CITY OF KANSAS CITY, MISSOURI

National Pollutant Discharge Elimination System (NPDES)

Municipal Separate Storm Sewer System (MS4) Permit

MO-0130516

May 1, 2023 - April 30, 2024

KANSAS CITY
MISSOURI

November 2024

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ACRONYMS

APWA	American Public Works Association
ARAP	Assumptions & Attainment Plan
Cartegraph	Cartegraph Environmental & Risk Management System
BMPs	Best Management Practices for stormwater
BOD	Biochemical oxygen demand
CERC	Columbia Environmental Research Center
City	City of Kansas City, Missouri
COD	Chemical oxygen demand
EPA	U.S. Environmental Protection Agency
GIS	Geographical Information System
HHW	Household Hazardous Waste
KCEEN	Kansas City Environmental Education Network
MARC	Mid-America Regional Council
MCMs	Minimum Control Measures
MDNR	Missouri Department of Natural Resources
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollution Discharge Elimination System
Permit	MO State Operating Permit MO-0130516
PHFs	Pesticides, herbicides, and fertilizers
SPCC	Spill prevention control and countermeasures
SWMP	Stormwater Management Plan
SWPPP	Stormwater Pollution Prevention Plan
TMDL	Total Maximum Daily Load
TSD	Treatment, storage and disposal
USACE	U.S. Army Corp of Engineers

CERTIFICATION

As required in Part H, Section 1 of Missouri State Operating Permit No. MO-0130516, annual reports shall be signed in accordance with 40 CFR 122.22 and 10 CSR 20-6.010(2)(B) and include the following certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Signed by:
Kenneth C Morgan
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11/26/2024

Kenneth C. Morgan, P.E.

Director, Water Services Department

City of Kansas City, Missouri

Date

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INTRODUCTION

This report is submitted to the Missouri Department of Natural Resources (MDNR) by the City of Kansas City, Missouri (the City) pursuant to the conditions of the National Pollutant Discharge Elimination System (NPDES) Missouri State Operating Permit MO-0130516 (the Permit) for stormwater discharges from its municipal separate storm sewer system (MS4). The City received it renewed permit in September 2023 in the mid of its permit year, also the reporting period May 1, 2023 through April 30, 2024. Since the terms listed in the 2023 permit do not differ in any significant way from those in the previous version issued in 2018, the City continues to implement the 2022 Stormwater Management Program Plan (SWMP) developed to address the requirements of the 2018 Permit with few minor adjustments to better comply with the latest permit.

This report documents the City's effort during the reporting period May 1, 2023 through April 30, 2024. For each of the nine minimum control measures (MCMs) required in the Permit, relevant Best Management Practices (BMPs) are provided with a list of measurable goals, a self-evaluation of compliance status, a summary of implementation activities, assessment of BMP effectiveness, plans for the next reporting period, as well as a summary of monitoring results, where applicable.

SECTION 1. TOTAL MAXIMUM DAILY LOAD

Total Maximum Daily Load (TMDL) (Permit Ref. C.)

Status: Not applicable

No Total Maximum Daily Load (TMDL) has been established with an applicable wasteload allocations for any area of the MS4 by the end of the reporting period. The Permit requires action from the permittee when the receiving stream has an approved or established TMDL.

SECTION 2. MINIMUM CONTROL MEASURES (MCMs)

1. Public Education and Outreach of Stormwater Impacts

The City has ongoing public education and outreach programs to inform the public about the impacts of stormwater discharges on waterbodies and steps the public can take to reduce pollutants in stormwater runoff as identified in the SWMP. The following are highlights of MCM 1 activities including BMPs.

1.1 Inform the public (Permit Ref. E.1-a.i.)

The City utilizes various established communication venues and social media to educate and reach out to the public for stormwater education. Contents are customized to suit different age groups. Delivery methods are selected to facilitate effective outreach.

BMP 1: Utilize established communication venues and social media to disseminate information

Measurable Goals:

- The stormwater-related education messages are disseminated through available resources. The messages will focus on the subject of potential pollutants from application of pesticides, herbicides, and fertilizers, as well as from management and disposal of used oil and toxic materials.
- A variety of audiences are targeted for stormwater education.

Status: Goals met.

City's *What's on Tap?* newsletter to its water customers every other month: The newsletter is a tool for wide-spread dissemination of educational messages and information. During the reporting period, the section, *KC Education Station*, in the newsletter continued to highlight outreach activities. The newsletters were delivered to approximately 170,000 owners that have water accounts with Water Services Department.

City's website to provide information on stormwater management and water quality matters. The City continued to improve its website, including its education page (https://www.kcwater.us/education/). The page currently lists various links and resources covering teacher resources, community outreach, water quality, tours, printed materials, videos, and water quality grants.

City's ongoing public water quality education program. During the reporting period, the City's public education and outreach program promoted concurrent curriculum with lessons provided along with national and state standard alignments in science. Previously, the water quality education program provided four curricula offered to a variety of grade levels. The program has been expanded to provide individual curricula for every grade from Pre-kindergarten through 12th grade. In addition, the education program initiated development of a school district partnering strategy.

Use of Social Media to promote and inform about stormwater activities and outreach. Water Services Department continued to inform citizens of stormwater runoff protection through social media including Twitter, Facebook, Instagram, YouTube and LinkedIn. During the reporting period, Water Services Department created 74 posts and ran them on each of the following: Twitter, Instagram, and Facebook to promote clean water messages.

Continuous Improvement: The City will continue to educate and reach out to the public by enhancing and improving its existing programs and exploring new opportunities and venues. The City will continue to evaluate the content of the messages to ensure complete information is provided to the public, track the number of messages delivered and the number of individuals or groups contacted.

1.2 Activities and materials specific to targeted audiences and pollutants (Permit Ref. E.1-a.ii & iii)

The City provides stormwater education and outreach to different age groups and addresses a number of pollutants commonly present in stormwater runoff, including pesticides and used-oil-related substances.

BMP 1: Provide water-quality-related curriculum to students and workshops to adults

Measurable Goals:

- Different grades from pre-kindergarten through 12th grade will be contacted;
- Track the number of students and adults, and number of classes and workshops; and
- Track the number of training sessions to address pesticides, herbicides, fertilizers, used oil, and toxic materials.

Status: Goals met.

Table 1. lists the achievements made through Water Services Department's Water Education for Kansas City (***WE KC***) Program.

Table 1. A list of water-quality related curriculum under *WE KC* program

Name	Content	Age group targeted	Achievement (numbers about teaching)
What is Water	Importance of water and pollution impact on streets to rivers, oceans, and the earth.	Pre-Kindergarten children	- 19 instances in person - A total of 638 participants - 10 instances at public schools - One instance at a charter school - 7 instances at private schools - One instance with a non-profit group
Freddy the Fish	Various pollutants brought by human activities that *Freddy* will encounter during his adventure.	Kindergarten children	- 40 instances in person - 2 virtual presentations - A total of 1,751 participants - 21 instances at public schools - 3 instances at charter schools - 6 instances at private schools - 12 instances with non-profit groups
Ways of Water	The movement of stormwater down a watershed and the types of pollutants commonly traveling through a watershed in the runoff.	1st Graders	- 39 instances in-person - 2 virtual presentations - a total of 1,769 participants - 25 instances at Public schools - 4 instances at charter schools - 6 instances at private schools - 6 instances with non-profit groups
Clean Water Messages	Stormwater runoff and contaminants	2nd Graders	- 68 instances in-person - 3 virtual presentations - A total of 3,451 participants, - 47 instances at public schools, - 6 instances at charter schools - 6 instances at private schools

			- 12 instances with non-profit groups.
Trash Tally	Cataloging trash in KC area, learning about runoff and solutions to pollution.	3rd Graders	- 44 instances in-person - 2 instances virtually - 2,308 participants - 37 instances at public schools - 4 instances at charter schools - 4 instances at private school - One instance with a non-profit group
Hitchhiking with H2O	Water properties and a hands-on activity about pollutants in water	4th Graders	- 57 instances in-person - 1 virtual presentation - 2,692 participants - 44 instances at public schools - 5 instances at charter school - 4 instances at private school - 5 instances with non-profit groups.
KC to the Sea	The role of stormwater management in protecting the water quality in local rivers, lakes, and streams.	5th Graders	- 59 instances in person - 1 virtual presentation - A total of 2,577 participants - 36 instances at public schools - 10 instances at charter schools - 5 instances at private schools - 9 instances with nonprofit groups
Force of Water	Erosion and flooding in a hands-on activity with sand tables, types of trash commonly found in the runoff	Middle School Students in Earth Science Class or 6th Grade	- 40 instances in-person - 2,445 participants - 34 instances at public schools - 5 instances at charter schools, - One instance at a private school
Macro Monitoring	The movement of stormwater down towards storm drains and impact on macros in the water	Middle School Students in Life Science Class or 7th Grade as well as High school students	- 15 instances in-person - 702 participants - 6 instances at public schools - 4 instances at a charter school - 3 instances at private schools - 2 instances with non-profit groups
Water Testing	General testing methods, assessment tools, data collection and evaluation of water pollution	Middle School students in Physical science or 8th grade as well as High School students	- 34 instances in-person - 4 virtual presentations - 930 participants - 21 instances at public schools - 9 instances at a charter school - 7 instances at private schools - One instance with a non-profit group

Journey of Stormwater	A water frame and a hands-on activity regarding the volume of stormwater, and the types of trash commonly found in the runoff	High school students	- 19 instances in-person - One virtual presentation - 508 participants - 10 instances at public schools - One instance at a charter school - 5 instances at private schools - 2 instances with non-profit groups - One instance with a college group - One instance with a homeschool group
KC Water Presentations	Stormwater runoff, the City's Consent Decree and wastewater infrastructure, and pollutants in runoff	Youth and adults	- 29 in-person presentations - 1438 adults - 8 instances at public schools - 3 instances at a charter school - One instance at a private school - One instance at a college - 10 nonprofit groups and one HOA - 5 presentations to local government staff

Continuous Improvement: The City will continue to conduct various programs to educate both children and adults.

1.3 Additional public education activities (Permit Ref. E.1-a.iii.)

BMP 1. Implement programs through leadership, partnership, and supporting role

Measurable Goals:

- Water Services Department administers and completes at least two rounds of the Water-quality Education Small Grant program within the five-year permit term.
- The KC Green Team will continue to play a role in shaping the City's policies (Note: this and the next goal related to KC Green Team have been moved to ***Section 6.1. Employee training to prevent or reduce stormwater pollution*** for content appropriateness).
- The KC Green Team will organize at least three activities or events annually to educate and inspire staff on green solutions and sustainability with City operations.
- Water Services Department will continue to be a leading sponsor for MARC's water quality public education program by engaging in key decision-making processes and making significant contributions to program implementation.

Status: Goals met.

The City continues to identify opportunities to reach out to the public for education on stormwater. A list of public education activities is listed in Table 2. below.

During the reporting period, Water Services Department continued to work with the organizations that received the grant from the City's Water Quality Public Education Grant Program in 2023. See Table 3 for the achievements made.

