



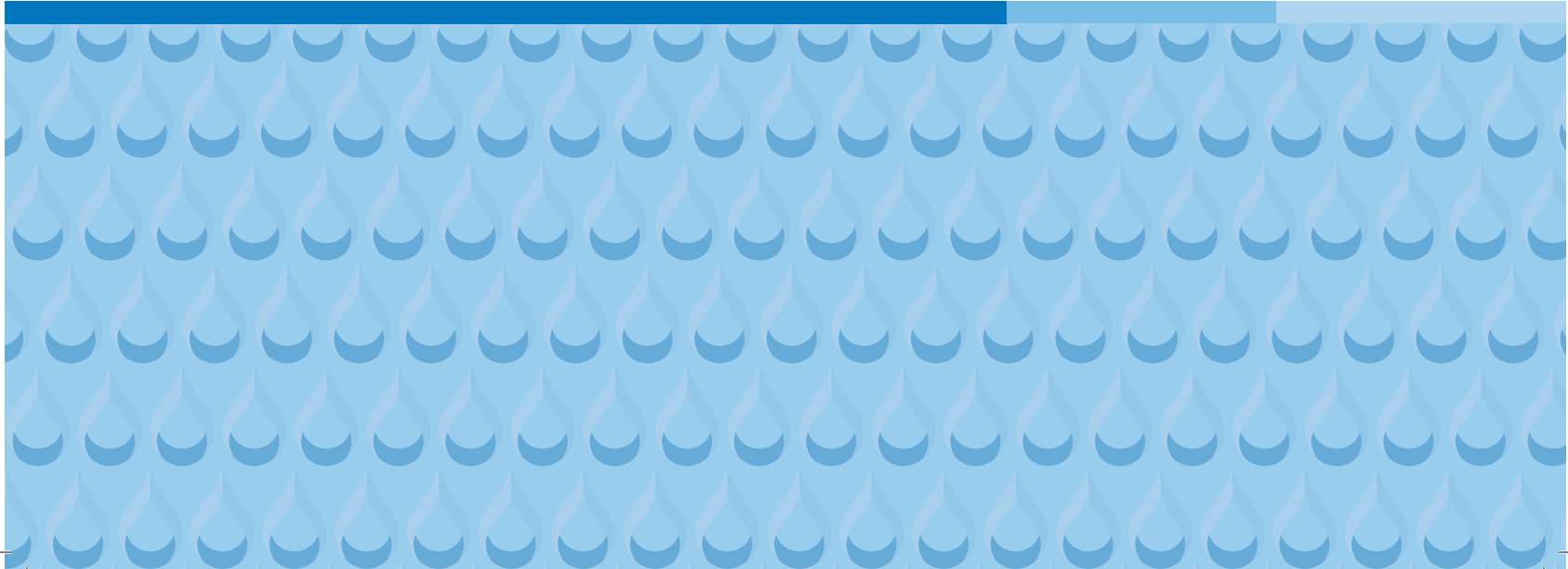
KANSAS CITY'S OVERFLOW CONTROL PROGRAM

ANNUAL REPORT

Reporting Period: January 1, 2016 to December 31, 2016



KANSAS CITY
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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 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, 2016, and December 31, 2016.

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
- 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 the sewered areas
- Implementation of disinfection at all six wastewater treatment plants

III. KANSAS CITY'S SEWER SYSTEM OVERVIEW

Kansas City began building the basic sewer infrastructure that would allow the city to grow and prosper more than 150 years ago. 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 sanitary sewer system are a separate 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 for 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, 2016, through December 31, 2016. Work also 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 schedule 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

Lower Blue River Basin

- Neighborhood Sewer Rehabilitation
 - Consent Decree Required Start Date – 2018
 - Actual Start Date – September 2016

Middle Blue River Basin

- Consolidation Piping – Outfall 063
 - Consent Decree Required Start Date – 2016
 - Actual Start Date – February 2014

- Sewer Separation – Outfall 099
 - Consent Decree Required Start Date – 2016
 - Actual Start Date – March 2015

- Sewer Separation – Outfall 067
 - Consent Decree Required Start Date – 2016
 - Actual Start Date – June 2014

- Relief Sewer – Diversion Structure 068
 - Consent Decree Required Start Date – 2016
 - Actual Start Date – April 2015

Northeast Industrial District (NEID) Basin

- Neighborhood Sewer Rehabilitation
 - Consent Decree Required Start Date – 2017
 - Actual Start Date – February 2016

- Gooseneck Creek In-line Gates and Pump Station
 - Consent Decree Required Start Date – 2016
 - Actual Start Date – March 2015

- Sewer Separation - Diversion Structure 006
 - Consent Decree Required Start Date – 2016
 - Actual Start Date – February 2014

Turkey Creek/Central Industrial District Basins

- Central Industrial District Storm Drainage Improvements
 - Consent Decree Required Start Date – 2016
 - Actual Start Date – December 2013

- Upgrade the Turkey Creek Pump Station
 - Consent Decree Required Completion Date – December 31, 2016
 - Actual Completion Date – November 2016

- Neighborhood Sewer Rehabilitation
 - Consent Decree Required Start Date – 2018
 - Actual Start Date – October 2016

Westside WWTP

- Wet Weather Treatment Improvements – Phase 1
 - Consent Decree Required Start Date – 2017
 - Actual Start Date – July 2016

South of the Missouri River Separate Sewer System

- Round Grove Pumping Station Capacity Improvements
 - Consent Decree Required Start Date – 2016
 - Actual Start Date – May 2016

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 BR032 (suspended)
- Outfall BR033 (suspended)
- Outfall BR056 (continued)

V. DATA MANAGEMENT AND PROJECT CONTROLS

Managing the large amount of data generated by OCP is a primary focus of Kansas City Water Services. During the reporting period, Water Services 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, Water Services continued to utilize Primavera scheduling tools for schedule management. This software enables 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 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 was being integrated into the City's GIS platform.

During the reporting period, the program 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 source that are cost-effective for the City to remove. It also provided real-time analytics data to track program performance.

The program also began pilot-testing Aconex, a web-based software as a service (SAAS) program, for document control on OCP projects in 2016. 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

A summary of public outreach activities for the City's OCP program completed during the reporting period is provided below. Additional information regarding these activities is in the discussion of NMC 7, which begins on page 32 in this report.

- Conducted 17 public meetings attended by 431 citizens about OCP projects, which are discussed in more detail later in this report.
- Hosted 29 Scheduling Events reaching 662 residents in support of Kansas City's Private Inflow and Infiltration Program, Keep Out the Rain.
- Published OCP-related information on the Water Services website at kcwaterservices.org, KC Water newsletters, the City of Kansas City, Missouri publications and online at kcmo.gov.

VII. IMPLEMENTATION OF OVERFLOW CONTROL MEASURES

A. POST-CONSTRUCTION MONITORING PROGRAM

Post-construction monitoring activities completed in 2016, as defined in *Appendix D* of the Consent Decree, are outlined in this report beginning on page 71.

B. GREEN INFRASTRUCTURE

i. ADDITIONAL GREEN INFRASTRUCTURE PILOT

Additional green infrastructure pilot projects in NEID and Lower Blue River Basins have moved forward from conceptual design to 30% design. During the reporting period, preliminary design was completed at three sites:

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

Each of the sites has had one or more green infrastructure conceptual designs completed that incorporates input from the property owner. The preferred concept design was moved forward to preliminary design at two of the three sites. The East High School site was only completed to concept design to match the schedule for

other improvements being completed on site by the school district. In 2017, all three sites are anticipated to have preliminary and final design completed. Depending on each property owner's schedule, construction at one or more of the sites may begin in 2017.

ii. CONSENT DECREE GREEN INFRASTRUCTURE PROJECTS

During the reporting period, Water Services 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 during the reporting period to complete green infrastructure conceptual designs for two green infrastructure facilities. The conceptual designs were substantially completed in 2016. Preliminary and final design for the green infrastructure sites will begin in 2017, with preliminary design completed in 2017, and final design anticipated to be completed by 2018. Construction is also scheduled to begin in 2018.

