2022 ANNUAL REPORT



For the period of:
July 1, 2021 - June 30, 2022

Prepared by the City of Tulsa
Streets and Stormwater Department

Save Our Streams™

CITY OF Tulsa
A New Kind of Energy.

Annual Report

OPDES Stormwater Permit #OKS000201

July 1, 2021 to June 30, 2022

Co-Permittees:

Oklahoma Turnpike Authority

Oklahoma Department of Transportation

TABLE OF CONTENTS

CERTIFICATION STATEMENT
OPDES Permit No. OKS000201
Review of Stormwater Annual
Report

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 gathered and evaluated 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 is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment for knowing of violations.

Roy N. Teeters
Manager
Stormwater Management Division

10·12·22
Date

Section 1
The Status of Implementing the Stormwater Management Program (SWMP)

The Stormwater Management Program (SWMP) of the City of Tulsa's municipal stormwater discharge permit #OKS000201, Part II, consists of 12 separate programs. A brief review of each of the individual programs and tasks performed during the period of July 1, 2021 through June 30, 2022, will result in the effective assessment of permit compliance.

Part II(A)(1) Structural Controls and Stormwater Collection System Operation

Status: Compliant and Ongoing

The City of Tulsa's SWMP provides for the maintenance of both above and below ground structural stormwater controls including detention ponds, inlets, conduits and channels. The primary purpose of this program is to assure proper operation of these structural controls for better control of stormwater quantity. Additionally, stormwater quality benefited from the removal of sediment, floatables, and regular inspections of all structures. The following table is an inventory of the work performed on these structures during this reporting period.

Maintenance of Above Ground Stormwater Structural Controls

ABOVE GROUND STRUCTURE(S)	INVENTORY (FOR REPORTING PERIOD)	OPERATIONS & MAINTENANCE (O&M) ACTIVITY	O&M ACTIVITY (COMPLETED EACH REPORTING PERIOD)
Channels/ Streams/ Detention Ponds	1,636 acres	Mowing	13 x/year of mowable property (totaling 21,268 acres)
Channels & Streams/ Detention Ponds	2,364 acres	Weed control (Herbicide)	All parcels 1 x/year for broad leaf weed control (totaling 2,364 acres)
Channels & Streams (Hydro Mulch Plus)	418 acres	Weed Control (Herbicide)	All parcels 6 x/year for growth control (totaling 2,593 acres)
Channels & Streams (Inhouse)	282 acres	Weed Control (Herbicide)	All parcels 5 x/year for growth control (totaling 1,410 acres)
Wet Ponds	67 acres	Algae Control	All ponds 6 x/year for growth control (totaling 400 acres)
Channels/ Streams/ Detention Ponds	1,636 acres	Cleaning/ Sediment Removal (Ponds/Streams)	72,676 cubic yards/period
Roadside Ditches	972 miles	Sediment Removal (Roadside Ditching)	27,246 linear feet/period

Maintenance of Below Ground Stormwater Structural Controls

BELOW GROUND STRUCTURE(S)	INVENTORY (FOR REPORTING PERIOD)	OPERATIONS & MAINTENANCE (O&M) ACTIVITY	O&M ACTIVITY (COMPLETED EACH REPORTING PERIOD)
Storm Sewer Pipe (all pipe - driveway pipe, crossover pipe, etc…)	1,360 miles	Inspect Flush/clean Repair or Replace	10.5 miles/period 2.9 miles/period 1,961.2 linear feet units/period
Catch Basin/Inlets	35,752 units	Inspect & Clean Repair	1,673 units/period 235 units/period
Pump Station	14 units	Clean interior, Inspect & Maintain	675 maintenance activities

Additionally, prior to mowing of all stormwater control structures, all trash was collected and disposed of properly. Detention ponds that are multi-use had trash cans for disposal of litter. These cans were emptied on a regular basis.

Compliance shall be based on completion of the O&M ACTIVITY column found in the charts.

Part II(A)(2) Areas of New Development and Significant Redevelopment

Status: Compliant and ongoing

This requirement was met through the continued implementation of the Stormwater Master Drainage Plan, Tulsa Stormwater Management Criteria Manual and ordinances (Title 11-A, Chapter 3, Watershed Development Regulations; Title 11-A, Chapter 5, Pollution; Title 42, Chapter 11, Planned Unit Development) that relate to any new development and significant re-development that occurs in Tulsa. These documents were created in order to reduce flooding due to new development and significant re-development. A secondary benefit was to reduce the impact on water quality as a result of construction. The City of Tulsa follows a city-wide Comprehensive Plan. This plan addresses all facets of activities including water quality and had undergone an update in 2016 with guidance from many groups, including Stormwater Quality and Engineering Services - Stormwater Design Section. The City of Tulsa also utilizes the Master Drainage plans specific to each basin. The Master Drainage plans are planning tools used to determine capital improvements to reduce flooding, providing solutions to storm water drainage, maintenance and management issues. These capital improvement projects are

prioritized based on benefits and costs. Master Drainage Plans are updated as funds become available.

Tulsa has developed stormwater master drainage plans (MDPs) for 31 watersheds that cover the entire city. The MDP's are used as planning tools to determine/regulate fully developed floodplains that extends beyond the typical FEMA floodplain. MDPs are also used as planning tools to develop capital improvement projects that will mitigate flooding problems in the basins. They identify and provide solutions to storm water drainage, maintenance and management issues. Projects are prioritized based on benefits and costs. These Master Drainage Plans are being updated as funds become available.

Tulsa continued to implement the "Tulsa Stormwater Criteria Manual". This manual, created and adopted in 1994, is a comprehensive manual designed to assist engineers, designers and construction operators in aspects of storm water runoff control before, during and after construction activities are completed. This includes both water quality and quantity. The Criteria Manual has several purposes including minimizing water quality degradation by preventing siltation and erosion of the City waterways and preserving environmental quality. This manual is utilized by the City of Tulsa staff, as well as site development engineers during the design and review phases of all new developments and significant redevelopment projects that occur within the City of Tulsa. Tulsa completed an update of this document to reflect more current policies and practices 2019. Additionally, the Watershed Development Regulations (Title 11-A, Ordinance # 16959) lists the current practices regarding regulation of new development and significant redevelopment for the control of storm water runoff.

Anyone planning to develop or redevelop areas of Tulsa has to follow a process with the Development Services Division of the City of Tulsa. This process requires developers to follow extensive planning, designing, and review. This ensures the area targeted for development meets all City requirements, including reducing the impact of flooding, impacts on city owned utilities, traffic needs, etc., after construction is completed.

The City of Tulsa had recently completed work on a major update of its zoning code. Including a separate rewrite of the Landscaping Chapter which was completed between March of 2017 and December 2018. A Stormwater Quality representative was involved in the working group and draft updates to ensure Low Impact development (LID) impediments are removed and LID is incentivized to the maximum extent practicable.

The Subdivision and Development Regulations has also undergone an update completed in May 2018. This effort was a recommended strategy from our Comprehensive Plan, PLANiTULSA, which was approved by City Council in 2010. The guiding principles of this plan include a desire for Tulsa to become a more environmentally and fiscally

sustainable city. The City of Tulsa hired a contractor to perform tasks associated with the subdivision regulation update outlined in a Request for Proposals. Stormwater Quality staff had been actively involved in working group to remove barriers and encourage LID.

The City's Comprehensive Plan has again recently begun a review with input from Stormwater Quality. This document provides direction and goals for various elements of Tulsa's growth and development. Language was added that promoted the recreational use of waterways, maintaining high water quality, LID, and adding increased enforcement efforts to developments and erosion control.

As mentioned above, the Stormwater Design Criteria Manual is working to incorporate a revised Chapter 1100, now titled Low Impact Development. This Chapter simply references the Low Impact Development Design Manual which is complete, led by Dr. Jason Vogel at the University of Oklahoma. When this chapter is adopted, Tulsa will have taken a big step toward promoting and providing guidance on LID projects in Tulsa. The City of Tulsa also worked with Dr. Vogel on a LID Maintenance and Inspection Manual. This process began in early 2018. Workshops were held with regulators and developers to fine tune these documents and adoption by the City Council and further promotion will be done in coming years. Further promotion of LID was accomplished by implementation of the following:

- LID was promoted at 58 educational functions, particularly those with key personnel, including engineers and planners.
- Continuous review of Tulsa's development regulations to determine if they are LID friendly.
- Conducted public education events promoting LID, especially with developers/contractors.
- Developed "Guide to Low Impact Development" literature that is distributed at public events.

Stormwater Quality has adopted an already existing City Program to recognize Low Impact Development practices in Tulsa. The program, Partners for A Clean Environment (PACE) is a voluntary, non-regulatory recognition program coordinated by the City of Tulsa's Quality Assurance and Stormwater Quality groups. The focus of the program is to provide recognition to businesses, individuals and groups who go above and beyond environmental regulations in an effort to be better stewards of our land and water. Currently

there are 19 members of this program, though more LID features have been implemented in Tulsa and time should be devoted in the future to promoting membership in this program. The Great Plains LID webpage shows a map that Stormwater Quality staff utilize to document LID in Tulsa. It currently has approximately 60 features with info such as address, brief description, and pictures to aid viewers.