In June 2023, Water Services Department selected four proposals to provide grant money to support projects and activities related to water quality protection, improvement, and education. Four organizations signed a contract with the City for the small grants program:

- Heartland Conservation Alliance: *Green Guard Stewardship Training*
- Kansas City Arts Institute: *Brush Creek Film Festival*
- Little Blue River Watershed Coalition: *Project Blue River Rescue*

- StoneLion Puppet Theatre: *Puppets for the Water*

Continuous Improvement: The City will continue to lead, participate in and support various programs and activities.

Table 2. Additional public education activities

Programs/ Partnerships	Achievement During this Report Period
Green Infrastructure Tours	• Water Services Department hosted 25 tours of the Green Infrastructures sites, reaching 565 people.
Water Quality Small Grant Program	See Table 3. A summary of the City's Water-quality Public Education Grant Program for details.
Stormwater Table Events	Stormwater table events are community outreach at tabling events with informative posters on stormwater runoff and stormwater mitigation. There were 11 outreach events, reaching about 595 people.
Storm drain Marking	49 students and adults participated in marking drains over 47 storm drains.
Community Litter Pickups	• Water Services Department works with all age groups to provide an educational litter pickup. • These events feature a talk on watersheds, pollution, and stormwater runoff along with safety instructions for proper trash collection. • 15 events, 546 participants, over 74 bags of trash: - 14 youth groups and schools, 524 participants, over 46 bags of trash - 1 university, 1 government group, 22 participants, over 28 bags of trash
The Mid America Regional Council (MARC) Water Quality Public Education Program 	Water Services Department continues to be a leading stakeholder for the program. • Conducted the 3rd metro-wide virtual Plog-a-thon throughout the month of October 2023. On October 14 and 21, MARC and partner municipalities organized six county-wide Plogs on regional trails. 174 people participated in the event and collected nearly 200 bags of trash across the region. • The Water Quality Education Committee promoted the two 20-second videos of Dewy, the Committee's mascot on social media, with media showing on feeds 1,349,364 times reaching 532,378 individuals and 849 clicks to the cleanwaterkcmetro.org website. • Worked with the Center for Watershed Protection in developing the training curriculum for municipalities and contractors on Green Infrastructure (GI) installation and maintenance. • Awarded six organizations for their proposed water-quality public education projects. These organizations include Deep Roots KC, Groundwork Northeast Revitalization Group, Heartland conservation Alliance, Little Blue River Watershed Coalition, My Regional Wins! and StoneLion Puppet Theatre. The award amount totals $21,000. • Continued to distribute the education and outreach materials, e.g., brochures about Build Your Own Rain Garden, Know your Roots, Pick Up After Your Pet, Making and Using Compost etc., and signages on Do Not Mow/Native Planting, Pick up after Your Pet etc.

Table 3. A summary of achievements by the City Water Quality Public Education Grant Program

Organization	Achievements
Heartland Conservation Alliance	• 4 Workshop: 12 green guards learned about conservation and sustainability • 4 Volunteer workdays removing 1567 lbs of trash
Little Blue River Watershed Coalition	LBRWC connects citizens to their rivers and streams by using hands on projects to demonstrate best management practices that make a difference in stream health. • Hosted Blue River Cleanup on April 6, 2024 • 492 volunteers removed 50 tons of trash and 592 tires.
Kansas City Art Institute	• Over 200 participants joined the Brush Creek Film Festival to learn about Brush Creek and water quality.
StoneLion Puppet Theatre	• 578 participants engaged in 25 Puppet workshops for water education • 3,674 participants engaged in 20 Puppet Performances for water quality education.

1.4 Public reporting of illicit discharges or water quality impacts (Permit Ref. E.1.a.iv.)

BMP 1: Promote, publicize, and facilitate public reporting of illicit discharges

Measurable Goal: Ongoing use of the resources to provide relevant information.

Status: Goal met.

The City uses a centralized system – 311 to provide a hotline for residents to report a problem, request a service, or track a City service, including addressing illicit discharges. The app – myKCMO is implemented to make the 311 system readily accessible for different communication devices. Residents can download the app through App Store, Google Play, or web app, or simply call 311 or (816)513-1313 to ask for services. The twitter account is Follow@KCMO311.

https://www.kcmo.gov/city-hall/311

Each request is assigned a case number, logged by category and routed to the appropriate City department for follow-up and resolution.

The system includes a sub-category, I16-Illicit Discharge to facility public reporting, expediate internal handling, and providing a simple and direct means for public sharing and internal tracking of the cases.

Continuous Improvement: Continue to use these resources to address this requirement and seek opportunities to increase effectiveness.

2. Public Involvement and Participation

The City developed and implemented several public involvement/participation programs to connect public with the SWMP. These efforts include providing online access for the public to review the SWMP.

2.1 Public involvement in the development of the SWMP (Permit Ref. E.2.a.i.)

BMP 1. Involve the public in the development of the SWMP.

Measurable Goal: Public participation in the development of the SWMP.

Status: Goal met.

The City completed an updated SWMP to improve compliance with the permit terms in the previous reporting period. The drafted copy was posted for public comments on a couple of public platforms, including City's websites: https://www.kcwater.us/about-us/stormwater/ and City Clerk's website, as well as distributed through City Council's communication list, City's project announcement site – KCMO Plan Room, and City's environmental commission. The finalized version was submitted to MDNR in August 2022.

Continuous Improvement: Continue to implement the 2022 SWMP and seek improvement.

2.2 Public participation in implementation activities (Permit Ref. E.2.a.ii.)

Note: this section will be moved under Section 1.5 in the next annual report to be consistent with the latest permit terms.

BMP 1. Involve the public in the cleanup events.

Measurable Goals:

- Track the annual number of events that occurred
- Track the number of volunteers

Status: Goals met.

Water Services Department hosted 15 community cleanup events with 546 volunteers. Some of these events targeted stream banks. For details, see Table 2. Additional public education activities. In addition, Water Services Department, through its grant program, supported the Blue River Cleanup. For details, see Table 3. A summary of achievements by the City Water Quality Public Education Grant Program.

There was also a more intensive and city-wide cleanup effort involving multiple events through April 2024. For details, see Table 4. Achievements through Spring 2024 Great Kansas City Cleanup.

Table 4. Achievement through Spring 2024 Great Kansas City Cleanup

Continuous Improvement: The City will continue the above practices for public involvement and participation.

3. Illicit Discharge Detection and Elimination

The City's efforts include implementing and enforcing a program that detects and eliminates illicit discharge to the MS4 system. A key aspect of the efforts is maintaining the system mapping in the geographic information systems (GIS). The City is making progress in implementing procedures to manage stormwater-related information from various sources.

3.1 Maintain and update a storm sewer map (Ref. E.3.a.i.)

BMP 1: Maintain and update storm sewer geographical information system (GIS).

Measurable Goals:

- Add to the Water Services Department GIS all known stormwater components including outfalls and newly replaced or constructed on public properties.
- If information is available, add to the Water Services Department GIS all outfalls on large commercial or industrial properties; review historical As-builts for gaps to improve the database.

Status: Goals met.

The City continues to maintain the GIS that maps those known constructed outfalls and all receiving waterbodies. The City's data sources for the updates on the outfalls information include the result of the ongoing outfall field screening and construction As-builts drawings. Water Services Department may also make a correction or addition on the outfall locations if a review of archived As-Builts or easement indicates any error, and such a review is usually conducted per a customer's request for information. The current total number of stormwater outfalls recorded in the system is 10,600.

BMP 2: Enhance the storm sewer GIS.

Measurable Goal: Complete the database of the stormwater BMPs that have been constructed on the City's properties, and keep the database updated.

Status: Ongoing progress.

Water Services Department continues to update its stormwater BMP mapping in the GIS. BMPs are tracked separately: As-builts for private development are collected by the City Planning Department; As-builts for capital projects are collected by the City's Green Team. As-builts from both sources are sent to the GIS Division with Water Services Department, which extracts the stormwater BMP info. and registers in the GIS

Continuous Improvement: Water Services Department will continue to use the current approaches to update and maintain the GIS for storm sewer system mapping and seek improvement.

3.2 Prohibit illicit discharges and implement enforcement actions (Permit Ref. E.3.a.ii. & iii.)

BMP 1: Follow the established procedure for illicit discharge investigation and enforcement

Measurable Goals:

- Conduct investigations in a timely manner; reduce and minimize the impact, if possible; stop and eliminate sources, if feasible.
- Take enforcement action when needed.

Status: Goals met.

Water Services Department is responsible for investigating the incidence of illicit discharges following the updated investigation procedure. During the reporting period, Water Services Department investigated 52

incidents of suspicious illicit discharges and sent out one letter of violation. All cases were resolved in a timely manner.

Continuous Improvement: Water Services Department will continue to investigate any reported incidents per the established procedure and implement enforcement procedures and actions as specified in the ordinance.

3.3 Conduct a field screening program (Permit Ref. E.3.a.iv.)

BMP 1. Follow the established procedure for outfall field screening

Measurable Goals:

- Inspect 150 outfalls or other stormwater discharge points annually.
- Follow up on the issues identified during the screening and have them resolved in a timely manner, if feasible.

Status: Goals met.

The outfalls located within the industrial areas were targeted for screening during the reporting period. A total of 307 outfalls of various sizes including 36" or larger were inspected. The field inspector utilized the City's GIS to identify the sites for screening and followed the established procedure.

Continuous Improvement: Continue implementing the established program.

3.4 Procedures to minimize, contain, and respond to spills (Permit Ref. E.3.a.v.)

BMP 1: Follow the established guidelines to address spills

Measurable Goals:

- Implement the guidelines to address spills.
- Track the number of the spills that discharge or have potential to discharge to the MS4.

Status: Goals met.

The Fire Department implements the following guidelines that address the potential impact on stormwater from a spill:

- HazMat Response General Operational Guideline for Fuel Spills. The Guideline encourages using dry absorption as the preferred method to clear a spill and taking measures to protect stormwater drains. It also provides directions on how to properly dispose of water and avoid discharge into storm drains if flushing is the option.
- HazMat response General Operational Guideline for First Responders. The Guideline requires the flush water must be confined after it has been used and then disposed of properly.

The Fire Department responded to a total of 159 incidents, of which 17 are fluid-related. No spills or leaks reached to storm drains or streams. Hazardous material-related incidents referred to here may not necessarily be about liquid spills (e.g., chemical odors emitted from structures). Also note the total number does not include incidents that may have fluids spilled but were classified as a higher level of calls (i.e., emergency calls for injuries in vehicular accidents, etc.). Of all the 363 incidents, there was no spill that discharged or had potential to discharge into the MS4.

Continuous Improvement: The Fire Department will continue to follow the established guidelines to address spill incidents.

3.5 Maintain the City's sanitary sewer system (Permit Ref. E.3.a.vi.)

BMP 1: Limit exfiltration from municipal sanitary sewers

Measurable Goal: Maintain 140 miles of sewer lines annually.

Status: Goal met.