For the Turkey Creek/Central Industrial District project, a Design Professional was selected during the reporting period to complete green infrastructure conceptual designs at three locations. The concept designs for all the three locations were completed, and preliminary design of the green infrastructure began during the reporting period. Preliminary design and final design is scheduled to be completed by December 2017. Construction is scheduled to begin in 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 assumed care of the maintenance work for the pilot project area. The crew provided routine and seasonal maintenance as required under the site maintenance plan. In addition, nine concrete forebays were retrofitted to eliminate standing water and increase performance. In 2017, Water Services plans on partnering with 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, Town Fork Creek, and Turkey Creek/Central Industrial District.

Field investigation activities for neighborhood sewer rehabilitation projects are being completed through a Water Services OCP Program Management contract and city-wide sewer cleaning and closed circuit television (CCTV) inspection contract. The work consists of sewer system network characterization and manhole inspections, sewer cleaning, and CCTV inspection of sanitary sewers in the NEID and Lower Blue River 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 phases, 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*. During the reporting period, the combined sewer system had 20 active projects. Two (2) projects were in pre-design, meaning that the Request for Proposal/Qualification was under development or contracts with Design Professional were under negotiation. Eight (8) projects were under design, and ten (10) projects were either advertising for construction bids, under construction, or construction was completed.

Table 1: Project Status - Combined Sewer System Basin (through December 31, 2016)

COMBINED SEWER SYSTEM		Pre-Design	Design	Construction	CD Due Date
Project Name	Description	Percent Complete through 12/31/2016		Planned Completion Date	
Brush Creek Basin					
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>50%</u> July 2017	June 2019	12/31/2020
Lower Blue River Basin					
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 were issued for the rehabilitation of manholes and sewer pipes that are 12-inches and smaller in diameter.	<u>50%</u> May 2017	April 2019	June 2021	12/31/2021
Middle Blue River Basin					
Distributed Storage: Outfall 059	Green infrastructure solutions are being implemented to reduce combined sewer overflows at Outfall 059. Three construction contracts have been issued for completion of the work. <i>*Construction for Phase 1 is 100% complete; Phase 2 is 95% complete; and Phase 3 is 45% complete.</i>	<u>100%</u>	<u>100%</u>	* Sept. 2017	12/31/2017
Distributed Storage: Outfall 069	Green infrastructure solutions are being implemented to reduce combined sewer overflows at Outfall 069. Three construction contracts have been issued for completion of the work. <i>**Construction for Phase 1 is 100% complete; Phase 2 is 85% complete; and Phase 3 is 40% complete.</i>	<u>100%</u>	<u>100%</u>	** Sept. 2017	12/31/2017

COMBINED SEWER SYSTEM		Pre-Design	Design	Construction	CD Due Date
Project Name	Description	Percent Complete through 12/31/2016 Planned Completion Date			
<i>Middle Blue River 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 have been issued for rehabilitation of manholes and sewer pipes that are 12-inches and smaller in diameter within the collection system. Area 1 construction achieved full operation in August 2015. Area 2 construction achieved full operation in December 2016.	<u>100%</u>	<u>100%</u>	<u>99%</u> Dec. 2016	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 15 of 18 diversion structures. 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 and integration of water main replacement work. Due to the size of the project, it has been broken up into two phases to facilitate construction. WSD has requested a time extension from EPA Region 7 for this project due to the expanded scope of the project to integrate water main and full sewer separation work.	<u>100%</u>	<u>100%</u>	<u>15%</u> Aug. 2018	12/31/2018 requested
Sewer Separation: Outfalls 066 and 067	Design documents are being prepared 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>70%</u> May 2017	Oct. 2019	12/31/2019

COMBINED SEWER SYSTEM		Pre-Design	Design	Construction	CD Due Date
Project Name	Description	Percent Complete through 12/31/2016		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. As a result 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> March 2016	<u>10%</u> May 2018	12/31/2018
Relief Sewer: Diversion Structure 068 to Blue River	The project is being designed to reduce combined sewer overflows by eliminating typical year overflows at Outfall 068. A conceptual alternatives evaluation was completed. A new open storage basin will be constructed in lieu of a relief sewer. WSD has requested a time extension from EPA Region 7 for this project due to its expanded scope involving landfill investigation in the vicinity of new open storage basin.	<u>100%</u>	<u>25%</u> July 2018	July 2020	12/31/2020 requested
<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>15%</u> Dec. 2017	12/31/2018 requested
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 a tiered extended detention facility with wetland vegetation, permeable pavement, bioswales and an open channel for conveyance.	<u>100%</u>	<u>15%</u> Feb. 2018	Aug. 2020	12/31/2020

COMBINED SEWER SYSTEM		Pre-Design	Design	Construction	CD Due Date
Project Name	Description	Percent Complete through 12/31/2016		Planned Completion Date	
<i>Northeast Industrial District Basin, continued</i>					
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 a combined sewer flow utilizing a real-time control (RTC) system and a new 4-MGD submersible pump station. The pump station will deliver the stored volume to the Blue River Interceptor through a new force main. WSD has requested a time extension from EPA Region 7 for this project due to potential property acquisition issues.	<u>100%</u>	<u>60%</u> June 2017	Oct. 2018	12/31/2019 requested
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>10%</u> April 2018	April 2020	12/31/2020
<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>	July 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>	Achieved Full Operation on 11/1/16 <u>95%</u> Final Completion March 2017	12/31/2016

COMBINED SEWER SYSTEM		Pre-Design	Design	Construction	CD Due Date
Project Name	Description	Percent Complete through 12/31/2016		Planned Completion Date	
<i>Turkey Creek/Central Industrial District Basin, continued</i>					
CID In-Line Gates at Santa Fe Pump Station	This project is being performed to modify 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 gates, including the addition of real-time SCADA control capabilities and establishment of gate operational criteria.	<u>100%</u>	<u>100%</u>	Sept. 2017	12/31/2017
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>20%</u> Dec. 2017	April 2020	12/31/2020
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>50%</u> May 2017	April 2019	June 2021	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>	Nov. 2018	12/31/2018
<i>Westside WWTP</i>					
Westside Wastewater Treatment Plant	This project involves wet weather treatment and disinfection sized for 32 mgd. A facility plan for non-OCP work will also be completed. Design is also scheduled to comment in March 2017.	<u>50%</u>	June/July 2018	December 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.

Field investigation activities for the I/I reduction projects are being completed through a Water Services OCP Program Management contract and City-wide Sewer Cleaning and Closed Circuit Television (CCTV) Inspection contracts. The work consists of sewer system network characterization and manhole inspections, sewer cleaning, and CCTV inspection of sanitary sewers in the Line Creek/Rock Creek and Little Blue River 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 13 active projects. Two (2) 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. Five (5) projects are currently in design, and six (6) projects are advertising for construction bids, construction is underway, or was completed in 2016.