Part II(A)(3) Roadways

Status: Compliant and ongoing

This requirement was met through the City's street sweeping and mowing activities performed and managed by the Streets and Stormwater Department.

Through the utilization of private contractors, Streets and Stormwater swept arterial streets 12 times. Emphasis was placed on sweeping after de-icing material was no longer required as a result of a snow or ice event. Residential streets were swept 4 times. The program's progress is measured in curb miles swept and yds^3 of material removed. Arterial and residential mileage per year may vary due to weather variations as well as contractor issues from one year to the next. BMP's that prevent run-off from deicing material are in place at Tulsa's east and west maintenance yards. All of Tulsa's trucks washing facilities drain to the sanitary sewer, thus avoiding potential contamination in the storm sewer.

Street Sweeping

Type	Sweeping Requirement	Sweeping completed	O & M Activity (for reporting period)	Material Removed
Arterial	~8x annually	12	8,579 miles	5,803 yds^3
Residential	~4x annually	4	9,925 miles	21,959 yds^3

Contractors have reviewed the MS4 Permit and the Pollution Ordinance, in order to be familiar with the MS4 regulations and requirements, to prevent contamination of the waters of the State. As contracts for sweeping, mowing, and road maintenance come up for renewal, language will be added to include a water quality requirement. This will require the contractor to review the SWMP, Pollution Ordinance and the MS4 permit.

During this reporting period, trash removal was also conducted on all street right-of-ways prior to any mowing. This program has faced a decline of participants for a variety of reasons including the pandemic and inmates being routed to other programs. Numbers for inmate work crews are as follows:

Litter Removal from Roadways

Collected by	Amount Collected	
Inmate work crews	11,647 bags	178.2 tons

In past years, the Tulsa Stadium Improvement District (TSID) conducted concentrated street and sidewalk cleaning efforts in the Central Business District, of the downtown area of Tulsa. This area consists of 1.4 square miles containing 58.37 curb miles.

Central Business District

Type of Activity	Interval
Sidewalk cleaning	3x/week
Storm sewer intake structure and sidewalk cleaning	2x/week
150 trash cans (inspect/clean)	6x/week
14 Pet Waste Stations (refilled)	5x/week

Stormwater Quality continued to warn citizens and companies not to sweep or blow grass/leaves/debris into the street or storm sewer as it is a violation of Tulsa's

Ordinance's and could result in a fine. In addition, literature was distributed titled "Landscaping BMP". This literature is given to anyone believed to be disposing of leaves and grass into the MS4 (Municipal Separate Storm Sewer System). It directs the alleged disposer against further disposal of this material into the MS4.

Permit compliance was achieved with the completion of the specified street sweeping and litter removal.

Part II(A)(4) Flood Control Projects

Status: Compliant and ongoing

To address this program requirement, the City of Tulsa has continued to implement the following activities:

1. Flood Management Project Design Review
2. Utilization of the NPDES Permit Evaluation Study – Water Quality Enhancement Assessment of Existing Flood Control Detention Facilities, September 15, 1998.

A discussion of the procedures for each activity is presented below.

Flood Management Project Design Review

To ensure that proposed flood control projects assess the impacts on the water quality of receiving water bodies, the City has and will perform a project design review for all current and future major flood control projects. The project design review utilizes criteria derived from design considerations included in the Stormwater Design Criteria Manual.

By definition, the purpose of a flood control project is to reduce flood damage. Flood control and water quality management strategies differ greatly. Flood control projects are designed to manage stormwater runoff resulting from large, infrequent storm events. Normally, these projects are designed to quickly convey runoff resulting from up to a 100-year storm event. Conversely, water quality management facilities are designed to handle runoff from much smaller, more frequent storm events (1-2 year storm event). In a given year, 70-90 percent of all runoff (and generally the associated pollutants) typically result from storm events producing less than 2 inches of rainfall. Water quality management facilities attempt to slow stormwater runoff, maximizing hydraulic detention periods to facilitate sedimentation and biological uptake. Therefore, this program element does not attempt to provide comprehensive water quality management utilizing "flood control" structures. The goal is to assure that project impacts to receiving waters are assessed and minimized through the use of sound engineering design principles. Where possible, water quality treatment principles will be incorporated into the design of flood control projects.

Sections 700 and 900 of the City of Tulsa Stormwater Design Criteria Manual document minimum design criteria. These criteria address the following design considerations:

- Channel Design
  - -Maximum velocity
  - -Channel geometry, side slopes
  - -Channel material/stabilization
  - -Side slope vegetation

Additional City review will take into consideration:

- Detention Structure Design
  - -Storage volume to maximize residence time
  - -Outflow structure design to slowly release detained flows without causing flooding
  - -Energy Dissipaters to slow velocity

- Location
  - -Downstream effects
  - -Existing receiving water quality
  - -Maintainability
  - -Proximity in the watershed with respect to impervious areas

Existing Flood Control Structure Evaluation - NPDES Permit Evaluation Study

In September 1998, Tulsa evaluated the feasibility of retrofitting 19 existing flood control structures to provide additional pollutant removal. This study recommended using upper watershed BMP's or control of pollutants at the source rather than retrofitting existing flood control structures. This is currently addressed through the implementation of a number of stormwater management programs. This includes street sweeping, construction site erosion control and public education. These programs will continue to be utilized.

The City of Tulsa has guidelines for development in the upper 1/3 of drainage basins to have detention. These detention ponds help slow the rate of stormwater runoff as well as improve the quality of runoff by allowing pollutants to settle out.

Compliance will be based upon the assessment of the impact(s) to receiving water quality during the design phase of flood control project. Where possible, water quality treatment principles will be incorporated into the design of these projects.

Part II(A)(5) Pesticide, Herbicide, and Fertilizer Application

Status: Compliant and ongoing

All City of Tulsa personnel, as well as all contract applicators that applied pesticides and herbicides were required to be licensed and subject to all regulations under the Oklahoma Pesticide Applicators Law, including re-certification. City personnel that applied pesticides, herbicides and fertilizers received annual in-house training on specific types of pesticides, herbicides and fertilizers. All Stormwater Management and Parks employee

license records are available upon request. See below for training records. Parks Department herbicide applicators are also licensed under this law with records available at 4508 E. Mohawk Blvd upon request.

Oct2, 2021 Oklahoma Urban and Community Forestry Annual Conference – Oklahoma City – 3 employees

October 6-7, 2021 OKVMA training – Hard Rock Casino, Catoosa Oklahoma – 10 employees

March 2, 2022, Winfield Workshop virtual – 4502 S. Galveston, Tulsa Ok – 10 employees

With the issuance of the Environmental Protection Agency's (EPA) (now Oklahoma Department of Agriculture Food and Forestry's) Pesticide General Permit in October 2011, the City of Tulsa was required to formulate a Pesticide Discharge Management Plan (PDMP) as per the "Weed and Algae Control" category. The primary purpose of the PDMP is to protect water quality from abuse and misuse of pesticides. The City of Tulsa is compliant with all requirements of the PDMP and will continue to remain vigilant in their protection of waterways from pesticide misuse.

The Master Gardeners Program, available through the Oklahoma State University (OSU) Cooperative Extension Service, is a free service that offers expert advice to the public on all aspects of gardening, including the proper application of pesticides, herbicides and fertilizers as well as other gardening and lawn care tips and information. This service is available to the public either by visiting the extension services at 4116 East 15th, accessing the website www.tulsamastergardeners.org/ or utilizing the telephone hotline at (918) 746-3701. The Tulsa Master Gardeners answers approximately 100,000 garden related questions annually.

These questions are answered by volunteers trained in various horticultural issues including proper application of pesticides, herbicides and fertilizers. This program also distributes "Fact Sheets", which discuss choice of chemicals and application rates for most of the common uses of pesticides and fertilizers in urban areas. Gardening education is further accomplished by various media outlets including TV, radio, print, and online newsletters. This is also accomplished by numerous Home and Garden Shows throughout the year. The Master Gardener Program was also promoted through distribution of the "City Life" newsletter in the month of January 2022 and March 2022. The City of Tulsa

further promoted the Master Gardeners Program through the distribution of brochures and on the City of Tulsa's stormwater quality website. See Attachment A for a list of brochures distributed.

In accordance with Part II(13)(5)(b) of Tulsa's current MS4 permit, in FY 14-15, Tulsa sent a letter to 227 pesticide applicators licensed by the Oklahoma Department of Food and Forestry to apply pesticides in Tulsa County. This letter contained information on the importance of proper application of pesticides, herbicides and fertilizers, instructions to not blow grass clippings and/or leaves into the street and advised applicators that non-compliance is a violation of the City of Tulsa's Pollution Ordinance, which could result in a fine.