Wastewater Maintenance Division

162.3	miles of sewers televised
262.8	miles of sewers cleaned
0.44	miles of public sewers repaired
1.34	miles of private sewers repaired
118	manholes repaired

Smart Sewer Program

39.0	miles of sewers televised
36.0	miles of sewers cleaned
0.29	miles of public sewer repaired
1.44	miles of lateral repaired, replaced/rehabilitated
14.1	miles of public sewer repaired/replaced/rehabilitated
473	inlets repaired/replaced/rehabilitated

Collection System

0.2	miles of sewers televised
34.6	miles of sewers cleaned
1.1	miles of lateral replaced
0.18	miles of public sewer repaired/replaced/rehabilitated
14	manholes repaired

Continuous Improvement: The City will continue to implement the above programs to limit exfiltration and overflows from sanitary sewers and will improve the data tracking through GIS tools in development.

3.6 Proper management of materials or wastes (Permit Ref. E.3.a.)

BMP 1. Implement programs for solid wastes and household hazardous waste management

Measurable Goals:

- Maintain all the established programs.
- Host one or more rounds of city-wide curbside waste collection events.
- Maintain the operation of the three community recycling drop-off centers.
- Maintain the operation of the two yard-waste drop-off centers.
- Maintain the operation of household hazardous waste collection.

Status: Goals met.

The City operates multiple programs that encourage proper disposal, as well as preventing and addressing illegal dumping. See Table 5, Figures 1 and 2 for details.

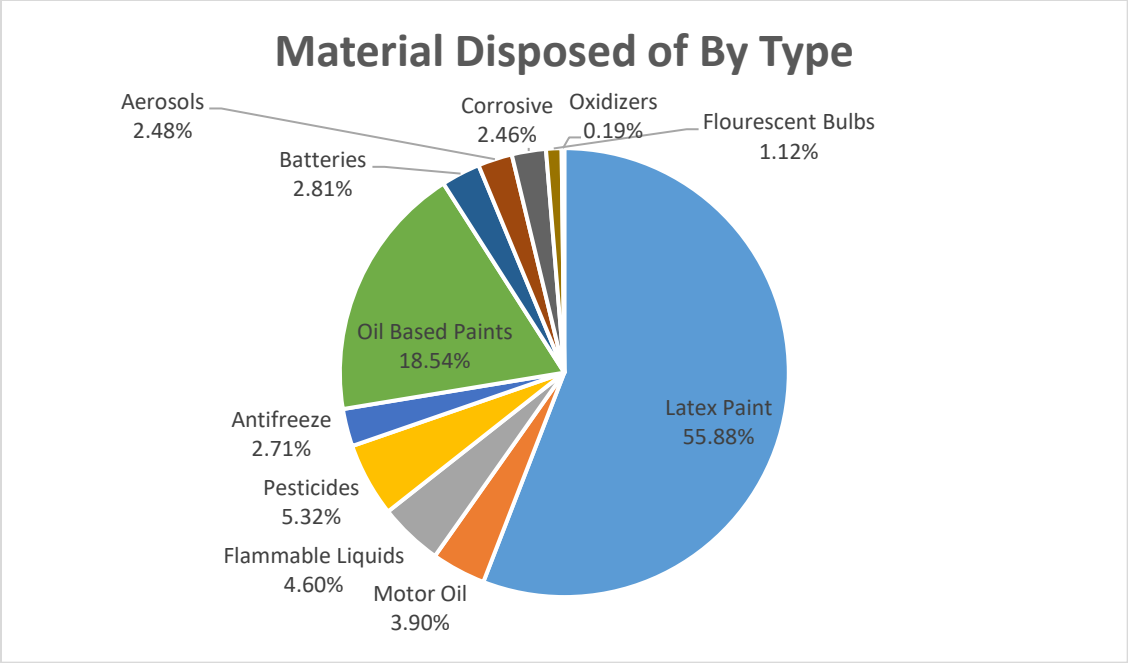
Table 5. Comprehensive solid waste management program achievements

Quantity (in Ton)	Programs		
	KC Recycles		
881	Community recycling drop-off centers (3)		
	Hard to Recycle		
1,615 tires	4 tons brush	6 tons shredding	7.3 tons electronics
	Bulky Items Collection		
4,250	Bulky items		
	Leaf and Brush Collection		
1,088	Curbside		
15,000	Drop-off centers (3)		
	Illegal Dumping Cleanup		
3,081	Material collected		
	38 cameras placed at different locations		
	Neighborhood Cleanup Assistance		
173	Tires received at drop-off centers		
	Number of dumpsters placed: 554		
	Number of trucks for Neighborhood Clean-up: 169 trucks in 18 weekends		

Quantity	Household Hazardous Waste (HHW) (Calendar Year 2023)	
654 tons	Total weight collected at HHW Facility	12,439 vehicles participated
132 tons	Total weight collected at Mobile Outreach	2,257 vehicles participated
14.3 tons	Total materials reused in Swap Shop	
58 tons	Total materials recycled	
459 tons	Total materials sent for energy recovery	
46 tons	Total materials incinerated	

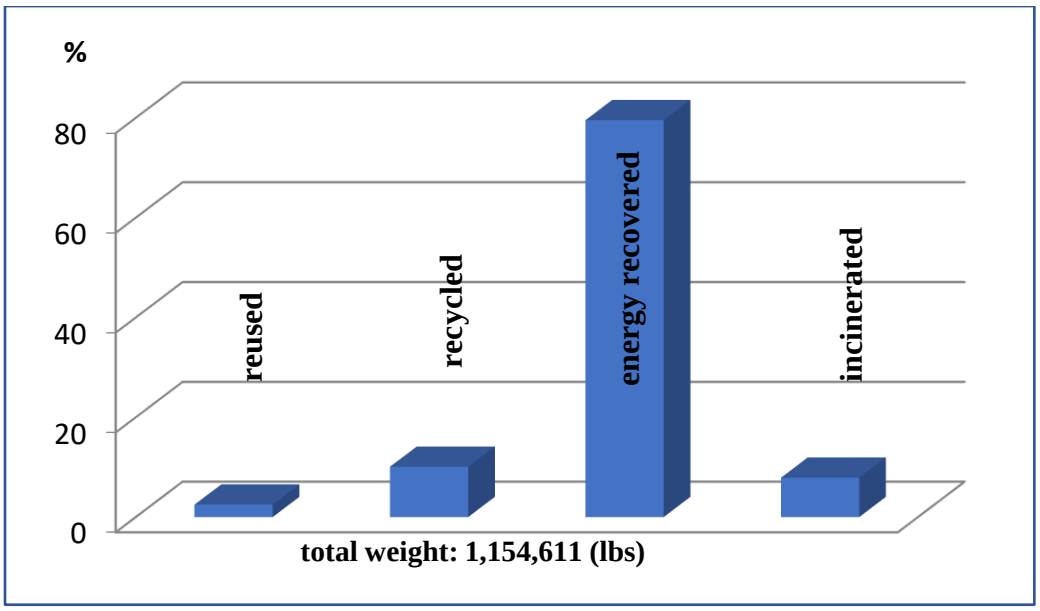
Continuous Improvement: The Solid Waste Division of Public Works will continue to operate its various solid waste management programs. For the Household Hazardous Waste Facility, Water Services Department has been conducting a study for management of and physical updates to the existing facility. The current finding is that the facility may need to be relocated such that the City can continue its current service while the new site is in construction. The new site will be sized to accommodate the forecasted household hazardous waste received over the next 50 years.

Figure 1. Material by type disposed of by Household Hazardous Waste (HHW) facility in 2023



- Total weight of the materials disposed of (not collected) was 1,154,611 pounds, or about 577 tons.
- Total weights are only for materials that were reused, recycled, used for energy recovery, or material incinerated.
- Percentages reflect the HHW numbers associated with Kansas City, Independence, Lee's Summit and the MARC participating communities.

Figure 2. Distribution of material managed by HHW facility in 2023



4. Construction Site Runoff Control

The City's efforts include conducting inspections, adopting the Stormwater Pollution Prevention Plan (SWPPP) template for City capital improvement projects, and taking enforcement actions to reduce pollutants in stormwater runoff to the MS4 system, from construction activities on land disturbances sites that disturb one or more acres or disturb less than one acre when part of a larger common plan of development or sale that will disturb a cumulative total of one or more acres over the life of the project. The City's SWMP addressed this control measure and the efforts made during the reporting period are documented below.

4.1 Ordinances to require erosion and sediment control BMPs (Permit Ref. 4.a.i.)

BMP 1: Continue to implement City ordinance

Measurable Goal: Ongoing implementation of City ordinance as any development occurs.

Status: Goal met.

The City implements the City Code Chapter 63 Erosion and Sediment Control. Division 4 of this chapter is about enforcement which includes enforcement activities, suspension or revocation of permit, action against the security, as well as fines and penalties. See the link below.

https://library.municode.com/mo/kansas_city/codes/code_of_ordinances?nodeId=COORKAMIVOII_CH63ERSECO

Continuous Improvement: The City will continue its current practice.

4.2 Implement and enforce erosion and sediment control for City capital projects (Permit Ref. 4.a.ii. iii, v. vi & vii)

BMP 1. Addressing site wastes

Measurable Goals: Not applicable.

Status: Requirement addressed.

The City developed a template of Stormwater Pollution Prevention Plan (SWPPP) to address sediment and erosion controls. The Plan contains requirements to manage construction site-related wastes, including but not limited to, solid waste, liquid waste, concrete waste (washout area), hazardous waste, etc.

BMP 2. SWPPP review, site inspection and enforcement action

Measurable Goals: Track annual numbers of construction sites, submitted SWPPPs and reviews, inspections conducted by the City inspector, enforcement actions, and employees who receive relevant training.

Status: Goals met.

The SWPPP is submitted to and stored in the e-Builder system. Water Services Department, as well as project managers, reviews each SWPPP. During the reporting period, Water Services Department reviewed 29 SWPPPs submitted by project managers from different City Departments.

Water Services Department provided monthly oversight inspection. The inspector identifies the status of the project through the City's e-Builder system and/or receives the notice from a project manager. Inspection starts the 1st month when the inspector is aware of the project and does not stop until several months after 100% of the construction. Each project manager carries the responsibility for keeping the e-Builder system updated.

During the reporting period, Water Services Department conducted 331 inspections for 29 sites. Issues identified during the inspection were all resolved in time.

If there is any issue identified during the inspection, the inspector sends notification to the relevant project manager, who subsequently will inform the contracted construction manager. If the issue does not get resolved within a reasonable timeframe, the project manager can withhold the payment to the contractor until the issue is resolved.

4.3 Implement and enforce erosion and sediment control for private projects (Permit Ref. 4.a.ii. iii, v. vi & vii)

BMP 1: Addressing site wastes

Measurable Goal: Not applicable.

Status: Requirement addressed.

For private construction projects (≥1 acre), the City's Land Development Division with City Planning & Development Department requires that construction site operators comply with the City's erosion control requirements as well as the requirements of the Missouri Department of Natural Resources. Both regulations require management of site wastes.