Table 2: Project Status – Separate Sanitary Sewer System Basin (through December 31, 2016)

SEPARATE SANITARY SEWER SYSTEM		Pre-Design	Design	Construction	CD Due Date
Project Name	Description	Percent Complete through 12/31/2016		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>	Bidding July 2018	12/31/2018
I/I Reduction Area 2	The project consists of the 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>	Bidding July 2018	12/31/2018
<i>Blue River North Basin</i>					
I/I Reduction	The project consists of the 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>	Bidding July 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>90%</u> April 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, 2 new manholes, and manhole rehabilitation. Construction of the rehabilitation measures will achieve targeted infiltration and inflow reduction.	100%	<u>100%</u>	<u>85%</u> July 2017	12/31/2021

SEPARATE SANITARY SEWER SYSTEM		Pre-Design	Design	Construction	CD Due Date
Project Name	Description	Percent Complete through 12/31/2016		Planned Completion Date	
<i>Blue River South Basin, continued</i>					
I/I Reduction Area 3	The project consists of the 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>	Bidding June 2018	12/31/2021
I/I Reduction Area 4	The project consists of the 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>30%</u> July 2017	Jan. 2020	12/31/2021
I/I Reduction Area 5	The project consists of the 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>40%</u> May 2017	Oct 2018	12/31/2021
<i>Line Creek/Rock Creek</i>					
I/I Reduction Area 1	The project consists of the 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>90%</u> Feb. 2017	Sept. 2018	12/31/2023
I/I Reduction Area 2	The project consists of the 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>95%</u> Feb. 2017	March 2019	12/31/2023
I/I Reduction Area 3	The project consists of the 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>50%</u> June 2017	June 2019	Nov. 2021	12/31/2023

SEPARATE SANITARY SEWER SYSTEM		Pre-Design	Design	Construction	CD Due Date
Project Name	Description	Percent Complete through 12/31/2016 Planned Completion Date			
<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. WSD has requested a time extension from EPA Region 7 for this project to enable the I/I Reduction in Blue River Central Project to be completed to properly size new pumps.	100%	0% June 2017	Aug. 2021	12/31/2022
<i>Little Blue River</i>					
I/I Reduction Area 1	The project consists of the 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.	50% June 2017	July 2019	Nov. 2021	12/31/2021

a. Private Inflow/Infiltration Reduction Program

In 2016, Water Services continued to develop and commenced the implementation of 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.

In March 2016, three Design Professional firms began conducting building plumbing evaluations, and in August 2016, local plumbing contractors began to disconnect cost-effective I/I sources identified by the Design Professionals.

By the end of the reporting period, the following had been accomplished under the I/I reduction program through voluntary participation by property owners:

- Building plumbing evaluations had been attempted at approximately 12,000 private properties.
- Interior and exterior building plumbing evaluations had been completed at approximately 6,000 private properties.
- Exterior building plumbing evaluations only had been completed at approximately 5,600 private properties.
- Approximately 1,500 cost-effective private I/I sources had been identified at approximately 1,000 private properties.
- Approximately 300 disconnection repairs had been completed by plumbing companies 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, 2017, and June 30, 2017. This list, however, should not be interpreted as an explanation of all activities that will occur in the first half of 2017. 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:
 - Dry Weather Sewer Line: Outfall 056 in the Middle Blue River Basin
 - Green Infrastructure Workforce Development
 - Birmingham Relief Sewer Project

- Requests for bids proposals will be advertised for selection of Construction Contractors for the following OCP projects:
 - Blue River Central I/I Reduction Area 1 Project
 - Blue River Central I/I Reduction Area 2 Project
 - Blue River North I/I Reduction Project
 - Line Creek/Rock Creek I/I Reduction Area 1 Project
 - Line Creek/Rock Creek I/I Reduction Area 2 Project
 - Sewer Pipe Consolidation: Outfall 063 Project and Sewer Separation - Phase 2
 - Gooseneck Arch Sewer Gate and Pump Station Improvements
 - In-Line Storage: OK Creek Gates
 - Additional Green Infrastructure Pilots in NEID and Lower Blue River basins

- Water Services will issue a Notice to Proceed to Design Professionals or Construction Contractors for the following OCP projects:
 - Neighborhood Sewer Rehabilitation: Lower Blue River (design)
 - Neighborhood Sewer Rehabilitation: Turkey Creek/CID (design)
 - Westside Wastewater Treatment Plant – Wet Weather Phase 1 (design)
 - Line Creek I/I Reduction Area 3 (design)
 - Little Blue River I/I Reduction Area 1 (design)
 - CID In-Line Gates at Santa Fe Pump Station (construction)
 - In-Line Storage: OK Creek Gates (construction)
 - Blue River South I/I Reduction Area 3 (construction)
 - Blue River Central I/I Reduction Area 1 Project (construction)
 - Blue River Central I/I Reduction Area 2 Project (construction)
 - Blue River North I/I Reduction Project (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 2016.
- 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: 2016 NMC Accomplishments Summary

NMC	Description	Accomplishments
1	Proper Operation and Regular Maintenance Program	<ul style="list-style-type: none"> ✓ Conducted routine maintenance procedures ✓ Conducted routine inspection schedules ✓ Carried out the emergency response protocol and reported 60 dry weather overflows, 22 in the CSS ✓ Inspected flow regulating structures ✓ Conducted 119 miles of CCTV inspections ✓ Cleaned 166 miles of CSS interceptor and collection lines ✓ Received and responded to 3,526 3-1-1 Action Center calls about the City’s wastewater collection system
2	Maximization of Storage in the Collection System	<ul style="list-style-type: none"> ✓ Conducted 11,572 inspections of the CSS diversion structures ✓ Began construction on 8 projects to reduce and/or eliminate inflows and encourage upstream detention ✓ Rehabilitated Turkey Creek Pump Station to help reduce overflows to the Kansas River ✓ Rehabilitated Milwaukee Flood Station and sluice gate at Prospect Flood Station to optimize interceptor sewer capacity
3	Review and modification of pretreatment requirements	<ul style="list-style-type: none"> ✓ Inventoried non-domestic CSS discharges ✓ Inspected 66 non-domestic FOG sources ✓ Assessed non-domestic CSO discharge impacts ✓ Issued 20 citations for standards violations and self-reporting violations
4	Maximization of Flow to the POTW for Treatment	<ul style="list-style-type: none"> ✓ Contracted an In-Line Storage and Conveyance Operational Analysis study using real-time control to optimize system storage and capacity
5	Elimination of CSOs during Dry Weather	<ul style="list-style-type: none"> ✓ Conducted 1,156 inspections of flow regulating structures in CSS to identify dry weather overflows

NMC	Description	Accomplishments
		<ul style="list-style-type: none"> ✓ Repaired 459 localized sewer defects ✓ Reported 22 dry weather overflows in the CSS ✓ Reported 4 dry weather overflows from CSOs ✓ Reported 2 pump station dry weather overflows ✓ Performed routine preventative cleaning of system
6	Control of Solids and Floatable Material in CSOs	<ul style="list-style-type: none"> ✓ Repaired or replaced 197 catch basins ✓ Inspected and cleaned 14,476 catch basins ✓ Conducted street sweeping of 11,504 lane miles ✓ Performed construction site erosion control at 42 city-contracted construction sites
7	Pollution Prevention Programs to Reduce Contaminants in CSOs	<ul style="list-style-type: none"> ✓ Conducted street sweeping of 11,504 lane miles ✓ Carried out Oil and Grease Management Program ✓ Conducted Solid Waste and Recycling activities ✓ Conducted Household Hazardous Waste Program ✓ Conducted Leaf and Brush Collection and Recycling Programs ✓ Collected 130,829 tons of solid waste ✓ Distributed 2,366 trash carts in the Middle Blue River Outfall 059 and 069 project areas ✓ Conducted Public Education and Outreach Programs ✓ Made 22 presentations to more than 900 citizens and stakeholders ✓ Conducted 18 public meetings with approximately 275 residents
8	Public Notification	<ul style="list-style-type: none"> ✓ Provided CSO notification ✓ Distributed 9 media advisories for sewer overflows ✓ Conducted warning sign inspections
9	Monitoring to Characterize CSO Impacts and the Efficacy of CSO Controls	<ul style="list-style-type: none"> ✓ Identified and mapped CSO structures and outfalls ✓ Monitored water quality

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 2016 (May 1, 2015 through April 30, 2016), the operating expenses for sewer operations were as follows:

- Wastewater Treatment and Pumping: \$ 30,568,910
- Sewer Maintenance: \$26,185,991
- Administration and General: \$ 27,654,747
- Industrial and Household Hazardous Waste: \$1,315,945

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: 2016 CSS Maintenance Activities

Activity	Quantity
Sewer- Main Stoppages Opened	102 work orders
Sewer- Main Repairs	459 work orders
Sewer- Manhole Repair/Resurfacing	158 work orders
Sewer- Water in the Basement	969 work orders
Sewer CCTV	119 miles
Sewer Cleaning	166 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 2016, approximately 119 miles of CSS were televised, which far exceeded the Consent Decree requirement of 41.6 miles for 2016. 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 also utilized 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 2016, approximately 166 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 2016, a total of 60 dry weather overflows were reported, 22 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, 3,526 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, 11,572 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 Structure 1 was eliminated in 2016 by the Neighborhood Planning Division.

