approximately 316 residents</li> </ul>
8	Public Notification	<ul style="list-style-type: none"> <li>✓ Provided CSO notification</li> <li>✓ Distributed 18 media advisories for sewer overflows</li> <li>✓ Conducted warning sign inspections</li> </ul>
9	Monitoring to Characterize CSO Impacts and the Efficacy of CSO Controls	<ul style="list-style-type: none"> <li>✓ Identified and mapped CSO structures and outfalls</li> <li>✓ Monitored water quality</li> </ul>

## a. NMC 1- Proper Operation and Regular Maintenance Program

### i. ORGANIZATION

Kansas City operates and maintains its wastewater systems through its Water Services Department. The Wastewater Line Maintenance Division and the Wastewater Treatment Division are primarily responsible for the operation and maintenance (O&M) of the City's CSS. The Stormwater Maintenance Division is responsible for street cleaning activities and replacement of catch basins in the CSS area.

The Wastewater Treatment Division is responsible for the O&M of the two wastewater treatment plants (WWTPs) within the CSS area (Blue River and Westside).

Several Line Maintenance sections within the Wastewater Line Maintenance Division are responsible for the O&M of the City's CSS including:

- Sewer Investigation/CCTV Inspection Sections
- Sewer Cleaning Section
- Sewer Repair Section

### ii. RESOURCES

Water Services maintains adequate personnel and capital resources to maintain O&M activities throughout the CSS. Through the end of the reporting period, Water Services had 163 staff members in the Wastewater Line Maintenance Division.

In fiscal year 2017 (May 1, 2016 through April 30, 2017), the operating expenses for sewer operations were as follows:

- Wastewater Treatment and Pumping: \$29,223,528
- Sewer Maintenance: \$23,208,801

- Administration and General: \$34,786,672
- Industrial and Household Hazardous Waste: \$798,141

**iii. LIST OF CRITICAL FACILITIES**

Water Services maintains a list of critical CSS facilities, including diversion structures, flow splitters, and outfalls. Diversion structures divert excess wet weather flow to receiving streams. Often, several diversion structures direct excess wet weather flow to the same outfall. Flow splitters are structures that divide flows within the CSS, but do not direct flow to receiving waters (one or more flow regulating structures are downstream of the flow splitting structure, upstream of the receiving waters). *Attachment C* contains a list of critical facilities. Inspection intervals vary from three to 30 days, depending on the history of required cleaning. If inspections reveal the interval is not adequate, it is adjusted accordingly.

*Attachment C* lists the identification number, location, map number, and receiving stream of the CSOs and inspection intervals.

**iv. CSO SEWER MAINTENANCE MANUAL**

The Wastewater Line Maintenance Division adheres to requirements outlined in the CSO Operations and Maintenance Manual, which is available in hard copy at Water Services' offices. The manual provides requirements to personnel for the proper operation and maintenance of the CSS, including:

- Routine inspection schedules
- Emergency response protocols
- Dry weather overflow reporting procedures
- Training and safety practices

**v. LOG OF MAINTENANCE ACTIVITIES**

Water Services currently uses the Hansen computerized maintenance management system (CMMS) to log maintenance activities. The system tracks maintenance activities with work orders initiated from various sources, including customer complaints, 3-1-1 Action Center calls, and investigation activities. Work orders are prioritized based on the critical nature of the defect utilizing a system that categorizes each order into one of three levels of severity. They are closed out upon completion of the work. Work orders track parameters, including:

- Date initiated
- Initiating party
- Date completed
- Line segment
- General supervisor
- All costs, including materials
- Labor hours, including overtime
- Permitting

*Table 4* shows a summary of the maintenance activities performed in the combined sewer system during the reporting period.



Table 4: 2017 CSS Maintenance Activities

Activity	Quantity
Sewer- Main Stoppages Opened	81 work orders
Sewer- Main Repairs	173 work orders
Sewer- Manhole Repair/Resurfacing	170 work orders
Sewer- Water in the Basement	1285 work orders
Sewer CCTV	105 miles
Sewer Cleaning	272 miles
Sewer CIPP	47.3 Miles

**vi. CLOSED CIRCUIT TELEVISION INSPECTION**

The Wastewater Line Maintenance Division maintains a CCTV inspection program. The division utilizes both internal resources and contractors to perform the work.

In 2017, approximately 219.4 miles (1,158,507 LF) of CSS were televised, which far exceeded the Consent Decree requirement of 44.2 miles for 2017. Documentation for mileage cleaned is stored in Hansen and verified using WinCan software.

**vii. SEWER CLEANING**

The Wastewater Line Maintenance Division conducts sewer cleaning activities in-house and uses outside contractors.

Water Services maintains a fleet of sewer cleaning equipment including:

- Jet trucks
- Jet-Vac trucks
- Rodding machines
- Easement machines
- Bucket machines

Local contractors are utilized for specialized cleaning services on large diameter sewers through contractual agreements.

In 2017, approximately 272 miles of CSS were cleaned, which exceeded the Consent Decree requirements of 106 miles annually. This mileage is documented in Hansen.

**viii. OVERFLOW AND BYPASS RESPONSE**

The Wastewater Line Maintenance Division has a documented protocol to guide actions following a dry weather overflow in both the combined and separate sanitary sewer systems. When a triggering overflow is recognized, staff responds quickly to control the release of wastewater and perform appropriate cleanup tasks. This activity is documented by Wastewater Line Maintenance supervisors and

reported to MDNR in accordance with the City's plan and permits. Copies of overflows reported to MDNR are included in *Attachment A*. In 2017, a total of 77 dry weather overflows were reported, 30 of which were in the combined sewer system.

**ix. EMERGENCY CONTACT**

The City maintains a 3-1-1 Action Center for reporting collection system problems. The Action Center can be reached by calling 3-1-1 in Kansas City, Missouri, or by calling (816) 513-1313. The Action Center is staffed from 7:00 a.m. to 7:00 p.m. during the regular business week. Emergencies can be reported outside of these hours via 3-1-1, which connects to dispatch after hours. During the reporting period, 3,977 3-1-1 calls related to wastewater collection system problems were received and responded to.

Emergency contact numbers are also posted on 88 combined sewer outfall signs. Each sign identifies the outfall by number and lists the emergency contact number. The signs solicit public reports of dry weather overflows. The emergency contact number directs the caller to the 3-1-1 Action Center. More information about the signs can be found in NMC 8 later in this document.

**b. NMC 2- Maximization of Storage in the Collection System**

**i. COLLECTION SYSTEM INSPECTIONS**

All CSO diversion structures and flow splitters are inspected and cleaned regularly to identify overflows, remove debris and blockages, assess the operational status of the structure, and make needed repairs. Inspection crews can readily view detailed structure information such as inspection logs, inventory sheets, schematics, profiles, and sectional views. Inspections of all diversion structures occur at intervals ranging from three to 30 days as shown in *Attachment C*. During the reporting period, 10,842 inspections of the CSS diversion structures were performed. Tracking logs are documented in Hansen.

**ii. DIVERSION STRUCTURE MODIFICATION**

Modification of diversion structures may be necessary after inspections or maintenance activities. Tracking of the modifications occurs in Hansen. Diversion Structures 66, 95, 96, 97, 100, 102, 103, 104, 106, 107, 108, 110, and 319 were eliminated in 2017 by the Sewer Consolidation: Outfall 063 project. Flow Splitter 85 was also removed in 2017.

**iii. REDUCE AND/OR ELIMINATE INFLOWS AND ENCOURAGE LOCALIZED UPSTREAM DETENTION**

The City actively identifies projects with the opportunity to produce multiple benefits by integrating green solutions that reduce and/or eliminate inflows or provide localized detention. Obstacles, opportunities, and project development process recommendations will be identified upon completion of these projects so that future projects can provide greater environmental benefits.

Water Services staff members continually oversee and maintain green infrastructure improvements that are their responsibility. The Green Solutions Maintenance Crew, housed in the Preventative Maintenance Division, provides routine green infrastructure maintenance services, including trimming, mulching, and weeding. Water Services' Senior Landscape Architect and Landscape Technician provide inspection and assist with coordinating maintenance activities.

1. Water Services Capital Projects

In addition to the OCP green infrastructure projects, Water Services has three (3) other green infrastructure projects currently in design and one (1) project under construction through the stormwater and wastewater divisions. Construction was completed for three (3) projects during 2017. These projects, listed in *Table 5* below, are intended to reduce inflows or provide solutions for localized flooding. In addition, green infrastructure improvements are being evaluated for inclusion as part of other stormwater and wastewater projects currently in design.

As implementation of OCP continues, additional projects will be implemented that will aid in reducing and/or eliminating inflows. These projects will contain private inflow source reduction, including the disconnection of downspouts, sump pumps, and other sources of stormwater inflow from private property.

*Table 5: Water Services Green Infrastructure Projects Under Design and Construction (2017)*

Property/Project Name	Phase	Description/Type
Marlborough 81 <sup>st</sup> Street and Chestnut	Complete	Rain Garden
Ruskin Heights Channel	Complete	Live channel bed
89 <sup>th</sup> & Lane	Design/ROW	Live channel bed
7900-8100 Olive	Complete	Infiltration swale with rock box
Loma Vista & Eastern	Design/ROW	Enhanced detention basins
Cookingham-Lakeside	Construction	Potential undetermined green infrastructure component
4012 & 4016 Cleveland Ave	Design/ROW	Potential undetermined green infrastructure component

2. Other City-Wide Green Infrastructure Efforts

Outside of Water Services, implementation of green infrastructure projects occurs in three primary ways: 1) through City capital project enhancements; 2) required private installations; and 3) voluntary private installations.

**iv. UPGRADE/ADJUST PUMP OPERATIONS AT INTERCEPTOR LIFT STATIONS**

Six pump stations are within the boundaries of Kansas City's CSS. Four pump stations (Turkey Creek, Santa Fe, Northeast Industrial District (NEID), and Blue River) function as influent pump stations for the Blue River and Westside WWTPs. These pump stations are operated according to the Wet Weather Operating Plan defined in NMC 4.

OCP includes provisions for additional system storage and some sewer separation upstream of these stations to reduce overflow frequency. Two small pump stations in the CSS (12th and 15th Street stations) are operated to maximize storage in the upstream system during wet weather.

In 2017 various design and construction was initiated, continued or completed at pump stations, force mains, and pipelines including Santa Fe Pump Station, Gooseneck Pump Station, OK Creek Gate Structure, 87<sup>th</sup> Street Pump Station, Round Grove Pump Station, Westside Wastewater Treatment Plant capacity maximization and Chouteau Pump Station.

Continuous improvements are made to existing systems at all plants and stations as part of routine operations and maintenance upkeep. This enables continued reliability of system components during events requiring flow maximization.

**v. REMOVAL OF OBSTRUCTIONS TO FLOW**

Cleaning of existing interceptors to maintain available conveyance and storage capacity is a standard procedure performed by the Wastewater Maintenance Division. The division utilizes its crews and external contract cleaning crews on an as-needed basis to remove and prevent accumulation of debris and sediment that restrict the flow. This information is tracked in the computerized maintenance management system.

**c. NMC 3- Review and Modification of Pretreatment Requirements**

The Regulatory Compliance Division regulates non-domestic discharges. The division is responsible for implementing and enforcing Chapter 60, Article IV of the Kansas City Code of Ordinances and several city-wide programs, including:

- Federal Pretreatment Program
- Surcharge Program for high-strength wastewaters
- Oil and Grease Management Program
- Annual review of pretreatment requirements

These activities incorporate the following control measures:

- Inventory non-domestic CSS discharges - Identification of significant industrial users (SIUs).

- Assess non-domestic CSO discharges - Implementation of the surcharge program to evaluate the impact of non-domestic wastewater.
- Evaluate feasible modifications - Periodic review of pretreatment requirements as necessary. No pretreatment requirements were modified in 2017.

**i. FEDERAL PRETREATMENT PROGRAM**

The Regulatory Compliance Division’s administration of the Federal Pretreatment Program is subject to regular review by MDNR and the USEPA, Region VII. An annual report of the City’s Pretreatment Program activities is filed with MDNR in March of each year. The 2016 Industrial Pretreatment Program Annual Report was submitted to the MDNR on March 30, 2017, and can be found in *Attachment B*.

The report includes the following information:

- Companies in significant non-compliance
- Inter-jurisdictional agreement status
- Permit activity
- Annual enforcement log
- Notices of violations

The Regulatory Compliance Division identifies the regulated discharge flow volume, potential pollutants of concern, drainage basins, and the pump station(s) serving each SIU. During the reporting period, there were 67 SIUs permitted under the program. Each SIU is inspected annually and monitored periodically for compliance with its wastewater discharge permit conditions.

**ii. SURCHARGE PROGRAM**

The Surcharge Program levies a surcharge fee for biological oxygen demand (BOD), total suspended solids (TSS), and/or fat, oil and grease (FOG) concentrations above that in “normal sewage” as defined in Chapter 60 of the City’s Code of Ordinances. Food handling operations such as restaurants are most affected by this ordinance. The surcharge program also makes SIUs aware of the effects their discharge has on the sewer system and encourages them to reduce their waste discharge through modifications or improved housekeeping procedures.

**iii. OIL AND GREASE MANAGEMENT PROGRAM**

The Oil and Grease Management Program, through training, outreach, inspections, and enforcement, encourages non-domestic sources to limit the discharge of fats, oils and grease (FOG) into the sanitary sewer system. The primary non-domestic sources of FOG discharges are restaurants.

Water Services’ Regulatory Compliance Division completes inspections of grease traps at food handling facilities. At the time of the inspections, facility personnel are

informed about ordinance requirements regarding FOG discharges; if requirements are not met, there is a potential for enforcement actions. During the inspection, the inspector reviews cleaning records, outlines oil and grease best management practices, and may perform a sink test to determine if the lines are clogged with FOG. If a FOG issue is discovered during the inspection, the inspector will suggest one of the following maintenance improvement options:

- Shorter cleaning cycles
- Replacement of grease traps with grease interceptors

In 2017, there were 630 food service establishment inspections. There were no enforcement actions taken because of these inspections.