BMP 2; SWPPP review, site inspection and enforcement action

Measurable Goal: Track annual numbers of construction sites, submitted SWPPPs and reviews, inspections conducted by the City inspector, enforcement actions, and employees who receive relevant training.

Status: Goals met.

For privately funded construction projects (≥1 acre), the Land Development Division of City Planning & Development Department reviews the Site Disturbance Plans that are submitted as part of the construction plans for the proposed development. Developers are required to obtain land disturbance permits from MDNR and to develop and implement a SWPPP per their permit requirement. The Land Development Division requires that the SWPPP be kept available and current on site for City inspectors to view during inspections.

No change related to site inspection or enforcement procedure was made. The Land Development Division of City Planning & Development Department provides a minimum of two inspections; additional inspections are as needed, depending on the scope and scale of the project. A total of 1,272 inspections were conducted.

4.4 Procedures to address public reporting of the discharge of pollutants (Permit Ref. 4.a.iv.)

BMP 1. City's MyKCMO System for Centralized Reporting

Measurable Goal: Keep track of public reporting of the discharge of pollutants from construction sites.

Status: Goal met.

The City has a centralized MyKCMO (used to be 311) system to provide residents with access to report problems, and request and track City services, including addressing illicit discharges from construction sites. Once the report is logged into the system, the appropriate department or division will be assigned to investigate the issue. The department or division will close the issue in the system after the issue is resolved. The public can track the status online. See 1.4 BMP 1. for more details.

During the report period, 77 cases related to sediment or erosion control were entered in the MyKCMO database and 75 cases were closed. Note the numbers include sites of various sizes including single properties.

Continuous Improvement: The City will continue the current practice to address all public reporting.

4.5 Education and training for site operators (Permit Ref. 4.a.vii.)

BMP 1: Provided city-wide online training

Measurable Goal: Provide training and/or education opportunities to project managers.

Status: Goal met.

During the reporting period, eight newly hired engineers and project managers took the online training for the topic of sediment and erosion control. Here is a summary of the training:

- The training targeted City project managers/engineers that oversee capital construction projects, as well as construction inspectors and environmental officers with responsibility for inspecting construction sites that involves City land disturbance activities.
- The content covers a review of the City's Land Disturbance Permit requirements, stormwater best management practices at construction sites, a review of EPA's expedited settlement agreement and recent enforcement actions.

Continuous Improvement: The City will continue to provide training to both project managers from multiple departments that are responsible for managing capital construction projects, and inspectors that are responsible for inspecting construction sites involving land disturbance activities.

5. Post-Construction Stormwater Management in New Development and Redevelopment

The City developed, implemented, and enforced programs to address the quality of long-term stormwater runoff from new development and re-development projects that disturb one or more acres or disturb less than one acre when part of a larger common plan of development or sale that will disturb a cumulative total of one or more acres over the life of the project. The programs ensured that stormwater controls are in place that have been designed, developed, and implemented to minimize water quality impacts.

5.1 Ordinances to address post-construction runoff and strategies to minimize water quality impacts (Permit Ref. 5.a.i. ii. & iii)

BMP 1: Implement and enforce all relevant City ordinances

Measurable Goal: Track the annual numbers of reviews of development applications, review of construction projects, pre-application development assistance sessions with development stakeholders, review of covenants for Maintenance, and review of stormwater BMP easements.

Status: Goals met.

Existing City regulations that address post-construction stormwater management and minimize water quality impact include the following:

Stream Buffer Regulations and Conservation and Open Space Development Regulations: City Code Chapter 88, the Zoning and Development code, promotes more open space and greater natural resource protection by incorporating the Stream Buffer Regulations and Conservation and Open Space Development Regulations. Both regulations apply to new development, redevelopment, and construction and infrastructure projects near streams.

Provisions for Flood Hazard Reduction: City Code Chapter 28 addresses floodplain management. In November 2023, the City repealed the old version and enacted an entire new version of like number and subject matter. The new version was modeled after the Federal Emergency Management (FEMA)'s model ordinance and adopted new updated FEMA rate maps. Article IV Provisions for flood hazard reduction specify permitting conditions for floodplain development, and standards for land usage, construction and post-construction management regarding storage of hazardous and non-hazardous material and equipment. In comparison to the requirements in the old version, the new one has reduced substantial improvement percentages from 50% to 49 percent of a structure's market value for better protection.

APWA 5600 design criteria for *Storm Drainage Systems & Facilities*, APWA 2600 Specifications for Storm Sewers, and BMP manual: City Code Chapter 88 Series 400 and 500 require a macro/micro stormwater drainage study for development or re-development, and adherence to APWA 5600 design criteria for *Storm Drainage Systems & Facilities* and APWA 2600 Specifications for Storm Sewers, as well as the Manual of Best Management Practices.

During the reporting period, the City was actively participating in a regional effort that was led by the Mid America Regional Council (MARC) to update the regional APWA Stormwater Standards. A public engagement roadshow and factsheet was designed to educate the region on the updated standards. The new standards are intended to move the region to a modern method of managing stormwater to mitigate stream erosion and flooding risks, and giving priority to a retention-based standard, versus a value-based standard.

Covenants for stormwater BMP maintenance: CP&D uses three types of covenants applicable to different stormwater BMP maintenance scenarios for new development and re-development. These covenants include *Stormwater Detention Covenant for Maintenance*; *Stormwater Detention & BMP Covenant for Maintenance*; and *Conveyance of Easement for BMPs*. These documents require developers or property owners to take responsibility for maintenance, repair, and restoration of detention basins or BMP structures.

During the reporting period, CP & D reviewed 120 plans for the infrastructure construction; had 516 consultation meetings for pre-application development plan, and reviewed 24 stormwater covenant agreements, 18 BMP easements, and 107 storm drainage studies.

Continuous Improvement: The City will continue to require developers to comply with all the relevant City codes for new development and re-development.

BMP 2. Enhance regulatory mechanisms to support post-construction stormwater management

Measurable Goal:

- Complete the development of the Tree Preservation and Enhancement ordinance; and
- Track the annual numbers: stormwater BMPs installed, and trees on City right-of-way and City parks removed, pruned, planted, and damaged.

Status: Goals partially met.

During the reporting period, progress was made to update the following ordinances:

Tree Preservation and Protection: The City adopted the Urban Forest Master Plan in May 2020. The Plan established a goal of 35 percent tree canopy cover for the City. On Mar. 16th, 2023, the City amended City Chapter 88 through Ordinance No. 220961 by enacting new section 88-424-01 through 88-424-13, Tree Preservation and Protection. The intent of the amendment is to preserve and advance the aesthetic, economic, and environmental benefits of a high-quality urban forest, by protecting trees and mitigating any unnecessary removal of trees. The ordinance helps with better stormwater management and runoff infiltration.

During the reporting period, City Planning & Development Department reviewed 11 cases for tree preservation plans with some of the project reviewed at multiple steps. The City also approved ordinance added section for alternative compliance, which allows the option to pay into the Tree Fund as a means of alternative compliance landscaping when planting standards cannot be met. Three projects contributed to the Tree Fund. In addition, Parks & Recreation Department planted 1,500 trees on Parks' Department properties.

Updated Green Stormwater Green Infrastructure Manual: Water Services Department completed updates to the Kansas City Missouri Green Stormwater Infrastructure Manual (GSI) in October 2022. The updated version adds two new sections: Design Guidance for GSI practices (e.g., storage & sizing calculations, bioretention, rain garden, etc.), and Design Deliverable Expectations for GSI Projects. These additions are intended to make the manual a better guidance and resources for the users or City project managers by providing a standard calculation method for estimating the storage and sizing of each major GSI type and specifying the standard for design deliverable to facilitate City review of each project.

Water Services Department is coordinating with other City departments to keep track of the BMP installations on private and public properties, and to ensure the information is timely incorporated in the City's GIS database for green infrastructures.

Continuous Improvement: The City will continue to enforce the tree ordinance for both private development and capital improvement projects and make progress towards 10,000 trees in three years. The City will continue to use the GSI manual on capital improvement projects and encourage its use for private development. The City will continue to work with MARC and other local municipalities to update the APWA 5600 and 2600 and the BMP Manual.

5.2 Ensure long-term operation and maintenance of post-construction BMPs (Permit Ref. 5.a.ii. & iv.)

BMP 1. Inspect post-construction BMPs

Measurable Goal: Inspect an average of 20 detention/retention basins per year (**Note:** this is the goal set up newly to replace the old one, which is Inspect stormwater BMPs constructed through PIAC projects and have

them maintained based on the agreement for maintenance responsibility set prior to construction. The original goal is covered in Section 6.2)

Status: Goal met.

The private detention/retention basins and other stormwater BMPs inspected by the City: Water Services Department continues to administer the Detention Basin Credit Program. During the reporting period, Water Services Department:

- Inspected three detention/retention basins under the Detention Basin Credit program.
- Inspected another 40 detention/retention basins that are not with the Detention Basin Credit Program.
- Had five detention basin remediated.
- Inspected 10 private stormwater BMPs.

The Regional Green Infrastructure Maintenance Program: Water Services Department is working with MARC and Center for Watershed Protection, as well as multiple local cities, to develop a regional training program that supports the continued expansion of green workforce skills. The program is the first of its kind in the region, establishing the structure, tools, and continuous workload pipeline to support the viability of green infrastructure and to make our contracting partners successful in the long-term.

Continuous Improvement: Water Services Department will continue to inspect private detention/retention basins and stormwater BMPs; continue to address the issues identified through inspection and continue to play a role in developing the regional training program.

6. Pollution Prevention and Good Housekeeping for Municipal Operations

The City currently has multiple efforts to practice pollution prevention and good housekeeping for City's municipal operations.

6.1 Employee training to prevent or reduce stormwater pollution (Permit Ref. 6.a.i.)

Measurable Goals:

- Track the annual numbers of relevant presentations made in the monthly stormwater coordinating committee meetings, employees who receive online training on stormwater pollution prevention in municipal operations, employees who receive training on SPCC, Parts Washer and HAZWOPER, and views of the relevant YouTube Videos.
- Complete employee training on sediment and erosion control for land disturbance activities.
- The KC Green Team will continue to play a role in shaping the City's policies.
- The KC Green Team will organize at least three activities or events annually to educate and inspire staff on green solutions and sustainability with City operations (Note: the last two goals were originally listed under Section 1.4 – BMP 1. Implement Programs through Leadership, Partnership, and Supporting Role. They are moved here for content appropriateness.).

Status: Goals met.

BMP 1: Using webinars as training resources. To keep staff abreast with the current advancement in stormwater management and watershed planning, Water Services Department enrolled a group membership with the Center for Watershed Protection to access training resources, in lieu of having presentations in internal meetings. Twenty city staff, across different City departments and with job responsibilities that can impact City's stormwater and watershed management policies and practices, were provided the access to the Center's member services, which included webinars. During the reporting period, employees attended the webinars on Realistic Restoration Targets in Urban Areas (13), Non-structural BMPs (18), Behavior Change (14), Stormwater Standards (18), Methods to Address Pollution Sources from Municipal Practices (18), Stakeholder Engagement (18), and Maintaining Forests in Stream Restoration (18).