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

The City actively identifies projects that have 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 six (6) other green infrastructure projects currently in design and two (2) projects under construction through the stormwater and wastewater divisions. These projects are intended to reduce inflows or provide solutions for localized flooding.

In 2016, design began on six (6) projects and construction began on two (2) projects listed in *Table 5* below. 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 (2016)

Property/Project Name	Phase	Description/Type
Marlborough 81 st Street and Chestnut	Construction	Rain Garden
Ruskin Heights Channel	Construction	Live channel bed
89 th & Lane	Design	Live channel bed
7900-8100 Olive	Design	Rain garden and bioswales
Loma Vista & Eastern	Design	Enhanced detention basins
Cookingham-Lakeside	Design	Potential undetermined green infrastructure component
4049 E. 70 th Terrace	Design	Detention Basins with Native Plants
4012 & 4016 Cleveland Ave	Design	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 Plans 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 2016, the Turkey Creek Pump Station was upgraded, including the replacement of pumps, flap gate hinges, and bar screens. In addition, the elevation of the overflow wall was raised 12 inches to prevent flow from bypassing/overflowing sooner. These repairs will help reduce the occurrence of the Kansas River surcharging back into the station.

Contractors also repaired a sluice gate at the Prospect Flood Station and rehabilitated the Milwaukee Flood Station, which will help prevent the Missouri River from backing up into the NEID sewer.

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 Line 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 Hansen.

c. NMC 3- Review and Modification of Pretreatment Requirements

The Industrial Waste 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 2016.

i. FEDERAL PRETREATMENT PROGRAM

The Industrial Waste 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 2015 Industrial Pretreatment Program Annual Report was submitted to the MDNR on March 30, 2016, 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 Industrial Waste 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 68 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' Industrial Wastewater 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 2016, there were 610 food service establishment inspections. There were no enforcement actions taken as a result of these inspections.

iv. REVIEW OF PRETREATMENT REQUIREMENTS

Every year, the Industrial Waste Division reviews the pretreatment program to determine whether changes are warranted. Economic and environmental impacts are taken into account when evaluating potential changes. These include an assessment of the non-domestic discharges to the CSS. In 2016, no changes to the pretreatment program were made.

In 2016, as part of the development of a Wastewater System Master Plan by the City's OCP Program Manager, an evaluation of the Industrial Pretreatment Program was completed and recommendations were presented to Water Services and Industrial Waste Division for consideration.

The following improvements were recommended to the City's Industrial Pretreatment Program (IIP):

- Hire four (4) staff
- Purchase an Emergency Response Vehicle
- Purchase three (3) composite samplers
- Purchase five (5) portable PC tablets for inspection and data acquisition
- Provide four (4) wireless internet hubs and broadband cable installation
- Purchase and maintain an IPP recordkeeping software
- Conduct industrial user surveys on a regular scheduled basis (every 5 years)
- Conduct updated Loadings Survey on the Blue River WWTP and other WWTP's receiving industrial discharges every 10-20 years
- Eliminate the 40 percent discount for SIUs not having a NOV for 12-month period
- Switch from the IIP application form to an industrial user survey form
- Update the City Sewer Ordinances as outlined in Appendix A
- Update the Enforcement Response Plan (ERP)

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 2006.¹ Plant stress tests were also performed on both plants.² 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 is limited by secondary treatment capacity of 156 MGD. Stress testing has confirmed that 40 MGD is the peak capacity the Westside WWTP can process without affecting process performance. Water Services plans to convert the secondary treatment system consisting of trickling filtration over to activated sludge when necessitated by future regulatory requirements and also to increase wet weather capacity in the future as part of the Overflow Control Program.

In 2016, Water Services contracted a second phase of the In-Line Storage and Conveyance Operational Analyses Project to evaluate the possible use of real-time controls to optimize storage and conveyance, increase capacity of the collection system, and balance flows between the Westside, Blue River, and Birmingham WWTPs. The purpose of this balance is to utilize the capacity at pump stations and treatment plants throughout the Line Creek/Rock Creek, Brush Creek, Turkey Creek, and Blue River basins to minimize CSO and SSO activations and volume discharged to receiving streams.

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 achieved due to the capacity limitation of secondary treatment.

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

² *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. Within five days of the original notification, follow-up written reports are made. 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 2016, 22 dry weather overflows in the CSS and four (4) 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 2016, dry weather overflows occurred on the following days and locations:

- Westside Wastewater Treatment Plant
 - Mace Road Pump Station: January 19, 2016
 - Pied Creek Pump Station: June 07, 2016
 - Pied Creek Pump Station: July 12, 2016
 - Burlington Creek Pump Station: August 22, 2016
- Birmingham Wastewater Treatment Plant
 - May 30, 2016
 - June 3, 2016

Attachment A includes copies of these reports submitted in 2016.

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 2016, Water Services swept a total of 11,504 lane miles, including 7,626 lanes miles in the combined sewer system area and 3,878 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 2016, 14,476 catch basins were inspected and cleaned, and 197 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 2016, 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 2016 is listed in *Table 6*.

Table 6: 2016 Amount of Solid Waste Collected

Waste	Quantity
Solid Waste	87,226 Tons
Recycling – Curbside	19,464 Tons
Recycling – Recycling Centers	741 Tons
Bulky Items	4,983 Tons
Leaf and Brush	3,606 Tons
Waste Tires	17,040 Tires
Household Hazardous Waste	721 Tons
Illegal Dumping Collected	3,244 Tons
TOTAL	119,985 Tons

During the reporting period, the City distributed 2,366 trash carts, for free to residents, in the Middle Blue River Distributed Storage Outfall 059 and 069 project areas as a demonstration project to promote best practices for solid waste collection and the control of floatables.

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 2016, the program served 31 communities, including Kansas City, from four 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 residential hazardous waste, including pesticides, herbicides, and fertilizers. It is open to the public on Thursdays, Fridays and Saturdays year-round, except City-observed holidays.

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. 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 in landfills, storm sewers, or sanitary sewer facilities. More than 3,171 vehicles were served at the mobile events in 2016.

In 2016, the program collected a total of 1,441,754 pounds (721 Tons) of HHW materials, including 774,531 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, 3,606 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 Overflow Control Program, are provided below.

1. Presentations, Conferences, and Tours

During the reporting period, 24 presentations were made to more than 900 citizens and stakeholders about OCP, 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:

- KCIC-MOARC Conference — February 2016
- Time Warner Cable Lunch and Learn – February 26, 2016
- Community Engagement University – April 5, 2016
- i-Build Showcase – April 14, 2016
- East High School Green Guard – April 14, 2016
- Wet Weather Conference—May 2016

- Groundbreaking at 81st Troost Green Infrastructure Site – May 2016
- AWWA Conference—June 2016
- NLC Tour—June 29, 2016
- LICA Tour—July 20, 2016
- WEFTEC Conference—September 2016
- Community Engagement University – September 27, 2016
- Art and Science on the River Kickoff – October 7, 2016
- National Clean Water Law Conference—November 2016
- Water Services offers educational tours of the Swope Campus Parking lot to interested groups. A total of 10 tours were conducted in 2016, reaching 106 people. These tours included four work days with students from GreenWorks KC where students assisted with planting milkweed in the bioretention cells or held 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 2016 in support of OCP projects. A total of 17 public meetings were held for OCP projects with approximately 431 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 (2016)