**iv. REVIEW OF PRETREATMENT REQUIREMENTS**

Every year, the Regulatory Compliance Division reviews the pretreatment program to determine whether changes are warranted. Economic and environmental impacts are considered when evaluating potential changes. These include an assessment of the non-domestic discharges to the CSS. In 2017, no changes to the pretreatment program were made.

## d. NMC 4- Maximization of Flow to the POTW for Treatment

### i. WASTEWATER TREATMENT PLANT (WWTP) PERFORMANCE AND FLOW CAPACITIES

Capacity studies were performed for both the Blue River WWTP and Westside WWTP in 2006.<sup>1</sup> Plant stress tests were also performed on both plants.<sup>2</sup> The studies compared flows processed during wet weather and dry periods to determine the relationship between performance and flow.

Field stress testing results at the Blue River WWTP indicate the maximum wet weather plant capacity ultimately is limited by secondary treatment capacity of 156 MGD, although actual practice indicates this as a maximum treatment capability. Stress testing has confirmed that 40 MGD is the peak capacity the Westside WWTP can process without affecting process performance. Future plans include converting the secondary treatment system consisting of fixed film media components to activated sludge when necessitated by future regulatory requirements. This will also likely include optimizing wet weather capacity and treatment.

### ii. WET WEATHER OPERATING GUIDELINES FOR WWTPs

#### 1. Blue River WWTP

The Wet Weather Operating Guidelines for the Blue River WWTP summarize the operating procedures at the facility during wet weather events. The guidelines specify that the Blue River WWTP processes combined (primary plus secondary) wastewater only to the maximum capacity of the secondary treatment plant.

The operating guidelines indicate that the secondary treatment plant has a design capacity of 105 MGD and a total capacity of 140 MGD. The primary treatment capacity of 220 MGD is not achievable due to the capacity limitation of secondary treatment.

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<sup>1</sup> *The Blue River Wastewater Treatment Plant Capacity Study dated March 2, 2006, and the Westside Wastewater Treatment Plant Capacity Study dated April 6, 2006.*

<sup>2</sup> *Technical memorandums titled Blue River Wastewater Treatment Plant Stress Test Report dated August 2008 and Westside Wastewater Treatment Plant Stress Test Report dated December 2007.*



## 2. Westside WWTP

The Wet Weather Operating Guidelines summarize the procedure for operations at the facility during wet weather events. The guidelines provide the following recommended conveyance rates for wet weather pump stations:

- Turkey Creek PS - 11.4 MGD
- Santa Fe PS - 4.5 MGD
- Line Creek PS - 8 MGD

As improvements to the Turkey Creek Pump Station and wet weather facilities for the Westside WWTP are completed, Water Services will reevaluate the pumping rates from these three lift stations during wet weather to determine how much additional flow can be pumped and handled at the Westside WWTP.

## e. **NMC 5- Elimination of CSOs during Dry Weather**

The Wastewater Line Maintenance Division actively works to eliminate dry weather overflows. The measures taken include:

- Routine preventative cleaning of the combined sewer system
- Inspection to identify dry weather overflows
- Correction of primary causes of dry weather overflows
- Notification to MDNR when a dry weather overflow occurs

### i. **FLOW REGULATING STRUCTURE INSPECTION**

Flow regulating structures in the CSS include diversion structures and flow splitters. Routinely, these structures are inspected to verify proper functioning. Diversion structures direct excess wet weather flows to receiving waters. The inspection interval varies for each structure and is based on historical records of performance and the sensitivity of the area surrounding the structure. Flow splitters are structures that divide flows within the CSS, but do not direct flow to receiving waters. *Attachment C* of this report lists the inspection intervals completed for each diversion structure and flow splitter in the CSS.

### ii. **DRY WEATHER OVERFLOW CORRECTIVE ACTION**

Water Services implements dry weather overflow (DWO) corrective actions to address operational problems believed to be the cause of overflows. The corrective actions include interceptor cleaning and sewer repair.

The Wastewater Line Maintenance Division's sewer repair program is responsible for repairing localized sewer defects linked to the occurrence of DWOs. Jet vacuum

cleaning units remove materials that may restrict flow leading to blockages and DWOs at upstream locations. This action is taken immediately, as is practical, upon notification that a DWO has occurred.

**iii. DRY WEATHER OVERFLOW NOTIFICATION**

The Wastewater Line Maintenance Division notifies MDNR within 24 hours of discovery of a DWO. Follow-up written reports are completed within five days of ending the overflow. In all occurrences, the area around the overflow is cleaned and inspected for any debris or contaminants. If vandalism to manholes causes a DWO, the standard manhole covers are replaced with bolt-down covers to deter future vandalism. In 2017, 30 dry weather overflows in the CSS and seven (7) dry weather overflows from combined sewer outfalls were reported to MDNR.

The Wastewater Treatment Division notifies MDNR of DWOs that occur at either pump stations or treatment plants within 24 hours of discovery. Within five days of the occurrence, a follow-up written report is submitted to MDNR.

In 2017, dry weather overflows occurred on the following days and pump station locations:

- Westside Wastewater Treatment Plant
  - Pied Creek Pump Station: July 28, 2017
  - Burlington Creek Pump Station: June 6, 2017
- Birmingham Wastewater Treatment Plant
  - April 6, 2017
- Blue River Wastewater Treatment Plant
  - April 29, 2017
  - June 9, 2017

*Attachment A* includes copies of these reports submitted in 2017.

**f. NMC 6- Control of Solids and Floatable Material in CSOs**

**i. PREVENTING EXTRANEIOUS SOLIDS AND FLOATABLES FROM ENTERING THE CSS**

Water Services and other City departments employ various measures that minimize extraneous solids and floatables from entering the CSS, including:

- **Street Sweeping** – Water Services sweeps streets on a routine schedule to reduce trash, silt and other debris on the streets. During 2017, Water Services swept a total of 15,909 lane miles, including 11,219 lanes miles in the combined sewer system area and 4,690 lane miles in the separate sewer system areas. The schedule for street sweeping runs from January 1

through December 31 each year; by the end of that time, street sweeping will have been conducted twice annually on all streets with curbs within the CSS area and once annually within the SSS area.

- **Repair and Clean Catch Basins** – To maintain the proper function of stormwater inlets, the Stormwater Line Maintenance Division performs catch basin cleaning and repairs through its Catch Basin Replacement Program. This information is stored and tracked in Hansen. In 2017, 12,505 catch basins were inspected and cleaned, and 308 were repaired or replaced.
- **Construction Site Erosion Control** – Soil erosion from construction activity can increase the quantity of turbidity, nutrients, metals and sediment in the sewer system and receiving waters. Sedimentation problems can potentially reduce the hydraulic capacity of sewer lines, leading to overflows. The implementation and enforcement of erosion control regulations can be an extremely effective method of reducing these constituents in the CSS. In 2017, the Stormwater Utility Division inspected 42 City-contracted construction sites that were one acre or larger in size for compliance with stormwater erosion control regulations. Construction work is required to conform to City engineering and construction standards for all public or private work.

#### g. NMC 7- Pollution Prevention Programs to Reduce Contaminants in CSOs

Kansas City has a long-standing record of implementing pollution prevention measures and providing pollution prevention options to residents. The City continues to implement the following measures to help reduce pollution entering the combined sewer system and, in turn, rivers and streams:

- Street sweeping (See NMC 6)
- Oil and Grease Management Program (See NMC 3)
- Solid Waste and Recycling
- Household Hazardous Waste Program
- Leaf and Brush Collection and Recycling
- Public Education and Outreach Programs

#### i. SOLID WASTE AND RECYCLING

Kansas City offers curbside pickup of solid waste, recycling, and bulky items to give residents a convenient way to dispose of unwanted waste and, ultimately, reduce illegal dumping. The City also manages three drop-off recycling centers used by businesses and residents of multi-family dwellings who may not have curbside recycling options available. In addition to these programs, the City also provides

services for cleanup of illegal dump sites, a drop-off facility for waste tires, and reduced-cost dumpsters for neighborhood cleanups. The total amount of solid waste collected through City programs in 2017 is listed in *Table 6*.

*Table 6: 2017 Amount of Solid Waste Collected*

Waste	Quantity
Solid Waste	78,351 Tons
Recycling – Curbside	17,702 Tons
Recycling – Recycling Centers	692 Tons
Bulky Items	6,841 Tons
Leaf and Brush	4,810 Tons
Waste Tires	14,065 Tires
Household Hazardous Waste	812 Tons
Illegal Dumping Collected	3,115 Tons
<b>TOTAL</b>	<b>126,388 Tons</b>

**ii. HOUSEHOLD HAZARDOUS WASTE PROGRAM**

The household hazardous waste (HHW) program is hosted by Water Services and consists of two subprograms: an HHW drop-off facility and HHW mobile collection events. In 2017, the program served 58 communities, including Kansas City, from five counties in the region.

The HHW drop-off facility acts as a central location for providing a cooperative regional collection system for Missouri communities in the Kansas City metropolitan area. The facility accepts various types of residential hazardous waste, such as automotive fluids, batteries, household cleaners, pesticides, herbicides, fertilizers, and paint. It is open to the public on Thursdays, Fridays and Saturdays year-round, except City-observed holidays and the last two weeks of December.

The Swap Shop is an ancillary facility of the drop-off facility where certain materials in good condition (such as paint) can be distributed and reused instead of being disposed. Operational hours for the Swap Shop are Tuesdays, Wednesdays and Saturdays from 9:00 am to 4:00 pm; and Thursdays and Fridays from 9:00 am to 6:00 pm. Drop-off of household hazardous waste from participating communities occurs on Thursdays and Fridays between 9:00 am and 6:00 pm, and Saturdays from 9:00 am to 4:00 pm.

Mobile events throughout the City and the region provide convenient opportunities for proper disposal of HHW. These events typically occur on Saturdays from April 1 through October 31 and can be held in any city or county participating in the regional HHW program. The program provides a viable alternative to improper

disposal of HHW in landfills, storm sewers, or sanitary sewer facilities. A total of 2,950 vehicles were served at the mobile events in 2017.

In 2017, the program collected a total of 1,624,347 pounds (812 Tons) of HHW materials, including 776,449 pounds coming from Kansas City residents.

**iii. LEAF AND BRUSH COLLECTION AND RECYCLING**

The Leaf and Brush Recycling Program is a collaborative effort between Water Services and the City's Public Works Department. Water Services is responsible for the collection of curbside leaf and brush, and the Public Works Department runs the drop-off facilities. Water Services collects leaf and brush from residents three times a year, once in the spring and twice in the fall, on regularly-scheduled trash pickup days at no charge. Residents are also allowed to drop off leaf and brush waste at the drop-off facility.

The leaf and brush collected are composted or mulched by a local company and made available to residents for free or for a small fee. Removal of excess leaf and brush from residences curtails illegal dumping of these materials down storm drains and into local creeks, streams, and rivers. During the reporting period, 4,810 tons of leaf and brush materials were collected and recycled.

**iv. PUBLIC EDUCATION AND OUTREACH PROGRAMS**

Water Services provides additional outreach and education to encourage residents and business owners to minimize or eliminate contaminants from entering the sewer system. Descriptions of outreach and education initiatives, including those that are part of the City's Overflow Control Program, are provided below.

**1. Presentations, Conferences, and Tours**

During the reporting period, 20 presentations were made to more than 900 citizens and stakeholders about overflow control measures, wastewater, and water quality. The presentations included groups such as professional associations, metropolitan planning and non-governmental organizations, and neighborhood groups. The following is a listing of the organizations and presentations given during the reporting period:

- National Utility Contractors Association, Inaugural Meeting— January 2017
- Wet Weather Conference — May 2017
- Water Environment Federation (WEF) Conference — May 2017
- MARC Urban Stormwater Conference – January 24, 2017
- Marlborough GI Tour for Pitt State — March 15, 2017
- Seven Oaks Green Guard – March 16, 2017
- Key Coalition Water Quality – April 15, 2017

- Community Engagement University – April 25, 2017
- i-Build Expo – May 4, 2017
- Media Tour on the MO River – May 10, 2017
- WEFTEC Water Quality Education – October 2, 2017
- Community Engagement University – October 3, 2017
- Crisis in Cowtown Water Resiliency – October 5, 2017
- KU Masters Class on Water Sustainability – November 20, 2017
- Water Services offers educational tours of the Swope Campus Parking lot to interested groups. A total of 6 tours were conducted in 2017, reaching 104 people. These tours included a work day with students from the Marlborough Green Guard where students assisted with a litter pickup in the nearby neighborhood after their tour was completed.

2. Public Meetings

Table 7 displays information about the public meetings held in 2017 in support of OCP projects. A total of 15 public meetings were held for OCP projects with approximately 316 residents in attendance. The public meetings listed below were held throughout the community, not just in the combined sewer system area.

Table 7: OCP Project Public Meeting Information (2017)

Date	Project	Meeting Purpose	No. of Attendees
March 30, 2017	CID/West Bottoms Green Infrastructure Projects	Project update	19
April 8, 2017	Arleta Park PIAC Planning Meeting #1	Community discussion	50
April 18, 2017	Arleta Park Core Stakeholder Discussion	Community discussion	6
April 24, 2017	Middle Blue River Basin Phase II	Project update	5
April 25, 2017	Center Planning & Development Council	Program update	25
May 6, 2017	Arleta Park PIAC Planning Meeting #2	Community discussion	50
May 16, 2017	Arleta Park Core Stakeholder Discussion	Community discussion	6
May 17, 2017	Southern Communities Coalition	Program overview	30
June 7, 2017	I/I Reduction Blue River North Area 1	Project update	10
June 10, 2017	Arleta Park PIAC Planning Meeting #3	Community discussion	50
June 29, 2017	I/I Reduction—Blue River South Area 3	Project update	1
July 12, 2017	CID/West Bottoms Green Infrastructure Projects	Project update	21
July 18, 2017	I/I Reduction Blue River Central	Project update	10
September 7, 2017	I/I Reduction Line Creek/ Rock Creek Areas 1&2	Project update	13
December 11, 2017	Historic West Bottoms Association	Stakeholder update	20
TOTAL			316

In addition to the 15 public meetings pertaining to project information and program updates, outreach and scheduling events were also held in support of Kansas City’s voluntary Private Inflow and Infiltration Reduction Program, called Keep out the Rain. *Table 8* displays information pertaining to these outreach efforts, which total 12 scheduling events with 202 attendees. These public scheduling events are listed separately because they are part of a larger, coordinated outreach effort for the City’s Keep Out the Rain Program.

