CITY OF KANSAS CITY, MISSOURI

National Pollutant Discharge Elimination System (NPDES)

Municipal Separate Storm Sewer System (M4) Permit

MO-0130516

May 1, 2021 - April 30, 2022

KANSAS CITY
MISSOURI

October 2022

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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.

Wes Minder, Assistant City Manager/Director

KC Water

City of Kansas City, Missouri

10/27/22

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 report documents permit activities conducted during May 1, 2021 through April 30, 2022 (the reporting period).

As required in the Permit, the City submitted to MDNR an updated plan for its Stormwater Management Program in August 2019 (2019 SWMP). The plan was prepared to ensure its compliance with the conditions specified in the renewed permit issued in September 2018. During the reporting period, the City re-evaluated its permit implementation and its long-term plans. The City is in the process of making adjustments to its 2019 SWMP for improved compliance with the permit terms. The City is planning to submit an updated SWMP (2022 SWMP) to MDNR for review and approval once the updated version has gone through its public review process.

This report is organized to match the layout of the requirements in the Permit and includes activities identified in the 2019 SWMP. For each of the nine minimum control measures (MCMs) required in the Permit, a list of relevant Best Management Practices (BMPs) is provided with a description of individual BMPs, a summary of compliance status, assessment of BMPs, implementation status, plan for the next reporting period, any planned changes to SWMP, and 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) had 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.)

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

Status: Goal met through multiple public education and outreach efforts.

BMP 1: 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 column of KC Education Station in the newsletter provided instruction on how to get KC Water's resources to help with litter pickup and to learn about stormwater impacts. The KC Education Station column also made announcements for upcoming school outreach activities, as well as providing a message on the importance of storm drain protection.

BMP 2: 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.

BMP 3: 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 kindergarten through 12th grade. In addition, the education program initiated development of a school district partnering strategy.

BMP 4: Use of Social Media to promote and inform about stormwater activities and outreach. KC Water continued to inform citizens of public education and outreach and stormwater runoff mitigation through social media. KC Water uses Twitter, Facebook, Instagram, YouTube and LinkedIn to promote clean water messages. During the reporting period, KC Water created 74 posts on Twitter, 74 posts on Instagram, and 74 posts on Facebook relating to stormwater and education and outreach.

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. Under the school district partnering strategy, the City would support school districts to provide water quality education for all grades. The education program has started to evaluate candidate school districts for implementation of this strategy and has developed a memorandum of understanding template for partnering school district.

1.2 Pollutants related to pesticides and pollutants related to used oil (Permit Ref. E.1-a.ii.)

Measurable Goal: Multiple activities were conducted during the reporting period. Specific measurable goal will be defined in the upcoming updated 2021 SWMP.

Status: The requirement was addressed through multiple efforts.

BMP 1: Use of the *KC to the Sea* curriculum in City schools. The curriculum was designed to help educate 4th through 6th grade students on the role of stormwater management in protecting the water quality in local rivers, lakes, and streams. During the reporting period, 49 lessons of KC to the Sea were taught to a total of 1,839 students in 23 public schools, 14 charter schools, and 12 nonprofit groups.

BMP 2. Lessons addressing pollutants: *Freddy the Fish, Ways of Water, Clean Water Messages, Trash Tally, Hitchhiking with H2O, Force of Water, Macro Monitoring, Water Testing, and Journey of Stormwater.* City staff taught ***the Freddy the Fish*** class targeted to Kindergarten children to educate them about various pollutants brought by human activities. Freddy the Fish was taught to 1,177 participants in 19 instances in Person, and five virtual presentations: five instances at Charter schools, nine instances at Public schools, one instance with a community wide virtual presentation, and nine instances with non-profit groups.

Ways of Water is a program targeted for 1st Graders. It incorporates the water cycle and a hands-on activity creating a watershed. Ways of Water lesson was taught to 1,129 participants, 24 instances in-person and one virtual presentation: six instances at Charter schools, one instance at a Montessori school, one instance at a Parochial school, seven instances at Public schools, and nine instances with non-profit groups.

Clean Water Messages is a program targeted for 2nd Graders. It incorporates stormwater runoff, contaminates, and a hands-on activity about water filtering. Clean Water Messages lesson was taught to 1,164 participants, 22 instances in-person, four virtual presentations, and one hybrid presentation: three instances at Charter schools, one instance at a Parochial school, 20 instances at Public schools, and three instances with non-profit groups.

Trash Tally is a program targeted for 3rd Graders. It incorporates graphs and storm drain locations, and it is usually a prelude to a litter pickup or other service project. Trash Tally lesson was taught to 988 participants, 30 instances in-person: five instances at Charter schools, one instance at Parochial School, 20 instances at Public schools, and four instances with non-profit groups.

Hitchhiking with H2O is a program targeted for 4th Graders. It incorporates water properties and a hands-on activity about pollutants in water. A Hitchhiking with H2O lesson was taught to 787 participants, 17 instances in-person and one virtual presentation: four instances at Charter schools, one instance at a Parochial school, nine instances at Public schools, and four instances with non-profit groups.

Force of Water is a program targeted for Middle School Students in Earth Science Class or 6th Grade. It incorporates erosion and flooding in a hands-on activity with sand tables. Force of Water lesson was taught to 1,077 participants, 23 instances in-person: one instance at Charter school, four instances at Parochial schools, 15 instances at Public schools, and three instances with non-profit groups.

Macro Monitoring is a program targeted for Middle School Students in Life Science Class or 7th Grade as well as High school students. It incorporates macroinvertebrates and water site characteristics. The Macro Monitoring lesson was taught to 571 participants, 15 instances in-person: two instances at Charter schools, one instance at Montessori school, 10 instances at Public schools, and two instances with non-profit groups.

A ***Water Testing*** lesson is a program targeted for Middle School students in Physical science or 8th grade as well as High School students. This lesson is designed to introduce students to various components and substances found in our waterways and how they can be used to determine water quality, Water Testing lesson was taught to 915 participants, students, 26 instances in-person: two instances at Charter Schools, three instances at Parochial schools, two instances at private schools, 16 instances at Public schools, and three instances with non-profit groups.

Journey of Stormwater is a program targeted for High School Students. It incorporates a water frame and a hands-on activity regarding the volume of stormwater. A Journey of Stormwater lesson was taught to 359 participants, 10 instances in-person: one instance at Parochial school, one instance at Private school, seven instances at Public schools, and one instance with non-profit groups

BMP 3: Adult Water Lessons. The City created a new lesson that builds on the ***KC to the Sea*** curriculum. This lesson adds in more information about stormwater runoff, the wastewater consent decree and infrastructure, and expanded information on pollutants in runoff. Three lesson presentations were provided to 109 adults from three nonprofit groups and one school district. One lesson was taught in-person and two were taught virtually.

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

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

Measurable Goal:

- Completion of annual requests for proposals, review, administration and award of grants.
- Active implementation, participation and support of efforts.

Status: Goals met.

BMP 1. Public Education Activities. A list of public education activities is listed in TABLE 1. below.