Date	Project	Meeting Purpose	No. of Attendees
January 11, 2016	Historic West Bottoms Assoc.: CID Green Infrastructure	Project informational meeting	20
February 2, 2016	Middle Blue River Distributed Storage Outfall 059 and 069 Target Green Tour	Neighborhood Update	50
February 2, 2016	Brush Creek Coordination Committee: Middle Blue River Basin Green Solutions	Project update meeting	15
February 18, 2016	Marlborough Zoning Overlay	Project informational meeting	10
February 22, 2016	Vacant to Vibrant Working Group: Green Infrastructure	Community discussion	20
May 26, 2016	81 st & Troost Green Infrastructure Site	Community discussion	11
June 16, 2016	Rachel Morado Green Infrastructure Site	Community discussion	11
July 7, 2016	Marlborough Livable Streetscape	Community discussion	14
September 19, 2016	NE Industrial Association: NEID 006	Project update	50

Date	Project	Meeting Purpose	No. of Attendees
September 20, 2016	Town Fork Creek: Neighborhood Sewer Rehabilitation	Project informational meeting	42
September 20, 2016	Town Fork Creek: Neighborhood Sewer Rehabilitation	Project informational meeting	11
September 22, 2016	Middle Blue River Distributed Storage Outfall 059 and 069 Target Green	Community update meeting	50
October 11, 2016	Middle Blue River Sewer Pipe Consolidation/ Sewer Separation at Outfalls 063/099	Project informational meeting	5
October 14, 2016	6 th District Community Update: Overflow Control Program Update	Community update meeting	50
November 15, 2016	Country Club Right of Way Meeting: 006/067	Project update	45
November 30, 2016	NE Gooseneck Creek: Smoke Testing	Project informational meeting	3
December 8, 2016	City of Kansas City, MO Council Update: Overflow Control Program	Council & Community Update	24 Also aired on KC Channel 2

In addition to the 18 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 Program, called Keep out the Rain. *Table 8* displays information pertaining to these outreach efforts which total 29 scheduling events with 662 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 (2016)

Date	Project	Meeting Purpose	No. of Attendees
April 19, 2016	Keep Out the Rain	Scheduling Event	25
April 26, 2016	Keep Out the Rain	Scheduling Event	25
May 3, 2016	Keep Out the Rain	Scheduling Event	1
May 17, 2016	Keep Out the Rain	Scheduling Event	4
May 17, 2016	Keep Out the Rain	Scheduling Event	15
May 18, 2016	Keep Out the Rain	Scheduling Event	75
May 24, 2016	Keep Out the Rain	Scheduling Event	18

Date	Project	Meeting Purpose	No. of Attendees
June 2, 2016	Keep Out the Rain	Scheduling Event	20
June 8, 2016	Keep Out the Rain	Scheduling Event	20
June 9, 2016	Keep Out the Rain	Scheduling Event	10
June 29, 2016	Keep Out the Rain	Scheduling Event	14
June 29, 2016	Keep Out the Rain	Scheduling Event	12
June 30, 2016	Keep Out the Rain	Scheduling Event	12
July 14, 2016	Keep Out the Rain	Scheduling Event	21
July 28, 2016	Keep Out the Rain	Scheduling Event	6
August 30, 2016	Keep Out the Rain	Scheduling Event	4
September 1, 2016	Keep Out the Rain	Scheduling Event	12
September 7, 2016	Keep Out the Rain	Scheduling Event	4
September 9, 2016	Keep Out the Rain	Scheduling Event	35
September 27, 2016	Keep Out the Rain	Scheduling Event	35
September 29, 2016	Keep Out the Rain	Scheduling Event	20
October 1, 2016	Keep Out the Rain	Scheduling Event	36
October 3, 2016	Keep Out the Rain	Scheduling Event	50
October 11, 2016	Keep Out the Rain	Scheduling Event	50
October 11, 2016	Keep Out the Rain	Scheduling Event	35
October 26, 2016	Keep Out the Rain	Scheduling Event	30
October 27, 2016	Keep Out the Rain	Scheduling Event	35
November 14, 2016	Keep Out the Rain	Scheduling Event	30
November 21, 2016	Keep Out the Rain	Scheduling Event	8

3. Target Green

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, Water Services provided project updates to the Marlborough Community

Coalition, an overarching neighborhood group in the project area, at several of their regularly scheduled monthly meetings.

On September 22, 2016, more than 50 area residents attended an open house to celebrate the City's receipt of the Envision Platinum Award for the Middle Blue River Basin Green Infrastructure Projects, to view updated project information about the Target Green Marlborough Project, and discover other City resources that may be available to residents in the community. The city departments that participated included:

- City Manager's Office
- City Communications
- City Planning and Development
- Health Department
- Land Bank
- Neighborhood and Housing Services
- Parks and Recreation
- Public Improvements Advisory Committee
- Public Works – Capital Projects
- Public Works – Solid Waste
- Water Services

The purpose of this coordinated public education and outreach effort was to encourage residents to participate in existing City programs that improve the neighborhood while protecting water quality, and reducing water/energy consumption. Some of the programs included:

- Lead paint abatement program
- Minor home repair program
- Paint program
- Historic preservation tax credits
- Brownfields assessment program
- Income-eligible weatherization assistance
- Home rebate program for energy efficiencies upgrades
- Programmable thermostat program
- Land bank program
- Energy Sense Water Heater and Space Heating Rebate program
- Solid waste neighborhood clean-up program

4. Other Outreach

During the reporting period, the City of Kansas City, Missouri and the Water Services Department continued to add OCP project information online. The KC Water website (www.kcwaterservices.org/overflow-control-program) provides general information about the Overflow Control Program, and the Current Projects page contains project fact sheets. The fact sheets provide citizens information about a particular 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.org/marlborough) provides updates regarding collaborative city efforts within the Target Green project area (Distributed Storage at Outfalls 059 & 069).

The 2015 Storm Drain Manhole Cover Design Contest invited local artists to design a manhole cover with a water quality message that would be placed on highly visible catch basins in both the combined and separate sewer systems. The winning design featured aquatic species and the message “THINK – Protect Your Water, Protect Our Home”. In April 2016, the manhole covers were cast and 76 were installed in strategic locations throughout the city, including Royals Stadium, City Hall, and the Marlborough Neighborhood.

v. **NEWSLETTERS**

Water Services produces both internal and external newsletters for disseminating information to employees and customers respectively. The internal newsletter, titled “News on Tap,” is distributed to employees electronically and in hard copy on a monthly basis. Each of these newsletters contained aspects supporting the education efforts for the Overflow Control Program. Water Services included two articles on wastewater-related topics and initiatives in the employee newsletter in 2016.

The external newsletter, known as “What’s On Tap,” was sent to customers twice in 2016 along with their water bills and included the following topics:

- *June 2016: Breaking Ground on KC’s Largest Green Infrastructure Project*
- *September 2016: KC Water uses Robots to fix Kansas City’s Sewers*

The internal 2016 newsletters included the following wastewater-related topics:

- *March 2016: Keep Out the Rain*
- *August 2016: What is Green Infrastructure?*

vi. **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 2016, 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. No applications were received for the program in 2016; additional marketing of the program will begin in 2017.

For Earth Day, 2016, 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.

2. Green Infrastructure Team

The Green Infrastructure Team (GIT) focuses on identifying, tracking, and supporting green infrastructure capital projects in Kansas City. Their focus in 2016 was to create and conduct a survey of city departments to determine how to best move forward with the maintenance of green infrastructure installations. The survey was completed and conducted and the team is in the process of compiling recommendations to the City Manager.

vii. STORMWATER: FROM KC TO THE SEA

Since 2010, Water Services has worked to educate local 4th- through 6th-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 2016, 3,207 students from 39 schools throughout Kansas City participated in the program. The curriculum also received an Excellence in Communications Award from the North Association of Flood and Stormwater Management Agencies during the reporting period.

viii. 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 2016, Water Services assisted 15 groups with water quality related events, reaching 691 people.

ix. 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. 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. The program accomplishes this through a bi-annual community survey, yearly media campaign, printed materials, and a grant program that funds projects designed to improve public understanding of the negative impacts of stormwater runoff.