*Table 8: Public Meeting Information (2017)*

Date	Project	Meeting Purpose	No. of Attendees
February 8, 2017	Keep Out the Rain	Scheduling Event	3
April 25, 2017	Keep Out the Rain	Scheduling Event	25
May 17, 2017	Keep Out the Rain	Scheduling Event	30
June 13, 201	Keep Out the Rain	Scheduling Event	18
July 11, 2017	Keep Out the Rain	Scheduling Event	30
July 26, 2017	Keep Out the Rain	Scheduling Event	1
August 31, 2017	Keep Out the Rain	Scheduling Event	9
September 7, 2017	Keep Out the Rain	Scheduling Event	8
September 26, 2017	Keep Out the Rain	Scheduling Event	20
October 5, 2017	Keep Out the Rain	Scheduling Event	35
November 2, 2017	Keep Out the Rain	Scheduling Event	8
November 14, 2017	Keep Out the Rain	Scheduling Event	15
Total			202

3. Marlborough Neighborhood Green Infrastructure Improvements

Public outreach activities for the Distributed Storage at Outfall 059 Project and Distributed Storage at Outfall 069 Project were combined and coordinated with other city departments. In the reporting period, the City provided project updates to the Marlborough Community Coalition, an overarching neighborhood group in the project area, at several of their regularly scheduled monthly meetings.

Community newsletters containing OCP Program project information were also distributed to residents by mail in March and in June; the June distribution also included a letter to residents pertaining to the care and maintenance of local rain gardens.

On November 1, 2017, residents, contractors, project stakeholders and City representatives gathered to celebrate the completion of green infrastructure improvements at 81<sup>st</sup> Street and Troost Avenue. Nearly 50 attendees were present for the celebration.

#### 4. Other Outreach

During the reporting period, the City of Kansas City, Missouri continued to add OCP project information online. The City's website ([www.kcmo.gov/smartsewer](http://www.kcmo.gov/smartsewer)) provides general information about the Overflow Control Program, current projects and fact sheets. The fact sheets provide citizens information about each active OCP project, including what they should expect, why the project is being completed, and who they should contact with questions.

The City of Kansas City, Missouri website ([www.kcmo.gov/marlborough](http://www.kcmo.gov/marlborough)) also provides updates regarding collaborative city efforts within the Marlborough neighborhood project area (Distributed Storage at Outfalls 059 & 069).

### v. **KC GREEN TEAM**

In 2008, four KC Green Teams were created under Administrative Regulation 5-5 Green Solutions and Sustainability: Education and Outreach, Green Infrastructure, Regulation and Policy, and Resource Management. To effectively execute the mission of each team, City staff members from various departments volunteer their time.

#### 1. Education and Outreach Team

The Education and Outreach Team (EOT) organizes a variety of events and activities to educate City staff and residents about green solutions and sustainability within City operations and the City as a whole.

In 2017, the EOT continued the KC Green Neighborhood Recognition Program, which allows neighborhoods proactive in sustainability to receive recognition for their green initiatives. Neighborhoods can apply for the program and are scored based on their efforts in six categories: Natural Environment, Waste and Recycling, Transportation, Energy, Food and Urban Agriculture, and Water and Stormwater Management. Practices in the Water and Stormwater Management category include rain barrel use, planting and maintaining rain gardens, utilizing pervious pavement, and routing downspouts to green space. Depending on the number of homes implementing sustainable practices and the amount of collaborative special neighborhood projects, the neighborhoods are given a rating of Platinum, Gold, Silver, or Not Eligible. Five applications



were received for the program in 2017, two renewals and three new. Pendleton Heights and Ivanhoe Neighborhoods were selected for renewal of their KC Green status and Greenway Fields was designated a new KC Green Neighborhood. For Earth Day, 2017, the EOT hosted a booth at Science City, the local science museum where volunteers played Stormwater Plinko with visitors and educated them about the connection between their drinking water and local creeks, streams, and rivers. This year the event was titled KC Earth Day Celebration of Art and Science and was held in partnership with Paseo Academy of the Performing Arts and EPA Region 7. Students from Paseo Academy presented art in their specific media that was inspired by environmental challenges, including water quality. Over 300 people attended the event.

In odd numbered years, the KC Green EOT hosts the KC Green Fair in September. This year the focus of the fair was on energy efficiency and weatherization. Water Services hosted a booth, passed out water quality information, answered questions on programs and policies, and played Stormwater Plinko with families. A total of 50 people visited the booth.

## 2. Green Infrastructure Team

The Green Infrastructure Team focuses on identifying, tracking, and supporting green infrastructure capital projects in Kansas City. In 2017, the team provided a green infrastructure (GI) maintenance proposal to the City Manager, which resulted in approval to create a citywide on-call green infrastructure maintenance contract that city departments may access, as well as approval to add maintenance of three of the city's green infrastructure project sites to the Smart Sewer Green Stewards program. Additionally, the team maintained a list of city-built GI projects and began review of Smart Sewer green stormwater infrastructure (GSI) specifications and Green Streets Manual.

## vi. **STORMWATER: FROM KC TO THE SEA**

Since 2010, Water Services has worked to educate local 4<sup>th</sup>-6<sup>th</sup>-grade students via a curriculum titled *Stormwater: From KC to the Sea*. The five-day interactive curriculum teaches students how precipitation moves through a watershed, how stormwater becomes polluted, and how BMPs implemented on public and private property could improve water quality and reduce the quantity of stormwater entering the sewer system.

During 2017, the curriculum saw another record breaking year with 4,929 students from 54 schools throughout Kansas City participating in the program. Water Services received an Outstanding Service Award from the Missouri Environmental Education Association based on the KC to the Sea curriculum and other education programs listed in the following paragraphs during the reporting period.

**vii. WE KC  (WATER EDUCATION FOR KANSAS CITY)**

In 2016, Water Services launched the WE KC Program to expand the school age education program beyond *Stormwater: From KC to the Sea*. Through WE KC, Water Services will empower youth organizations and after school groups to make good water quality choices for their future through hands-on learning and facilitation of stewardship projects. The program provides the technical assistance, hands-on learning tools, and supplies groups need to implement their own water education programs. Through WE KC in 2017, Water Services assisted 73 groups and schools with water quality related events and educational programs, reaching 3,666 people.

**viii. REGIONAL WATER QUALITY EDUCATION PROGRAM (RWQEP)**

Water Services is one of the 23 local governmental organizations that contribute funding and staff time to a Regional Water Quality Education Program (RWQEP) sponsored by Mid-America Regional Council (MARC). RWQEP allows metro area cities to pool resources and provides a regional approach to raising public awareness about water quality issues affecting Kansas City for the benefit of both MS4 and combined sewer cities.

During the past 14 years, the program has addressed several top NPS pollution issues facing our region. The program's theme — "Clean Water. Healthy Life." — focuses on changing behaviors to improve water quality, community health and quality of life. Each year, the Regional Water Quality Education Committee (WQEC), with MARC staff support, develops an NPS pollution-focused message that supports the program's theme and determines the most effective means for disseminating the message. The committee's education and outreach activities vary each year but typically consist of a media campaign, a mini-grant program, training, and education and outreach materials. This year, the program also partnered to host the Kansas City Urban Stormwater Conference, held January 23–24, 2017.

In 2017, the public outreach campaign focused on communicating a "one water" message to Greater Kansas City residents age 25–54, emphasizing the importance of both indoor and outdoor water quality and conservation concerns. The goal was to educate people about actions they can take to help improve water quality and direct them to assets they can use to educate others.

MARC staff compiled a "fact sheet" as a web page, included original art sized for social media to accompany many of the facts, and contracted four entertaining animated videos — for dissemination through paid advertising and earned media which directed viewers to the Water Quality website. WQEC members and MARC partners were encouraged to share and post the facts on their own social media channels, which led to a moderate amount of organic reach. The campaign focused on National Water Quality Month, which is recognized during the month of August. During this time, the campaign message was seen or heard more than two million times and the website saw 5,000-page views — up from 1,000 last year and 656 in 2015.

**ix. PARTNERSHIPS IN PUBLIC OUTREACH**

**TABLING EVENTS**

Water Services partnered with various schools and municipalities to host or participate in tabling events that raised awareness of water quality issues and promoted Science Technology Engineering, and Math (STEM) education in the Kansas City region. Water Services tables used a combination of stormwater “Plinko”, the stormwater frame, aquatic macroinvertebrates, watershed models, and BMP bean bag tosses to get students and families interested in the science and math of water quality. The following tabling events reached a total of 583 people during the reporting period.

- STEM in the Gym at Prairie Branch Elementary - February 25, 2017
- STEM in the Gym at Sni-A-Bar Elementary - February 28, 2017
- Independence Watershed Festival – May 18, 2017
- Weatherby Lake Watershed Festival – June 11, 2017
- Missouri River Masterpiece Festival – September 30, 2017

**WATER QUALITY SMALL GRANT PROGRAM**

In 2016, Water Services launched the Water Quality Small Grant Program to support local non-profits in projects and activities related to water quality protection, improvement, and education within the city limits of Kansas City, Missouri. This grant process will help streamline reporting procedures for those organizations WSD already supports and increase capacity for water quality education partnerships in groups with which it has not previously worked. In 2017, Water Services pledged \$93,600 in grant funding for water quality education programs. The following organizations and projects received grant funding in 2017; though some of the projects will not occur until 2018 due to the grant running through the city’s fiscal year.

1. Blue River Watershed Association (BRWA)

Water Services continued to work with the Blue River Watershed Association (BRWA), a nonprofit, grassroots community organization that engages citizens in protecting and restoring the area’s watersheds. The organization focuses its efforts on community education, environmental stewardship, and strategic partnerships.

Water Services provides staff to support the BRWA’s T.R.U.E. (Teaching Rivers in an Urban Environment) Blue Program, which trains and equips area teachers, students, and community members to establish school-based “stream teams” to monitor water quality in local streams. In 2017, Water Services staff continued to volunteer their time to mentor small groups of students as they collected water quality data in local streams. Water Services also provided funding for a series of 12 Saturday camps, occurring in the Seven Oaks Neighborhood. The camps will teach the neighborhood, which is in the CSS, about water quality issues in Kansas City and how they can transform vacant lots to stormwater amenities.

2. Bridging the Gap

Bridging the Gap (BTG) received funding for their “Business Outreach and Stream Clean-up Project”. Presentations will be given to businesses in retail districts selected by Water Services and BTG within the combined and separate storm sewer systems to teach their employees how their business practices can affect water quality in nearby streams. They will then engage employees from the selected business to participate in a stream clean-up. As part of this grant, BTG will also repost the water quality social media campaign developed from their 2016 grant and send it out through the BTG network.

3. Friends of Kaw Point Park

In 2016, in a partnership that crosses the state line, Water Services funded the Kansas City, KS based Friends of Kaw Point Park to set up a “hydro caching” project in Kansas City, MO. This project, which was designed to draw the geocaching audience into water quality, involved setting up 20 geocaches along local waterways and near constructed BMPs. Once the cache is discovered, the participant will view an information card on the BMP or complete simple water quality tests on the waterbody. They will continue this grant through 2018 with an additional 10 caches and maintenance of the existing 20 caches. This partnership grant also includes teaching 16 “From Runoff to Rivers” classes in local middle and high schools.

4. Healthy Rivers Partnership/ Little Blue River Watershed Coalition

**Project Blue River Rescue**

Project Blue River Rescue is an outreach event put on by Healthy Rivers Partnership and hosted by the Friends of Lakeside Nature Center, which is operated by the City’s Parks and Recreation Department. The event is sponsored by MDC and MDNR through the Missouri Stream Team Program and supported by many local governmental entities and businesses. The City’s Parks and Recreation, Public Works, and Water Services Departments continue to provide facilities, volunteers, equipment, expertise, and assistance with program coordination. Water Services also supported the clean-up with grant funding in both 2016 and 2017.

On April 1, 2017, approximately 960 volunteers participated in this event. Nearly 50 tons of trash and approximately 1,397 used tires were collected and disposed of or recycled. In addition to trash removal, groups removed invasive honeysuckle from three acres and planted 1,000 native trees and shrubs along the Blue River.

5. Little Blue River Watershed Coalition

**Blue at the Zoo**

The first Blue at the Zoo was held in April 2016 as part of Blue River Celebration Month. The event was so successful that LBRWC applied for a grant to continue the event during “Scout Weekend” in April 2017 at the Kansas City Zoo. Blue at the Zoo educated scouts and their accompanying adults about the adverse impacts of stormwater runoff and water pollution at 10 different booths. Using hands-on learning opportunities, exhibits, and displays presented by agency, corporate, and municipal partners and outdoor educators, approximately 300 participants learned about watersheds, water pollution, and stream life and habitat — from the bugs and fish in the stream to the snakes, turtles and raptors that live in the riparian corridor.

**Missouri River Watershed Festival**

Water Services once again funded the Missouri River Watershed Festival. This festival is held each year at Lakeside Nature Center and draws school groups from the metro area. Subjects addressed at the Festival include: rivers, watersheds, non-point source pollution, aquatic ecology, water quality, stormwater, solid waste and recycling, wildlife of all kinds, bottomland ecology, Stream Teams, and the natural history of the local site, as well as the Missouri River. More than 350 students are educated each year through booths and hands-on learning activities.

6. StoneLion Puppet Theatre

StoneLion Puppet Theatre (SPT) is dedicated to expanding environmental education through the art of puppetry. SPT received a grant spanning 2016 and 2017 to perform one of two water quality-based puppet shows at 25 Kansas City public, private, and charter schools. The first show, “The Little Red Hen’s Garden,” focused on the effect of pesticides, herbicides, and fertilizers on waterways. The second show, “Down the Drain,” followed trash from the street to a stream and eventually to the ocean. SPT also partnered with Water Services to hold five evening water festivals (SPLASH Carnivals), in conjunction with other school scheduled events, to reach students and their families. During 2017, Stone Lion held 11 school assembly puppet shows and 4 SPLASH Carnivals water festivals with interactive booths.