Table 1. A list of public education activities

Programs/ Partnerships	Achievement During this Report Period
KC Green	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. • The Green Infrastructure Team continued to work on identifying, tracking, and supporting green infrastructure capital projects. A proposal for an updated interdepartmental maintenance agreement template was drafted and the team engaged in team learning at each meeting through facilitated discussion of green infrastructure fact sheets published by EPA. • The Regulation and Policy Team continued to work on drafting a new ordinance addressing tree canopy preservation in development within the city. As part of the process, existing codes will be updated and brought into compliance to ensure

	developers are protecting the existing tree canopy and planting new trees. In addition, the Office of Environmental Quality is facilitating a group to update the nuisance codes to make it easier for residents to plant native. This will include education of codes staff and the public. • The Resource Management Team received a grant from the Mid America Regional Council (MARC) Solid Waste Management District to improve procurement processes within the City. The grant will be used to audit current practices, create training materials for city staff, identify Key Performance Indicators to measure success, and work with the Procurement Department and vendors to ensure that sustainable products are widely promoted. The goal of this grant is to reduce the amount of hard to recycle items procured and promotion of more sustainably sourced products. Procurement staff worked with the green team and consultant to develop the program and set goals. Procurement staff has been trained on the new program. The citywide staff training is still being developed. • The Education & Outreach Green Team hosted a table at the employee picnic with great success. Twenty-nine employees signed up to be on a green team. The Team also worked with KC Can Composting to perform a composting audit that led to the establishment of a City Hall composting pilot program. The program is expected to be rolled out to other departments in the coming year. An electronic waste collection was hosted for America Recycles day in November, resulting in 7,817 pounds of electronic waste collected. For Earth Day the Team partnered with both Parks and Water Departments to hold the Great Kansas City Cleanup, resulting in more than 5,000 lbs of loose litter diverted from our waterways and 200 lbs of glass recycled and diverted from the landfill.
Green Infrastructure Tours	• KC Water offers educational tours of its public green infrastructure facilities and Green Storm Infrastructure demonstration parking lot at its Swope Campus headquarters. • KC Water hosted nine tours of the Swope Campus, reaching 130 people.
Water Education for Kansas City (WE KC Program)	Programs target students/youth at each level of learning. During the reporting period these lessons were provided: • What is Water: Pre-K: a program offered to teach younger students about the importance of water and the importance of keeping it clean. The lesson was taught through in 8 instances in person and three instances online with 285 participants. • See E.1-a.ii.1. BMP 2 and BMP 3 for other activities.
Water Quality Small Grant Program	**See TABLE 2.** Administer the annual Water Quality Education grant program
Stormwater Table Events	Stormwater table events are community outreach at tabling events with informative posters on stormwater runoff and stormwater mitigation. There were 12 outreach events, reaching about 2023 people.
Stormdrain Marking	KC Water works with students to mark storm drains around the city with markers that teach runoff leads to the river. 31 students and adults participated in marking drains over 23 storm drains.

Stormwater Presentations	• KC Water provides presentations regarding stormwater runoff, pollution, and improved water quality to various groups of all ages. During this reporting period, seven presentations were given to 123 people with non-profits, schools, and volunteers. In response to COVID, six instances in-person and one virtual presentation.
Community Litter Pickups	• KC Water 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. • 22 Events were completed 652 people collecting over 104 bags of trash. - 16 youth groups and schools with 541 students participated in educational litter pickups collecting over 53 bags of trash. - One business group with 20 people participated in educational litter pickups collecting over 8 bags of trash. - One Church group with 18 people participated in educational litter pickups collecting over 5 bags of trash. - Three nonprofits with 51 people participated in educational litter pickups collecting over 4 bags of trash. - Elmwood Earth Day trash bash with 22 adults collected 34 bags of trash.
The Mid America Regional Council (MARC) Water Quality Public Education Program 	KC Water continues to be a leading stakeholder for this program. • Relaunched the "Name the Droplet" contest to select a name for the Water Quality Education Committee's new mascot. Dewy was the newly selected Mascot. • Conducted the first metro-wide virtual Plog-a-thon on October 17, 2021. MARC organized six county-wide Plogs on regional trails to get residents outdoors after a long quarantine and engage them in a socially responsible activity that reduce the impact of trash and litter on regional water quality. 118 people participated in the event, collecting at least one bag-full of trash each. • Hosted four webinars to provide information on emerging trends in stormwater management and resilience around the country. Webinar speakers represented 13 organizations, including stormwater utilities, public works, planning, and parks departments, engineering firms, regulatory entities and nonprofit organizations. On average, 50 virtual registrants attended each session • Education and outreach campaign, MARC distributed the following in 2021: - 1,198 brochures with a variety of education messages including Build Your Own Rain Garden, Know your Roots, Pick Up After Your Pet, Making and Using Compost, Use Lawn Chemicals Wisely, Keep Sediment Out of Our Water, Protect Our Streams and more. - 548 playing cards - 100 pet waste bag dispensers - 75 storm drain inlet markers for local municipalities - 700 portable/car litter bags - 100 Water Quality Education postcards

BMP 2: **Water quality education in the Era of Covid-19.** During the COVID pandemic, interactions were limited with schools, community groups, outreach events and social gatherings. KC Water shifted to create more online content and reach people through more online presentations. Lessons were able to be taught in an outdoor setting with social distancing and mask mandates being followed. Online lessons made up approximately 8% of outreach being completed during the reporting period. 24 instances on online engagement efforts were completed with an additional lesson being taught in a hybrid of in-person and online.

BMP 3: Active participation and financial support for MARC's Water Quality Education Committee (WQEC). The City continues to be a leading stakeholder and sponsor for MARC's water quality education effort. KC Water staff were also actively engaged in the committee's work by attending meetings regularly and participating in public events. Also see Table 1. A List of public education activities for details.

BMP 4. Continue City's participation and support for American Public Works Association's (APWA) efforts to improve and update various development standards that benefit water quality. The City continued to participate in the efforts by the Kansas City Metropolitan Chapter of APWA to revise stormwater-related standards that include *APWA Division II. Sec. 2600 Storm Sewers* and *Sec. 5600 Storm Drainage Systems & Facilities*. No progress was made during the reporting period.

Continuous Improvement: The City will continue various programs and activities. The City will also go through the appropriate process to adopt the updated APWA standards and manual as needed.

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

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

Status: Goal met.

BMP 1: Promote, publicize, and facilitate public reporting of illicit discharges. 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. In March 2021, an app – myKCMO was 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.

During the reporting period, a new sub-category, I16-Illicit Discharge, was created under Sewer or Stormwater. The purpose of this addition was 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 look for 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 promoted volunteer activities for stream clean-up to improve water environment.

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

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

Status: Goal met.

BMP 1. Opportunities for public involvement in the development of the SWMP. During the reporting period, the City continued to update its 2019 SWMP for improved compliance with the permit terms. The updating process was near completion.

Continuous Improvement: Continue to implement the 2019 SWMP; complete the updating of the 2019 SWMP by inviting and incorporating public feedback; submit the updated plan, 2022 SWMP, to MDNR for review and approval.

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

BMP 1. Work cooperatively with non-governmental organizations on educating and training students on stormwater management, water quality, and water quality testing and KC to the Sea curriculum

Measurable Goal: Active participation and support of efforts.

Status: Goal met.

Through KC Water's Water Quality Small Grant Program, KC Water continued to work with various non-governmental organizations, including Friends of Kaw Point Park, Bridging the Gap, Stonelion Puppet Theater, and Little Blue River Watershed Coalition.

KCEEN: KC Water participates in the Kansas City Environmental Education Network hosted by Mid America Regional Council. The mission of KCEEN is to improve environmental education for students throughout the Kansas City region by raising awareness, providing opportunities for action, and coordinating information and resources. KCEEN serves pre-K through 12 educators through professional development opportunities and events.

MEEA: KC Water participates in the Missouri Environmental Education Association. This group meets to promote environment education and support EE educators such as KC Water with our stormwater lessons. The Justice, Equity, Diversity, and Inclusion work group (JEDI) is a subcommittee that meets to talk about how to incorporate more accepting language and practices for equity and inclusion among all environmental educators in Missouri. Part of the group discussion focuses on how to support MEEA and MEAA membership to represent all groups through inclusive mission statement, hiring practices, and educator resources, including KC Water's stormwater lessons that can also be region specific to list a few.

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

BMP 2. Administer KC Water's Annual Water Quality Education Grant (WQEG) program

Measurable Goal: Completion of another round of solicitation, review, and award of grants.

Status: Goal met.

During the reporting period, KC Water continued to work with the organizations that received the grant in 2020. See Table 2 for the achievements made.