BMP 2: Employee training related to sediment and erosion control at construction sites. For employee training related to sediment and erosion control at construction sites, refer to Section 4.6 for details. Eight city employees received the training on the new land disturbance permit requirement and sediment and erosion control measures.

BMP 3: Employee training related to municipal operations. The City's Office of Environmental Quality provided City employees with training on Parts Washer; Spill Prevention, Control and Countermeasure (SPCC), and HAZWOPER requirements. During the reporting period, the numbers of employees that received training on Parts Washer, SPCC and HAZWOPER-related were: 1, 38 and 45, respectively.

Water Services Department continues to use online accesses to three videos for stormwater pollution prevention education. These videos are produced by Excal Visual, and the titles are: *Stormwatch; A Drop in the Bucket*, and *Rain Check.* Each video is designed for stormwater pollution prevention education for employees working outdoors with materials, wastes and operational activities that could potentially impact the quality of the stormwater runoff. Water Services Department uses these videos to target employees from both City operations and private industries. During the reporting period, Water Services Department focused the training on private industries. See Section **7.2. Inspections and enforcement control measures** – BMP 2 for details.

BMP 4: Other relevant employee training. The City's Green Infrastructure Team held bi-monthly meeting during the reporting period. Attendees included city staff from multiple departments whose job functions have direct relevance to green infrastructures. Discussion topics included employee and contractor training for the

Green Stormwater Infrastructure Manual, Operation and Maintenance Pilot Program, development of a GSI Ordinance, and inter-department coordination to contribute to a city-wide GSI database.

The Office of Environmental Quality is participating in two employee development pilot programs with the Green Infrastructure Leadership Exchange focused on the basics of GSI and Equity in GSI.

BMP 4: KC Green Team's effort. 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.

During the reporting period, the Team made the following achievements:

- The Team successfully got the City accepted into the GSI Accelerator Program developed by the Center for Regenerative Solutions. The modules in the Program that the City could use for employee training are– Storm-Flood Risks and Green Infrastructure Accelerator. The training tool will help the City to grow its capacity to implement equity-centered, nature-based climate solutions to some of the most pressing climate change challenges the City is facing or will face.
- The City is in the process of securing $5 million from the Missouri Department of Natural as part of the American Rescue Plan Act of 2021 for riparian restoration along the Blue River, which drains the majority part of the City south of Missouri River.
- The City is part of a collaborative group, led by Evergy - a regional energy company, to leverage funds through the Missouri Energy Efficiency Investment Act to address the urban heat island in the historic northeast district. Plans to utilize funds currently include tree planting and will likely include rain gardens and bioswales with native plants.
- The Education & Outreach Green Team hosted multiple cleanup events in April 2024. See Table 4. The achievements through 2024 Great Kansas City Cleanup for details.

Continuous Improvement: The City will continue to provide training and education to its employees based on their job responsibilities.

6.2 BMP maintenance to reduce floatable and other pollutants (Permit Ref. 6.a.ii.)

Measurable Goals:

- Inspect and maintain BMPs that were constructed on City's properties through its Smart Sewer Program or on private properties but with an easement for City Maintenance (**Note:** this is a newly added goal, which also incorporates the goal originally listed in Section 5.2. Inspect stormwater BMPs constructed through PIAC projects and have the maintained based on the agreement for maintenance responsibility set prior to construction.).
- Inspect and maintain the listed public detention/retention basins; and
- Inspect an average of 20 detention/retention basins per year (**Note:** this measurable goal has been moved to Section 5.2).

Status: Goals met.

BMP 1: City departments continued to maintain stormwater green infrastructure constructed on City properties or on properties that City has maintenance easements. Continuing maintenance allows the established green infrastructure to function at an optimal level. Water Services Department keeps an inventory of all green infrastructure facilities constructed and/or maintained by the City. The inventory is mapped in the City's Geographic Information System (GIS) for tracking and for facilitation of operation and maintenance.

Water Services Department maintains the green infrastructures using three venues: Green Solution Team which is composed of in-house staff, Green Stewards Team which is a group with Bridging the Gap – a partner with the City, and eight contractor companies.

- Green Solution Team: maintained 363 individual infrastructures of 26 sites; completed 5,530 tasks of various types, which include 2,517 tasks of cleaning concrete structures and drainage paths, as well as 1,291 tasks of trash and debris removal.
- Green Stewards Team: maintained 268 individual infrastructures of 3 sites.
- Contractors: maintained 92 individual infrastructures of 13 sites.

Other City departments maintain the green infrastructures that they build unless specific arrangements are made for another City department including the Water Department to assist.

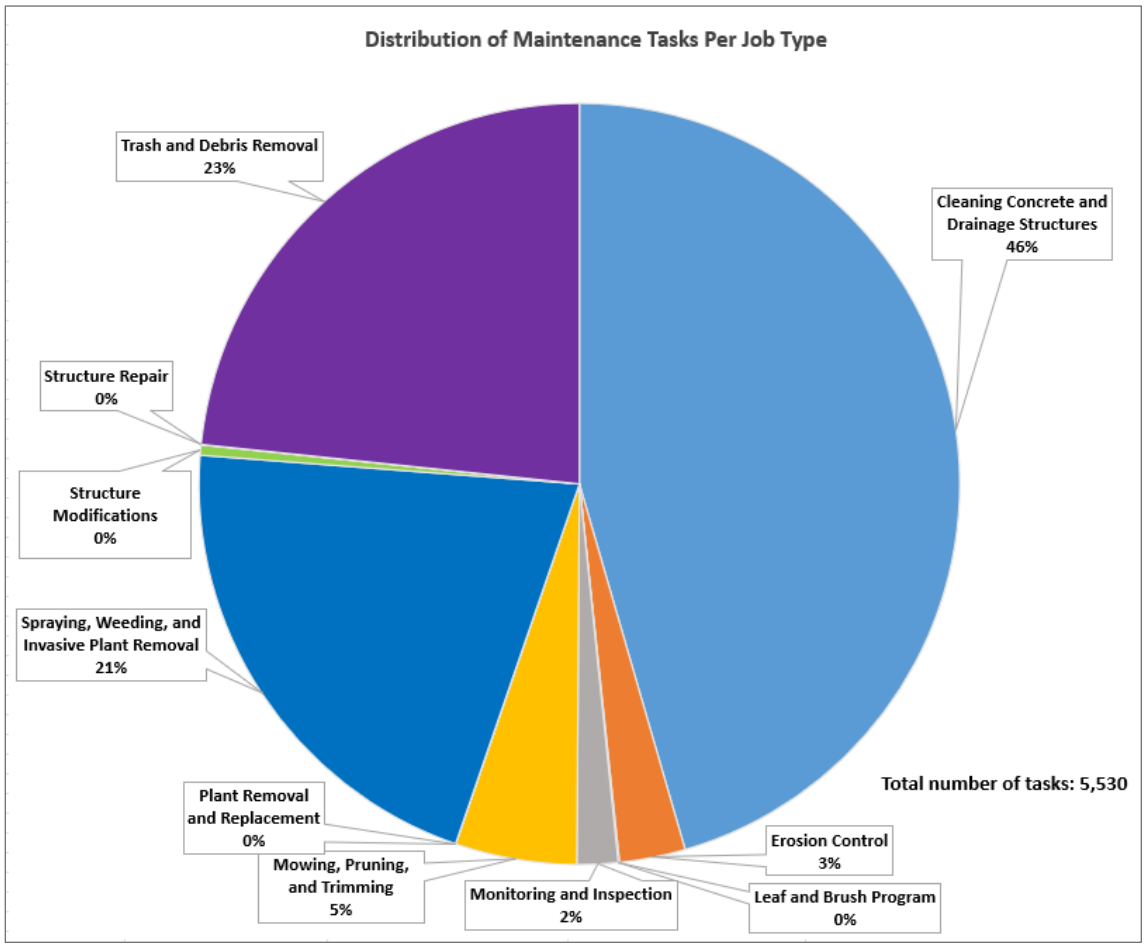
The interdepartmental KC Green Infrastructure Team has shifted from adopting a maintenance proposal to developing a funding strategy to help different City Departments, who, other than Water Services Department, own GSIs on their properties, to have maintenance and repair responsibilities consistently defined and fulfilled. The purpose is to ensure long-term effective function of these infrastructures.

BMP 2: Inspected and maintained the public detention basins. Water Services Department's Preventative Maintenance Division inspected and maintained the public detention basins. These public basins include the ones at 8801 James A Reed Rd., 6013 North Strathbury Road, 300 Chestnut Trafficway, 3913 North Kensington Road, Stillwell Avenue, and Gardner Avenue (now a retention basin). The City owns multiple detention basins at several police department patrol stations that include North Patrol, Central Patrol, Metro Patrol, South Patrol, East Patrol, and Shoal Creek Patrol stations. Police Department maintains these basins.

BMP 3; Water Services Department maintains an inventory of BMP facilities constructed on City owned properties. The inventory is mapped in the City's Geographic Information System (GIS) for tracking and for facilitation of operation and maintenance of green infrastructure facilities constructed and/or maintained by Water Services Department.

Continuous Improvement: The City will continue its commitment to long-term maintenance of the BMPs constructed on City properties. Water Services Department will continue to lead to keep the GIS database for BMPs updated.

Figure 3. Green Stormwater Infrastructures maintained by Water Services Department – distribution of maintenance tasks



6.3 Controls for reducing or eliminating the discharge of pollutants (Permit Ref. 6.a.iii.)

City implemented measures for reducing or eliminating the discharge of pollutants from street, roads, municipal parking lots, maintenance and storage yards, waste transfer station, fleet or maintenance shops with outdoor storage areas, and salt/sand storage locations and snow disposal areas the City operates.

6.3.1 Management of deicing chemicals (Permit Ref. 6.a.iii.1.)

Measurable Goal: Amount of deicing materials used annually.

Status: Goal met.

BMP 1: Management and improvements to the City's deicing storage facilities. The City's Public Works Department maintains the deicing chemical and material storage facilities. There are three districts and two outlying salt storage facilities. The facilities vary in size, and their storage capacities range from 6,000-12,000 tons of materials. Rock salt is stored in dome structures at two locations. The domes were constructed on asphalt slabs and consist of wooden and concrete structural materials, capable of containing deicing chemicals during periods of extended storage. The three additional salt storage facilities are **Cover-All** buildings with ten-foot-high concrete walls constructed on an asphalt slab. Salt brine and calcium chloride solutions are also used as deicing agents for the public streets, and both are stored in tanks. During

the reporting period, the City used a total of 18,000 gallons of salt brine, 13,500 gallons of liquid calcium chloride, and 20,000 tons of salt to keep the City streets safe for cars and passengers.

Continuous Improvement: The Public Works Department will replace one existing dome with a Cover-All building and may add an additional cover-all building north of the river in the future when funding is available.

BMP 2: General Services Department's practice. The City's General Services Department, which manages about 160 City sites, used deicing material mostly sourced from the Public Works Department (the amount was included in the above 6.3 BMP 1). In addition, it applied about one ton of ice-melt, sourced from a retail vendor, on the sidewalks of the buildings for pedestrians' safety.