The “Blue Thumb-Planting for Clean Water” campaign that began in fall of 2015 was carried over for 2016. This media campaign targeted homeowners, local governments, contractors, and those interested in gardening, landscaping and green living in Kansas City. The spring campaign featured “Leisurely Landscaping,” and “Native Trees and Shrubs” was featured in the fall. The goal of the campaign is to promote the use of native plantings to improve water quality. The campaign reached over 5.3 million impressions in 2016 through radio, print, online, and social media.

x. PARTNERSHIPS IN PUBLIC OUTREACH

BLUE RIVER CELEBRATION MONTH

In April of 2016, Water Services held a month of events to celebrate the completion of the Blue River Channel Project, including a different event each week highlighting the Blue River and its uses.

April 8: Blue River History Day – Held in partnership with the Civil War Roundtable of Kansas City, this event included a tour of the Big Blue Battlefield, historical

pictures of the Blue River Channel, and a series of short presentations about the Battle of Westport.

April 16: Blue at the Zoo Education Day – This event was held near the swinging bridge that crosses the Blue River at the Kansas City Zoo. Nine organizations partnered to create interactive booths that educated zoo attendees on the Blue River watershed, native plants, water pollution, and wildlife along the river. This event coincided with the unveiling of the new Blue River signage along the bridges in the zoo to educate all attendees about the wildlife that can be found in or around rivers in Kansas City.

April 22: Businesses on the Blue and Blue River Channel Project Dedication – This day celebrated the businesses that have chosen to locate along the Blue River with a luncheon provided by the Kansas City Industrial Council. The USGS presented information on their Blue River Inundation Mapping tool during the event. The celebration culminated with bus tours of the flood risk management features of the Blue River and a dedication ceremony with speeches from City Officials and the US Army Corps of Engineers.

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. The following organizations and projects received grant funding in 2016; some of the projects will not occur until 2017 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 2016, 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 to teach the T.R.U.E. Blue program in ten Kansas City middle schools.

2. Bridging the Gap

Bridging the Gap is providing an outreach program to businesses called "Be the Solution to Storm Drain Pollution". Presentations will be given to businesses selected by Water Services 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 cleanup. The program also involves developing a series of social media posts that will be sent out through the Bridging the Gap network.

3. Friends of Kaw Point Park

In a partnership that crosses the state line, Water Services has funded the Kansas City, KS based Friends of Kaw Point Park to set up a “hydrocaching” project in Kansas City, MO. This project has been completed successfully on the Kansas side and draws the geocaching audience into water quality. Caches will be set up at 10 locations 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. This partnership grant also include teaching 10 “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.

On April 2, 2016, approximately 800 volunteers participated in this event. Nearly 85 tons of trash and approximately 900 used tires were collected and disposed. In addition to trash removal, groups removed invasive honeysuckle from three acres and planted 500 native trees and shrubs along the Blue River.

Big Muddy Clean-up

The Big Muddy Clean-up deploys boats from Healthy Rivers Partnership and Missouri River Relief to carry volunteers to remote areas on the Missouri River where they clean up trash that could not be reached easily by land. During the boat ride, volunteers are educated on the value of the river and ways the water quality is affected by the businesses and outfalls they see along the shoreline. On October 2, 2016, 128 volunteers collected 6 tons of trash, 29 tires and 2 tons of scrap metal from the riverbank for disposal.

Art and Science on the River

During this event, held in partnership with Paseo High School, student artists are taken out in boats on the Missouri River as a catalyst to their

creative process. The field experience is an adaptation of the “View from the River” program, an interpretive trip along the Kansas City Riverfront from Missouri River mile 363 at Kaw Point to Kansas City’s newest bridge at Mile 358. Accompanying the students are working Kansas City-area artists, including dancers, actors, writers, sculptors, architects and art dealers. After the field experience, students put on a public art show to showcase what they have learned and inform new audiences about the importance of protecting rivers.

5. Little Blue River Watershed Coalition

Blue at the Zoo

The first Blue at the Zoo was held in April of 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 will educate scouts and their accompanying adults about the adverse impacts of stormwater runoff and water pollution. Using hands-on learning opportunities, exhibits, and displays presented by agency, corporate, and municipal partners and outdoor educators, participants will learn all 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

The Missouri River Watershed 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 performed 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,” focuses on the effect of pesticides, herbicides, and fertilizers on waterways. The second show, “Down the Drain,” follows trash from the street to a stream and eventually to the ocean. SPT will also partner with Water Services to hold five evening water festivals (SPLASH Carnivales), in conjunction with other school scheduled events, to reach students and their families. During 2016, Stone Lion held 6 school assembly puppet shows and 1 SPLASH Carnivale water festival 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 a distance of 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 2016, nine 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/

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 1³ includes all of the current outfalls and diversion structures. Diversion Structure 1 and Outfall BR071 was eliminated in 2016 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. 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. 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.

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

³ 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".

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.

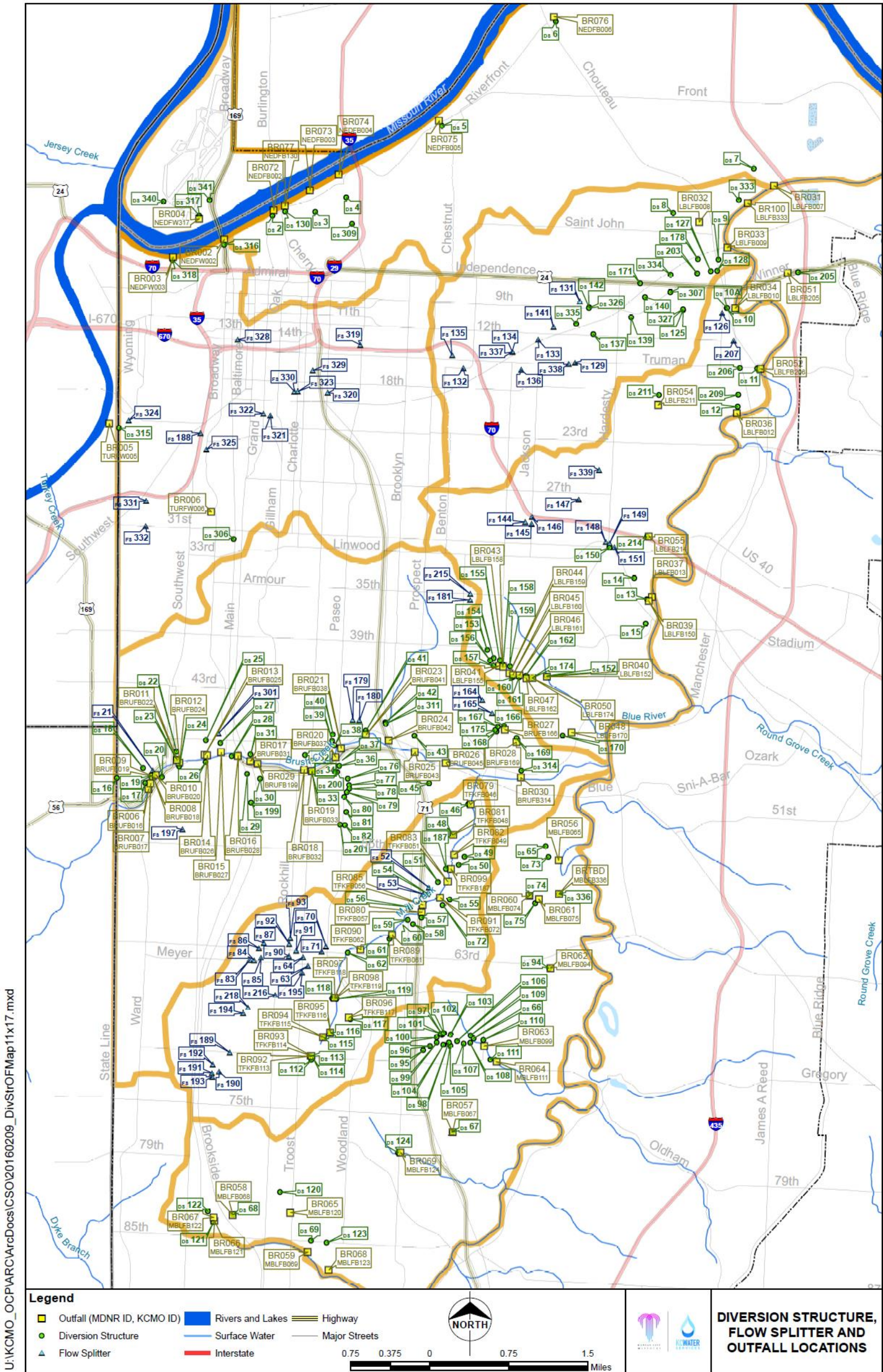
Overflow frequency varies significantly, both within the individual basins and across the City. The estimated average overflow frequency at the 87 outfalls south of the Missouri River is more than 20 times in a typical year. A complete summary of the overflow frequency, volume, and duration for each 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)⁴ 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 2016 as shown in Table 9 in *Appendix D* of this report.