Tulsa continued to maintain a website that is accessible to the public, which contains guidance for pesticide and fertilizer application for both commercial and residential applicators. This website is located at www.cityoftulsa.org/sos and is regularly promoted. The number of pageviews during this year was 6,709 which was slightly lower than previous years. Continued efforts are being made to drive citizens to the website for all manner of Stormwater Quality related info, videos, activities, etc…Including the topic pesticides.

See Part II(A)(10)(c) "Public Education" for additional public education on the proper use, storage and disposal of pesticides, herbicides and fertilizers by Tulsa during this period.

Part II(A)(6) Illicit Discharge and Improper Disposal

Status: Compliant and ongoing

The location and removal of illicit discharges and improper disposal continued to be an important aspect of the City of Tulsa's SWMP. Many departments within the City of Tulsa maintain various programs that involve locating and removing non-stormwater discharges to the storm sewer system and/or educating the public on proper disposal practices.

a.) Non-stormwater discharges

Tulsa allows the discharge of exempt non-stormwater discharges, as defined by 40 CFR 122.26(d)(2)(iv)(B)(1), to the storm sewer unless these discharges are determined to be contributing significant amounts of pollutants to the storm sewer. When an exempt non-stormwater discharge is found to be contributing significant amounts of pollutants to the storm sewer, enforcement action will be taken using Tulsa's Pollution Ordinance.

Other categories of allowable non-stormwater discharges to the MS4 are:

- Car Washing (non-commercial and charity)
- Swimming Pool / Hot Tub
- Outside Washing (pavement washing)

For the above discharges, Tulsa has established BMP's that must be implemented prior to allowing the discharge to the MS4. Failure to implement these measures may result in a violation of the Pollution Ordinance.

Discharges from emergency firefighting activities were monitored during all phases of Tulsa's firefighting activities for potential releases of pollutants. This was accomplished through the continued implementation of Tulsa's Fire Department (TFD) policies. These polices were implemented to ensure public health and safety and reduce the release of pollutants.

During this reporting period 296 investigations were conducted identifying 33 illicit discharges to the storm sewers. Tulsa's Pollution Ordinance was adopted November 1995 and continues to be utilized for the removal of non-stormwater discharges (see Section 6). This Ordinance allows the City of Tulsa to recover cleanup cost from the responsible party.

Additionally, the City of Tulsa achieves permit compliance by performing industrial stormwater inspections at City of Tulsa facilities. These inspections are performed to control pollutants that may be discharged into the MS4 system through routine operations and maintenance. These inspections focus on the proper storage of outdoor parts and materials, the condition of tanks and containers that store liquids and processes that may be conducted outdoors. Twenty-six City facility inspections were also conducted during this time and are now compliant with Permit objectives.

Once an illicit discharge was identified, the responsible party was required to stop the discharge, redirect the discharge to the sanitary sewer or obtain an OPDES wastewater discharge permit from the Oklahoma Department of Environmental Quality (ODEQ). This was accomplished using the Pollution Ordinance.

Fliers titled, "Responsible Pet Ownership" and "Stormwater Quality Programs", were distributed at events and activities during this reporting period. These flyers educated the reader on the negative aspects of not collecting and disposing of pet waste properly. These programs were also promoted on the City of Tulsa's Stormwater Quality website.

The City of Tulsa co-sponsored the "Paws and Claws" theme night at the Tulsa Drillers baseball games. "Responsible Pet Ownership" flyers and pet waste bags were passed out to Tulsa area pet owners. The attendance increased this year, averaging around 5,000 per game.

These games were good opportunities to interact with pet owners on responsible ways to clean up after their pet.

In an effort to control runoff from pet waste, Tulsa parks have a total of 30 pet waste signs. Pet stations provide pet waste disposal bags to properly dispose of pet waste in the trash. The stations are checked and refilled 1-2 times per month.

Public reporting of an illicit discharge or illegal disposal by concerned citizens (via the 311 call center or directly to the Stormwater Management Division), other City departments and government agencies (ODEQ or the EPA) are regularly promoted on the city's website or at educational events (see Attachment B). Multiple channels for reporting illicit discharges are a valuable part of the City's effort to locate illicit discharges and improper disposals. This year Stormwater Quality staff completed 296 service requests, 40 of these investigations were from the 311 call center.

Promotion of the proper disposal of leaves, grass and pet waste was accomplished through the utility bill stuffer in Jan. 2022 and March 2022. A new flyer was also developed recently which describes and visually shows various types of pollution from homes, including pet waste.

Dry weather field screening and dry weather flow follow-up continue to be used, resulting in the location, identification and removal of illicit discharges and improper disposals that occurred during this reporting period (see Part II(A)(6)(e)) and Part II(A)(6)(f)).

Within the last few years, the Stormwater Quality group has been involved in the special event planning process. Information about the City of Tulsa's pollution ordinance and illicit discharges is provided in the Special Permit Event Application. Additionally, special events are regularly inspected by stormwater quality staff to ensure no violations are occurring. Last fiscal year the City of Tulsa processed approximately 156 special event permit applications.

b.) Sanitary sewer overflows

In a continuing effort to eliminate sanitary sewer overflows during this reporting period, the City initiated eight sanitary sewer manhole and/or pipeline rehabilitation projects. Three sanitary sewer evaluation studies were initiated during this reporting period. No un-sewered area projects were completed during this reporting year. Excess wet weather flow to the sanitary sewer was diverted to seven flow equalization basins which reduce the amount of non-target rainwater from entering the sanitary sewer system.

The City of Tulsa's Working in Neighborhood's Department utilizes two programs that help eliminate sanitary sewer contamination of waterways. The Emergency Repair Grant consists of a $5,000 maximum grant to very low income residents to make emergency repairs to conditions that threaten the health and safety of the occupants. Areas of service include: electrical, plumbing, roofs, heating, and sewer lines. The Rehabilitation Loan Program is a $35,000 maximum rehabilitation loan available for moderate to very low

income residents to assist citizens with home repairs, weatherization, and energy efficiency. Each residence is given a rigorous inspection to include lead based paint (LBP), electrical/mechanical/plumbing (EMP), structural, and interior repairs. Areas of service include: lead based paint, electrical, plumbing, security (doors and windows), roofs, heating, interior issues, weatherization, and sewer lines. Twenty sewer lines were repaired/rehabilitated under these programs in the past fiscal year.

Sewer cleaning crews specifically targeted 63 miles of sewer lines known for grease accumulation problems. This maintenance program reduced the likelihood of sanitary sewer backups and overflows. Emergency cleaning of 51 miles of sanitary sewer was also conducted to remove grease and reduce sanitary sewer overflows. Additionally, in an effort to reduce grease blockages that result in sanitary sewer overflows, Tulsa continued its grease abatement program, better known as FOG (Fats, Oils, Grease) Best Management Practices Program, for the sanitary sewer. This voluntary program encourages restaurant owners to follow best management practices that ensure proper kitchen and grease management practices. Various meetings with business owners also facilitated discussion on the proper care and maintenance for trash receptacles, grease rendering bins, and parking lots.

As a result of the FOG BMP program the following actions took place during this reporting period:

Action	Results
Businesses Inspected	1,860
Businesses Participating in the FOG Program	268
Samples Obtained	2
Number of Enforcement Actions	3
Fines Issued	$525

Below is a breakdown of the advertising the FOG program conducted during this year:

Television Network	Frequency (# times aired)	Impressions (# views)
KOTV Channel 6	4.0	250,819
KJRH Channel 2	3.0	287,400
KTUL Channel 8	2.4	632,106
Cox Cable	1.6	60,890

The FOG program increases residential educational activities during the holiday months to help minimize residentially related grease blockages due to holiday cooking activities. This year these activities included distributing 'Trap the Grease' brochures at 5 area grocery store locations. Over 700 grease related flyers were distributed. Also, a fryer oil collection event was held where 85 gallons of fryer oil was collected for proper disposal from 40 participants. The City of Tulsa worked with Oklahoma State University with a Back to School Bash. We handed out 400 string backpacks, coloring books, flyers, and frisbees to students. We discussed the importance of not pouring grease down the drain. Approximately 600 people attended this event.

Tulsa continued efforts to reduce sanitary sewer overflows into storm sewer through the use of TV inspection and smoke testing techniques. Work completed during the reporting period included:

71 miles of sanitary sewer TV inspected
186 sanitary manholes raised to grade
113 main line sanitary sewer repairs
14,565 feet of main line sanitary sewer replaced or rehabilitated

In addition to investigating the private sewer defects located through smoke testing, the smokie inspector program also investigates private businesses that have a history of sewer defects. These businesses include apartment complexes, nursing homes and assisted living apartments, mobile home and RV parks, office complexes, motels, hotels, hospitals, schools, and shopping centers. The following statistics are from some of these sources. For the fiscal year 2021 – 2022, the smokie inspectors investigated and closed 5,200 cases. Of these cases, 298 were closed by cleanout repairs made by the inspectors.