## h. NMC 8- Public Notification

### i. COMBINED SEWER OVERFLOW PUBLIC NOTIFICATION PLAN

The City recognizes the need to notify the public when a CSO occurs and has developed a notification plan. The purpose of the plan is to inform and educate the public of potential overflows in the urban waterways during and following storm events. The goals of the public notification program are to:

- Notify citizens when overflows are likely to occur
- Educate the public about the potential health impacts associated with overflows in waterways
- Educate the public about the potential danger and health impacts of high waters in waterways during heavy rainstorms
- Enable citizens to take appropriate steps to protect themselves and their families from such hazards

Water Services utilizes these methods to inform the public of the potential for CSOs:

- **Signs** – Two types of warning signs have been installed to notify citizens of the hazards of CSOs. The first type, a Pedestrian Warning Sign (PWS), has been posted at public access points to streams. It notifies citizens that the streams receive CSOs and to avoid contact with the water during and 72 hours after rainfall. For more information, citizens are encouraged to call the OCP information line that is staffed by Water Services employees.

The process of replacing and relocating PWS signs began in late 2014 and was completed in 2015. After completion of sign replacement and relocation, there are 107 PWS locations.

The second type of warning sign is posted at all outfall locations. The sign warns citizens to avoid contact with water and displays the City's 3-1-1 Action Center phone number, so they can report dry weather overflows. The signs are printed in English and Spanish and are readable from approximately 20 feet. The Wastewater Line Maintenance Division is responsible for inspecting and maintaining the signs. Signs are inspected during overflow events and through routine inspections.

- **Media Advisories** – When a sewer overflow occurs during the recreation season, Water Services Communications distributes a media advisory to local media outlets. In 2017, eighteen (18) advisories were distributed.
- **Website** – In addition to providing notification directly to media outlets, the media advisories are also posted on the KC Water Services website at [www.kcwaterservices.org/sewer-overflows-2/](http://www.kcwaterservices.org/sewer-overflows-2/)

## i. NMC 9- Monitoring to Characterize CSO Impacts and the Efficacy of CSO Controls

The following sections summarize what has been completed to aid the City in assessing the effectiveness of the NMC and the control measures described in the Overflow Control Plan.

### i. MAPPING CSS DRAINAGE AREA DIVERSION STRUCTURES AND OUTFALLS

All CSS drainage areas have been mapped, and all diversion structures are inspected. As needed, maps are updated to include any changes to the diversion structures. Figure 1<sup>3</sup> includes all the current outfalls and diversion structures. Thirteen (13) diversion structures were eliminated in 2017 and removed from this figure.

### ii. RECEIVING WATER BODIES AND DESIGNATED USES

Kansas City's combined sewers overflow to numerous receiving streams. Primary receiving streams include the Kansas River, Missouri River, Blue River, and Brush Creek. Town Fork Creek is a tributary to Brush Creek. Brush Creek is tributary to the Blue River, which is tributary to the Missouri River. The Missouri River at the Broadway Bridge in Kansas City drains a total of 484,100 square miles. That area includes 59,756 square miles of tributary to the Kansas River at De Soto, Kansas (approximately 30 miles upstream of the confluence of the Missouri River and Kansas River). All of Kansas City's CSS basins are eventually tributary to the Missouri River, though they represent only 0.01 percent of the total Missouri River tributary area at Kansas City. The Downtown Airport, Central Industrial District, and the Northeast Industrial District are each directly tributary to the Missouri River. The Turkey Creek basin is the only Kansas City CSS basin tributary to the Kansas River. The remaining CSS basins in Kansas City — Lower Blue River, Brush Creek, Town Fork Creek, and Middle Blue River — are tributary to the Blue River.

Figure 2 shows streams that receive overflows from Kansas City's CSS and indicates the current recreational water quality standard designated by the State of Missouri, or by the State of Kansas for the Kansas River. As of [October 16, 2017](#), the Brush Creek and Town Fork Creek classifications were updated to Primary Contact recreational use, Whole Body Contact Class B. This figure defines in blue the CSS area directly tributary to the Missouri River, including those areas tributary via the Kansas River. It also shows all areas tributary to the Blue River. The map distinguishes between those tributary areas upstream of Kansas City's CSOs, such as upstream of the points marked with red stars, and areas directly tributary to those stream reaches that receive CSOs. Within the Blue River basin, areas directly tributary to those stream reaches that receive CSOs include both CSS, shown in yellow, and SSS, shown in green.

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<sup>3</sup> Figure 1 and Figure 2 were originally included in the October 2008 report entitled "Capacity, Management, Operations and Maintenance Plan (CMOM) and Nine Minimum Controls".

Of the total area tributary to the Blue River, 74 percent is located upstream of those reaches of the Blue River, and its tributaries are impacted by overflows from Kansas City's CSS. Kansas City's CSS serves 10 percent of the total area tributary to the Blue River. The remaining 16 percent of the Blue River tributary area is served by separate storm and sanitary sewer systems in Kansas City.

**iii. DEVELOPMENT OF OVERFLOW OCCURRENCE ESTIMATES**

The current performance of the CSS was estimated using computer models developed as part of the Overflow Control Plan. Water Services calibrated the models for sewer flow meter and rainfall data. The estimated overflow volume from Kansas City's CSS in a typical year is just over six billion gallons.

Overflow frequency varies significantly, both within the individual basins and across the City. The estimated average overflow frequency at the 87 outfalls south of the Missouri River is more than 20 times in a typical year. A complete summary of the overflow frequency, volume, and duration for each outfall is found in the supporting documentation included in the Overflow Control Plan.

**iv. GENERAL DEVELOPMENT OF A LONG-TERM MONITORING PLAN FOR THE OVERFLOW CONTROL PROGRAM**

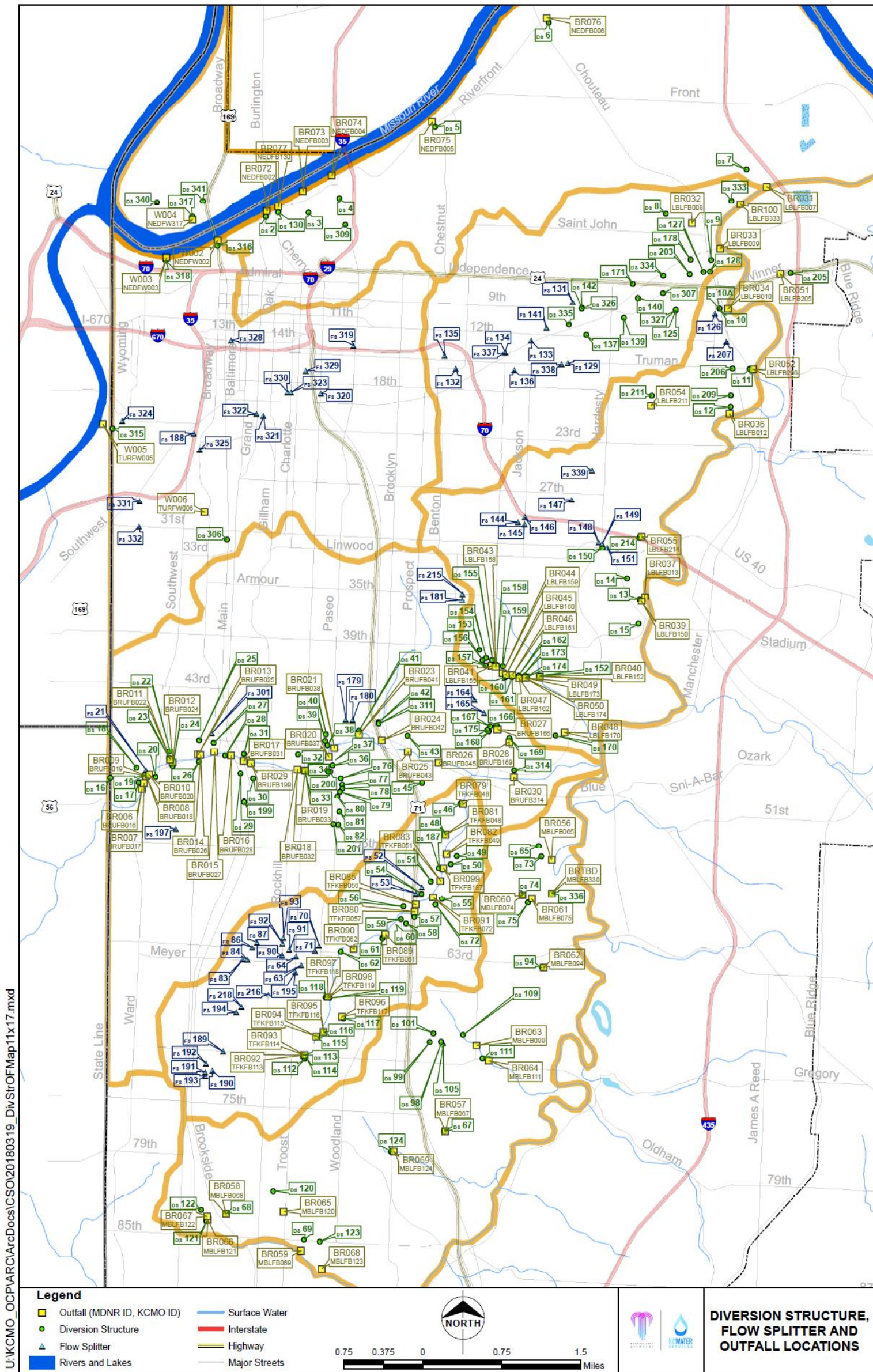
The City is implementing a Water Quality Monitoring Program (WQMP)<sup>4</sup> that was developed to address the requirements of Section II, Water Quality Monitoring Plan of the Post-Construction Monitoring Program Performance Criteria, included as Appendix D of the Consent Decree. The WQMP is being implemented City-wide and addresses water quality in both the CSS and SSS areas. Summary results from the WQMP for 2017 as shown in Table 9 in *Appendix D* of this report.

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<sup>4</sup> Dated December 28, 2010



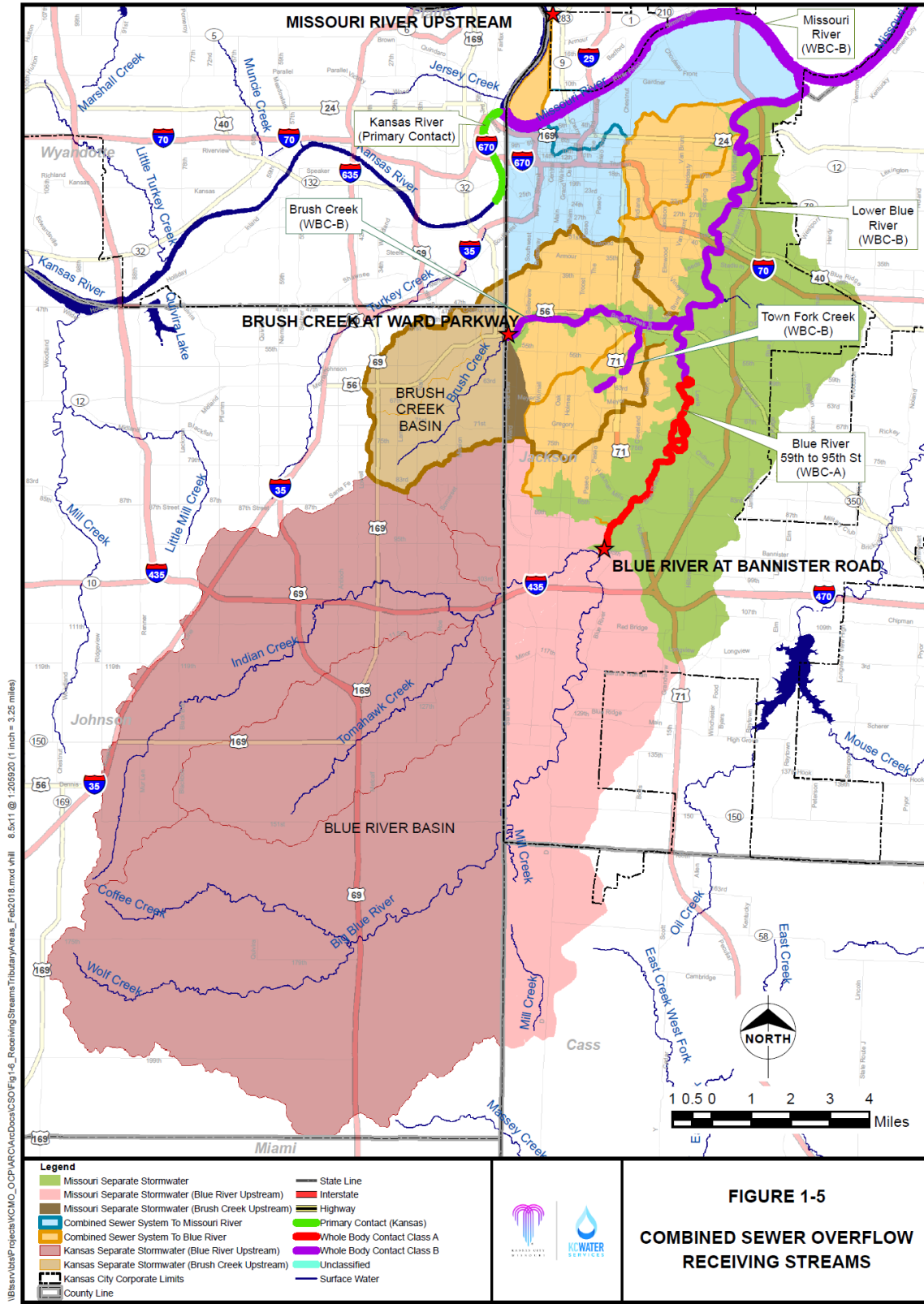
Figure 1: Diversion Structure, Flow Splitter, and Outfall Locations



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Figure 2: Combined Sewer Overflow Receiving Streams



## XII. CAPACITY, MANAGEMENT, OPERATION AND MAINTENANCE PLAN PERFORMANCE CRITERIA – APPENDIX C

The following information is a summary of activities conducted during the reporting period to demonstrate compliance with the Capacity, Management, Operation and Maintenance (CMOM) program. This program aims at improving the ability of the utility to manage its separate sewer system and ultimately reduce the occurrence of sewer overflows and maintain compliance.