Continuous Improvement: The departments will continue the practice to ensure pedestrians' safety.

6.3.2 Maintain roadways and stormwater inlets (Permit Ref. 6.a.iii.2 & 4)

Measurable Goals:

- For the combined-sewer-system-service area, street sweeping is conducted at least twice annually on all streets with curbs.
- For the MS4 area, street sweeping is conducted the same day for emergency requests and within 48 hours for non-emergency sweeping requests.
- Public Works provides one or more rounds of leaf and brush curbside collection services.
- Public Works maintains the three Lead & Brush Drop-off sites.
- Water Services Department inspects and cleans 15,000 stormwater inlets annually.

Status: Goals partially met

BMP 1: Street sweeping and MyKCMO app. The City provides myKCMO app for residents to request cleaning. The app is free and available on Google Play and Apple App stores. If anyone notices a location in need of a spot cleanup, they can snap a photo and upload it to the myKCMO app to request the City service. This allows the City's street sweeping service to be used more effectively. The City uses Elgin Eagles and Curb Tender's mechanic sweepers. Here is a summary of the program achievement:

- For the combined sewer area, street sweeping was done twice as planned amounting to 3,307 miles of streets with curbs. In addition, 1,960 miles of streets with or without curbs were cleaned per residents' requests through myKCMO app.
- For areas outside of the combined sewer system service, 750 miles of streets were swept.
- In total, the City swept 6,033 miles of streets with a collection of 1,623 tons of debris.

BMP 2: Stormwater inlet cleaning program. Here is a summary of the program achievement:

- Inspected and cleaned 10,600 stormwater inlets, short of meeting the goal for 15,000 due to staffing shortage despite of an aggressive campaign across the City.
- Completed repairing 221 inlets, with 128 repairs requested through MyKCMOapp.
- Completed 59 work orders for storm line repair.

BMP 3: Leaf and Brush Collection. The City collected 1,088 tons of leaf and brush through its curbside collection, and 15,000 tons through its three collection centers.

Continuous Improvement: The City will continue to implement the programs for street sweeping, inlets cleaning and leaf & brush collection. Water Services Department continues to evaluate hiring paths and staff resources to attain the desired yearly goal.

6.3.3 Incorporate BMPs in street design and construction (Permit Ref. 6.a.iii.3.)

BMP 1: Follow the adopted standards and regulations.

Measurable Goals: Follow the City's adopted standards and comply with City's effective regulations relevant to the reduction or elimination of pollutant discharge from the City's trafficways.

Status: Goal met.

For street design, construction and maintenance, the City follows the following standards, ordinances, manuals as well as relevant permit requirements:

- The Kansas City Metropolitan Chapter of the APWA standards with the supplements:

https://www.kcmo.gov/city-hall/departments/public-works/public-works-design-construction-standards

- Stream Buffers regulation – City Code Chapter 88. Zoning and Development Code, Section 415. Stream Buffers;
- Tree Preservation and Protection – City Code Chapter 88. Zoning and Development Code, Section 424. Tree Preservation and Protection;
- 2022 Green Stormwater Infrastructure (GSI) Manual (published in October 2022, an updated version of the 2020 GSI manual); and
- Land Disturbance Permit – MO-R100000 issued by the State in July 2022, and Kansas City MO Stormwater Pollution Prevention Plan template generated by the City to comply with the permit.

During the reporting period, the City continued to work with the Mid-America Regional Council (MARC) and other local communities on a regional scale to update both the stormwater design criteria currently defined in APWA Section 5600, Stormwater Drainage Systems and Facilities as well as the MARC Manual of Best Management Practices for Stormwater Quality.

BMP 2: Incorporate BMPs in street design and construction.

Measurable Goals:

- Track the annual number of BMPs constructed through street projects

(Note: the previous goal was set for tracking the annual number of BMPs included in street design. After a re-evaluation of the permit implementation, the City recognizes that tracking the number of BMP construction has practical benefits and more value.)

Status: Goal met

The Public Works Department follows the City's adopted BMP Manual in the street design. During the reporting period, stormwater BMPs were constructed through three roadway projects. The BMPs installed included bioretention cells, vegetated median with infiltration trench, and tree wells with soil cells.

Continuous Improvement: The City will continue to comply with relevant standards, regulations and manuals in its street design. The City will continue to work with MARC and other municipalities to update the regional stormwater-related standards and stormwater BMP Manual.

6.4 Storage of paints and petroleum products; spill prevention and management (Permit Ref. 6.a.iv.)

Measurable Goals:

- Inspect all City sites on an annual basis following the effective Environmental Management System (EMS) and track the inspection result in Cartegraph; and
- Follow up with each department about its site management and keep track of the follow-up on monthly basis.

Status: Goals met.

BMP 1: Implement and enforce the Environmental Management System (EMS) for City operations. The City implements the EMS for City operations. The EMS was updated in 2020, as good environmental stewardship for all of its organizational activities. Chapter 5. Chemical Management specifically addresses management of chemicals, including storage of paints, solvents, petroleum-related products, petroleum tank management, and spills and overfill prevention. Chapter 6 Waste Management addresses specific requirements for latex paint, used oil contaminated materials, as well as used oil. Chapter 7 addresses spill prevention and response.

BMP 2: The City's Office of Environmental Quality's annual inspections. The Office of Environmental Quality conducted annual inspection at 329 sites that are either owned or operated by the City. The inspection was done in compliance with the EMS and tracked in the Cartegraph Task Management System (Cartegraph). An automated report is generated on a monthly basis to provide a summary of environmental compliance recommendations for each department.

Continuous Improvement: The City continues to implement the EMS and use the Cartegraph for tracking.

6.5 Reduce pollutants related to pesticides, herbicides, and fertilizers (PHFs) (Permit Ref. 6.a.v.)

Measurable Goals:

- Ensure that crew engaged in applying pesticides at City sites are certified;
- Ensure that PHFs are not used or used sparingly and only as needed at various City sites including those managed by the General Services Department, Parks & Recreation Department and Water Services Department;
- Ensure that City golf courses are managed with an approach of responsible land management and conservation of natural resources; and
- Identify opportunities to adopt BMPs or use environmentally friendly products in lieu of conventional pesticides.

Status: Goals met.

BMP 1: City's EMS. There are multiple chapters in the City's EMS that address the application of pesticides, herbicides, or fertilizers (PHFs). Chapter 2. section 2.05.01 states that pesticides, used throughout City facilities and its landscapes, are regulated by the Missouri Department of Agriculture, which certifies commercial, noncommercial, and public pesticide applicators. Chapter 5. section 5.07.06 specifies persons engaged to apply pesticides for commercial, noncommercial, private, and public entities are certified. It states that City departments that apply or utilize the services of those who apply PHFs should put into place BMPs to reduce their run-off before and after the products have been applied. Chapter 9 section 9.03.03 lists chemicals that are not allowed in the storm water system. The list includes herbicides and pesticides.

BMP 3: City's Parks & Recreation Department parkway maintenance activities. The Parks & Recreation Department crew maintain over 40 miles of park roads; hundreds of parking lots; 12,000 acres of parkland in 220 parks; 135 miles of boulevards, parkways, and streets, and over 100 miles of trails and bikeways. Herbicides and fertilizers are used sparingly and only as needed to specific areas which require a higher level of maintenance.

BMP 4: Parks & Recreation Department's maintenance of park lands. The Parks & Recreation Department crew continue to maintain, improve, and protect thousands of acres of land that provide wildlife habitat and contribute to reducing stormwater runoff and water pollution throughout the City. These properties include:

- More than 6,500 acres protected as woodlands throughout the park system
- More than 165 acres in the reduced mowing program

- More than 290 acres of natural areas on 36 sites, consisting of restored and remnant prairies, glades, butterfly gardens, bio-swales, and rain gardens

In addition, the Parks & Recreation Department conducted the following tasks:

- Planted 1,500 trees
- Maintained more than 400,000 trees on the City's owned land
- Maintained 45 perennial native plant beds

BMP 5: The Parks & Recreation Department's maintenance of golf courses. The Parks & Recreation Department crew and contractors continue to use environmental BMPs and procedures to manage its five golf courses: Hodge Park, Shoal Creek, Swope Memorial, Minor Park, and Heart of America. They are required to have commercial applicator license. The contracted management teams from Kemper Sports and Orion Management Solutions continue to reduce pesticide and fertilizer usage at the above courses by:

- Maintaining a native buffer near water bodies and sensitive areas wherever possible; and
- Allowing the outer rough areas that were once mowed and irrigated at each course to return to their native habitats (approximately 15 to 20 acres)

In addition, Shoal Creek Golf Course is designated as a *Certified Audubon Sanctuary* through the International Audubon Cooperative Sanctuary Program for golf courses. This ecologically-based program promotes both responsible land management and conservation of natural resources.

BMP 6: Certification requirement for pesticide/herbicide/fertilizer application.

- For the approximately 30 acres of BMP sites that Water Services Department maintains, staff or contractors are required to have a Missouri Pesticide Applicator License.
- For maintenance of Parks & Recreation Department's properties, the Department requires its general supervisors, landscape technicians, and one of its Conservation Corps maintenance workers to have Pesticide/Herbicide Applicator licenses.
- For maintenance of the levee systems, Water Services Department required that contractors be certified for commercial application of pesticides and herbicides.
- The General Services Department manages about 160 City sites. It does not use PHFs to maintain lawn or other landscape areas.

Continuous Improvement: The City will continue to improve current practices regarding pesticide, herbicide, and fertilizer management.

7. Industrial and High-Risk Runoff

The City implements programs to monitor and control pollutants in stormwater discharges to the MS4 from industrial and high-risk runoff facilities.

7.1 Identify municipal waste sites that discharge into the MS4 (Permit Ref. 7.a.i.)

BMP 1: Conduct periodic site inspection.

Measurable Goal: Continue periodic site inspections; consider remedial options and determine a course of action, if necessary; continue to implement the maintenance plans based on the result of the inspections.

Status: Goals met.

The City ceased operations of all solid waste dump sites by 1974. The closed sites were operated by the City during various periods from 1950 to 1974. The 87th Street site is within the boundary of the MS4-served area and is thus subject to the MS4 permit. The site has been closed from dumping since 1972. The Office of Environmental Quality continues to monitor this inactive site for compliance with the MS4 Permit and in general for issues that may pose a threat to public health or safety, threaten environmental protection, or that may create a nuisance condition.

The Office of Environmental Quality performs periodic walk-through inspections for 87th Street site. Visual observations during the inspection include evaluations for: (1) cap integrity and vegetative cover; (2) water ponding on the cap surface of the site; (3) fill material exposure; and (4) evaluate for continued active seepage or leachate at this site. The inspection results are documented, and further investigations undertaken if warranted.

The Office of Environmental Quality established a maintenance program for the City's dump sites. All maintenance activities are geared toward maintaining the integrity of the site cap and minimizing the infiltration of water into the interred waste. The program may include surface waste removal and cap maintenance.