These repairs reduced stormwater inflow to the sanitary sewer, which in turn reduced sanitary sewer overflows and illicit discharges to the stormwater sewer. Permit compliance was achieved through implementation of these programs.
The number of sanitary sewer overflows during this time was 211. This is 63% increase from the prior year and slightly less than the long-term average of approximately 230 SSO's per year. Sewer Operations and Maintenance Key Performance Indicator is less than 10 overflows per 100 miles of sewer per year, or 199 overflows (1,990 miles of sewer).

c.) Floatables

The City of Tulsa, the "Keep Oklahoma Beautiful" organization and the Metropolitan Environmental Trust (the M.e.t.) sponsor many programs that directly or indirectly target litter control. These programs include but are not limited to:

- *Annual Creek Cleanup* – Co-sponsored by Tulsa Refuse and Recycling and the City of Tulsa's Parks Department during the month of April 2022. Volunteers removed litter from several different creek locations, such as Haikey Creek, Joe Creek, Mingo Creek, Dirty Butter Creek, Coal Creek, Vensel Creek, and Douglas

Creek. Not only did this clean-up remove litter from the creeks, but it also helped to bring attention to the importance of reducing litter discharges to urban streams and waterways.

During this year's creek cleanup, we had 648 participants. This was significantly greater than our previous years. We determined that this was due to our new format and allowing for citizens to participate for the whole month of April. We created a dashboard map where citizens could go online and sign up for their location, date, and time they wanted to participate. The team made sure each location was ranked how accessible the location was and how much trash was present. This allowed for citizens to choose a location that was best for them and to sign up with family members or groups. The volunteers disposed of 749 bags of trash collectively.

- *Earth Month* – This program throughout the month of April consisted of activities targeting the protection of resources including the reduction of litter and non-point source pollution.

- *Earth Day* – April 22, 2022 was set aside to draw attention to environmental efforts by citizens and area businesses, including reduction of litter and pollutants. This Earth Day was one of our rain barrel pickup days where over 200 rain barrels were given to residents along with information about other low impact development practices.

Tulsa took advantage of the opportunity to educate citizens on the importance of eliminating litter at many special events during this reporting period. Public education at these events usually involved setting up a display and handing out materials such as brochures, pencils, etc. These events included:

- The Greater Tulsa Home and Garden Show: March 10th-March 13th, 2022
- Tulsa Public Schools Events: October 2021 – April 2022
- Enviro-Expo at Bartlett Square: April 21st, 2022
- Tulsa County Free Fair: July 22nd, 2021 – July 23rd, 2021

A full list of public education activities conducted by the City of Tulsa can be found in Attachment B.

The Curbside Recycling Program continued offering every week pick-up of plastic, glass, paper, bimetals, aluminum, and other recyclables. Approximately 112,962 Tulsans participated which has resulted in the collection of approximately 6,680 tons of recyclables for this reporting period. This program is promoted on the city website. The recycling facility burned down on 4/1/2021 and did not reopen until March 2022. The numbers above reflect March-June 2022 collections.

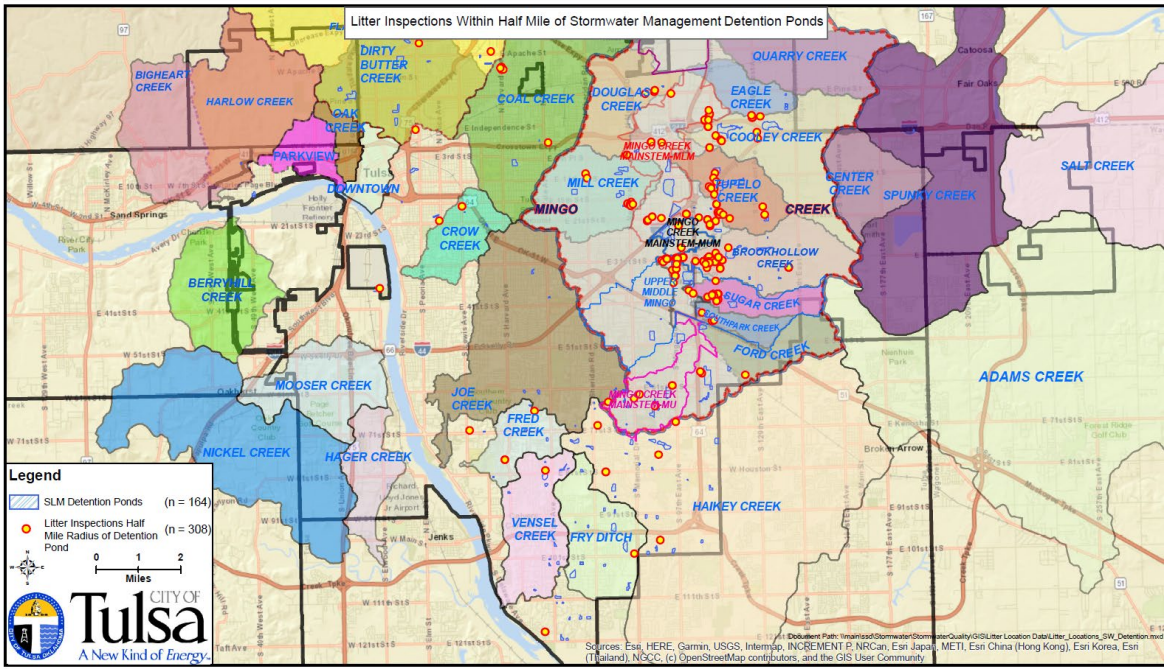
Environmental educational activities were conducted at Tulsa Parks, Girl Scouts Day Camps, Day Campers Home School, and Tulsa County's Free Fair. Combined these events involved approximately 3,054 children. Children were educated on the importance of reducing litter, non-point source pollution and recycling through various activities. Other education activities included the use of videos, hands on landscape displays (i.e., "Enviroscape"), distribution of hand outs and material containing non-point source pollution information, hands on stream monitoring of the creeks and performing park clean-ups.

Tulsa, in conjunction with the Tulsa County Conservation District/Blue Thumb historically had a storm sewer inlet placarding program which included the message "No Dumping Save Our Streams Tulsa" or "Dump No Waste Drains to River" and has a telephone number to report violators. All new storm sewer inlets have a similar message prestamped on the hood. Therefore any placarded inlets will eventually be replaced with stamped inlets, making the placarding program unnecessary.

Tulsa's Stormwater Quality group began a litter monitoring program in September of 2017 with the goal of better understanding the litter problem in Tulsa and doing more targeted education. The following is a breakdown of litter inspections completed this year. This program will rotate through sections (watersheds) of Tulsa each year with the main goal of the program being to educate property owners on the need to keep litter picked up and prevent it from impacting the MS4. The employee in this position splits their time approximately 50/50 between conducting litter inspections and working in our Household Pollutant Collection Facility. This position had also been vacant then hamstrung by another vacancy in our Collection Facility, requiring more time of the employee there and less time for him to conduct litter inspections. Still they were able to accomplish the following:

- 160 litter inspections
- 3,265 total sq ft. of litter directed to be cleaned-up
- Seven Notices of Violation including one $100 fine

The following map shows where the litter inspections were conducted in relation to Stormwater Management ponds. The data from this map is from previous years but is kept in an Arc GIS database and mapped weekly. Litter inspection efforts are partially focused on proximity to stormwater management areas, so these features do not become conductors of litter throughout Tulsa. Again, this program is scheduled to rotate through Tulsa's watershed's, and is still in its beginning stages.



Two sets of litter BMP's were created and printed previously, one targeted towards businesses and the other towards citizens. This literature has been passed out as a result of one-one contact with citizens regarding issues as well as during public events.

The City of Tulsa has anecdotally noticed a continued increase in the amount of litter and illegal dumping issues in Tulsa. Many of these pieces of litter end up in Tulsa's streams as "floatables" potentially causing blockages and creating eyesores for the community's perception of its natural resources. It is these two issues that this litter inspection program aim's to abate, though the amount of time and resources currently dedicated to this issue is small compared to the breadth of the problem.

The Metropolitan Environmental Trust (The M.e.t.) continued to operate ten recycling depots that are conveniently located throughout the metropolitan Tulsa area. Citizens can bring plastics, newspapers, mixed paper, cardboard, glass, aluminum, batteries, cooking grease, used motor oil, and electronic recycling (at six locations) for recycling. These depots were also used for the distribution of environmental educational information, including brochures and environmental events posters. Additionally, the M.e.t. distributed, displayed anti-litter posters on its Facebook and Twitter accounts. The M.e.t. staff had a combination of 121 educational classes and/or booths. In many of the grade school classes our educator provided bags and gloves and they conducted litter clean ups on the school grounds (approximately 30 litter clean ups).