### a. Collection System Management

#### i. ORGANIZATIONAL STRUCTURE

Water Services' organizational structure delineates job responsibilities, outlines opportunities for advancement, ensures effective employee to supervisor ratios, and guarantees adequate staff is in place to accomplish the mission and vision of the department. This structure is used during the annual budget process to determine staffing needs and allocate operational expenses appropriately. Water Services maintains job descriptions and organizational charts, effectively communicates job responsibilities to staff, and acquires and maintains the level of skills and abilities necessary to support the business needs of the organization.

Hiring for all vacant positions is handled through Water Services' Human Resources Division. Positions are posted internally city-wide to provide advancement opportunities for existing staff members. Water Services fills vacancies once the appropriate level of talent is found. At the end of 2017, there were 15 vacant positions in the Wastewater Line Maintenance division.

The organizational structure is evaluated during the annual budget process and through frequent communication between Human Resources personnel and the operating divisions of Water Services. In addition, members of the management team evaluate staffing needs throughout the year to address operational challenges that may not have been taken into consideration while developing the budget. The performance of all Water Services employees is evaluated using a formal performance review process. The Director and the Human Resources Manager are responsible for ensuring that Water Services' organizational structure and staffing meet department needs.

#### ii. COMMUNICATIONS AND CUSTOMER SERVICE

During the reporting period, KC Water communications staff continued to meet the unique needs of the many audiences the department serves. These audiences encompass:

- Approximately 900 employees
- 170,000 retail customers
- 32 wholesale water customers
- 27 wholesale wastewater customers

- Local and national media outlets
- Neighborhood and civic groups
- Mayor, City Council, City Manager, City Departments
- State and Federal elected officials and governmental entities

During the reporting period, KC Water continued to improve internal business processes, enhanced employee training, and launched a customer bill-pay mobile app, which enables customers to perform many of the same self-service account functions that are available through the website from the convenience of a smartphone.

Communications staff members produce a newsletter, “What’s on Tap”, that is distributed in water bills, and regularly update KC Water’s website ([www.kcwaterservices.org](http://www.kcwaterservices.org)). Currently, the website supplies basic information on the Overflow Control Program and informs customers of upcoming OCP projects. New webpages were added to promote OCP’s “Keep Out the Rain” program.

### iii. **INQUIRIES, REQUESTS AND COMPLAINTS**

The City tracks all customer service requests, and the primary point of contact for members of the public with requests or complaints is the City’s 3-1-1 Action Center. Calls to the Action Center are logged into a computer database that documents a description of the problem, location, caller identification, and contact data. An electronic ticket is then generated for routing to the appropriate City department. Complaints related to sanitary sewer or stormwater issues are routed to the Wastewater Line Maintenance staff by both phone and email. A supervisor scans each complaint and assigns them to an investigator to determine the nature of the problem. In 2017, the Action Center opened 4,040 cases for sewer-related issues.

A work order is initiated if the Wastewater Line Maintenance Inspector finds that a problem is with a facility for which Water Services is responsible. Once the work is complete, the customer service ticket is closed out. In situations where Water Services repair activities require the involvement of other City departments, the appropriate departments are called in, and the associated costs are charged back to the Line Maintenance Division for work completed on their behalf.

Occasionally, a member of the public will call Water Services directly. If the call is related to an ongoing customer service ticket, the operator accesses the customer service database, looks up the matter and routes the call to the appropriate Wastewater Line Maintenance Supervisor.

### iv. **LEGAL AUTHORITY**

The legal authority of Water Services rests in the City Charter of Kansas City, Missouri, which sets forth each of the City departments and defines their responsibilities. Chapter 60 of the City Municipal Code defines the specific authority and responsibilities of Water Services regarding the sewer system.

Specifically, Chapter 60 of the Municipal Code provides the Department authority to do the following:

- Charge fees to all users of the sewer system, whether they reside within the City limits
- Set rates for different classifications of sewer system users
- Enter into agreements with communities outside the City limits for wastewater services
- Measure and/or calculate the volumes of wastewater received from customers outside of the City limits
- Solicit bids, select contractors and construct public sanitary and combined sewers
- Set standards for the use of private septic tanks or cesspools, including the cleaning of the tanks and the disposal of collected materials
- Maintain the approved pretreatment program pursuant to 40 C.F.R. Part 403 and the Current NPDES Permits
- Prohibit the discharge of flammable or other hazardous materials into the sewer system
- Regulate the release of oil and grease into the sewer system by setting acceptable discharge concentrations and setting surcharge rates for higher concentrations of discharged oil and grease
- Require the pretreatment of waste from industrial or commercial users to protect the POTW
- Require industrial or commercial users to report on their releases into the sewer system
- Inspect the facilities of industrial or commercial users to determine the types and quantities of materials being released into the sewer system
- Implement the City's approved pretreatment program against any industrial or commercial users who violate the terms of the ordinance or permits issued

In addition, Section 60-346 of the City's sewer user ordinance gives the City the authority to regulate the connection of private sewers to the public system by entering into contracts, assessing fees, requiring adherence to the City's Standard Specifications, and requiring bonds. The City has the authority to deny a building permit or sewer connection permit if it is determined the receiving sewers have inadequate capacity. The City has established Standard Specifications for the design and construction of new or upgraded sanitary and combined sewers.

Coordination between the Departments of Public Works and Water Services is required to regulate the connection of private sewers to the public system in accordance with Section 60-346 mentioned previously.

An established Enforcement Program provides the City the support required to interpret, adapt, and enforce Water Services Rules and Regulations as needed, which helps control causes of SSOs. Causes may include I/I, corrosion, blockage due to industrial waste and FOG. The Enforcement Program also provides the City with the resources necessary to manage and implement the requirements set forth in the OCP, which will ultimately minimize overflows in the City's service area.

**v. ACQUISITION CONSIDERATIONS**

As part of the City's Acquisition Considerations Program, the design and construction of infrastructure acquired into the sewer system must comply with the City's technical specifications and construction standards. This program applies to prospective infrastructure from new construction and privately-owned systems being considered for a transfer of ownership to the City. The City has established a formal, written policy and guidelines for assuming ownership of preexisting infrastructure and ensures the performance of proper recordkeeping and documentation.

The program includes proactive measures to prevent the occurrence of I/I by inspecting new infrastructure to determine if it is properly designed, constructed, and installed, and by inspecting private sewers connecting to the public system to ensure they are watertight.

This program is primarily implemented and enforced through standard evaluation and inspection procedures. Located on the City's website, the City's standards (Design Criteria, Construction Specifications, and Standard Drawings) are a source of information for contractors and developers. City inspectors monitor new construction activities for compliance with City standards and specifications. Prior to accepting new infrastructure, City inspectors witness post-construction performance tests to assess the integrity of the infrastructure. The City's in-house inspectors are dedicated full time to monitoring construction activities of infrastructure to be dedicated to the City. This team of inspectors is within the City Planning and Development Department. Water Services works with City Planning and Development to ensure better coordination procedures.

The Permits staff (located in the City Planning and Development Department, Land Development Division) is responsible for issuing private development project permits for construction of public infrastructure, including storm and sanitary sewer improvements. The group, working under City ordinance, issues permits to those individuals and companies who have obtained the necessary insurance, bonds and construction plan approvals. The group also maintains public infrastructure records. The City provides unique file numbers to all public infrastructure construction plans, permits, and other pertinent records that are scanned and permanently stored.

The City Planning Development Services-Plans Management Division reviews and approves detailed plans required for permits. Upon submittal, the plans are reviewed for complete information and are then forwarded to the appropriate City

departments for technical review and approval. The City issues permits once they receive all required approvals.

Such acquisitions are extremely rare and most likely will require custom procedures. Generally, the City follows the following procedure:

- City assigns a project manager to oversee potential acquisition activities
- Owner of the infrastructure obtains and delivers to the City historical information on the infrastructure, including proof of ownership, design guidelines, design calculations, as-built plans, specifications, rights-of-way, and any other information of interest
- Owner obtains/performs a condition assessment (to be witnessed by the City)
- Owner tests the performance (to be witnessed by the City)
- City may determine whether the infrastructure will meet the desired conveyance need
- City may require the owner to make improvements if needed, before assuming ownership

**vi. INFORMATION MANAGEMENT SYSTEM**

The City maintains an Information Management System (IMS) that provides tools for tracking collection systems' performance, costs, and work orders and measures the effectiveness and efficiency of O&M activities.

In addition, the City continues to enhance its computer-based tools to manage and track collection system data. Standard operating procedures have been updated to ensure accurate documentation of pertinent collection system data and staff members' appropriate use of the IMS tools. The City continues to improve IMS training as mobile data units are deployed for data entry and research.

Collectively, IMS tools give staff members a well-defined, detailed understanding of how the collection system performs by monitoring, analyzing, and measuring their performance. The IMS tools help categorize and prioritize problems throughout the system so that staff members can make well-informed decisions regarding the allocation of resources and implement maintenance and rehabilitation activities that can minimize overflows.

Water Services continues to expand the IMS and share data among divisions in several locations around the City. For wastewater treatment and collection, the primary data system is Infor's Hansen work/service order, asset management and work crew assignment modules. Hansen combines the City's geographic information system (GIS) mapping with attribute tables, WinCan CCTV data management system, and other software applications to help manage the large quantity of data processed daily. The following is a list of the relevant systems maintained and used during the 2017 reporting period:

- **GIS – ESRI ArcGIS:** Discussed in more detail below
- **WinCan CCTV data management system:** Used to organize and store CCTV investigation information. WinCan stores digital video, still images and text data in a database format. The Division utilizes WinCan V8.24 with PACP coding.
- **Infor-Hansen System - CMMS:** Water Services is currently using Hansen 8.3 release 1404.
- **KWIK:** Used for Water, Wastewater, and Stormwater utility billing. Used to manage and bill approximately 170,000 customer accounts.
- **SCADA:** Used by the Water and Wastewater Treatment Divisions for data acquisition and signaling alarms.
- **Inventory Data Management – Interface Systems – Storeroom:** Used to manage supplies, track the quantity, cost, and physical location of spare equipment, parts, and material.
- **Mobile SR Tablet:** In-house developed web-based application to allow assignment of Hansen 8 service orders to be completed in the field in real-time with access to GIS, CIS, and Hansen 8 data via a secure connection. Tablets allow staff to close Hansen 8 service orders in the field and update Hansen within five (5) minutes, including the GIS that were allowable.

Water Services' Information Technology (IT) Division manages the PC network and applications specific to Water Services that includes the integration of various application programs to facilitate user and work needs at each location. The IMS interfaces are continually enhanced to improve efficiencies by automation based on work/problem code for work assignment and updates to the supporting system. Monitor tools have been added to review performance measures and provide real-time presorting to all the Water Services divisions.

On an annual basis, the systems are evaluated to assess upgrade or replacement needs. In addition, an assessment is conducted to evaluate if an existing module can replace an older standalone system or process.

Water Services IT continues to work with each division to support the use of IMS in addition to providing training as requested with the core Water Services systems as new functionality becomes available or an enhancement is made. A combination of Water Services IT staff and vendor-provided maintenance teams provide oversight and support for Water Services IMS tools.

#### GIS Software

During the reporting period, Water Services continued to use the ESRI ArcGIS suite of products, including ArcGIS for Desktop for spatial data. In Water Services, there are a moderate number of users of ArcGIS Desktop (split between water distribution, sewer collection, and stormwater collection) who create and maintain GIS data. A small number utilize ArcView to view the GIS and perform analysis. The remaining GIS users utilize ArcReader for viewing and plotting GIS data.



Field crews access GIS data via a secure connection from their mobile units based on user credentials. Monthly, the GIS group refreshes the accessible GIS data.

GIS data contains asset type, material, size, install date, pipe elevation, and address information. These data fields also exist in Hansen, which is integrated with GIS, and allows staff members to spatially analyze data through open database connectivity. Hansen 8 also has built-in integration into ESRI GIS, which allows work/service orders to be created via GIS.

#### **vii. GIS MAPPING**

The purpose of Water Services' GIS Mapping Program is to ensure that an accurate and comprehensive inventory is maintained of the collection and transmission systems, to assemble and present the information in a manner conducive for use and to ensure that it is easily accessible by Water Services personnel who depend on the data. The City's online mapping system makes Water Services GIS data accessible to employees on the city-wide network.

Water Services' mapping software identifies several collection system components and attributes, including:

- Gravity sewer/force mains
- Property lines/parcels
- Pipe attributes
- Manholes and other access points
- Diversion structures/flow splitters and outfalls
- Ownership of infrastructure
- Sewer easements
- Stormwater inlets
- Septic tanks
- Impervious surfaces
- Aerial photography
- Wastewater facilities (including pump stations, flood pump stations, and wastewater treatment plants)
- Green infrastructure
- Proposed new construction services
- Planimetric features (including contours, roads, surface water and land use)

Water Services continuously maintains comprehensive, accurate data in the GIS mapping system. Updates to the GIS are submitted by both internal crews and external consultants when routine field inspections or work in special project areas reveal changes or additions. These updates include new sewer extensions and sewer additions installed by contractors or identified by crews.

Digital maps generated from ArcGIS are available to field crews both in the office and via ArcReader or hard copies in the field.

Employees throughout Water Services utilize the system mapping tools and provide updates to inventory data. In addition to GIS edits by internal staff, the department obtains aerial photography from partnering GIS organizations. All relevant staff members receive training from IT personnel on ArcGIS and ArcReader. GIS administrators and users throughout Water Services evaluate the GIS Mapping Program on a continuous basis through monthly team meetings and frequent communication.

#### **viii. SANITARY SEWER OVERFLOW REPORTING AND NOTIFICATION**

The City maintains an SSO Reporting and Notification Program that ensures that discharges from the City's sewer system are documented, stored in a data management system, and properly reported to appropriate regulatory authorities. Water Services notifies the public, when appropriate, including persons with the potential to encounter the sewage. The program includes a listing of all building/private property backups discovered by or reported to the City that have occurred. Also included is the date of the building/private backup incident, location, source of notification (e.g., property owner, field crew), general cause(s) of the backup, and actions taken or suggested by the City to halt, mitigate, and prevent future incidents. The City follows its current NPDES Permits for verbal and written notification to the NPDES permitting authority to inform them that an SSO has occurred.