In March 2021, KC Water selected seven proposals from twelve organizations to provide a total $97,599 in grant money to support projects and activities related to water quality protection, improvement, and education. The organizations and their proposals were:

- Bridging the Gap; *Business Outreach and Stream Clean-up Project*
- *Project* Heartland Conservation Alliance: *Green Guard Stewardship Training*
- Hickman Mills School District: *The Water Fair*
- Little Blue River Watershed Coalition: *Cleaning the Blue, the Little Blue, and Mighty MO Too*
- Missouri River Relief: *Kansas City Missouri River Cleanup*
- Pembroke Hill School District: *Water Week at Pembroke Hill*
- StoneLion Puppet Theatre: *Puppets for the Water*

Continuous Improvement: KC Water will continue to administer this program.

Table 2. WQEG program achievement summary

Organization	Achievements
Bridging the Gap (Be the Solution to Storm Drain Pollution)	• 2020 Grant year: KCMO Water 5/6/21 Fertilizers and soil test post: Reached 502 Facebook, 251 Instagram and 418 Twitter impressions • 23 Social media posts related to water quality education with over 1100 reached • Community cleanups with over 17 community members removing trash.
Heartland Conservation Alliance	• Green Guard Steward Training started during the fiscal year. 12 Green Guards attended the first workshop on April 9, 2022, two trash cleanup workdays on Mary 26 and April 23 with about 17 participants removing several pounds 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 Little Blue River Cleanup on September 11, 2021 - 30 volunteers removed 90 tires • Hosted the Big Muddy Cleanup on October 2, 2021 - 35 volunteers • Project Blue River Rescue - 416 volunteers - 50 Tons of trash and 340 tires removed.
Missouri River Relief	• Hosted Missouri River Cleanup on Saturday August 21, 2021 - Volunteer Engagement: 166 Volunteers - Total Trash Collected: 6 tons - Waste Tires Removed: 2.3 tons (217 count)

	- Scrap Metal Removed: 1 ton Part of a statewide cleanup effort along the Missouri River.
Pembroke Hill School District	7th Grade students participated in water quality education engaging in two weeks of Runoff to Rivers education in October 2021 and April 2022 with an increase of 10% of students defining a watershed to 65% of students accurately defining a watershed post water education.
StoneLion Puppet Theatre	• 559 participants engaged in 24 Puppet workshops for water education • 2,789 participants engaged in 12 Puppet Performances for water quality education.

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.)

Measurable Goal: Add all new outlets as established to the KC Water GIS and systematically review the historical system for gaps

Status: Goal met.

BMP 1: Maintain the geographical information system (GIS) for outfall mapping. The City maintains the GIS that map constructed outfalls and all receiving waterbodies. The City's data sources for the outfalls information include:

- City-wide watershed studies conducted between 1997 and 2007
- Levee sewer outfall inspection reports conducted prior to 2002
- Investigations conducted under the City's Combined Sewer Overflow Program
- Data for the City's wastewater sewer systems
- Construction As-built drawings
- Previous outfall screening result

BMP 2: Update the GIS. KC Water uses a combination of three approaches to update its GIS for stormwater outfalls: (1) As KC Water receives As-Builts from various sources, newly-constructed outfalls are added to the map; (2) During this reporting period, KC Water built up a database of the outfall information from previous and ongoing field screening efforts, and the database was used to calibrate the existing records; (3) KC Water 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.

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

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

Measurable Goal: Efforts were carried during the reporting period. Specific measurable goal will be defined in the updated 2022 SWMP.

Status: The Permit requirement was addressed through continuing to implement the ordinance.

BMP 1: Continue to implement the City ordinance. The City adopted an ordinance for Stormwater Discharge Control Regulations (Chapter 61. Article III.) in 2007. The article specifically regulates the contribution of pollutants to the stormwater drainage system by any user, prohibits illicit connections, and establishes legal authority to carry out all inspections, surveillances, monitoring and enforcement procedures necessary.

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

3.3 Inspection and investigation procedures for illicit discharges (Permit Ref. E.3.a.iii.)

Measurable Goal: Resolution of potential illegal connections and related issues.

Status: Goal met.

BMP 1: Conduct the inspection following the established procedure. KC Water is responsible for investigating reports of illicit discharges. The inspection procedure, initially developed in 2013, was updated during the reporting period. It continued to follow the procedure for investigation. The investigation procedure follows the manual, *Illicit Discharge Detection and Elimination, A Guidance Manual for Program Development and Technical Assessments*, developed by the Center for Watershed Protection and Robert Pitt. During the reporting period, KC Water investigated 22 incidents of suspicious illicit discharges. All were resolved.

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

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

Measurable Goal: Complete a minimum of 100 screenings annually.

Status: Goal met.

BMP 1. Conduct field screening of the major outfalls. KC Water had completed the field screening of the major outfalls in the watersheds north of the Missouri River in previous years and has been in the process of assessing those located south of the River since 2018. During the reporting period, KC Water continued to screen the outfalls in the watersheds south of the River and those functioning as a component of the City's separate storm sewer system. A total of 107 outfalls were screened.

The field inspector utilized the City's GIS to identify the sites for screening and followed the established procedure.

Continuous Improvement: Continue to implement the established program

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

Measurable Goal: Continue the established procedures.

Status: Goal met.

BMP 1: Implement the established guidelines to address spills. 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 direction 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 332 incidents, of which 147 are for fluid cleanup and 18 are for hazardous materials handling during the reporting period. 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.).

Continuous Improvement: The Fire Department will continue to implement the guidelines.

3.6 Limit exfiltration from municipal sanitary sewers (Permit Ref. E.3.a.vi.)

Measurable Goal: To be defined in the upcoming 2022 SWMP.

Status: The Permit requirement continues to be addressed through KC Water's programs to limit exfiltration from sanitary sewers.

BMP 1: KC Water maintains the City's sanitary sewer system through a joint effort by different divisions.

Wastewater Maintenance Division

130.6	miles of sewers televised
199.0	miles of sewers cleaned
792	feet of public sewers repaired
4,774	feet of private sewers repaired
91	manholes repaired

Smart Sewer Program

27.8	miles of sewers televised
71.1	miles of sewers cleaned
0.3	miles of lateral repaired, replaced/rehabilitated
5.7	mile of sewer main repaired/replaced/rehabilitated
474	inlets repaired/replaced/rehabilitated

Collection Systems

8.9	miles of sewers televised
8.9	miles of sewers cleaned
9.6	miles of sewer line rehabilitated/replaced
217	sewer repair jobs
60	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.

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

Measurable Goal: Reported quantities from various efforts and programs

Status: Ongoing

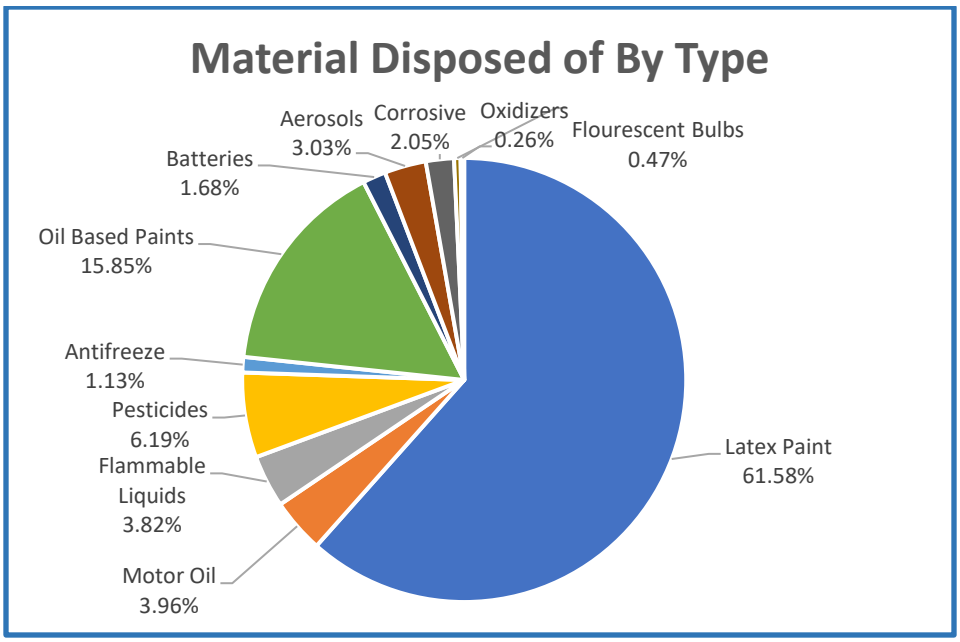
BMP 1. The City's operation of several waste management programs. The City operates multiple programs that encourage proper disposal, as well as preventing and addressing illegal dumping. See Table 3, Figures 1 and 2 for details.