Tulsa Parks emptied approximately 1,300 trash containers (placed at 102 parks and 15 stormwater detention sites) 1-2 times per week. Stormwater detention structures are multiple use facilities, which serve as city parks when not in use for stormwater detention. Additional trash containers were placed in parks to serve special events and scheduled activities. In addition, maintenance crews picked up loose trash from parks a

minimum of once per week. Trash containers with hinged lids have replaced opened topped barrels which have resulted in a reduction of loose trash blown about by the wind.

The Stormwater Management Division has crews that removed litter from 12 wet ponds and miles of lined and earthen channels that comprise Tulsa's storm sewer, thus reducing the amount of floatables discharged to waters of the state. During this fiscal year they spent 129 hours collecting 440.7 cubic yards of debris. The City of Tulsa's Public Facilities Section continued to utilize inmate work crews to remove litter along streets and expressways throughout Tulsa in an effort to keep the city free of roadside trash and debris. These crews removed over 11,000 bags of trash from along Tulsa's' roads.

Street curb lines within the Inner Dispersal Loop (Downtown Business District) were cleaned on a weekly basis. During this cleaning, crews simultaneously removed debris from the storm sewer intake structures. Pole mounted trashcans were inspected and emptied daily as needed.

The removal of approximately 1,476 tons of trash was accomplished through the placement of thirty cubic yard trash dumpsters in neighborhoods in Tulsa, 1,687 times. Tulsa had approximately 17,424 requests by citizens to pick up bulky waste (appliances, white goods, furniture) of which approximately 360 Freon bearing items were properly evacuated. In addition, 40 lbs. of latex paint latex paint were picked up with the curbside bulky waste program from 20 requests.

The Solid Waste Program uses the visual observation efforts of various field officers and citizen reports to identify and locate dumpsites throughout the City of Tulsa. The sites are thoroughly searched for evidence to be used for possible enforcement actions. Active sites are monitored using intense visual inspection and when possible, concealed surveillance. After these activities are completed, the sites are cleaned, charted, and monitored for new dump activity. These activities serve to deter the reactivation of dumping in the area and encourage the use of proper disposal methods. As additional enforcement efforts signage is being suggested to be placed in these areas indicating 'No Dumping' and 'Dumpers Will Be Prosecuted'.

This year, the Solid Waste division located 2,183 illegal dumpsites and conducted 658 investigations of illegal dumpsites within the city limits. One citation was issued based on these investigations. Seventy signs have been added at routine dump locations in an effort to deter this continued illegal dumping. Dumpsite contents were from construction activities, demolitions, green waste, furniture, appliances, tires and other household items. During this fiscal year, they collected 344 tons of debris from these dumpsites.

The City of Tulsa Security Patrol also made field inspections of chronic illegal dumpsites, but no arrests or tickets statistics were provided as a result of these inspections. These inspections are generated by 311 citizen and outreach complaints of homeless encampments on City of Tulsa Right of Way that generate chronic amount of trash and debris.

Other programs which clean up litter and trash throughout Tulsa include:

- The Better Way Program picked up 1,937 bags of trash totaling 41 tons.
- Center of Employment Opportunities program cleaned up 113 tons of trash and limb debris from the Right of way as well as removing and trimming 269 loads of green waste from roadways and side walks
- Community service crews removed 1,625 bags of trash and debris totaling 17.4 tons of trash and debris.

In addition, the City of Tulsa continued to collect and dispose of trash at its five floatable monitoring locations (see Section 4-Monitoring Data).

d.) Collection of used motor vehicle fluids and household hazardous wastes

Financial support continued for the M.e.t.'s recycling depots, which accept oil, antifreeze (only 2 of the 10 locations collect antifreeze), cooking grease and batteries, as well as other recyclable materials. All depots are open 24 hours per day (attended approximately 6 to 8 hours/day), seven days per week and are located in areas which are easily accessible to the public. The amount of material collected at these depots for the reporting period can be found in the following table. These numbers reflect totals from all the recycling depots and a pilot program that is collecting from nine restaurants/bars located throughout the greater Tulsa metropolitan area.

Material	Amount
Oil	29,260 gals.
Antifreeze	2,400 gals.
Plastics (incl. plastic bags)	307,465 lbs.
Aluminum and Steel	225,251 lbs.
Glass	765,820 lbs.
Batteries	16,363 lbs. automobile 35,844 lbs. household
Newspaper, Mix Paper, and Cardboard	869,362 lbs. paper 2,215,818 lbs. cardboard
Cooking Grease	2,687 gals.
Electronics	221,233 lbs.

Additionally, The M.e.t. conducts special collection events for hard to recycle items like tires and electronics. These collection events are also used to distribute educational material to the public regarding locations of the recycling depots and proper pollutant disposal.

During these collection events, educational fliers are distributed to the public. Each car received fliers regarding the following topics: (1) locations of the recycling depots, (2) latex paint disposal, and (3) Tulsa's Household Pollutant Facility.

The following are the collection amounts from M.e.t.'s specialized events within the City of Tulsa:

- 7/10/21 Fire Extinguisher/Smoke Alarm Event- 45 fire extinguishers, 68 smoke alarms, 99 fluorescent bulbs, 200 pounds of batteries
- 10/21/21 Tire Collection at Zo – 436 tires
- 11/27/21 Trap the Grease (Tulsa Stormwater) – 85 gallons
- 3/5/22 Big Spring Clean at Fairgrounds-156 pounds ammo, 420 pounds plastic bags, 3,900 pounds car batteries, 2,550 pounds household alk batteries, 1,500 pounds non-alk household batteries, 1,000 CFL bulbs, 3,000 pounds cardboard, 22,164 pounds electronic waste, 123 fire extinguishers, 632 pounds medication, 42,000 shredded paper, 456 pounds sharps, 2,100 tires.
- 4/30/22 Prescription Take Back at Central Tulsa Depot – 121 pounds of medication
- 5/4/22 Fire Extinguisher/Smoke Alarm Event- 4 fire extinguishers, 8 smoke alarms

In FY 21/22, The M.e.t. staff answered calls and emails from citizens who ask what to do with their pollutants. Staff educates on where to take items and how to handle responsibly. Staff gave out voucher numbers for the Household Pollutant Collection Facility to citizens who live in outlying communities. This voucher number(s) allow citizens to use this Facility at no charge (if below 45 pounds). The charge is given to the outlying community through a contract arrangement between The M.e.t. and the City of Tulsa.

The City of Tulsa has a Household Pollutant Collection Facility at 4502 South Galveston Ave. The facility is open 2 days a week (Wednesdays and Saturdays) from 8:00am till 4:30pm. This facility replaced the biannual collection events and has resulted in an easier and quicker method of pollutant disposal for Tulsans and the surrounding communities. This facility has been well received by the public as evidenced by our survey results and social media recognition. This facility was promoted in the Nov. 2021 and Feb. 2022 utility bill stuffers.

Below is a summary of the amounts of pollutants collected during the calendar year 2020:

Total weight collected: 386,764 lbs
Total Tulsa customers: 3,507
Total M.e.t. customers: 623
Total Customers from outside Tulsa and M.e.t. communities: 16 Sapulpa and 19 other cities

The following is a breakdown of the wastestreams per category:

Wastestream	Amount Collected
Toxic Liquid	**22,577lbs**
Toxic Solid	**15,284lbs**
Aerosols	**13,520lbs**
Low Viscous	**15,368lbs**
High Viscous	**21,316lbs**
Bulbs	**1,576lbs**
Bases	**9,956lbs**
Acids	**5,322lbs**
Oxidizers	**2,640lbs**
Flammable Loosepack	**13,888lbs**

In addition to the above household pollutants, the facility also collected and disposed of:

- 213,640 pounds of latex paint
- 2,950 pounds of used oil
- 1,550 pounds of antifreeze
- 7,000 lbs. of batteries
- 300 gallons of cooking oil

e.) Locate and eliminate illicit discharges and improper disposal

Dry weather field screening was conducted on approximately 48 square miles (30,744 acres) of the Tulsa's storm sewer system during the period of July 1, 2021 to June 30, 2022. Thus compliance with this section of the permit was achieved by screening 26 % of the Tulsa's MS4. The dry weather field screening program was designed to locate illicit discharges and illegal disposals into Tulsa's storm sewer.

A total of 152 outfalls were screened, of which 49 contained flows during dry weather periods. Once dry weather flow was located, the flow was sampled and tested for pH, temperature, appearance, conductivity, detergents, chlorine, copper, ammonia and fluoride (See Section 4 for specific data collected during dry weather field screening). If contaminants were identified in concentrations above action levels then a dry weather flow follow-up investigation was conducted. Dry weather flow follow-up investigations continued until the source of the

flow was identified. When the source of the illicit discharge was identified it was eliminated.