Adherence to and compliance with the SSO Reporting and Notification Program plays a vital role in minimizing SSOs, supporting the City's community values, and minimizing the City's compliance and legal risks. Properly tracking and reporting SSOs provides Water Services staff with a better understanding of release point trends and root causes throughout the collection systems and enables decision makers to prioritize resources to cost effectively minimize SSOs. Continuous tracking of overflow occurrences leads to proactive prevention of SSO events.

The primary point of contact for members of the public with complaints is Kansas City's 3-1-1 Action Center. The Action Center is the principal way in which SSO overflows are reported to Water Services. A work order is initiated if a problem with a Water Services facility is identified upon receipt and investigation of a 3-1-1 service call.

A total of 1,940 calls related to SSOs were routed to the Wastewater Line Maintenance Division during 2017. The breakdown of SSO call types includes:

- Water in basement dry weather – 1,420
- Water in basement wet weather – 520

In the event of a backup that resulted in the owner/tenant of the property calling 3-1-1 or calling Water Services Central Dispatch after hours, the City's Building and Private Property Response Plan comes into effect.

At the onset of the call, the consumer is asked a series of questions to determine the appropriate cleaning response. If the problem cannot be determined on the call, a Wastewater Line Maintenance Crew is dispatched to verify the condition of the City's sewer main and clean that section to ensure it is functioning properly.

If, because of the call, it is agreed upon that City involvement is necessary, a Hansen service request will be initiated. Either a Code 2 (Urgent) or a Code 3 (Emergency) prioritization will be given. In the case of a Code 2 event, a maintenance crew will respond as soon as it is available. In the case of a Code 3 event, a maintenance crew will be dispatched on an emergency basis and will respond as soon as possible.

Generally, if there is water coming into the house from an outside source, the event would be categorized as a Code 3. If water is slowly draining, then it would most likely be categorized as a Code 2. If water comes up in the basement after using the facilities in the residence, it would most likely be categorized as a Code 2 event. If it is determined that the backup occurred due to issues on private property, a "Property Owners Responsibility letter" is given to the property owner with instructions and next steps to resolve the issue.

Wastewater Line Maintenance Crews respond to dry weather backup complaints based on the Code 2 or Code 3 priority. Crews respond to all wet weather backup complaints as a Code 3 priority. Crews respond to inspect the city manholes for surcharge conditions. If a stoppage is found within the system, the crews will open it. If the sewer system is surcharging, a door hanger will be given to the property owner to inform them of the surcharge. The City will recommend that the owner contact a private plumbing company to install a backflow preventer at the property owner's expense.

Water Services strives to respond quickly to SSO complaints to control the release of wastewater and perform appropriate cleanup tasks; crews are dispatched 24 hours a day to investigate complaints. Water Services continually evaluates the SSO Reporting and Notification Program.

**ix. PERMIT AUTHORITY NOTIFICATION**

The Wastewater Line Maintenance Division notifies MDNR when a DWO occurs within 24 hours of discovery. Water Services completes follow-up written reports within five days of the completion on ending of the overflow. In all occurrences, the area around the overflow is cleaned and inspected for any debris or contaminants.

In the case of DWOs caused by vandalism to the manhole, the standard manhole covers are replaced with bolt-down covers to deter future vandalism.

The Wastewater Treatment Division notifies MDNR when dry weather overflows occur at either pump stations or WWTPs within 24 hours of discovery. Water Services submits a follow-up written report to MDNR within five days of the completion on ending of the overflow. There were 77 dry weather overflows reported to MDNR in 2017 compared to 60 in 2016. See *Attachment A* for copies of all dry weather overflow reports submitted in 2017.

## b. Collection Systems Operation

### i. BUDGETING

The budgeting process provides adequate fiscal resources to the operating divisions to carry out their responsibilities. The Department's Division managers identify recommended staffing and funding levels, which are then adjusted based on City priorities.

Proper funding, budgeting, and planning are necessary for the Line Maintenance and Wastewater Treatment divisions to provide sufficient capital, labor, and equipment to complete CMOM activities as needed to ensure the minimization of overflows.

Division managers create budgets on an annual basis. The budget process covers project costs and revenue sources for five years. The managers submit their budget requests to Water Services Accounting staff members who review the requests, compile the budget and submit it to the Water Services Director for review and approval. The Director then presents it to the City Manager who, in turn, presents it to the Mayor and City Council for review and approval. Ultimately, the City Council approves the budget, which takes effect at the beginning of each fiscal year (May 1 through April 30).

### ii. ENGINEERING

The purpose of Engineering within Water Services is multi-faceted, as it encompasses several functional business units. The business units are the coordinating entities behind many collection system activities, including new construction, construction inspections, rehabilitation and replacement, and capacity assessment and assurance. The business units confirm that new facilities are constructed according to standard construction specifications, do not contribute to future I/I problems and provide inspection and oversight of rehabilitative work to ensure proper execution.

The various engineering business units have unique areas of collection system responsibility, including:

- Planning is responsible for GIS mapping
- Energy Management is responsible for negotiating utility contracts for pump station and treatment plant operations
- Stormwater Management is responsible for the design of stormwater projects
- Systems Engineering is responsible for the planning, design, and construction of sewer collection systems and water distribution systems
- Facilities Plant Engineering is responsible for the design of all above-ground structures including pump stations and wastewater treatment plants for water and wastewater supply, treatment and pumping facilities
- The Smart Sewer program is responsible for development and implementation of the City's Overflow Control Program
- Waterways is responsible for stormwater management projects that are funded jointly by other government agencies such as the Corps of Engineers

The Smart Sewer program performs all engineering activities under the supervision and direction of registered professional engineers. Staff members in the Engineering Division receive continuing education and training through industry seminars and workshops, as well as classes required to maintain PE licensure.

In addition, the City commonly uses engineering consulting firms and outside contractors to perform planning, design, and construction activities.

### iii. **WATER QUALITY MONITORING**

Water Services has developed an integrated monitoring program intended to meet all water quality related objectives in a cost-effective manner as part of the Overflow Control Plan post-construction monitoring requirements set forth in *Appendix D*.

The Water Quality Monitoring Plan is divided into five sections:

1. Objectives and Rationale
2. Water Quality Monitoring Plan
3. Field Methods and Procedures
4. Quality Control
5. Resource Assessment

Water Services conducts sampling and analysis efforts for the Water Quality Monitoring Program in accordance with Water Services' OCP Quality Assurance Project Plan, Water Services Laboratory's Quality Assurance Manual, and Health and Safety Plan.

More information on the Water Quality Monitoring Program can be found in the Consent Decree Appendix D: Post Construction Monitoring Program Performance Criteria in this report.

**iv. PRETREATMENT PROGRAM**

The City continues to implement its approved pretreatment program pursuant to the Federal Register (40 C.F.R. Part 403) and current NPDES permits. Information on the pretreatment program may be found in NMC 3. Submittals to MDNR associated with the pretreatment program can be found in *Attachment B*.

**v. PUMP STATION OPERATIONS**

Pump station operation is a collaborative effort assigned to operations and maintenance groups to ensure reliable operations and continues as originally envisioned and developed.

The department ensures reliable operations by:

- Conducting routine scheduled inspections
- Troubleshooting when situations arise
- Performing preventative maintenance
- Retaining appropriate records of pump station performance
- Remotely monitoring pump station operations using remote dialers and a SCADA system

This program is executed in conjunction with the pump station maintenance program discussed later in this document. Operations staff are responsible for performing light and/or preventative maintenance work as needed and routine inspections are performed which generate corrective work orders identifying work to be performed by maintenance staff.

Monitoring the reliability of pump stations through routine inspections, troubleshooting, and remote supervision decreases the chance of pump station failure that could potentially cause an overflow. Proper pump station operation also maximizes storage and ensures adequate capacity throughout the collection system, which may consequently prevent an overflow from occurring.

The Wastewater Treatment Division operators visit each wastewater pump station (WWPS), flood pump station, and headworks pump station at WWTP sites on a regular basis. The visits occur at varying frequencies ranging from daily to three times per week for larger stations, to once per week for smaller stations. Visit frequency is based on several factors including manpower availability, facility size, complexity, criticality, reliability, and past maintenance history. Maintenance staff also performs emergency maintenance and other tasks needed to maintain the overall wastewater treatment system.

In 2017 various design and construction was initiated, continued or completed at pump stations, force mains, and pipelines including Birmingham Pump Station, Upper Rush Creek Pump Station, Weatherby Lake Pump Station, Pied Creek Pump Station and Buckeye Pump Station force main.

The pump stations include remote monitoring using telephone dialers and SCADA. In 2017, projects continued to implement an even more comprehensive SCADA system program. Pump station inspections are recorded in a log book, and inspection forms and data are archived.

At some of the larger stations, more extensive data is collected and filled out on worksheets, which are kept on clipboards at the site so operators can easily scan the data for trends during their inspections.

Water Services has assigned operations crews and maintenance crews to pump station O&M activities. [Additional operations crews are available as needed.](#) Maintenance also has crews available for electrical, instrument and controls, and HVAC repairs as needed.

Much of training for pump station operators occurs through on-the-job experience. Considerable training is provided through an in-house program in which staff are eligible to obtain continuing education credits required for certification.

**vi. PUMP STATION MAINTENANCE**

The purpose of the Pump Station Maintenance Program is to perform the necessary preventative, corrective and predictive maintenance required to sustain the reliability of wastewater and flood pump stations and ensure all pump stations throughout the service area are operating efficiently. This program is executed in conjunction with operations and maintenance to complete work orders generated from routine inspections, trouble calls, and preventative maintenance schedules. In 2017, 5,774 work orders were completed associated with maintenance of the City's 40 sewer pump stations and 15 flood pump stations.

Maintaining the reliability of pump stations helps to decrease the chance of pump station failure, [8110 807769](#) which could potentially cause an overflow. Performing predictive and preventative maintenance helps to correct problems before they become an emergency and increases pump station reliability.

Crews perform regular maintenance at each of the pump stations. All pump station maintenance is performed based on planned weekly maintenance schedules or when an emergency occurs. Typical tasks include verifying normal operation of pumps and equipment, checking for sewage leaks, servicing equipment for proper operation, and other corrective and preventative maintenance.

Maintenance supervisors produce a weekly maintenance schedule and select specific projects based on crew availability, parts availability and the urgency of a repair. Since 2010, staff members have updated plans during daily weekday meetings between the pump station mechanical, electrical and instrumentation mechanics and operators, supervisors and superintendents to facilitate

coordination. As a result, 90 percent of all work performed consists of scheduled and planned maintenance.

The senior management team is dedicated to computerized maintenance management administration, procurement, project specifications reviews, project drawings, project design meetings, and coordination. Additional daily meetings and communications with maintenance supervisors and chief plant operators are conducted to communicate and coordinate the activities that need to be performed.

The management and execution of work tasks are evaluated constantly through daily team meetings and regular tracking of work orders. Tracking work orders in computerized maintenance management system enables staff to identify performance patterns that may require further evaluation. All flood pump stations are inspected almost daily during routine events and more frequently during severe weather events. The U.S. Army Corps of Engineers conducts annual audits and identifies further actions needed for repair work.

**vii. PUMP STATION EMERGENCIES**

Emergency response procedures have been developed for pump station emergencies. The department monitors the basic operations status via the SCADA alarm reporting and telephone dial-out systems, with each used as appropriate to the pump station location and equipment type. The SCADA system is monitored 24 hours a day, seven days a week by a chief plant operator (CPO) at the Blue River WWTP who reports to a Section Superintendent who in turn reports to Wastewater Treatment Division Manager. The alarms received by the CPO indicate the type of equipment problem and permit the CPO to tailor responses. The CPO has guidelines that specify whom to call and when to call them based on the time of day, weather conditions and nature of the issue. Water Services also receives notification of trouble in the collection system from the public. External constituencies can hear an audible alarm or see a flashing red light at one of the pump stations and call Water Services' 24-hour response line to report trouble.

Water Services provides emergency response. The CPO has the authority to call in additional resources as needed, including either staff with electrical and mechanical expertise or a contract hauler. This system ensures that quick response is available 24 hours a day and improves employee accountability.

Additional assistance for pump station trouble calls may be summoned by the CPO. Skilled and/or general labor is available, as well as equipment operators and their respective equipment. The responder will determine labor and equipment needs during the initial assessment of the issue. Water Services works with an existing contractor to respond to pump station emergencies.

Work orders associated with pump station emergencies are completed and documented in computerized maintenance management system. The success and effectiveness of Water Services' efforts are measured through a variety of performance indicators, such as response time, the effectiveness of remedies, and the number of well-trained personnel available to monitor and respond to pump



station emergencies. The formal Emergency Response Plan is included as part of the City's 2010 Sewer Overflow Response Plan (SORP).

**viii. FORCE MAINS**

The Force Main Maintenance Program and Air Release Valve (ARV) Program consists of five elements: GIS, condition assessment, corrosion investigation, preventative maintenance, and documentation of maintenance activities.

Water Services initially inspect force main sewers in isolated areas using infrared video/thermal imagery conducted as part of the annual aerial flyover contract. If an anomaly is found, field inspectors in the Wastewater Line Maintenance Division are sent out to determine if the anomaly was an active leak on the force main. This program is discussed further in the Remote Sewer Inspection Program later in this report. The Line Maintenance Division also assists in the repair of force main breaks on a point repair basis.

The Blue River Wastewater Treatment Plant is responsible for the ARVs on the force main sewer. The inspection, maintenance, and contract work, is under their direct authority. The ARVs are checked annually at a minimum.

**ix. SMOKE TESTING**

The purpose of the Smoke Testing program is to identify specific public and private sources of stormwater I/I into the SSS and CSS that can be eliminated or reduced through rehabilitation or repair. Smoke testing, along with CCTV inspection, manhole inspections, and flow monitoring comprise the Sanitary Sewer Evaluation Survey (SSES) program elements. Smoke testing helps to identify significant sources of stormwater I/I, including private service laterals and illegal connections such as downspouts and area drains. Smoke testing can also be used to determine the location of sewer main defects likely contributing I/I to the system.