Table 3. Comprehensive solid waste management program achievements

Quantity (in Ton)	Programs
	KC Recycles (FY 2021/22)
768	Community recycling drop-off centers (3)
78	Hard to Recycle (electronic appliance)
	Bulky Items Collection (FY 2021/22)
5,608	Bulky items
	Leaf and Brush Collection (FY 2021/22)
1,882	Curbside
20,202	Drop-off centers (3)
	Illegal Dumping Cleanup *(*FY 2021/22)
2,914	Material collected
	26 cameras placed at 20 locations
	Neighborhood Cleanup Assistance (FY 2021/22)
3,562	Tires received at drop-off centers
	Number of dumpsters placed: 420
	Number of trucks for Neighborhood Clean-up: 223 trucks in 23 weekends

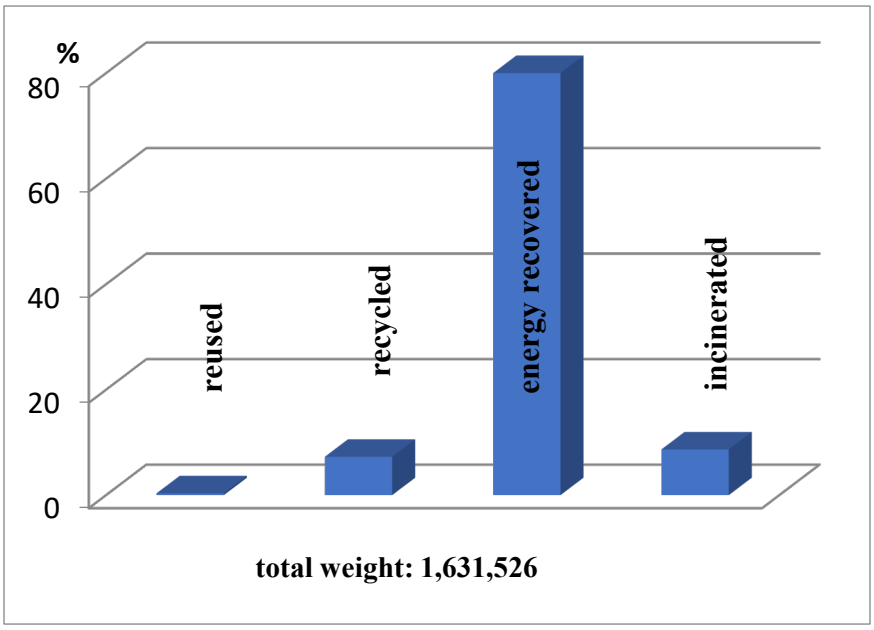
Quantity	Household Hazardous Waste (HHW) (Calendar Year 2021)	
650 tons	Total weight collected at HHW Facility	11,725 vehicles participated
178 tons	Total weight collected at Mobile Outreach	2,860 vehicles participated
2.75 tons	Total materials reused in Swap Shop	
59.3 tons	Total materials recycled	
683 tons	Total materials sent for energy recovery	
50.7 tons	Total materials incinerated	

Figure 1. Material by type disposed of by Household Hazardous Waste (HHW) facility in 2021



- Total weight of the materials disposed of (not collected) was 1,631,526 pounds, or about 816 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 2021



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, KC Water is conducting a study for management of and physical updates to the facility, with 15% complete around the end of the reporting period. The study is anticipated to be complete by October 2022. The result of the study will be used to guide its future operation and management.

4. Construction Site Runoff Control

The City's efforts include development and enforcement of 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.)

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

Status: Goal met.

BMP 1: Continue to implement City ordinance. 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 Control construction site waste (Permit Ref. 4.a.ii.)

Measurable Goal: Efforts were carried during the reporting period. Specific goals will be defined in the upcoming 2022 SWMP.

Status: The Permit requirement continues to be addressed through City's requirement for waste management at construction sites.

BMP 1; City-funded construction projects. For City-funded capital projects, 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 limited to, solid waste, liquid waste, concrete waste (washout area), hazardous waste, etc.

BMP 2: Private construction projects. 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.

Continuous Improvement: The City will continue to ensure that waste management is required for all ≥1 acre construction projects.

4.3 Review construction site stormwater pollution prevention plans (SWPPPs) (Permit Ref. 4.a.iii.)

Measurable Goal: Efforts were carried during the reporting period. Specific measurable goal will be defined in the upcoming 2022 SWMP.

Status: Completed for City-funded projects.

BMP 1: SWPPPs for City-funded construction projects. For City-funded construction projects, KC Water reviews each SWPPP. During the reporting period, KC Water reviewed 25 SWPPPs submitted by project managers from different City Departments.

BMP 2: SWPPPs for Private construction projects. 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.

Continuous Improvement: The City will continue the current practices.

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

Measurable Goal: Efforts were carried during the reporting period. Specific measurable goal will be defined in the upcoming 2022 SWMP.

Status: The Permit requirement continues to be addressed through using the MyKCMO system.

BMP 1. City's MyKCMO System for Centralized Reporting The City has a centralized MyKCMO (used to be 311) system to provide residents an 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, 30 cases related to sediment or erosion control were entered in the MyKCMO database and 35 cases were closed. Note the numbers include sites of various sizes including single property

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

4.4 Procedures for inspection and enforcement (Permit Ref. 4.a.v.)

Measurable Goals:

- For City-funded projects, KC Water provides monthly oversight inspections for active sites.
- For privately-funded projects, 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.

Status: Continue to conduct inspections.

BMP 1: City-funded projects. KC Water 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.

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.

During the reporting period, KC Water conducted 212 inspections for 25 sites. Issues identified during the inspection were all resolved in time.

BMP 2: Private construction projects (>1 acre). No change related to site inspection or enforcement procedure was made. The Land Development Division continued to conduct biweekly inspections on sites with active permits. A total of 1,446 inspections were conducted during the reporting period. However, enforcement actions were not tracked in Compass KC.

BMP 3: Privately-funded projects (< 1 acre). The Division of Inspections with City Planning & Development Department conducts investigations and enforces the ordinance. During the reporting period, the Division conducted 9,273 inspections with 1,021 failed erosion control inspections, and investigated about 80s complaints relevant to sediment or erosion control.

Continuous Improvement: The City will seek improvement to its current practices and utilize the new online service to track record.

4.5 Compliance with the erosion and sediment control ordinance (Permit Ref. 4.a.vi.)

Measurable Goal: Efforts were carried during the reporting period. Specific measurable goal will be defined in the upcoming 2022 SWMP.

Status: The Permit requirement continues to be addressed through a joint effort by individual City Departments for City-funded projects and City Planning & Development Department's oversight of private projects.

BMP1: City-funded projects. The department that manages the construction work is responsible for the compliance with the erosion and sediment control ordinance. KC Water provides regular oversight inspections to ensure compliance.

BMP 2: Privately-funded projects. City Planning & Development Department is responsible for compliance with the ordinance that outlines the enforcement options.

BMP 3: Improvement of City's e-Builder System. The City uses e-Builder as a platform to manage capital improvement projects. To support its compliance with the requirement for erosion and sediment control in a more effective way, the City made some improvement to the system by adding a few key relevant fields to project details. These fields include the area size of the land disturbance activities, watershed names, SWPPP uploaded or not, etc. The additional information serves a convenient tool for the inspector to identify projects to be inspected, find SWPPP to review, and to track project status. It also helps to remind project managers of their responsibilities pertinent to the requirement.

Continuous Improvement: The City will continue its current practice.

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

Measurable Goal: Provide periodic training.

Status: Goal met.