Continuous Improvement: The Office of Environmental Quality will continue periodic site inspections, consider remedial options and determine a course of action (if necessary), and implement the maintenance plans based on the results of the inspections.

7.2 Identify facilities that discharge into the MS4 (Permit Ref. 7.a.i.)

BMP 1: Maintain the inventory of high-risk-runoff sites.

Measurable Goal: Keep the inventory updated.

Status: Goal met.

During the reporting period, Water Services Department continued to maintain the inventory by consulting the list of MDNR's Hazardous Waste Program and the list of EPA's EPCRA (Emergency Planning and Community Right-to-Know Act) Section 313 program, communicating directly with facilities, doing online search and/or using other applicable methods.

The current inventory of the facilities includes 58 municipal-owned or operated facilities, 134 non-municipal industrial facilities and 22 commercial sites. For the municipal facilities, ten of them have a State permit. Among the non-municipal facilities, there were 11 hazardous waste treatment, storage and disposal (TSD) facilities and 25 Title III Section 313 facilities with one falling into both categories.

Continuous Improvement: Water Services Department will continue to update the inventory as needed.

7.2 Inspections and enforcement control measures (Permit Ref. 7.a.ii.)

BMP 1: Conduct the inspection program.

Measurable Goals: Inspect a minimum of 30 sites annually, follow up and have identified issues resolved timely, and conduct enforcement as necessary.

Status: Goals met.

Water Services Department inspected a total of 33 private and muncipal sites following the established procedure. Inspection priority was given to the facilities depending on:

- Time elapsed since last inspection
- A history of stormwater issues
- The nature of the site operation
- Public complaints

Water Services Department continues to use its updated standard operation procedure for inspection. When needed, it uses the established procedure for enforcement to address any potential violations of stormwater regulations by industrial or business operations.

The Office of Environmental Quality conducted a total of 329 environmental inspections at municipal owned or operated sites. The Office worked closely with Water Services Department to address stormwater requirements for each individual site.

BMP 2: Reaching out to the industrial communities.

Measurable Goals: Track the annual numbers of municipal and non-municipal employees that receive the City's stormwater training.

Status: Goals met.

During the reporting period, Water Services Department provided the video - *A Drop in the Bucket* to a total of 33 employees from two companies and one city employee. The video was produced by Excal Visual for stormwater pollution prevention education. The content was applicable to employees working outdoors with materials, wastes and operational activities that could potentially impact the quality of the stormwater runoff.

Continuous Improvement: Water Services Department will continue to evaluate the inventory for inspection priority, conduct the inspections based on the evaluation result for continuous practices. Enforcement action will be taken where necessary. Education and outreach will continue to be provided.

7.3 Monitor high risk-runoff Facilities (Permit Ref. 7.a.iii.)

Measurable Goals: Track the annual numbers of: the sites and the rain events that are monitored; the facilities from which stormwater monitoring data are collected; the facilities that are certified for Stormwater No-exposure Certificate and those that have the certificates, and the facilities that have the Stormwater Self-assessment program newly in place, and the facilities that maintains the program.

Status: Goals met.

BMP 1: Water Services Department continued to implement the Stormwater Self-assessment Program. The program was created in 2008 with the intent to help high-risk industrial operations to take preventive measures, improve housekeeping practices, and utilize BMPs to minimize stormwater pollution. Water Services Department continued to implement the Stormwater Self-assessment Program at 13 participating facilities.

BMP 2: Stormwater sampling program: During the reporting period, Water Services Department attempted multiple times to collect stormwater runoff samples at the designated sites; but was only able to collect one set of samples from one site during one rain event in May 2023. The collected samples were analyzed by Teklab, Inc. for more than 20 chemical parameters including pH, conductivity, alkalinity, turbidity, hardness, BOD-5

day, COD, ammonia nitrogen, solids of different types and major metal species in both dissolved and total phases. The concentrations of heavy metals were all below the reporting limits. The results were all within the concentration ranges of the local stormwater runoff collected from different land uses through the Stormwater Monitoring Program as required by the Permit.

Water Services Department collected stormwater monitoring data from three companies that are required to conduct the monitoring per their NPDES permits.

Continuous Improvement: Water Services Department will continue to implement the Stormwater Self-assessment Program and continue the monitoring.

7.4 Municipal operations (Permit Ref. 7.b.)

BMP 1: Maintain a list of municipal operations.

Measurable Goal: Maintain the existing inventory of facilities.

Status: Goal met.

The inventory of the industrial and high-risk runoff facility includes a list of 58 municipal operations. Of those, ten carry State NPDES permits.

Pollution prevention and good housekeeping measures will continue to be monitored at all municipal owned or operated sites. Water Services Department created a Stormwater Self-assessment Program in 2008. The program requires City facilities to establish good housekeeping measures and take steps to prevent pollution. Water Services Department continues to work with the Office of Environmental Quality to address pollution prevention and good housekeeping measures at all City facilities every year.

Continuous Improvement: Water Services Department will update the list as needed.

8. Flood Control Projects and Devices

The City through Water Services Department assesses the impacts that new flood control projects have on water quality in relation to MS4 activities. The City evaluates existing flood control devices to determine potential improvements. The City also implements retrofits of flood control devices owned and operated by the City that have been determined to be feasible.

8.1 Assess the water-quality impacts in the design of new flood control projects (Permit Ref. 8.a.)

BMP 1: New flood control projects.

Measurable Goal: Maintain the vegetation in both Dodson Flood Risk Reduction Project and Swope Park Industrial Park Levee Project.

Status: Ongoing.

The Dodson Flood Risk Reduction Project was completed and turned over to the City, as the sponsor of the project, on an interim basis during the previous reporting period. During the reporting period, the City continued to provide weed control services for the structural components, e.g., deadman mooring structures, gates and fences. U.S. Army Corps of Engineers (USACE) was working on a Semi-Quantitative Risk Assessment which is required for the levee to be accredited by Federal

The Swope Park Industrial Park Levee/Floodwall project included critical bank stabilization and installation and vegetation of a detention basin. The Water Services Department maintains the vegetated areas by using a mowing contract, which specifies mowing schedule, ground maintenance details, and conditions for herbicide application.

In addition to the above projects, the City has also been working on the following project:

Little Blue River Basin – Flood Risk Management & Ecosystem Restoration: Water Services Department, along with the Mid-America Regional Council, Jackson County and the Cities of Blue Sprins, Grandview, Lee Summit, Independence and Raytown have entered into an agreement with the USACE for a feasibility study in November 2021. USACE has been authorized to conduct a General Investigation Study to analyze whether changing conditions within the Little Blue River basin are increasing the flood risk. The objective of this study is to create a plan to address flood risk management and ecosystem restoration. The study will assess current conditions using hydraulic modeling to develop planning assumptions for a 50-yr time projection model.

During the reporting period, the partners continued to have monthly project meetings. Field investigations at over 100 sites were completed. Decisions were made about post Tentatively Selected Project review schedule, public engagement timeline and sponsor-partner concurrence process. The project team accessed existing conditions within the watershed and incorporated those findings into the hydraulic model to develop planning assumptions

Continuous Improvement: Water Services Department will continue to work with USACE and to ensure a thorough and successful transfer of long-term maintenance responsibilities for the Dodson Levee. WSD will continue to work with USACE and other partners for the Little Blue River project to identify and evaluate flood-risk mitigation alternatives to determine which of the proposed solutions are viable in terms of costs and long-term operations and maintenance. Ecosystem restoration projects will be evaluated as well. The first draft of the study is anticipated in early 2025, and a preliminary cost estimate is expected in November 2024.

8.2 Retrofit existing flood control devices to reduce stormwater pollutants (Permit Ref. 8.b.)

BMP 1. Existing flood control projects.

Measurable Goals:

- Brush Creek: Complete the Lower Brush Creek Ecosystem Restoration Feasibility study and seek funding for design and construction.
- Indian Creek: Complete the Indian Creek BMP Feasibility study and seek funding for design and construction.

Status: In progress.

Brush Creek Lower Reach – Section 1135 Ecosystem Restoration: Water Services Department entered into an agreement with the USACE for the Feasibility Study in February 2019. Through Section 1135 of the **Water Resources Development Act**, USACE reviewed the need to modify any portions of Brush Creek between the Paseo Blvd. bridge and the confluence with the Blue River (inclusive of Lake of the Enshrines) in order to improve environmental quality and provide ecosystem restoration. During the reporting period, Water Services Department partnered with USACE and a consulting contractor and completed a Master Planning Study for this reach. This Master Planning Study, along with the existing condition analysis from the Ecosystem Restoration project, resulted in the decision to terminate the Section 1135 project – the Feasibility Study, along with the Upper Reach's 1135 project, and convert them to a General Investigation Study.

Continuous Improvement: Water Services Department will continue to partner with USACE to begin a new General Investigation Study.

Indian Creek Watershed Study: In the previous years, Water Services Department had secured the 3.1 acre flood-damaged commercial properties (400-600 W 103rd St.) abutting Indian Creek. Building structures had been demolished, and the asphalt surface had been removed. Stormwater BMP options had been evaluated in the past. In addition, Water Services Department also had a project with ACE to use 2D Hydrology & Hydraulic, Physical Models to assess flood risk in the area. Further evaluation is needed to find a practical solution for local flooding issues. No progress was made during the reporting period.

Continuous Improvement: Water Services Department will continue to seek opportunities to protect water quality in association with flood control projects.

The projects listed below are newly added and were not included in the current SWMP:

Buckeye Creek Section 14 Streambank Stabilization. The purpose of this project is to address the eroding banks of Buckeye Creek and potential impacts on sanitary sewer mains. During the reporting period, the final feasibility study report was routed for internal review and approval.

Continuous Improvement: The feasibility study report is finalized and pending for approval. Contract execution process will be initiated for project design and implementation phase.

Shawnee Mission Parkway/Brush Creek Section 14 Streambank Stabilization. The purpose of this project is to address the eroding banks of a segment along Brush Creek, which crosses two cities and two States, and to seek measures to protect roadways and other infrastructures. During the reporting period, Water Services Department had meetings with USACE to discuss re-start of the project and funding required to complete project design and construction. The general concept for the design and construction is to strategically place stone structures and plant natural vegetation to stabilize bank erosion and protect nearby infrastructure.

Continuous Improvement: The plan is to complete the project design phase. Funding for construction has recently been acquired.

85th St. and Holmes Rd. Stream Daylight and Flood Risk Study. The purposes of this project are to lower flood profiles of Boone Creek at the intersection of 85th St. and Holmes Rd. and adjacent commercial and residential structures, as well as to reduce the risk of life safety due to flooding at the intersection.

The scope is to examine potential alternatives for expanding the daylighting of SW Boone Creek near 85th Street & Holmes Road. Alternatives for addressing the flood risk and infrastructure problems will be formulated and compared to include rough order magnitude construction and maintenance costs. During the reporting period, the assessment of alternatives began, and the initial array of alternatives was reduced to include only the ones determined to be most effective.

Continuous Improvement: A review of the initial array of alternatives will be conducted. Selection will be made for the alternatives to receive further consideration and cost/benefit analysis.