The City has developed a standard protocol for smoke testing. Water Services keeps a hard copy of this protocol along with electronic copies. Water Services uses external contractors to perform the smoke testing activities as dictated by specific projects; the smoke testing protocols accompanies all requests for proposals for these projects. Data is analyzed and used for system improvements as outlined in the Collection System Maintenance section below.

In 2017, smoke testing was performed on approximately 1,307,027 linear feet, or 247.5 miles, of sewer to detect I/I sources in the public and private sectors. Each positively identified source was photographed and located using a GPS device. A defect feature class was created and is included in the geodatabase.

**x. FLOW AND RAINFALL MONITORING**

Flow and rainfall monitoring is being performed in conjunction with *Appendix D* of the Consent Decree. Additional flow and rainfall monitoring will be performed in individual sub-basins to aid in the design of proposed improvements.

Water Services has developed a standard protocol for flow and rainfall monitoring and data analysis. Once the flow and rainfall data are received, it is stored on a server at Water Services and is reviewed by the Overflow Control Program team. The design professional conducts an analysis of the data for design of system improvements. Additional details and project-specific information on the flow monitoring program is described in more detail in *Appendix D* of this report.

**xi. CCTV INSPECTION**

The purpose of the City's CCTV Inspection Program is to visually assess the condition inside of the collection system. The program relies on the use of National Association of Sewer Service Companies (NASSCO) standardized ratings to characterize conditions. Currently, CCTV inspections are conducted to investigate a known trouble area and as a follow-up to line cleaning. Water Services has developed a standard protocol for CCTV inspections.

In 2017, the City televised approximately 208 miles of sewer lines, meeting the Consent Decree requirements of at least 119 miles annually for 2017. This mileage includes the mileage in the combined sewer system previously discussed in NMC 1. Water Services tracks CCTV inspection information in Hansen with information available from WinCan.

**xii. REMOTE SEWER INSPECTION PROGRAM**

The Remote Sewer Inspection Program is implemented to inspect remote portions of the sanitary sewer system in an economical and efficient manner to identify anomalies warranting further inspection. This is done through an aerial flyover that identifies and locates potential areas of ground seep into the watershed, specifically leaks from local underground sewer lines situated near or along the river, creeks and tributary streams in remote locations.

The entire 350 miles of the system's sewer lines and force mains are evaluated using the flyover process. The specialized equipment requires a small aircraft equipped with a video camera and thermal infrared/integrated GPS tracking. These tools detect temperature anomalies along remotely located portions of the collection system. The temperature anomalies indicate flow may be either exfiltration or overflowing from the collection system, and that further investigation is necessary.

After the flyover is performed, the infrared footage is analyzed and adjusted to remove any known anomalies such as lights, animals or other obvious heat sources. For those heat sources that cannot be characterized, and that may be resulting from sewer system leaks, Water Services staff visually inspects those areas. If staff members discover a leak, a work order is issued for the repair.

A flyover was performed in February 2017 with 21 anomalies discovered and none were confirmed overflows. Using the supplied GPS coordinates, the Wastewater Line Maintenance Division visually inspected the anomalies, and none were found to be related to sewers. Instead, they were the result of small ponds, dried up creeks with small pools of water, natural groundwater seepage, storm drainage pipes, and other non-sewage related items.

## c. Collection Systems Maintenance

### i. MANHOLE REPAIRS

The purpose of the Manhole Repair Program is to ensure the structural integrity of manholes in the system, reduce infiltration into manholes, control odor problems at manholes, increase accessibility to buried manholes, and prevent public harm due to structural failures.

Manhole repairs often reduce infiltration into manholes. This helps ensure capacity exists for the conveyance of sanitary sewer flows. The Manhole Repair Program also addresses the structural integrity of manholes. This reduces the likelihood a manhole would structurally fail, causing blockage in the system that may trigger either SSOs or CSOs. The Manhole Repair Program also helps to minimize overflows by increasing the accessibility of buried manholes. Greater accessibility for inspection and maintenance activities will minimize overflows with maintenance-related causes.

Activities associated with this program include the repair or replacement of manhole components in the upper three feet of the structure by the Wastewater Line Maintenance Division manhole repair crew, or manhole replacement by a heavy repair crew. The division's manhole repair crew implements various types of repairs, including:

- Lid and ring replacement
- Lid grade adjustment
- Brick replacement

The repair crew does not repair manholes suffering severe structural failure; these manholes are typically removed and replaced by a heavy repair crew in the Line Maintenance Division. In 2017, the City's OCP Program Management team inspected 4,900 manholes (MHs). A total of 854 MHs were repaired, replaced, or raised as follows: 7 MHs by City-wide MH Raising Contractor, 551 MHs by OCP Project Contractors, and 296 MHs by City Wastewater repair crews.

### ii. MAINLINE SEWER REPAIRS

Actual physical repairs are made to the gravity sewer lines by the Line Maintenance Division. The repairs are performed to make upgrades and improvements to mainline sewers as needed to ensure adequate capacity, keep flow in pipes, reduce and eliminate I/I, and maintain the design conveyance of the pipes in the system.

Overflows are minimized by reducing the levels of I/I entering the system and by fixing deteriorating pipes that keep the flow in the collection system. A reduction in I/I levels leaves more system capacity available for the conveyance of sanitary sewer flow, eliminating one significant cause of overflows. Maintaining the pipe also removes restrictions that could potentially cause blockages and overflows and further helps ensure capacity.

The type of repair method used is dependent upon several factors including:

- Pipe size
- Pipe type
- Pipe location
- Flow
- Surface conditions
- Severity of I/I

The City utilizes several repair technologies, including:

- Open cut
- Cured in place lining
- Horizontal directional drilling
- Boring and jacking
- Tunneling
- Pipe bursting
- Slip lining
- Grouting of joints
- Point repairs

Work orders are prioritized based on available assessment information and sound judgment. Work orders associated with mainline sewer repairs are tracked and stored in Hansen. Repair work performed by in-house construction crews is entered into Hansen by Collection Systems personnel, and repair work performed by outside contractors is entered into Hansen by Engineering personnel.

Water Services employs repair crews; however, a significant amount of mainline sewer repair work is completed by outside contractors. The department also relies on outside contractors for construction work that requires either special equipment or expertise to perform. In-house inspectors monitor work conducted by outside contractors. Specifications for construction work are included in formal contracts used to manage outside firms.

In 2017, approximately 58,190 linear feet of sewer main line repairs, including open cut replace/pipe bursting and point repairs/lateral rehabilitation and 5,107 linear feet of service lateral pipe replacement, were performed as a part of OCP projects and Water Services' annual sewer repair contract.

### **iii. SEWER CLEANING**

The two purposes of the Sewer Cleaning Program are to perform preventative maintenance cleaning on the gravity sewer system and to clean trouble or emergency areas. Preventative maintenance cleaning is intended to ensure that system design capacity is available and prevent non-structural blockages caused by either root intrusion or buildup of grease or debris. A large percentage of annual sewer cleaning is on lines that are part of a routine preventative maintenance schedule. Water Services conducts emergency cleaning in response to emergency calls. The remaining cleaning activities are unscheduled trouble or emergency calls.

City crews also perform corrective cleaning in response to stoppages, trouble calls, and city requests. If Water Services receives repeated trouble calls for a particular line segment, the line segment is placed on a frequent interval preventative cleaning cycle. CCTV inspection is completed in conjunction with all sewer cleanings. All sewer cleaning originates with a Hansen-generated work order. Completed work is also tracked in Hansen.

The City performs both hydraulic and mechanical cleaning. Mechanical cleaning is performed using either a rod machine or a bucket machine, while hydraulic cleaning is performed using jet trucks.

Water Services stores all data related to the Sewer Cleaning Program in Hansen. Cleaning records include date, time and location information related to the cleaning; method of cleaning used; names of staff members who performed the cleaning; and any further actions that were initiated.

In 2017, the City cleaned approximately 561 miles of sewer lines, meeting the Consent Decree requirements of at least 283 miles annually. This mileage includes the mileage in the CSS area previously discussed in NMC 1.

**iv. RESPONSE PLAN**

The City's Building and Private Property Backup Response Plan was developed to provide procedures for response and preventative maintenance. The purpose of the plan is to restore the public sewer line to a functioning condition and perform any cleanup that may be required while working within the applicable laws of the City.

If, while conducting preventative cleaning activities, a basement backup occurs that is found to be the responsibility of Water Services, the property owner will be directed to contact the City's Claims Department. The Claims Department will hire a private contractor to perform the clean-up work. If there is a claim or lawsuit, then the law department works with the property owner to install a backflow device (if they choose to have the device installed). This installation would be located on private property, and Water Services is typically not informed if the homeowner elected to have the device installed or not.

**d. Collection System Capacity**

**i. CAPACITY ASSESSMENT AND ASSURANCE**

The City's current procedure for capacity assurance involves coordination with several City Departments and Divisions. The City Planning and Development Department (City Planning) Land Development Division reviews new development additions. The developer's engineering consultant is responsible for certifying that the proposed development will not overload the receiving sanitary sewer system. They must verify that the receiving trunk sewer was sized adequately according to APWA standards and must also coordinate with Water Services when necessary to verify that the receiving pump station has sufficient capacity to handle the additional flows.

The City Planning Land Development Division has the authority to refuse authorizing the connection if there is a history of capacity issues or if the City has issued a moratorium on new connections in a specific area. City Planning is also responsible for reviewing plans and inspecting connections to the existing sewer system for a major infrastructure permit per Chapter 64 of the Code of Ordinance.

Water Services inspects the connections when new service line connections are requested and permitted. Water Services also inspects the installation of service lines on private property for 1-2 family residential structures, and building officials handle the inspections of the private service line installation on all other situations.

Public Works/Parks and Recreation inspects the right-of-way restoration associated with their excavation permits, and Public Works handles the traffic control inspections. Water Services supports the Land Development Division on larger proposed developments or unique drainage or sanitary sewer service areas when requested.

For single taps, City Planning Land Development Division grants or authorizes the connection. Water Services then issues the connection inspection permits for all connections and performs the inspection of the physical connection. Public Works (and/or Parks and Recreation Department for roads under its jurisdiction) issues excavation permits for excavation within the public right-of-way or easement. Public Works also issues any required traffic closure permits. Building officials issue a plumbing permit for the service line on private property.

## XIII. POST CONSTRUCTION MONITORING PROGRAM PERFORMANCE CRITERIA – APPENDIX D

### a. Flow Monitoring Program

Short-term flow monitoring was conducted by the City’s OCP Program Management team for five I/I reduction projects listed below beginning in April 2017 for approximately 90 days to seven months. Monitoring occurred to provide data for the identification and quantification of I/I sources and to measure the effectiveness of I/I rehabilitation work.

- Blue River South Projects 1 and 2
- Round Grove
- Line Creek/Rock Creek Basins Area 3 Project
- Birmingham Area 1 Project
- Buckeye Creek Basin

Multiple rain gauges were also installed in the project areas to supplement coverage provided by the City’s existing ALERT gauging system.

In addition, flow and rainfall monitoring was performed for 90 days at four locations in the Brush Creek Neighborhood Sewer Rehabilitation Project and the Middle Blue River Neighborhood Sewer Rehabilitation Project areas to provide quantification of system pre-construction and post-construction flows.

#### i. LONG-TERM FLOW MONITORING

During the reporting period, long-term flow monitoring was performed according to the revised CSS Metering Plan. Long-term flow monitoring commenced or suspended in 2017 at five locations within the combined sewer system as listed below.

- Outfall BR056 (suspended)
- Outfall BR039 (commenced)
- Outfall BR040 (commenced)
- Outfall BR059 (commenced following construction)
- Outfall BR069 (commenced following construction)



## b. Water Quality Testing

The 2017 reporting period is the seventh year of monitoring conducted under the Integrated Water Quality Monitoring Program (IWQMP). Since April 2011, Water Services staff members have conducted sampling and field measurements at 20 smaller water locations. A Water Services contractor has conducted sampling and field measurements at three locations on each of the Kansas River and Missouri River. The Water Services laboratory conducted analysis of the samples. Sampling and analyses were conducted according to the methods prescribed in the Integrated Water Quality Monitoring Program<sup>5</sup> and the associated Quality Assurance Project Plan<sup>6</sup>.

The details of the monitoring program, including sampling locations, frequency of monitoring, and water quality parameters are presented in the IWQMP. The IWQMP specifies monitoring to be conducted every other week. Field measurements include temperature, pH, dissolved oxygen, and aesthetic observations. Samples are collected and delivered to the Water Services laboratory for analysis of E. coli, TSS, and conductivity. Monitoring was conducted during the 2017 recreation season, which extends from April 1 through October 31.

The implementation of the IWQMP in 2017 was successful in obtaining 107 percent of the planned samples for both the small stream sites and the large river sites. Also, the collection frequencies for field duplicate samples and field rinse blank (FRB) samples (13 percent and 14 percent of samples, respectively) met or exceeded the planned numbers (10 percent for duplicates; 5 percent for FRBs), and exceeded the requirements specified in the sampling and quality assurance plans. Monitoring was also conducted outside the recreation season as weather conditions permitted.

A summary of the 2017 water quality monitoring results is presented for E. coli, dissolved oxygen, and TSS in Table 1.

Highest concentrations of bacteria are observed in Town Fork Creek (TF-01), the upper and lower ends of Brush Creek (BC-01, BC-03, BC-06 and BC-07) and the lower end of the Blue River (BR-08). These locations are generally consistent from past years. Bacteria concentrations in the Missouri River were lower in 2017 than in previous years, while bacteria concentrations in the Kansas River are noticeably lower than 2016 but higher than previous years.

Average dissolved oxygen concentrations were not noticeably different from previous years and are all meeting applicable water quality criteria.

The data collected in 2017 indicate TSS concentrations in the smaller tributary streams were not noticeably different from previous years. TSS concentrations in the Missouri River and Kansas River were lower than 2016 (a high flow year for those systems) but slightly higher than observed for previous years.