BMP 1: Provided city-wide online training. During the reporting period, the City provided a city-wide online training for the topic of sediment and erosion control. The training was designed to target City project managers/engineers that oversee capital construction projects 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. The same training was hosted on different dates: July 28 and Aug. 17, 2021 to accommodate staff schedule availability. Sixty-six City staff from five departments attended the training.

BMP 2: Training for site inspectors. During the reporting period, the staff with the responsibility of oversight inspection for capital project sites, took two webinars regarding sediment and erosion control-related topics, in addition to the above referred city-wide training.

Continuous Improvement: The City will continue to provide training for 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 a program to address the quality of long-term stormwater runoff from new development and redevelopment 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. This program 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 (Permit Ref. 5.a.i.)

Measurable Goal: Ongoing implementation of the requirements during development reviews.

Status: Goal met.

BMP 1: The City enacted a revised Zoning and Development code in 2009. The version promotes more open space and greater natural resource protection by incorporating the Stream Buffer Regulations and Conservation and Open Space Development Regulations. The following changes were made to the code during the reporting period: applicability of buffer zones, stormwater detention allowances, exception to continuous vegetation, allowance for federal mitigation credits as a method of mitigation, authority for stream buffer exception application and mitigation plans, map revisions, and plan review process.

Continuous Improvement: The City will continue to implement and enforce the Zoning and Development code.

5.2 A plan for long-term operation and maintenance of selected BMPs (Permit Ref. 5.a.ii.)

Measurable Goal: Efforts were carried during the reporting period. Specific measurable goal will be defined in the upcoming 2022 SWMP.

Status: The Permit requirement was addressed through multiple efforts to operate and maintain the City's BMPs.

BMP 1; For new development or redevelopment-related BMPs, CP&D continues to use three covenants applicable to stormwater BMP maintenance scenarios. 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.

Currently CP& D does not track its reviews of BMP easements, covenants, or BMP maintenance agreements in Compass KC, the City's new permitting system.

BMP 2: Continue to maintain the stormwater green infrastructure installed on City properties. KC Water maintains an inventory of all green infrastructure facilities constructed and/or maintained by KC Water. The inventory is mapped in the City's Geographic Information System (GIS) for tracking and for facilitation of operation and maintenance.

Individual City departments maintain the green infrastructure that they build unless specific arrangements are made for another City department to assist. KC Water continues to use the Green Stormwater Infrastructure (GSI) Manual on capital projects and to encourage its use for other city capital improvement projects. The manual provides design recommendations, construction specifications, details, and also provides establishment and maintenance procedures for green infrastructure.

The interdepartmental KC Green Infrastructure Team was finalizing a maintenance proposal, which creates a template for consistent maintenance agreements, or Memorandums of Understanding, to ensure that city-owned green infrastructure sites that overlap city department responsibilities have maintenance and repair responsibilities consistently defined.

BMP 3: For green infrastructure built through other stormwater projects, maintenance responsibility may vary. Examples of other stormwater projects include those funded by Public Improvement Advisory Committee. The KC Water Green Solutions crew is typically responsible for maintenance, unless arrangements with property owners, homeowner's associations, or others are in place.

Continuous Improvement: The Green Infrastructure Team will review and finalize the drafted proposal for a green infrastructure maintenance agreement template, and will put the final version in place. The team will continue to seek improvement to the current practices.

5.3 Strategies to minimize water quality impacts (Permit Ref. 5.a.iii.)

Measurable Goal: Efforts were carried during the reporting period. Specific measurable goal will be defined in the upcoming 2022 SWMP.

Status: Multiple efforts are in place to minimize water quality impacts.

BMP 1: The City Planning & Development Department requires macro/micro stormwater drainage study for a development. A developer must submit a stormwater drainage study for a plat application as required by the City Code Chapter 88 Series 400 and 500. A general stormwater management plan must be submitted for the entire development when the preliminary plat is submitted. The plan must depict the concept for stormwater detention, BMPs, volume controls, or treatment areas as appropriate. A macro/micro drainage study must be submitted for the entire development when the first plat is submitted; a detailed micro drainage study must be submitted for approval before the issuance of any building permits; a macro storm drainage study for the entire development must be submitted with a micro stormwater drainage study for each phase during final platting. Refer to Permit Ref. 5.a.i for required adherence to Stream Buffer Ordinance and BMP manual.

BMP 2: The City continued to require developments' adherence to the adopted APWA Design Criteria and Supplements. The criteria include the Manual of Best Management Practices for Stormwater Quality. The City also requires development's compliance with stream buffer regulations during the initial planning stages of new development/redevelopment, as well as during the construction of the projects. These criteria require developments to mitigate their potential impacts on water quality under post-construction conditions by including permanent water quality BMPs, stream buffers, and easement or covenants with maintenance provisions for sites within the MS4 area. In addition, KC Water provides guidance for implementation and design of BMPs during the plan review and approval process when requested.

In previous years, multiple City departments worked together to revise the APWA 5600 design criteria for *Storm Drainage Systems & Facilities* and APWA 2600 Specifications for Storm Sewers. Updated APWA 2600 Specifications are in the process of being adopted. Instead of adopting updated APW 5600 Design Criteria, commentary on enforcement of the currently adopted criteria were in review.

In November 2019, City Council passed Resolution #190760, which provided direction to implement the Green Stormwater Infrastructure (GSI) Manual on capital projects with an emphasis on inter-departmental integration, coordination of design, and construction of public improvements. The manual provides design recommendations, construction specifications, details, and also provides establishment and maintenance procedures for green infrastructures. The City continues to use the GSI manual on capital projects and encourages its use for other City capital improvements.

BMP 3: The City has adopted a stream setback ordinance and a companion conservation development ordinance. The ordinances are intended to protect life and property and promote healthy stream corridors while providing flexibility and development options in stream corridors and City-wide. The stream setback and conservation development ordinances became effective in 2009 and apply to new development, redevelopment, and construction and infrastructure projects near streams.

During the reporting period, some changes were made to the Stream Setback regulations. See Section 5.1 Ordinances to address post-construction runoff for details.

BMP 4: The City adopted the 2018 Urban Tree Master Plan. KC Green Team, which consists mainly of staff from different City departments, championed the 2018 Urban Tree Master Plan. The plan was adopted by City Council in February of 2020. An administrative regulation was adopted in September of 2020 for tree canopy preservation and enhancement in City departmental activities. The goal was to provide policies and procedures for tree removal and replacement within City property and City right-of-way, and to expand the tree canopy based on recommendations in the Urban Tree Master Plan and the Climate Protection Plan.

KC Green Team is in the process of drafting a new ordinance addressing tree canopy preservation in development within the city. As part of the process, existing codes will be updated and brought into compliance to ensure developers are protecting the existing tree canopy and planting new trees.

BMP 5: City Ordinance Chapter 28 addresses Floodplain Management. In Article IV. Provisions for Flood Hazard Reduction Sec. 28-51., general standards are set for:

1) Storage, material, and equipment. Specifically, the storage or processing of materials within the special flood hazard area that are in time of flooding buoyant, flammable, explosive, or could be injurious to human, animal, or plant life is prohibited.
2) Storage of other material or equipment may be allowed if not subject to major damage by floods, if firmly anchored to prevent flotation, or if readily removable from the area within the time available after a flood warning.
3) Hazardous materials. All hazardous material storage and handling sites shall be located out of `the floodplain.

Continuous Improvement: The City will continue with the current processes in place and refine or create new processes as needed or identified. In addition, the City will continue to review the updated APWA 5600 and 2600 draft standards and work on adopting the updated version.

5.4 Inspect post-construction BMPs (Permit Ref. E.5.a.iv.)

Measurable Goal: All facilities inspected prior to occupancy; inspect one-fifth of private stormwater facilities annually.

Status: Goals partially met – work in progress.

BMP 1: KC Water continues to administer the Detention Basin Credit Program to encourage the use of detention/retention basins. Routine inspections were conducted to the listed basins and owners of the properties can receive the credit in their monthly stormwater bills. During the reporting period, KC Water inspected 14 detention/retention basins. The department focused its effort on addressing the issues and corrective actions were taken to 5(five) basins. There are 99 basins on the inspection list.