Lower Brush Creek Stream Corridor Master Plan. The purpose is to examine options for the enhancement of the urbanized and highly altered Lower Brush Creek. Focus will be given to potential recreational and cultural enhancement opportunities that can work with current or potential future ecosystem restoration effort. Additionally, a public involvement process that will include stakeholders and community input will help inform the plan recommendations. During the reporting period, workshops have been held to engage and inform the public of this project and to solicit input. A draft version of the master plan report was developed and reviewed.

Continuous Improvement: All planned workshops were held, and the final report is completed.

9. Monitoring

Water Services Department conducts monitoring on the quality of representative stormwater discharges, evaluate ambient water quality and conduct biological assessment at selected stream sites. The purpose of these monitoring efforts are to assess the MS4 impact.

9.1 Stormwater Discharge Representative Monitoring (Permit Ref. 9.a.i, ii & iii.)

BMP 1: Implement the Stormwater Discharge Monitoring Program.

Measurable Goals: Conduct field sampling at a minimum of three separate locations (each of the six sites) during two (three) separate storm events annually occurring at least one month apart; take field measurement and laboratory testing of the collected field samples for 9 (11) parameters specified in the Permit; field sampling and measurement and laboratory testing shall follow the established sampling plan and the Quality Control Manual; keep record of all analytical results, and information of the rainfalls during which samples are taken, and observation; compile the data and conduct analysis on annual basis. (Note: the underlined words are the goals newly set in accordance with the renewed permit and the words in parentheses were the previous goals)

Status: Goals met.

The five designated sites are listed in Table 6. For each of the five sites, monitoring was done for two or more storm events at least one month apart. Monitoring included field measurements and sample collection. Samples were analyzed by Water Services Department Laboratory for physicochemical and microbiological parameters, except Oil & Grease, which was analyzed by Pace Analytical, a contractor laboratory.

All field sampling, measurements, sample handling, laboratory analysis, and data validation, as well as a quality assurance and quality control, follow the updated sampling plan for the MS4 stormwater discharge monitoring program and Standard Operational Procedures developed by Water Services Department Laboratory, except that the Total Kjeldahl Nitrogen (TKN) analysis was removed by the Water Services Department Laboratory Services from the testing list by error. A Corrective Action Response (CAR) was initiated on August 31, 2023. As a result, the samples collected before that date were not analyzed for TKN. Oil & Grease is not required by the renewed permit, thus the samples collected after the effective date of the renew permit were not analyzed for this parameter.

The data results and a summary are shown in Table 6 and Table 7, respectively. Storm event data records are maintained and include all analytical results, the date and duration (in hours) of the storm event(s), rainfall measurements or estimates (in inches) of the storm event that generated the runoff that was sampled, and the duration (in hours) between the storm event sampled and the end of the previous measurable (> 0.1-inch rainfall) storm event.

Continuous Improvement: The City will continue to implement the program.

Table 6. Stormwater runoff monitoring data

Location (land use represented)	Parameter (unit)	pH (SU)	Cond (µs/cm)	BOD (mg/L)	COD (mg/L)	O&G (mg/L)	*E. coli.* (MPN/100mL)	TSS (mg/L)	NO2+NO3 (mg/L)	TKN (mg/L)	Diss-P (mg/L)	TP (mg/L)
	Detection limit	NA	3	2	5	1.3	1	2.5	0.043	0.45	0.016	0.02
	Sampling Date											
SE 50th Ter. & Sterling Ave. (residential)	05/11/2023	7.7	243	20.1	124	ND	104,620	81.0	>0.894	NT	0.540	0.26
	7/24/2023	7.9	162	11.7	53	ND	17,300	17.0	>0.918	NT	0.110	0.22
210 Hwy & Randolph Rd. (industrial)	5/11/2023	7.8	127	10.1	78	ND	6,131	44.5	>0.651	NT	0.230	0.16
	7/24/2023	8.5	134	11.7	69	ND	6,131	65.0	ND	NT	0.0946	0.20
	9/24/2023	8.7	81	10.4	87	NT	5,475	199	ND	1.01	0.200	0.70
Gambril Park (residential)	9/11/2023	7.7	219	30.5	128	NT	>241,960	48.5	1.429	2.93	0.440	0.73
	1/8/2024	7.8	101	4.8	29	NT	24,196	44.0	ND	0.83	0.150	0.45
	3/7/2024	8.1	619	24.5	125	NT	980,400	107	>0.791	3.21	0.400	0.50
W. 133rd St & Inverness Dr. (commercial)	9/11/2023	8.4	116	7.0	55	NT	8,664	37.5	ND	0.94	0.130	0.19
NW Barry Rd. & NW Barrybroke Dr. (commercial)	7/24/2023	8.1	284	9.2	55	8.1	19,700	31.0	ND		ND	0.13
	9/22/2023	8.2	268	10.3	73	NT	6131	61.2	ND	1.01	0.200	ND
	12/22/2023	8.8	190	9.3	41	NT	573	21.4	ND	0.94	0.230	0.33
	3/7/2024	8.5	1301	NT	NT	NT	820	NT	NT	NT	NT	NT

Table 7. A summary of stormwater runoff monitoring data

Data summary	Parameter (unit)										
	pH (SU)	Cond (µs/cm)	BOD (mg/L)	COD (mg/L)	O&G (mg/L)	*E. coli.* (MPN/100mL)	TSS (mg/L)	NO2+NO3 (mg/L)	TKN (mg/L)	Diss-P (mg/L)	TP (mg/L)
	Detection limit										
	NA	3	2	5	1.3	1	2.5	0.043	0.45	0.016	0.02
	Result										
Sample count	13	13	12	12	1	13	12	5	7	11	11
Minimum	7.7	81	4.8	29	NA	573	17	0.651	0.83	0.0946	0.13
Maximum	8.8	1,301	30.5	128	NA	980,400	199	1.429	3.21	0.54	0.73
Average (Geometric mean for *e. coli*)	8.2	296	13.3	76.4	NA	14,306	63	0.403	1.43	0.19	0.27

ABBREVIATIONS
Cond-conductivity; BOD-biochemical oxygen demand; COD-chemical oxygen demand; O&G-oil & grease; TSS-total suspended solids; NO2+NO3 -nitrate and nitrite; TKN-total Kjeldahl nitrogen; Diss-P - phosphorus, dissolved; TP-phosphorus, total
NT: not tested; NA: not applicable; ND: below detection limit

For NDs, average is computed with half value of the method detection limit.

[M]Estimated value, matrix interference

[J]Estimated value, value may not be accurate

9.2 Biological assessments (Permit Ref. 9.b.)

BMP 1: Conduct biological assessments at selected streams.

Measurable Goals: Once in the spring and once in the fall during the five-year permit cycle

Status: Ongoing effort.

During the reporting period, Water Services Department continued to work with its contractor – Geosyntec Consultants and completed the project as developed in the 2021 Kansas City, MO Stream Biological Assessment Plan and Quality Control and Quality Assurance Plan. A total of sixteen stream sites are covered in the assessment. These sites are located respectively on: East Fork Shoal Creek, Line Creek, Round Grove Creek, Brush Creek, Hickman Mills Creek, Searcy Creek, Buckeye Creek, North Brush Creek, Fishing River, Little Blue River, Prairie Creek, three sites along Blue River, and two sites along Indian Creek.

Geosyntec completed all the sorting, processing and identification of the macro-invertebrate samples collected in both the spring and fall of 2022. Due to the drought conditions in the fall, macroinvertebrate samples were not collected for Searcy Creek, Fishing River and East Forck Shoal Creek. Concurrent to the collection of macro-invertebrate samples, Water Services Department staff collected stream water samples at the same sites for laboratory testing. Final reports, one for the spring samples and the other for the fall samples, were completed to include data analysis and interpretation.

Data analysis was done to incorporate the 2022 and previous years macroinvertebrate and water-quality results for across-site comparison, season comparison and trend analysis. The following macroinvertebrate vary significantly across the sites: (1) the Missouri Stream Condition Index (MSCI) scores for the same Fall season from the minimum of 8 at Brush Creek, a heavily urban impacted site, to the maximum of 20 at multiple stream sites including both urban and non-urban impacted, and the stream site with the largest variation is the control site – Fishing River; (2) the Taxa Richness (TR) ranges between 26 at Round Grove Creek (urban impacted) and 81 at Line Creek (urban impacted), with the control sites scoring noticeably higher than urban sites in general; (3) the Ephemeroptera/Plecoptera/Trichoptera Richness (EPT) ranges between 1 at Brush Creek and 18 at Little Blue River (control site) with the control sites scoring noticeably higher than urban sites in general.

Seasonal comparison has reconfirmed our findings over the last decade of the same type of investigation. The fall metrics generally show better or improved results than the spring ones. Regardless, the streams with some of the low spring values may still meet the criteria for partially supporting aquatic life or even the fully supporting aquatic life in the spring.

Trend analysis does not have any clear indication whether the macroinvertebrate community has improved or degraded. Most streams do vary across different years, but do not show a consistent trend. Even for the streams, such as Line Creek and North Brush Creek that there were significant construction work done adjacent to the stream sites in our investigation, both macroinvertebrates and water chemistry may have shown some severe degradation at the time of the construction. Those values could quickly rebound or return to the pre-construction levels within one or two years after the construction was completed. This type of recovery may be attributed to the Cit's stringent sediment and erosion control requirements for land disturbance activities and stream buffer ordinance.

Correlation analysis was done to evaluate water chemistry and the macroinvertebrate data. For control sites, MSCI, EPT, PDT and Shannon Diversity Index (SDI) correlate with chemical oxygen demand, dissolved oxygen, turbidity, water temperature, and dissolved oxygen. The only correlation found for impacted sites is Percent Contribution of Dominant Taxa (PDT) and water hardness. However, we should not equate the correlation to the cause-and-effect relation. It may only indicate that these water chemistry factors could have been environmental stressors to the macroinvertebrate community.

Continuous Improvement: Water Services Department will continue to evaluate the results and seek areas and opportunities to utilize the results to improve the City's policies and practices. Also another round of sampling will be planned for 2025-2028.

9.3 Methodology of sample collection analysis (Permit Ref. 9.c.)

BMP 1: Using required methods for sample collection and analysis.

Measurable Goal: Utilize the sample analytical methods specified in 40 Codes of Feder Regulation (CFR) 136.

Status: Goal met.

The analytic methods utilized in sample testing are consistent with the methods specified in 40 CRF 136. Below is a list of the parameters and corresponding testing methods.

- Total suspended solids: SM 2540 D
- Specific conductivity: SM 2510 B
- Chemical oxygen demand: SM 5220 D
- Biochemical oxygen demand: SM5210 B
- Oil & grease: SM 5520 F
- *E. coli*. SM 9223 B
- Total Kjeldahl nitrogen: SM 4500-Norg B and EPA 351.2
- Nitrate + nitrite: EPA 300.0
- Dissolved phosphorus, total phosphorus: SM 4500-P

Continuous Improvement: Water Services Department will continue using the standard methods for sample collection and analysis.