Water quality conditions can vary significantly year-to-year depending on precipitation conditions. Precipitation in Kansas City during 2017 was higher than average (38.527) at 46.02 inches.

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<sup>5</sup> *LimnoTech, December 28, 2010*

<sup>6</sup> *LimnoTech, 2005, revised 2010*

<sup>7</sup> *National Weather Service: <https://www.weather.gov/eax/annualpcpn>*

XV. Table 1: Summary of 2017 OCP Water Quality Monitoring

		E. Coli (Count/100 ml)			Dissolved Oxygen (mg/L)		TSS (mg/L)		
Site	No. of samples	Geometric mean	No. of Samples recreational season	Geometric mean recreational season	No. of samples	Average	No. of Samples	Average	
Small Stream Sites	BC-01	29	166	18	1,296	25	8.3	27	8
	BC-02	26	302	17	690	24	6.8	24	6
	BC-03	27	541	18	1,082	25	10.0	26	8
	BC-04	25	152	18	234	24	8.5	24	9
	BC-05	25	253	18	444	24	9.4	24	11
	BC-06	25	727	18	1,927	24	8.8	24	12
	BC-07	26	574	19	1,730	24	8.0	24	19
	BR-01	28	181	18	404	24	8.4	27	49
	BR-02	28	242	19	424	24	8.1	28	37
	BR-03	27	222	18	498	24	8.5	27	43
	BR-04	27	159	19	230	24	9.0	27	29
	BR-05	28	191	19	324	24	8.4	28	39
	BR-06	28	438	19	548	24	8.8	28	49
	BR-07	27	504	19	500	24	8.7	26	35
	BR-08	29	1,052	19	1,678	24	8.6	29	33
	BR-09	27	592	18	682	24	9.5	25	17
	IC-01	29	258	19	326	24	8.1	28	20
	PV-01	29	105	19	281	24	9.5	29	17
	TF-01	26	3,828	17	6,500	23	5.7	24	13
	MC-01	27	207	18	207	24	7.7	26	7
Large River Sites	MR-01-R	17	140	17	140	16	8.7	16	216
	MR-01-C	17	167	17	167	16	8.7	16	191
	MR-01-L	17	163	17	163	16	8.8	17	178
	MR-02-R	32	240	32	240	16	8.6	32	223
	MR-02-C	16	316	16	316	16	8.7	16	233
	MR-02-L	16	393	16	393	16	8.7	16	288
	KR-01-R	15	298	15	298	14	9.3	14	264
	KR-01-C	15	302	15	302	14	9.5	14	267
	KR-01-L	15	246	15	246	14	9.3	14	259

Note: Three locations were monitored at each of the large river sites (MC, KR), one each in the right channel (R), the center channel (C), and left channel (L).

## XVI. SUPPLEMENTAL ENVIRONMENTAL PROJECT PLAN – APPENDIX E

To date there have been three (3) Supplemental Environmental Projects:

- a. SEP No. 1 (original SEP project) – Septic Tank Closure Program
- b. SEP No. 2 - Sustainable Stormwater BMPs associated with Water Services Swope Campus Parking Lot Improvements
- c. SEP No. 3 - Blue River Trailhead at Blue Parkway

### **i. SEP No. 1 - Septic Tank Closure Program**

The original Supplemental Environmental Project plan (SEP) included the implementation of a Sewer Connection and Septic Tank Closure Program for areas where Kansas City Water Services provides sewer services. A re-evaluation of the properties showed that only 277 properties were eligible; of those eligible properties, only 43 connected to the public sewer system. Because of the community's low interest in this septic tank closure program, an Alternative SEP project was proposed by Water Services to USEPA on July 28, 2014.

### **ii. SEP No. 2- Sustainable Stormwater BMPs associated with Water Services Swope Campus Parking Lot Improvements**

This Alternative SEP involved constructing sustainable stormwater best management practices (BMPs) as part of Water Services' Swope Campus Parking Lot Improvements Project. On February 23, 2015, Water Services received a letter from USEPA indicating partial approval of the Swope Campus Parking Lot Alternative SEP in the amount of \$1,100,000. The Swope Campus SEP was substantially completed on September 11, 2015.

### **iii. SEP No. 3- Blue River Trailhead at Blue Parkway**

USEPA allowed Water Services to propose an additional alternative SEP to offset the remaining SEP balance of \$377,382. This third Alternative SEP, submitted to USEPA on April 29, 2015, entitled "*Blue River Trailhead at Blue Parkway*," was approved by USEPA on October 16, 2015. This SEP project uses various BMPs to improve water quality and habitat features from stormwater runoff at the new Blue River Trailhead before ultimately discharging into the Blue River near the Blue Parkway Bridge.

On July 28, 2015, Water Services requested a time extension to complete the Blue River Trailhead at Blue Parkway – SEP No. 3. On October 16, 2015, USEPA approved time extension requests for the Swope Campus SEP Project to September 27, 2016, and for the Blue River Trailhead SEP Project to September 27, 2018.

The design of SEP No. 3 was started in April 2017 and the Project held a bid opening on December 9, 2017. The Notice to Proceed for the construction of the improvements is set for April 2018 and the estimated completion should occur in early September 2018. The project will include over 2,400 square feet of rain gardens, 65 tree plantings, installation of almost 1,600 square feet of permeable pavement of parking area and a weir wall for detention.

## XVII. SCHEDULE FOR IMPLEMENTATION OF DISINFECTION TECHNOLOGY AT WASTEWATER TREATMENT PLANTS— APPENDIX F

Disinfection improvements have been completed. All six of the City's wastewater treatment plants are now equipped with effluent disinfection.

# ATTACHMENT A: DISCHARGE MONITORING AND BYPASS REPORTS

The following is an example of a Discharge Monitoring Report as submitted by Water Services to MDNR. To conserve resources, electronic copies of all discharge and bypass reports submitted to MDNR in 2017 are included on the enclosed disc.

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if Different)  
 NAME: KC, Rocky Branch Sewage Treatment Plant  
 ADDRESS: 4800 E 63<sup>rd</sup> St., Kansas City, MO 64130

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)  
 DISCHARGE MONITORING REPORT (DMR)

Form Approved  
 OMB No. 2040-0004

MO-0048305 PERMIT NUMBER 003 DISCHARGE NUMBER

FACILITY 500 NE 132<sup>nd</sup> Street  
 LOCATION Kansas City, MO 64165

MONITORING PERIOD  
 FROM 2015 01 01 TO 2015 01 31

Check here if No Discharge  
 NOTE: Read Instructions before completing this form

PARAMETER	SAMPLE MEASUREMENT	QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		VALUE	VALUE	UNITS	VALUE	VALUE	VALUE	UNITS			
Flow *	SAMPLE MEASUREMENT	1.2	0.87	MGD	-	-	-	-	-	Daily	24 Hr Total
	PERMIT REQUIREMENT	Daily Max	Monthly Avg		-	-	-	-	-	Once/Weekday	24 Hr Total
Biochemical Oxygen Demands	SAMPLE MEASUREMENT	-	-	-	-	9	6	mg/L	0	Once/Week	24 Hr Composite
	PERMIT REQUIREMENT	-	-	-	-	20 Weekly Avg	10 Monthly Avg		-	Once/Week	24 Hr Composite
Total Suspended Solids	SAMPLE MEASUREMENT	-	-	-	-	13	8	mg/L	0	Once/Week	24 Hr Composite
	PERMIT REQUIREMENT	-	-	-	-	25 Weekly Avg	15 Monthly Avg		-	Once/Week	24 Hr Composite
Ammonia as N (Oct 1 - Mar 31)	SAMPLE MEASUREMENT	-	-	-	0.22	-	0.22	mg/L	0/1	Once	Grab
	PERMIT REQUIREMENT	-	-	-	7.5 Daily Max	-	2.9 Monthly Avg		-	Once/Month	Grab
Oil & Grease	SAMPLE MEASUREMENT	-	-	-	ND <2	-	ND <2	mg/L	0	Once	Grab
	PERMIT REQUIREMENT	-	-	-	15 Daily Max	-	10 Monthly Avg		-	Once/Month	Grab
Dissolved Oxygen *	SAMPLE MEASUREMENT	-	-	-	10	-	9	mg/L	-	8 Times	Grab
	PERMIT REQUIREMENT	-	-	-	Daily Max	-	Monthly Avg		-	Once/Month	Grab
pH	SAMPLE MEASUREMENT	-	-	%	6.8	-	8.5	-	0	6 Times	Grab
	PERMIT REQUIREMENT	-	-	-	Daily Min 6.5	-	Daily Max 9.0		-	Once/Week	Grab

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER  
 Randy Williams  
 Utility Superintendent

TELEPHONE 2015 02 27

816 513-7205

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

COMMENTS AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)  
 \* Monitoring requirement only. \*2 Weekday, except for nine Federal holidays. ND - Non-Detect.

EPA Form 3320-1

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if Different)  
 NAME: KC, Rocky Branch Sewage Treatment Plant  
 ADDRESS: 4800 E 63<sup>rd</sup> St., Kansas City, MO 64130

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)  
 DISCHARGE MONITORING REPORT (DMR)

Form Approved  
 OMB No. 2040-0004

MO-0048305 PERMIT NUMBER 003 DISCHARGE NUMBER

FACILITY 500 NE 132<sup>nd</sup> Street  
 LOCATION Kansas City, MO 64165

MONITORING PERIOD  
 FROM 2015 01 01 TO 2015 01 31

Check here if No Discharge  
 NOTE: Read Instructions before completing this form

PARAMETER	SAMPLE MEASUREMENT	QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		VALUE	VALUE	UNITS	VALUE	VALUE	VALUE	UNITS			
BOD <sub>5</sub> Removal	SAMPLE MEASUREMENT	-	98	%	-	-	-	mg/L	0	Once	24 Hr Composite
	PERMIT REQUIREMENT	-	> 85%		-	-	-		-	Once/Month	24 Hr Composite
TSS Removal	SAMPLE MEASUREMENT	-	98	%	-	-	-	mg/L	0	Once	24 Hr Composite
	PERMIT REQUIREMENT	-	> 85%		-	-	-		-	Once/Month	24 Hr Composite
	SAMPLE MEASUREMENT	-	-	-	-	-	-		-		
	PERMIT REQUIREMENT	-	-	-	-	-	-		-		
	SAMPLE MEASUREMENT	-	-	-	-	-	-		-		
	PERMIT REQUIREMENT	-	-	-	-	-	-		-		
	SAMPLE MEASUREMENT	-	-	-	-	-	-		-		
	PERMIT REQUIREMENT	-	-	-	-	-	-		-		
	SAMPLE MEASUREMENT	-	-	-	-	-	-		-		
	PERMIT REQUIREMENT	-	-	-	-	-	-		-		
	SAMPLE MEASUREMENT	-	-	-	-	-	-		-		
	PERMIT REQUIREMENT	-	-	-	-	-	-		-		

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER  
 Randy Williams  
 Utility Superintendent

TELEPHONE 2015 02 27

816 513-7205

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

COMMENTS AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)  
 \* Monitoring requirement only.

## ATTACHMENT B: REPORTS SUBMITTED UNDER CURRENT NPDES PERMITS

To conserve resources, electronic copies of the following reports submitted to MDNR in 2017 are included in the enclosed disc.

- Monthly Operating Reports
- Industrial Pretreatment Program Annual Report – 2017
- Municipal Separate Storm Sewer System Permit Annual Report – May 1, 2015 – April 30, 2017
- Sewer Extension Authority Report – 2017
- Birmingham Inflow/Infiltration Report - 2017

## ATTACHMENT C: LIST OF CRITICAL FACILITIES AND INSPECTION FREQUENCY

Table 10 below is the start of the critical facilities list and associated inspection frequencies. To conserve resources, an electronic copy of the full list is included in the enclosed disc.

Table 10: Critical Structures Inventory – Kansas City, MO

STRUCTURE NUMBER	LOCATION	MAP #	MH #	RECEIVING STREAM	INSPECTION INTERVAL
2	100 MAIN STREET DIVERSION	S028	302	MISSOURI RIVER	30
3	100 GILLIS AVE DIVERSION 600FT W	S028	954	MISSOURI RIVER	7
4	308 N LYDIA AVE - DIVERSION STRUCTURE	S027	483	MISSOURI RIVER	30
5	* 101 PROSPECT AVE PUMP STATION	S009	800	MISSOURI RIVER	30
6	1931 N CHOUTEAU TRFY* MILWAUKEE PUMP STATION	S006	136	MISSOURI RIVER	30
7	7300 HAWTHORNE DIVERSION	S012	47	BLUE RIVER	30
8	320 BELMONT AVE	S024	209	BLUE RIVER	14
9	WILSON & CAMBRIDGE	S024	87	BLUE RIVER	30
10	801 E 9TH ST, IN PARKING LOT	S035	435	BLUE RIVER	7
11	7601 TRUMAN RD	S036	18	BLUE RIVER	14
12	1800 CRYSTAL AVE	S048	210	BLUE RIVER	14
13	3557 STADIUM DRIVE	S059	9	BLUE RIVER	14
14	3333 STADIUM DRIVE	S059	1	BLUE RIVER	14
16	5015 STATE LINE RD	S078	629	BRUSH CREEK	7
17	1308 W 50TH TER	S078	22	BRUSH CREEK	3
18	4941 WESTWOOD RD	S078	174	BRUSH CREEK	7
19	1204 W 50TH ST	S078	186	BRUSH CREEK	7
20	4979 WARD PARKWAY	S078	323	BRUSH CREEK	7

## ATTACHMENT D: CERTIFICATE OF ACHIEVEMENT OF FULL OPERATION FOR PROJECTS

To conserve resources, electronic copies of the Certificate of Achievement of Full Operation for the following projects achieving this milestone in 2017 are included in the enclosed disc:

- Middle Blue River Neighborhood Sewer Rehabilitation
- Storage: 87th Street Pumping Station Rehab (Phase 1)
- CID In-Line Gates at Santa Fe Pump Station
- Middle Blue River - Distributed Storage: Outfall 059
- Middle Blue River - Distributed Storage: Remaining Area Tributary to Outfall 069





KANSAS CITY  
MISSOURI

[KCMO.GOV/SMARTSEWER](https://kcmo.gov/smartsewer)