BMP 2: KC Water continues to inspect stormwater BMPs other than those listed in the Detention Basin Credit Program. Routine inspection was conducted to various types of stormwater BMPs including bio-swales, green roofs, underground storage chambers, rain gardens, as well as detention/retention basins outside of the Credit Program. A total of 99 stormwater BMPs were inspected during the reporting period.

Continuous Improvement: KC Water will increase the number of the inspection of private stormwater detention/retention basins, and in the meantime, will continue to address the issues identified through inspection.

6. Pollution Prevention and Good Housekeeping for Municipal Operations

The City currently have 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 Goal: Efforts were carried during the reporting period. Specific measurable goal will be defined in the updated 2022 SWMP.

Status: The Permit requirement continues to be addressed through ongoing multiple training efforts.

BMP 1: 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.

BMP 2: Employee training related to municipal operations. In previous year, KC Water purchased a license for online access 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.

During the reporting period, KC Water used one of the videos - *A Drop in the Bucket* to provide the training. Thirty-seven municipal employees from three City departments and 17 non-municipal employees that work with City limits had viewed the video.

BMP 3: Job function related training. The City's Office of Environmental Quality provided City employees with trainings on Parts Washer, and Spill Prevention, Control and Countermeasure (SPCC). During the reporting period, 95 employees received training on Parts Washer, and 51 employees received SPCC training.

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 floatables and other pollutants (Permit Ref. 6.a.ii.)

Measurable Goal: Efforts were carried during the reporting period. Specific measurable goal will be defined in the updated 2022 SWMP.

Status: The Permit requirement continues to be addressed through multiple efforts to reduce floatables and other pollutants.

BMP 1: City departments continues to maintain stormwater green infrastructure facilities constructed on their properties. The continuing maintenance allow the established green infrastructure to function at an optimal level. Currently, individual department maintains its own BMP site, unless other arrangements are made.

KC Water continues to use the Green Stormwater Infrastructure (GSI) Manual on capital projects and to encourage its use for other departments' capital improvement projects. The manual provides design recommendations, construction specifications, details, and also provides establishment and maintenance procedures for green infrastructure.

The interdepartmental KC Green Infrastructure Team was finalizing a maintenance proposal which creates a template for consistent maintenance agreements, or Memorandums of Understanding, to ensure that city-owned green infrastructure sites that overlap City department responsibilities have maintenance and repair responsibilities consistently defined.

BMP 2: KC Water'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 and the City's Board of Police Commissioners maintains multiple detention basins at several police department patrol stations that include Central, Metro, South, East Patrol, and Shoal Creek stations.

BMP 3; KC Water 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 KC Water.

Continuous Improvement: The Green Infrastructure Team will review and finalize the drafted proposal for a green infrastructure maintenance agreement template and will put the final version in place. The team will continue to seek improvement to the current practices.

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 Goals: 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 10,000 gallons of salt brine, 28,425 gallons of liquid calcium chloride, and 34,687 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 a total of

two tons of ice-melt, sourced from a retail vendor, on the sidewalks of the buildings for pedestrians' safety.

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

6.3.2 Street sweepings (Permit Ref. 6.a.iii.2.)

Measurable Goals:

- Sweep City streets according to schedule (approx. 20,000 curb miles annually)
- Two seasonal collections per year (one in the fall, one in the spring)

Status: One goal partially met and the other exceeded – work in progress

BMP 1: 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**.** A total of 10,185 miles of streets were swept with a collection of 1,484 tons of debris.

BMP 2: Leaf and Brush Collection. The City collected 1,882 tons of leaf and brush through its curbside collection and 20,202 tons of leaf and brush through its three collection centers during the reporting period.

Continuous Improvement: The City is addressing the stormwater funding challenges and working towards resource allocation to meet the goal for street sweeping.

6.3.3 Street design/construction/maintenance practices (Permit Ref. 6.a.iii.3.)

Measurable Goal: Efforts were carried during the reporting period. Specific measurable goal will be defined in the upcoming 2022 SWMP.

Status: The Permit requirement continues to be addressed through following the established procedures

BMP 1: Follow the APWA standards with the supplements. For street design, construction and maintenance, the City follows the Kansas City Metropolitan Chapter of the APWA standards with the supplements for all its relevant projects. See the following link:

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

During the reporting period, the City approved of the proposed changes and updated the following two standards: APWA Section 2100 – Clearing and Site Preparation, and SR-1 Drawings. The changes in the updated version allow better protection of storm sewer pipes in terms of the structural integrity and sealing of joints, thus reducing the chances of leakages.

Continuous Improvement: The City will move toward adopting the 2012 version Stormwater BMP Manual by MARC. The City was preparing technical updates to its 2020 Green Stormwater Infrastructure (GSI) Manual for development and redevelopment projects within its combined sewer overflow area. The GSI manual brings a positive message to the development community

about the City's overall direction for stormwater management. The City will continue to review its various relevant standards on a regular base to seek improvement.

6.3.4 Stormwater inlet cleaning (Permit Ref. 6.a.iii.4.)

Measurable Goals: Complete 15,000 cleanings per year

Status: Goal met

BMP 1: KC Water's stormwater inlet cleaning program. KC Water inspected and cleaned 16,096 stormwater inlets that included 1,305 inlets cleaned through 311 service requests. In addition, KC Water also repaired 62 stormwater inlets.

Continuous Improvement: KC Water will continue to maintain the stormwater inlets.

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

Measurable Goal: Efforts were carried during the reporting period. Specific measurable goal will be defined in the upcoming 2022 SWMP.

Status: The Permit requirement continues to be addressed through following the established procedure.

BMP 1: The City's Environmental Management System (EMS). The City implements the EMS, which 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.

BMP 2: Relevant topics addressed in the EMS. EMS Chapter 6 Waste Management addresses specific requirements for latex paint, used oil contaminated materials, as well as used oil. EMS Chapter 5 Section 04 addresses tank management. Regarding spill prevention, Section 5.04.02.a. specifically states for Portable Tanks' Condition**,** all portable tanks should be in "good" condition. Section 5.04.04.c.3. for petroleum Tank Requirements, Spills and Overfill Prevention states, both new and existing tanks must be equipped with catchment basins and one of the following: Automatic shutoff devices; Overfill alarms; Ball float valves.

Chapter 5 Section 04 also addresses spill and overfill prevention requirements. Chapter 5 Section 05 addresses spill prevention, control and countermeasures (SPCC).

Chapter 7 addresses spill prevention and response. It specifies job training and provides clear performance direction.

Chapter 5 Section 04 addresses tank management with regards to containment system material, Section 5.04.02.d. states: Portable Tanks should be made of, or lined with, a material that will not react with the substance being stored. Section 5.04.03.a. states (for aboveground and on-ground storage tanks) tanks shall be designed and built in accordance with recognized good engineering standards for the material of construction being used. The tank construction material shall be compatible with the liquid to be stored.

Chapter 5 Section 04 addresses tank management with regards to minimizing the contamination of groundwater, Section 5.04.04.e Release Detection states: All underground storage tanks must meet the federal release detection requirements.

BMP 3: The City's Office of Environmental Quality's annual inspections. The Office of Environmental Quality conducted annual inspection at 367 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 monthly a basis to provide a summary of environmental compliance recommendations for each department.

Continuous Improvement: The City continues using and following the EMS and Cartegraph, respectively

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

Measurable Goal: Efforts were carried during the reporting period. Specific measurable goal will be defined in the upcoming 2022 SWMP.

Status: The Permit requirement continues to be addressed through multiple efforts to reduce the usage of PHFs and implementation of BMPs.

BMP 1: City's EMS usage. There are multiple chapters in the City's EMS that address the application of pesticides, herbicides, or fertilizers (PHFs). 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.

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.

Section 9.03.03 lists chemicals that are not allowed in the storm water system. The list includes herbicides and pesticides.

BMP 2: Practices within the City's General Services Department. The department manages about 160 City sites. It does not use PHFs to maintain lawn or other landscape.