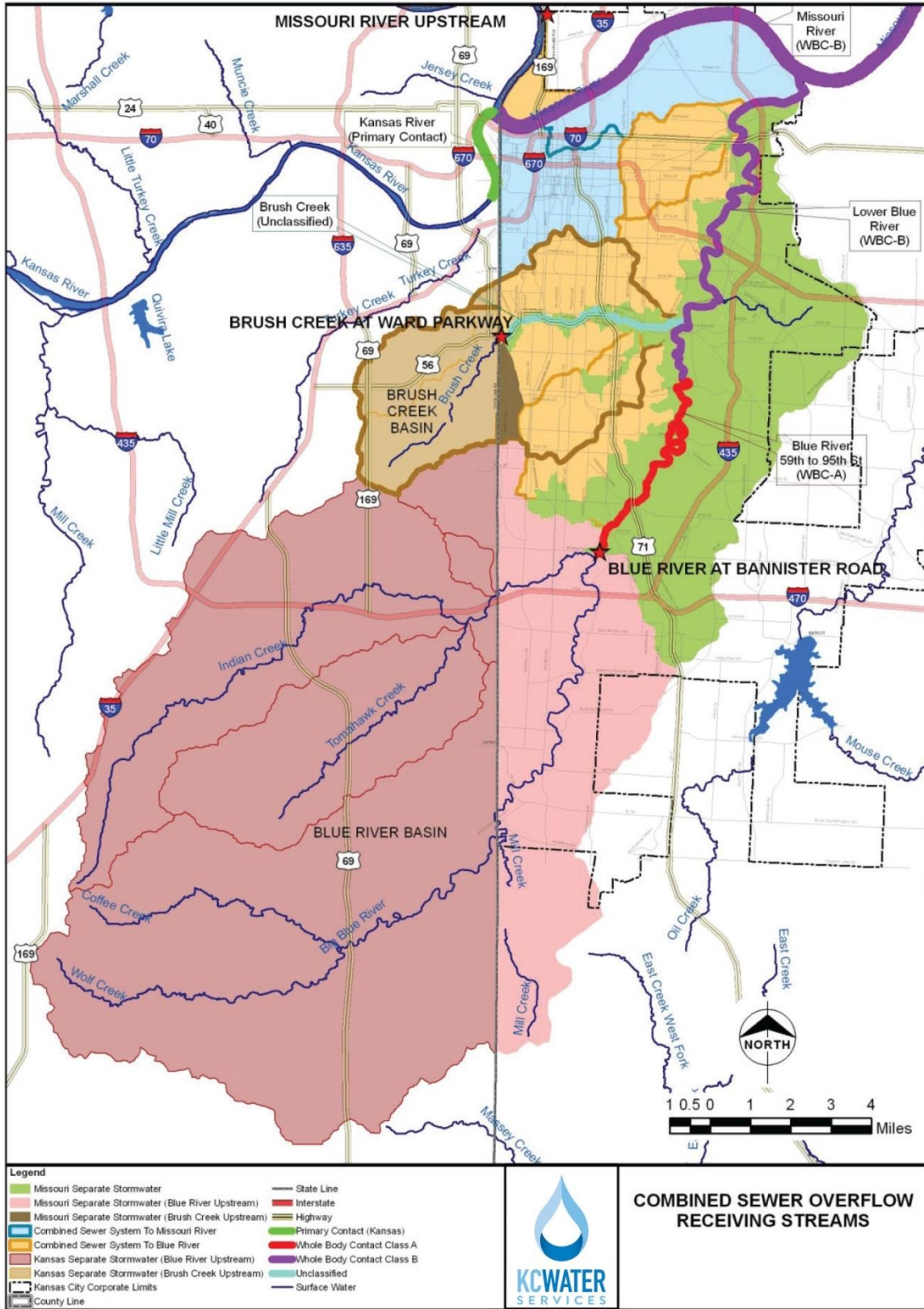
⁴ Dated December 28, 2010

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 2016, there were 20 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 850 employees
- 170,000 retail 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 also regularly update KC Water’s website (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 2016, the Action Center opened 3,899 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 or not 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 on a daily basis. The following is a list of the relevant systems maintained and used during the 2016 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 of 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. On a monthly basis, 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 that 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 come in contact with 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 1,464 calls related to SSOs were routed to the Wastewater Line Maintenance Division during 2016. The breakdown of SSO call types includes:

- Water in basement dry weather – 1,111
- Water in basement wet weather – 353

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, as a result 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.

As a general rule of thumb, 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 original notification. 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 occurrence. There were 60 dry weather overflows reported to MDNR in 2016 compared with 64 in 2015. See *Attachment A* for copies of all dry weather overflow reports submitted in 2016.

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
- OCP 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

Water Services 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

The purpose of the Pump Station Operations Program is to ensure reliable operations of Water Services' wastewater pump stations and flood pump stations.

The department ensures reliable operations by:

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

This program is executed in conjunction with the Pump Station Maintenance Program discussed later in this document. Routine inspections typically generate work orders for the maintenance crew and pump station operators are responsible for performing light maintenance work as needed.

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.

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 a number of factors including manpower availability, facility size, complexity, criticality, reliability, and past maintenance history. Maintenance staff performs tasks needed to keep pump station equipment in serviceable condition, perform preventative and emergency maintenance, plus other tasks needed to maintain the overall wastewater treatment system.

The pump stations include remote monitoring using telephone dialers and SCADA. In 2016, Water Services continued to implement a SCADA system program for the wastewater system. Water Services records pump station inspections 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 that 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. Seven operators are assigned to perform pump station rounds and station monitoring. Maintenance has two supervisors and 12 associates assigned full-time to mechanical investigation and repair activities at the stations. Maintenance also has crews available for electrical, instrument and controls, and HVAC repairs as needed.

The majority of training for pump station operators occurs through on-the-job experience. Water Services also provides considerable training through an in-house program in which staff is 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 predictive, preventative, and corrective maintenance required to sustain the reliability of wastewater and flood pump stations and ensure that all pump stations throughout the service area are operating efficiently. This program is executed in conjunction with the Pump Station Operations Program to complete work orders generated from routine inspections, trouble calls, and preventative maintenance schedules. In 2016, 2,750 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 that could potentially cause an overflow. Performing predictive and preventative maintenance helps to correct problems before they become an emergency situation 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. Each location has a log book and staff record work orders in the Hansen system.

Maintenance supervisors produce a weekly maintenance schedule and select specific projects based on crew availability, parts availability and the urgency of a particular repair. Since 2010, staff members have updated plans during a weekly meeting between the pump station maintenance planners, operators, and maintenance supervisors to facilitate coordination. As a result, 90 percent of all work performed consists of scheduled maintenance. Control of backlog work has also improved since this process was initiated.

Hansen administration, procurement, project specifications reviews, project drawings, project design meetings, and coordination consume the majority of the plant superintendent's time. Daily meetings with maintenance supervisors are

conducted to communicate and coordinate the activities that need to be performed.