The Stormwater Management Division continued to conduct random industrial inspections. Inspections were conducted to achieve compliance with Part II(A)(8) Industrial and High Risk Runoff. During these inspections, inspectors were checking for illicit discharges to the MS4 or the potential for an illicit discharge. If an illicit discharge was found, action was taken to halt the discharge using the Pollution Ordinance.

As addressed in Part II(A)(6)(b), Tulsa continued efforts to reduce sanitary sewer overflows into storm sewers during this reporting period. This was accomplished through the use of TV inspections and smoke testing techniques. Work completed during the reporting period included:

71 miles of sanitary sewer TV inspected
10.5 miles of storm sewer TV inspected
186 sanitary manholes raised to grade
1,961 linear feet of main line storm sewer repairs
113 main line sanitary sewer repairs
14,565 linear feet of main line sanitary sewer replaced or rehabilitated

These repairs resulted in the reduction of stormwater inflow and infiltration into the sanitary sewer, which in turn reduced sanitary sewer overflows and illicit discharges to the storm sewer system. Rehabilitation projects supplemented Tulsa's efforts by correcting known structural storm sewer problem areas (see Part II(A)(6)(b) Sanitary Sewer Overflows).

As previously mentioned, investigation/complaint procedures currently in place continue to be very effective in locating illicit discharges and improper disposal practices during this reporting period.

f.) Removal of illicit discharges

Once the source of an illicit discharge was located the responsible party was required to halt the discharge, redirect the discharge to the sanitary sewer or obtain an OPDES wastewater discharge permit from the ODEQ. Thirty-three illicit discharges were eliminated from Tulsa's MS4 during this reporting period as a result of enforcement of the Pollution Ordinance.

g.) Maintain a list of OPDES permit holders within the City of Tulsa

Databases are maintained for all OPDES permits for all discharges from construction, industrial activities, and OPDES wastewater discharge permittees within Tulsa. These databases include the name, address, OPDES permit number, contact person, SIC code(s) and other information. Updates were made when information became available. This information is usually obtained through inspections or ODEQ notification.

The City of Tulsa suffered a massive ransomware attack that prevented access to our databases for multiple months from April thru September 2021. The extent of the damage to the integrity of the databases is unknown, but it did affect some records that had been recently entered when the ransomware occurred. Every effort has been made to verify the accuracy of the information obtained from these databases for this annual report, but there is the possibility of missing records.

Part II(A)(7) Spill Prevention and Response

Status: Compliant and ongoing

All agencies and City Departments responding to spills are instructed to follow the City's Pollution Ordinance. This ordinance requires the removal of a pollutant rather than disposing to the storm sewer, unless there is an immediate threat to life and health. The Pollution Ordinance provides Stormwater Management with the authority to require the responsible party to clean up the spill. This Ordinance also gives the Stormwater Management Division the authority to recoup all cost incurred from the responsible party. The Stormwater Management Division has authority to oversee all clean-up work involving spills within the City of Tulsa.

This requirement was achieved as delineated in a Memorandum of Agreement between the Tulsa Fire Department (TFD) Hazardous Materials Unit, the Tulsa City – County Health Department and the Streets and Stormwater Department. In accordance with Section 300 of the TFD Emergency Operation Procedures, all agencies and City departments responding to spills ensured compliance with the Pollution Ordinance by removing spilled pollutants rather than flushing it into the storm sewer, unless there was an immediate threat to public health and safety.

The TFD Haz-Mat Unit responded to incidents involving spills or possible releases of chemicals or pollutants which either had the potential to or were discharged to the City's sanitary or storm sewer. Whenever the TFD responded to a spill that had entered either the sanitary or storm sewer system, the Streets and Stormwater Department was notified to evaluate impact on sewer systems and coordinate remediation activities.

If the responsible party was identified, they were required to conduct the clean up or hire a remediation company. In cases involving remediation, all work was inspected to ensure a proper and thorough clean up.

Below is a summary of the investigations conducted by the Stormwater Management Division:

Number of Investigations	Description of Investigations
26	**Construction** (relating to construction site potential violations)
10	**Hazmat** (relating to potential discharges of pollutants from fire department responses involving the hazardous materials unit)
257	**Stormwater** (relating to potential releases of pollutants to the storm sewer or violations of the Pollution Ordinance)
3	**Drug Labs** (relating to the potential release of pollutants from drug lab remediation to the storm sewer or violations of the Pollution Ordinance)
296	**Total number of investigations for this reporting year**

Stormwater Management inspectors conducted 419 industrial stormwater runoff inspections, each involving a discussion regarding spill prevention and management with industrial representatives.

Agreements have been put into place between Tulsa and both the Oklahoma Turnpike Authority (OTA) and the Oklahoma Department of Transportation (ODOT) that address spills that occur on OTA or ODOT MS4s within Tulsa.

Part II(A)(8) Industrial & High Risk Runoff

Status: Compliant and ongoing

Tulsa continued to use the Industrial & High Risk Runoff program to identify, monitor and control pollutants from municipal landfills; treatment, storage and disposal facilities for municipal waste; facilities subject to EPCRA (Emergency Planning and Community Right-to-know Act) Title III, Section 313 reporting requirements; and any other industrial or commercial discharge the City determined had the potential to contribute substantial pollutant loading to the City's storm sewer system. This program contains procedures for inspecting, monitoring, and controlling pollution from the aforementioned sources. A database of industrial stormwater sources discharging to the City's storm sewer continues to be maintained.

During this reporting period, 419 industrial stormwater inspections were conducted. Two enforcement actions were taken against industries or facilities in order to eliminate illegal or illicit discharges. $100 in fines was associated with these enforcement actions.

This program has also provided an opportunity to educate owners and operators of industrial or commercial facilities concerning stormwater quality regulations and requirements as per ordinances and regulations.

Part II(A)(9) Construction Site Runoff

Status: Compliant and ongoing

a.) Structural and non-structural best management practices

Through inspections and enforcement actions, Tulsa required construction sites to implement and maintain adequate structural and non-structural (BMPs) during this reporting period. The use and maintenance of structural and nonstructural best management practices (BMPs) to reduce pollutants discharged to the City's storm sewer from construction sites has been achieved through control measures provided in the Pollution Ordinance, Title 11-A, Chapter 3 (Watershed Development Regulations), Chapter 5 (Pollution Ordinance), Title 35 Infrastructure Development Process (IDP), and building permits.

During this reporting period Tulsa's Development Services section issued:

24 Watershed Development permits, which include Earth Change permits.

224 Stormwater Drainage permits

915 Stormwater Connection permits

216 Floodplain permits

8 Floodway permits

These permits require the operator to have adequate erosion control measures in place and maintained prior to, and throughout the duration of the project until final stabilization. Prior to receiving an Earth Change permit; applicants were required to submit an NOI and storm water pollution prevention plan for all sites disturbing at least one acre. Additionally, 19 Stormwater Pollution Prevention plans were reviewed to ensure the use and maintenance of structural and nonstructural erosion control BMPs at construction sites.

b.) Inspection and control of construction sites

Inspection and enforcement of control measures to reduce soil erosion at construction sites is shared between several City groups (Stormwater Management, Development

Services and Engineering Services). Stormwater Management conducted a total of 1,545 construction site inspections for compliance with erosion control measures and issued 9 enforcement actions. The total amount of fines and penalties collected was $200.

Development Services conducted 531 erosion control inspections at the same number of construction sites. Twenty-five corrective actions were issued as a result of these inspections. If a site is in violation, the inspector contacts the builder and informs him/her of the actions which must be taken to come into compliance. If voluntary compliance is not achieved, the Stormwater Management Division conducts follow-up inspection to ensure compliance with the Pollution Ordinance. If the site is still non-compliant appropriate enforcement action is taken. Building permits were not issued for construction sites larger than one acre until a stormwater pollution prevention plan was in place.

Engineering Services Division conducted daily inspections on 141 city and 92 privately funded Infrastructure Development Process (IDP) projects. Implementation and continued compliance with the Pollution Ordinance was enforced. Appropriate structural and nonstructural erosion control measures were inspected during these site inspections. If the existing erosion control methods were inadequate, additional structural or nonstructural BMPs were required. Engineering Services has the authority to revoke Watershed Development Permits as a result of failure to implement and maintain adequate erosion control measures. None of these permits were revoked during this reporting period, but violations were reported to the contractors at weekly progress meetings. This resulted in corrective action leading to compliance.

c.) Education and training of construction site operators

The brochure “Construction Site Best Management Practices” was available to construction operators at the Permit Center. Construction operators normally must visit the Permit Center in order to obtain Watershed Development permits from the City of Tulsa, but during the pandemic, access to this resource was restricted though this brochure is still available on the City of Tulsa website. This brochure lists erosion and

sediment controls that can be utilized at construction activities. This brochure was also available at other events (see Attachment B). Approximately 20 of these brochures distributed during this reporting period.

To assist local developers and builders with the use, installation and maintenance of erosion control measures, City of Tulsa representatives in the past attended Builders Council as well as Developer Council meetings held at the Greater Tulsa Home Builders Association as we are able. These meetings prior to the pandemic had been held monthly, but lately have been occurring with less frequency.