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 on 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:

a) More than 6,500 acres protected as woodlands throughout the park system
b) More than 165 acres in the reduced mowing program
c) 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:

a) Planted 1,500 trees
b) Maintained more than 400,000 trees on the City's owned land

c) Established 15 perennial native plant beds
d) Eliminating 65 annual 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:

a) Maintaining a native buffer near water bodies and sensitive areas wherever possible
b) 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 KC Water 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, KC Water required that contractors be certified for commercial application of pesticides and herbicides.

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

Measurable Goal: Review list and add or remove facilities, as warranted.

Status: Goal met.

BMP 1: City's management of municipal waste sites. 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, in consultation with several departments, 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.

BMP 2: Hazardous waste treatment, storage, and disposal (TSD) facilities; Title III Section 313 facilities; other facilities that contribute a substantial loading of pollutants to the MS4. During the reporting period, the inventory of the facilities remained the same as the one of previous year. There were nine TSD facilities and 27 Title III Section 313 facilities with one belong to both categories.

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

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

Measurable Goal: Complete a minimum of 30 inspections per year.

Status: Goal met.

BMP 1: KC Water's inspection of industrial and high-risk dischargers. KC Water inspected a total of 32 private industrial 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

BMP 2: Office of Environmental Quality's inspection of municipal operations. The Office of Environmental Quality conducted annual environmental inspection at all municipal owned or operated sites. The Office worked closely with KC Water to address stormwater requirement for each individual site.

BMP 3: Inspection and enforcement for industrial and business operations. KC Water updated its standard operation procedure for inspection. In addition, it established the procedure for enforcement to address any potential violations of stormwater regulations by industrial and business operations.

Continuous Improvement: KC Water 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.

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

Measurable Goal: Annual review of self-assessment reporting.

Status: Goal met.

BMP 1: KC Water 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. KC Water continued to implement the Stormwater Self-assessment Program at 16 participating facilities. Eight facilities renewed their Stormwater No-exposure certificates.

BMP 2: Stormwater sampling program: During the reporting period, KC Water was able to collect two rounds of samples at one selected location in November 2021, and three rounds of samples at two other sites in March 2022. The data results are in Table 4. The values in shade indicates exceedance of the corresponding ranges of the parameters shown for the stormwater runoff in local urban areas. All the exceedances occurred for samples taken at two of the three sites on March 21, 2022. The parameters include biochemical oxygen demand, total solids, copper in total, and zinc in both total and dissolved forms. The record from two nearby rain gauges shows a rain event of >1" four days prior to the sampling event. The logical assumption was that the ground got "flushed" days before the runoff collected. Yet, the results do not validate the assumption. The causes for these exceedances remain unknown.

Table 4. Data summary of stormwater monitoring at the selected industrial areas

Parameter	Unit	# tested / # detected	Reporting Limit	Method Detection Limit	Minimum	Maximum	Average	Range of stormwater runoff*
Conductivity	us/cm	3/3	3	3	127	179	151	NA
pH	SU	6/6	1.00	1.00	7.7	8.1	8.0	NA
Alkalinity	mg/L	6/6	5	2	38	133	75	32-177
Biochemical Oxygen Demand (BOD)	mg/L	6/6	2.2	2.2	5.3	40.8	17.3	3-21
Chemical Oxygen Demand (COD)	mg/L	6/6	20	5	26	272	117	7-803
Ammonia	mg/L	6/5	0.1	0.1	0.3	0.7	0.4	<0.13-4.72
Total Oil and Grease[AC]	mg/L	6/1	5.2	2.8	ND	11.9	3.1	<1.4-24
Total Phenols	mg/L	6/3	0.05	0.016	0.16	0.26	0.12	<0.002-0.56
Total Dissolved Solids (TDS)	mg/L	6/6	1	1	77	3,280	797	22-4,940
Total Solids (TS)	mg/L	6/6	2.5	2.5	60	3,810	997	160-1,800
Total Suspended Solids (TSS)	mg/L	6/6	2.5	2.5	16	282	84	8-879
Volatile Suspended Solids (VSS)	%	6/3	1	1	35	50	41	NA
Turbidity	NTU	6/6	0.02	0.01	12	233	74	NA
Calcium	mg/L	6/6	2.00	0.0214	18.6	90	21.3	NA
Silver, dissolved	mg/L	6/0	0.020	0.001	ND	ND	NA	<0.0007-0.0053
Cadmium, dissolved	mg/L	6/0	0.005	0.00023	ND	ND	NA	<0.00011-0.078
Chromium, dissolved	mg/L	6/0	0.005	0.00079	ND	ND	NA	<0.00026-0.02
Copper, dissolved	mg/L	6/1	0.01	0.00069	ND	0.0113	0.0022	<0.00053-0.025
Nickel, dissolved	mg/L	6/0	0.005	0.00108	ND	ND	NA	<0.0004-0.019
Lead, dissolved	mg/L	6/0	0.01	0.00282	ND	ND	NA	<0.00214-0.064
Zinc, dissolved	mg/L	6/6	0.01	0.0017	0.0127	0.476	0.099	<0.00016-0.272
Silver	mg/L	6/0	0.02	0.0016	ND	ND	NA	NA
Cadmium	mg/L	6/0	0.005	0.00023	ND	ND	NA	<0.00011-0.136

Table 4 (Cont'd)

Parameter	Unit	# tested / # detected	Reporting Limit	Method Detection Limit	Minimum	Maximum	Average	Range of stormwater runoff*
Chromium	mg/L	6/1	0.005	0.00079	ND	0.0111	0.013	<0.00026-0.110
Copper	mg/L	6/4	0.01	0.00069	ND	0.0364	0.012	0.00053-0.035
Magnesium	mg/L	6/5	1	0.0049	ND	6.54	3.032	NA
Nickel	mg/L	6/1	0.005	0.00108	ND	0.0091	0.0024	<0.0004-0.018
Lead	mg/L	6/1	0.01	0.00282	ND	0.0123	0.0039	<0.00214-0.12
Zinc	mg/L	6/6	0.01	0.0017	0.0269	0.58	0.202	0.01-0.473
Mercury	mg/L	6/0	0.2	0.02	ND	ND	NA	<0.000025-0.0002

***The ranges listed here were extracted from the ranges found for the stormwater runoff samples collected from representative residential, industrial, and commercial areas in the City from year 2005 to year 2015 per Part VI. Monitoring and Reporting Requirement.**
**** Average is calculated based on (1) two or more data points above the detection limit, or (2) one data point above the detection limit and using half of the detection limit for the remaining ones under the detection limit.**
[J] Estimated value, value may not be accurate.

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

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

Measurable Goal: Maintain the existing inventory of facilities.

Status: Goal met.

BMP 1: Maintain a list of municipal operations. The inventory of the industrial and high-risk runoff facility includes a list of 73 municipal operations. Of those, ten carry State NPDES permits, 11 sites have the City's Stormwater No-exposure Certificates, 15 sites will be required to renew the certificates, and five operations continue to implement the Stormwater Self-assessment Program.

Pollution prevention and good housekeeping measures will continue to be monitored at all municipal owned or operated sites. KC Water created a Stormwater Self-assessment Program in 2008. The program requires City facilities to establish good housekeeping measures and take steps to prevent pollution. KC Water 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: KC Water will update the list as needed.

8. Flood Control Projects and Devices

The City through KC Water assess the impacts new flood control projects 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.)

Measurable Goal: Efforts were carried during the reporting period. Specific measurable goal will be defined in the upcoming 2022 SWMP.

Status: The Permit requirement continues to be addressed through efforts to assess the water-quality impacts.

BMP 1: Review of flood control projects. The flood control projects in which the City is involved are collaborative efforts with U.S. Army Corps of Engineers (USACE). Project design shall include an Environmental Assessment and/or an Environmental Impact Statement(s). The Stormwater Engineering Division of KC Water reviews the designs and provides input. The impact on water quality is one of the key elements considered in the review process.

Continuous Improvement: The City will continue the current practices.