This program is evaluated consistently through daily team meetings and regular tracking of work orders. Tracking work orders in Hansen enables staff to identify patterns that may require further evaluation. All flood pump stations are inspected by the department on a quarterly basis, and the U.S. Army Corps of Engineers conducts annual audits.

vii. PUMP STATION EMERGENCIES

Water Services has emergency response procedures that crews follow 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 certified plant operator (CPO) at the Blue River WWTP. 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 Hansen. 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 through the use of 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 2016, smoke testing was performed in approximately 43,120 linear feet, or 8.17 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 is 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 2016, the City televised approximately 246 miles of sewer lines, meeting the Consent Decree requirements of at least 112 miles annually for 2016. 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 2016 with 29 anomalies discovered and 2 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 2016, the City's OCP Program Management team inspected 7,605 manholes (MHs). A total of 506 MHs were repaired, replaced, or raised as follows: 125 MHs by City-wide MH Raising Contractor, 212 MHs by OCP Project Contractors, and 169 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 2016, approximately 14,000 linear feet of sewer main line repairs, including open cut replace/pipe bursting and point repairs/lateral rehabilitation and 1,000 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 jetters.

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 2016, the City cleaned approximately 367 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 seven I/I reduction projects listed below beginning in April 2016 for approximately 90 days. Monitoring occurred to provide data for the identification and quantification of I/I sources.

- Blue River Central Area 1 Project
- Blue River North Project
- Blue River South Area 4 Project
- Blue River South Area 5 Project
- Line Creek/Rock Creek Basins Area 1 Project
- Little Blue River Area 1 Project
- Little Blue River Area 2 Project

Eight (8) rain gauges were also installed in the project areas to supplement coverage provided by the City's existing ALERT gauging system.

In addition, pre-construction flow and rainfall monitoring was performed for 90 days at three locations in the Town Fork Creek Neighborhood Sewer Rehabilitation Project area to provide quantification of system flows prior to rehabilitation.

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 continued or was suspended in 2016 at three locations within the combined sewer system as listed below.

- Outfall BR032 (suspended)
- Outfall BR033 (suspended)
- Outfall BR056 (continued)

b. Water Quality Testing

The 2016 reporting period is the sixth 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 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 Program⁵ and the associated Quality Assurance Project Plan⁶.

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 2016 recreation season, which extends from April 1 through October 31.

The implementation of the IWQMP in 2016 was successful in obtaining 96 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 (14 percent and 13 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 brief summary of the 2016 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) and the lower end of the Blue River (BR-06, BR-07 and BR-08). These locations are consistent from past years. Bacteria concentrations in Brush Creek appear to be generally lower in 2016 than in previous years. In the Missouri and Kansas Rivers, however, bacteria concentrations were noticeably 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 2016 indicate TSS concentrations in the smaller tributary streams were not noticeably different from previous years. One sample at BR-04 reported a TSS concentration of 2,600 mg/L, which is noticeably higher than all other samples, the next highest being 66 mg/L. This result may represent an outlier. Relatively higher TSS concentrations in the Missouri River and Kansas River were observed as compared to previous years, reflecting that 2016 was a high flow year for those systems.

Water quality conditions can vary significantly year-to-year depending on precipitation conditions. Precipitation in Kansas City during 2016 was higher than average (38.867) at 48.65 inches, and was the highest annual precipitation total since 1998 (49.547).

⁵ *LimnoTech, December 28, 2010*

⁶ *LimnoTech, 2005, revised 2010*

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

Table 1: Summary of 2016 OCP Water Quality Monitoring

Site	E. Coli (Count/100 ml)				Dissolved Oxygen (mg/L)		TSS (mg/L)		
	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	30	221	20	583	26	9.1	29	16
	BC-02	23	224	16	364	24	6.7	23	11
	BC-03	28	358	17	576	26	11.7	28	7
	BC-04	26	147	17	215	25	8.3	26	10
	BC-05	23	323	15	393	24	8.3	23	12
	BC-06	25	200	16	406	24	8.4	24	11
	BC-07	25	173	16	283	25	8.0	25	17
	BR-01	31	315	18	346	26	8.8	31	29
	BR-02	31	392	17	508	26	8.5	31	30
	BR-03	29	313	17	531	26	8.6	29	42
	BR-04	28	472	16	796	26	9.2	28	114
	BR-05	29	512	17	871	26	8.7	29	38
	BR-06	29	735	17	1,360	26	9.0	29	38
	BR-07	29	663	18	1,117	26	9.0	29	37
	BR-08	31	1,683	20	2,400	26	8.5	31	44
	BR-09	29	618	16	822	26	10.4	29	13
	IC-01	28	318	16	604	26	9.2	27	26
	PV-01	31	120	18	377	25	9.3	31	20
	TF-01	24	4,684	18	3,253	24	6.5	25	10
MC-01	32	194	17	195	26	9.1	32	7	
Large River Sites	MR-01-R	13	679	13	679	10	7.2	13	611
	MR-01-C	13	602	13	602	10	7.1	13	505
	MR-01-L	12	486	12	486	9	7.0	12	469
	MR-02-R	23	674	23	674	17	7.0	23	462
	MR-02-C	14	853	14	853	10	7.3	14	590
	MR-02-L	16	619	16	619	10	7.1	16	689
	KR-01-R	13	417	13	417	10	8.2	13	524
	KR-01-C	13	411	13	411	10	8.1	13	432
	KR-01-L	13	571	13	571	10	8.1	13	374

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).

XIV. 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 second 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,.

Proposals for the design of the SEP No. 3 Project were submitted to Water Services in December 2016, and the evaluation of the proposals for the selection of a Design Professional was being completed at the end of reporting period. The Notice to Proceed for the design is scheduled to occur in April 2017.

On November 21, 2016, Water Services presented a SEP Interim Report to USEPA officials at an OCP Update Meeting held at Water Services. This Interim Report provided a detailed description of the status of each of the three (3) SEP projects. A hard copy of this report was mailed on November 23, 2016. Within 120 days after the completion of SEP No. 3, Water Services will prepare and submit the SEP Completion Report for all three SEP Projects to USEPA in accordance with the Consent Decree requirements.

XV. 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. In order to conserve resources, electronic copies of all discharge and bypass reports submitted to MDNR in 2016 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 63rd 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 132nd 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 / PERMIT REQUIREMENT	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 *2	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 816 513-7205
 DATE 2015 02 27

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

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if Different)
 NAME: KC, Rocky Branch Sewage Treatment Plant
 ADDRESS: 4800 E 63rd 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 132nd 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 / PERMIT REQUIREMENT	QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		VALUE	VALUE	UNITS	VALUE	VALUE	VALUE	UNITS			
BOD ₅ 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	-	-	-	-	-	-		-		

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER
 Randy Williams
 Utility Superintendent

TELEPHONE 816 513-7205
 DATE 2015 02 27

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

ATTACHMENT B: REPORTS SUBMITTED UNDER CURRENT NPDES PERMITS

In order to conserve resources, electronic copies of the following reports submitted to MDNR in 2016 are included in the enclosed disc.

- Monthly Operating Reports
- Industrial Pretreatment Program Annual Report – 2016
- Municipal Separate Storm Sewer System Permit Annual Report – May 1, 2015 – April 30, 2016
- Sewer Extension Authority Report – 2016
- Birmingham Inflow/Infiltration Report - 2016

ATTACHMENT C: LIST OF CRITICAL FACILITIES AND INSPECTION FREQUENCY

Table 10 below is the start of the critical facilities list and associated inspection frequencies. In order 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

In order to conserve resources, electronic copies of the Certificate of Achievement of Full Operation for the following projects are included in the enclosed disc:

- Middle Blue River Neighborhood Sewer Rehabilitation Project Area 2
- Swope Campus Parking Lot and Sustainable Stormwater Improvement Project (SEP #2)
- Turkey Creek Wastewater Pump Station Modifications