City inspectors conducting soil erosion control inspections at construction sites, informed construction site operators on aspects of use and maintenance of appropriate structural and nonstructural BMP's. Additionally, City of Tulsa supervisors answered questions regarding construction site OPDES requirements and erosion control requirements.

Although formal training was not conducted by Field Engineering, whenever a contractor was out of compliance, Field Engineering took the time to train contractors on the correct installation of erosion control measures. City inspectors conducting soil erosion control inspections at construction sites informed construction site operators on aspects of use and maintenance of appropriate structural and nonstructural BMPs. Additionally, City of Tulsa supervisors answered questions regarding construction site OPDES requirements and erosion control requirements.

Building permit applicants of all private developments were notified of their responsibility under the OPDES permitting program during the building permit application review process and during any pre-submittal meetings. Through the infrastructure development process (IDP), proposed developments were reviewed, and applicants were notified of the OPDES erosion and sediment control requirements prior to issuing IDP project permits. The City of Tulsa offers pre-development meetings to those considering a new development within the City. These meetings are site specific and provide guidance on all requirements. Included in the discussion is the requirement for erosion control throughout the construction period and the permanent requirements to prevent stormwater pollution. In addition, the City explains storm water pollution requirements when we conduct presentations or training to the development and building communities.

d.) Building permit applicants notification

Building permit applicants of all private developments were notified of their responsibility under the OPDES permitting program during the building permit application review process and during any pre-submittal meetings. Through the infrastructure development process (IDP), proposed developments were reviewed, and applicants were notified of the OPDES erosion and sediment control requirements prior to issuing IDP project permits.

In addition, the City explains stormwater pollution including the use of Low Impact Development (LID) as an effective Best Management Practice. Utilizing the predevelopment meetings and the IDP process to open the discussion about implementing LID practices before any development has actually taken place makes successful implementation of practices more likely to occur. In addition, the City explains stormwater pollution requirements and the benefits of LID when conducting presentations or training to the development and building communities.

Developers and design engineers were provided the "OPDES General Permit for Stormwater Discharges from Construction Activities (OKR10)" information. Anyone obtaining an OPDES General Permit for Stormwater Discharges from Construction Activities (OKR10) submitted a stormwater pollution prevention plan along with an NOI, for review and approval prior to receiving an Earth Change permit. A stormwater pollution prevention plan checklist was utilized during the review process.

Part II(A)(10) Public Education

Status: Compliant and ongoing

The City of Tulsa Stormwater Quality group continues its robust public education efforts through the implementation of strong media campaigns. In total Stormwater Quality outreach was viewed over 8,000,000 times including via digital media, tv ads, public events, utility bill stuffers, etc…The Stormwater Quality group collaborated with Byers Creative to develop new animated commercials for social media and 60 second live action videos to help deliver stormwater quality public education messages. City Communication staff posted 89 messages to social media with stormwater messages this period. Tulsa's Facebook page has 47,000 followers, Twitter 60,000 followers, and 5,700 followers on Instagram which allow these messages to reach quite a large audience. The animated commercials show how leaves and grass, pet waste, and household pollutants can make their way into the storm sewer system causing contamination. The 60 second videos expand upon this concept by further showing how the "Little Things" we do in our daily lives can have a negative impact on water quality. In addition to these new commercials, the Sgt. Red and Mingo commercials have been run as well during parts of this reporting period.

The below table shows the number of views from the commercials, in addition to the number of radio and digital ad impressions.

Media	Impressions (# of views/listens)
KOTV Channel 6	4.0 Million
Spotify	307,912
Pandora	161,605
OTT	388,053
Cox Radio	1.2 Million
KTUL/ Channel 8	3.1 Million

The City of Tulsa maintains a TV channel for the broadcast of public meetings, events, and forums. This channel has been shown to be watched by roughly half of Tulsans or 85,446 households. During non-broadcast times, various videos including several Stormwater Quality videos are shown.

The City of Tulsa passes out tote bags, pens, pencils, rain gauges, pet waste bags, tumbler cups, notepads, folders, and fishing poles with a sticker that has our SOS logo, among other promotional products with the website and phone number on it. These items are very popular and well received at in-person events and are geared toward starting a conversation with a citizen about water quality topics.

Tulsa and its educational partners continued to educate the public on the prevention of pollution at the source. To get the most from each educational opportunity, many public educational activities targeted multiple sources of non-point source pollution, including vehicle fluids, pesticides, herbicides, fertilizers, and erosion control practices. A detailed description of the City of Tulsa's public education efforts can be found in Section 6(c).

The following groups participated in various public education events during this reporting period:

- City of Tulsa
    - Streets and Stormwater Department
    - Parks Department
    - Communications Department
- Tulsa County Conservation District (Blue Thumb Program)
- Metropolitan Environmental Trust (M.e.t.)

Education Activities Included:

- Displays at workshops and conferences
- Public presentations at conferences and seminars
- Presentations at local schools
- Presentations at homeowners' associations and neighborhood gatherings
- Creation and distribution of educational material (brochures, activity sheets, note pads, etc.) at a number of events
- News press releases and articles informing the public about environmental issues, including non-point source pollution
- Environmental awareness at numerous events
- Utility bill stuffer – stormwater information sent to all citizens that purchase water and sewer as well as pay utility bills to the City of Tulsa

See Attachment B for a full list of Educational Activities.

During this reporting period, Tulsa continued to create and utilize existing brochures, pamphlets and handouts to meet and exceed all its public education requirements. A complete listing of this material can be found as Attachment A "Educational Material Distributed 2021-2022". Attachment B "Education Events 2021-2022" is a complete listing of all the public education events the Stormwater Quality group participated in during this reporting period. Both these attachments can be found in the appendix of Section 6.

The Tulsa County Blue Thumb Program continued its efforts to reduce non-point source pollution. The Tulsa County Conservation District (TCCD) is involved with this Clean Water Act Section 319 funded program, which utilizes citizen volunteers. Volunteers have contributed thousands of hours of work to the Blue Thumb program's activities. The program's goal is to make citizens of Tulsa aware of non-point source pollution and to encourage the adoption of practices that protect Tulsa's streams. This program has contributed greatly to the education of the public through the organization and training of citizen watershed monitoring groups and distribution of the "Blue Thumb Fish Prints". The Blue Thumb Program continues to collect data from area streams and uses this data to focus educational activities within the affected watersheds. This education involves informing local citizens on how to protect their streams against non-point source pollution. The TCCD continues to promote the Blue Thumb Program and encourage participation at public events, such as the Greater Tulsa Home and Garden Show and the Enviro Expo.

The Stormwater Quality group administers an electronic newsletter that is sent out quarterly to an estimated 1,912 email addresses. Through this newsletter recipients are educated on stormwater issues such as proper disposal of grass clippings, businesses that are practicing Best Management Practices are recognized and stormwater quality educational events are promoted. The public is also informed of ways they can help improve and maintain stormwater quality, how they can contact the City of Tulsa for

more information, request personnel to come speak at an event and how to report illicit discharges. This newsletter was sent out in Aug. 2021, Dec. 2021, and May 2022 this year.

The Stormwater Quality Section created several brochures and flyers that focus on different types of pollutants that can get into storm drain. Not all of them were distributed during this fiscal year. The list of materials distributed can be found in Attachment A. Some of our other available brochures include Pool Water Disposal, Carpet Cleaning, Rain Barrel Assembly Instructions, and Latex Paint Disposal.

The Stormwater Quality group partners with the City of Tulsa's Working in Neighborhoods (WIN) department to further public education efforts. The WIN newsletter goes to 515 neighborhoods and 103,912 members on the nextdoor app. This newsletter talked about our Stormwater messaging in the April 2022 article. The Stormwater Quality group utilizes this newsletter to help spread the word about upcoming educational events and programs. Details of WIN newsletter announcements can be found in Appendix B.

With the expansion of the Marketing and Creative studio, the City of Tulsa has undertaken many additional outreach videos over the last several years, including an explanation and overview of the Watershed Characterization Program. This video has been shared on social media and posted to Youtube and has been viewed 37 times. In addition to the new Biosampling video, stormwater has videos on YouTube that demonstrate the importance of keeping our storm drains clean. The most viewed stormwater video was watched over 2,000 times. In total the Stormwater Department has 18 videos. The videos focus on pollutants such as pet waste, litter, and motor oil, and discussed how to remediate these problems.

a.) Public reporting of illicit discharges and improper disposal

Numerous publications that promote the public reporting of illicit discharges and improper disposal were created and distributed by the City of Tulsa. Regular distribution locations included Tulsa Parks, Recreation Centers, and libraries. Material was also distributed at events such at events though these continued to be somewhat limited by the pandemic. The following is a partial list of publications distributed:

> *"Stormwater Quality Programs"* is a general brochure highlighting the current stormwater quality programs in the City of Tulsa. Also provided in the brochure are ten solutions to stormwater pollution, including the reporting of illicit discharges, and lists a telephone number and instructions on how to do so. This number is promoted all educational material distributed through our stormwater quality programs.
>
> *"City of Tulsa – General Guide to Regulatory Floodplains"* is a brochure designed to guide the public through floodplain requirements within the City of

Tulsa. It provides a telephone number and encourages the public to report illegal discharges into the storm sewer.