BMP 2: Flood control project inspection. The Dodson Flood Risk Reduction Project was completed and turned over to the City, as the sponsor of the project, on an interim basis. The final phase of work included constructing the tie-in levee to connect the Boone Creek Levee to the existing Bannister Levee. It also included continued construction on the earthen levee embankment from Prospect Avenue to the previously constructed flood wall (Phase I) near 85th Street and Bruce R. Watkins Drive. The planting of aquatic plants was completed for the detention area located on the river side of the Levee, and planting of native grasses was completed for the detention area located on the land side of the floodwall. A number of trees were also planted on the slopes and on the top of the bank of the detention area. The plants will be managed in an environmentally responsible manner.

Continuous Improvement: The U.S. Army Corps of Engineers will work on a contract for the repair and improvement of some deficiencies that were identified after the completion of the project. The repair contract is expected to be completed before the end of 2022.

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

Measurable Goal: Efforts were carried during the reporting period. Specific measurable goal will be defined in the upcoming 2022 SWMP.

Status: The Permit requirement continues to be addressed through ongoing efforts to assess the impacts and conduct retrofitting where applicable.

BMP 1 Coordination for flood control retrofit projects. KC Water entered into an agreement with the USACE for the Lower Brush Creek Ecosystem Restoration Feasibility Study in February 2019.

Through Section 1135 of the **Water Resources Development Act**, USACE is reviewing 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.

Potential modifications could:

- Address issues with sediment management within the Lake of the Enshriners
- Reduce goose habitat, while providing/improving habitat for native species of flora and fauna within and adjacent to the stream
- Improve water quality
- Provide ancillary improvements to flood control

Currently the feasibility study is under way. The study will present conceptual designs for ecosystem restoration, provide analysis of the costs, benefits, and environmental impacts of the alternatives, and recommend a selected plan. The City can subsequently elect to partner with the USACE to proceed with design and construction of the selected plan.

A kickoff meeting for the feasibility study was set up for May 2022. Site visits would be scheduled to visually assess existing site conditions, to review the projects done or proposed along the creek, and to discuss the potential challenges.

Continuous Improvement: KC Water will continue to partner with USACE to complete the feasibility study.

BMP 2. Indian Creek Watershed Study. In the previous years, KC Water 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 been removed. During the reporting period, design options continued to be evaluated to convert the area into a green space that will have stormwater best management features and provide a public education venue. The best management practices included in this project will help to treat stormwater runoff from adjacent parking areas that were constructed prior to adoption of the City's BMP requirements.

Once the design is complete, KC Water will bid the project for construction. The budget for the project is approximately $700,000.

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

8.3 Include the procedures in the SWMP document (Permit Ref. 8.c.)

Measurable Goal: To be defined in the upcoming 2022 SWMP.

Status: The Permit requirement was addressed.

BMP 1: **Procedures in SWMP**. The 2019 SWMP includes the required procedures.

Continuous Improvement: The access to the required procedure will continue to be included in the future version of the SWMP.

9. Monitoring

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

9.1 Collect stormwater samples from stormwater discharges (Permit Ref. 9.a.i & ii.)

Measurable Goals: Stormwater samples are to be taken from runoff resulting from three qualified storm events at six designated locations.

Status: Goal met.

BMP 1: Stormwater discharge monitoring. For each of the six designated sites, monitoring was done for three storm events with at least one month apart.

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

9.2 Sample testing and recordkeeping (Permit Ref. 9.a.iii.)

Measurable Goals: Complete sample testing; finalize the data, and conduct data analysis and interpretation.

Status: Met goals

BMP 1: Sample testing. Monitoring included field measurements and sample collection. Samples were analyzed by KC Water Laboratory for physicochemical and microbiological parameters, except Oil and Grease, which were analyzed by Pace, 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 KC Water Laboratory.

Samples were analyzed for the parameters required in the Permit. See Table 5 for data and Table 6 for a summary of the data results.

Continuous Improvement: Continue to implement the program.

BMP 2: Sample results and data analysis. 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 the practices.

Table 5. 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	0.035	0.21	0.016	0.016
	Sampling Date											
SE 50th Ter. & Sterling Ave. (residential)	06/11/2021	8.0	429	100	195	ND	69,700	268	2.098	4.76	0.466	0.613
	03/18/2022	7.9	784	9.1	53	ND	11,199	16	>0.996	1.92	0.240	0.270
	04/23/2022	8.0	135	10.6	72	ND	10,462	264	>0.601	2.76	0.390	0.750
W. 135th St & Wyandotte St. (industrial)	06/24/2021	8.1	278	12.8	75	ND	1,872	102	>1.24	2.0	0.137	0.368
	08/31/2021	8.0	178	9.6	85	ND	12,033	44	>0.766	1.81	0.380	0.460
	03/18/2022	7.6	910	8.8	93	ND	33	111	>0.953	1.58	0.250	0.360
210 Hwy & Randolph Rd. (new site, industrial)	08/10/2021	8.2	189	9.7	126	5.5	24,196	44	1.165	2.48	0.274	0.369
	12/28/2021	8.8	120	11.5	41	ND	816	71	>0.606	1.46	0.183	0.261
	04/29/2022	8.6	100	9.6	32	ND	2,359	14	ND	1.02	0.049	ND
NE 51st Ter. & N. Michigan Ave. (residential)	06/24/2021	7.4	210	36.7	148	ND	51,200	96	1.128	4.0	0.332	0.459
	08/31/2021	8.0	92	8.9	65	ND	46,400	44	>0.705	2.97	0.260	0.450
	03/21/2022	7.4	1,361	10.8	160	ND	548	327	ND	2.51	0.270	0.820
W. 133rd St & Inverness Dr. (commercial)	06/11/2021	8.2	48	14.2	58	ND	1,782	12	>0.583	1.14	0.196	0.320
	07/15/2021	8.2	97	5.4	50	6.9	909	14	>0.465	0.78	0.055	0.183
	08/31/2021	8.0	105	8.2	66	ND	6,488	14	>0.862	0.85	0.100	0.110
NW Barry Rd. & NW Barrybroke Dr. (commercial)	06/11/2021	8.4	402	20.7	81	7.0	15,531	76	0.821	1.90	0.127	0.320
	07/15/2021	8.2	229	5.6	35	ND	6,131	84	ND	0.94	0.117	0.137
	08/31/2021	8.8	163	13.5	78	ND	7,701	76	ND	1.43	0.210	0.410

Table 6. 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	0.035	0.21	0.016	0.016
	Result										
Sample count	18	18	18	18	18	18	18	18	18	18	18
Minimum	7.4	48	5.4	32	ND	33	12	ND	0.78	0.049	ND
Maximum	8.8	1,361	100	195	7.0	69,700	327	2.1	4.76	0.466	0.82
Average (Geometric mean for e. coli)	8.1	319	17.0	84	1.6	14,964	93	0.75	2.02	0.224	0.37

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 available; 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

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

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

Status: Ongoing effort.

BMP 1: Conduct biological assessments. During the reporting period, KC Water updated the sampling plan to address the current permit requirement and follow the most recent relevant State protocols. The plan was reviewed and approved by the State. The updated version is titled 2021 Kansas City, MO Stream Biological Assessment Plan.

KC Water established a contract with Geosyntec Consultants to implement the plan. As required by the contract, Geosyntec developed a Quality Control and Quality Assurance Plan, which was reviewed and approved by KC Water.

The contractor completed one round of macro-invertebrate collection in April 2021, along with KC Water collecting stream water samples for laboratory testing. 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.

Continuous Improvement: KC Water will continue to implement the sampling plan, which includes conducting habitat assessment, having the samples collected in the spring of 2022 to be processed and identified, data analysis and report preparation, and repeating the cycle for the fall of 2022.

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

Measurable Goal: Efforts were carried during the reporting period. Specific measurable goal will be defined in the upcoming 2022 SWMP.

Status: The Permit requirement was addressed by using the required methods.

BMP 1: Using required methods for sample collection and analysis. 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: KC Water will continue to use the standard methods for sample collection and analysis.