"City of Tulsa Official Floodplain Notice" and *"Flood Hazard Information About Your Property",* are two brochures that were sent to approximately 15,000 residences last year who live in or near the floodplain, have the potential to experience flooding and what to do in case of flooding. It provides a contact telephone number and encourages the public to report illegal discharges into the storm sewer.

"*City of Tulsa Floodplain Map Atlas*" is a hardcopy atlas/book that shows the FEMA SFHAs and the City of Tulsa Regulatory Floodplains throughout the City. The atlas also provides flood hazard information as well as provides phone numbers for citizens to report blocked drains or illegal dumping.

"*2020 Repetitive Loss Area Notice*" is an annual publication that goes to all property owners who are near a repetitive loss property. A repetitive loss property is defined as a property that has filed one or more insurance claims for flood losses in the past 10 years. This publication provides phone numbers for citizens to report blocked drains or illegal dumping.

"*Know Your Risk of Flooding*" is a new brochure that is handed out during public events and/or meeting. It provides tips on what to do before, during, and after a flood event. It also provides facts about flood insurance.

During this reporting period, information was placed into two monthly utility bill stuffers in Nov. 2021 and Jan. 2022 encouraging the public to report illegal discharges. These articles gave instructions on the proper procedures for reporting along with telephone numbers for the 311 Center, which is the primary method for reporting of citizen concerns. Additionally, the 311 Center has 'on hold' messages that deliver stormwater quality information to callers. Multiple message topics were conveyed to callers during this time period. In previous years, almost 600,000 calls were made to the Customer Care Center.

Tulsa maintains a website, www.cityoftulsa.org/sos that has several links to tips that promote ways to reduce stormwater runoff pollution including the public reporting of illegal discharges to the storm sewer. The number of pageviews was 6,709 during this time a slight decrease from previous years. While conducting inspections, City of Tulsa personnel continued to direct citizens, business owners or operators to our website for more information about our programs.

Tulsa's Annual Creek Cleanup. Co-sponsored by Tulsa Refuse and Recycling and the City of Tulsa's Parks Department during the month of April 2022. Volunteers removed litter from several different creek locations, such as Haikey Creek, Joe Creek, Mingo Creek, Dirty Butter Creek, Coal Creek, Vensel Creek, and Douglas Creek. Not only did this clean-up remove litter from the creeks, but it also helped to bring attention to the importance of reducing litter discharges to urban streams and waterways. The Stormwater Quality public education is geared towards a variety of audiences. The Save Our Streams

social media pages posted ads discussing the Great Tulsa Cleanup, the Household Pollution Collection Facility, and many other events. On average the ads reached roughly 268 people per post.

As a result of public awareness of the reporting of illicit discharges and improper disposal, 296 investigations were conducted involving the identification and removal of 33 illicit discharges to the storm sewer during this reporting period.

b.) Proper management and disposal of used motor vehicle fluids and household hazardous wastes

Public education in the proper management and disposal of used motor vehicle fluids and household hazardous wastes was accomplished through various methods. These methods include the distribution of the following educational material:

"Motor Oil" is a brochure distributed during this reporting period that targeted the proper use, storage and disposal of motor oil.

"Stormwater Quality Programs" is a brochure given to the public detailing our stormwater quality programs. Included in the brochure is information on the adverse effects of household chemicals on the environment as well as instructions on how to dispose of chemicals properly.

"City of Tulsa – General Guide to Regulatory Floodplains" is a brochure designed to guide the public through floodplain requirements within the City of Tulsa. It provides a telephone number and encourages the public to report illegal discharges into the storm sewer.

"City of Tulsa Official Floodplain Notice" and *"Flood Hazard Information About Your Property",* are two brochures that were sent to approximately 15,000 residences last year who live in or near the floodplain, have the potential to experience flooding and what to do in case of flooding. It provides a contact telephone number and encourages the public to report illegal discharges into the storm sewer.

"*City of Tulsa Floodplain Map Atlas*" is a hardcopy atlas/book that shows the FEMA SFHAs and the City of Tulsa Regulatory Floodplains throughout the City. The atlas also provides flood hazard information as well as provides phone numbers for citizens to report blocked drains or illegal dumping.

On January 6, 2016, the City of Tulsa opened the new Household Pollutant Collection Facility at 4502 South Galveston Ave. The facility is open 2 days a week (Wednesdays and Saturdays) from 8:00 am till 4:30 pm. See Part II(A)(6)(d) for a summary of the

pollutants collected this year, including motor oil, various vehicle fluids, and most household pollutants. Education material is distributed at this Facility.

At most of the major events and outreach, the used motor vehicle fluid and household hazardous waste brochures were distributed. See attachments for specific info.

Currently, The M.e.t. has ten drop-off recycling depots with collection containers for used motor oil, cooking grease and batteries. Two of the ten locations have containers for antifreeze collections. The "Recycling Locations" map flier and the "Tulsa Area Recycling Directory" both provide locations to the depots. These handouts are given during speeches, booths and events. The website, www.metrecycle.com promotes the events and depots. Staff had interviews on local news television stations before and during the specialized collection events. Fliers are distributed at booths, speeches and events throughout the year (see list below).

In regard to quantities of fliers distributed in FY 21/22 at events, educational booths or mailed to public:

FY 21/22 distribution estimates below:

Tulsa area Recycling Directory: 2,500

Buy Recycled, Close the Loop: 50

Latex Paint and the Environment: 300

Deep Green Clean: 100

Recycling Locations Map: 2,000

Focus on the Four: 1,000

Stop Ewaste: 100

What to do with Rechargeable Batteries (new flier): 100

COT Medication Flier: 350

Mercury in Your Home: 10

The revised specifications for new storm sewer inlet hoods include the message "Dump No Waste, Drains to River". These specifications were accepted by the City of Tulsa and the new inlet hoods have been obtained. As a result, all new or repaired catch basins will now have the message permanently cast into the hood therefore not requiring a placard.

Environmental educational activities were conducted at Tulsa Parks, Girl Scouts Day Camps, Day Campers Home School, and Tulsa County's Free Fair. Combined these events involved approximately 3,054 children. Children were educated on the importance of reducing litter, non-point source pollution and recycling through various activities. Other education activities included the use of videos, hands on landscape displays (i.e., "Enviroscape"), distribution of hand outs and material containing non-point source pollution information, hands on stream monitoring of the creeks and performing

park clean-ups. More details about this program can be found on Attachment C in the Appendix of Section 6.

c.) Proper use, application and disposal of pesticides, herbicides and fertilizers

The responsibility of educating the public on the proper use, application and disposal of pesticides, herbicides and fertilizers was accomplished through the distribution of educational material (brochures, videos, ads, etc.), public speaking engagements, and utility bill stuffers. The following section lists some of the materials and activities used to comply with this requirement. An extensive list along with the number of pamphlets distributed can be found in Appendix A and B of Section 6. This info was also promoted in three utility bill stuffers, during Jan., Feb. and March 2022.

> *"Fertilizers" and "Pesticides"* are two brochures which emphasize the proper application and disposal for the use of pesticides and fertilizers. It also lists alternatives to chemicals to control pests and fertilize lawns.
>
> *"Stormwater Quality Programs"* is a brochure given to the public detailing our stormwater quality programs. Included in the brochure is information on the adverse effects of pesticides and fertilizers on the environment as well as instructions on how to dispose of them properly.
>
> *"Pollution Prevention Plan"* is a Best Management Practice (BMP) created to guide citizens to do their part to keep our storm sewer clean. It addresses a number of pollutants including but not limited to fertilizers, herbicides and pesticides.

The Master Gardeners Program sponsored by Oklahoma State University - Tulsa Cooperative Extension Office maintains a telephone information service for the public regarding all aspects of gardening and landscaping, including the proper application and disposal of pesticides, herbicides and fertilizers. This service is offered five days a week, between 9 a.m. and 4 p.m. and has numerous brochures available to the public. See Part II (A) (5) "Pesticide, Herbicide and Fertilizer Application" for more information about this program. This program was publicized by Tulsa through the distribution of the *"Fertilizers"* brochure. OSU provided additional advertising through various means.

The City of Tulsa requires all City personnel, as well as all City contractors that apply pesticides and herbicides to be licensed and subject to all the regulations under the Oklahoma Pesticide Applicators Law, including re-certification. City personnel that apply pesticides, herbicides and fertilizers received annual in-house training on specific types of pesticides, herbicides and fertilizers that are applied. When available, employees attended workshops, conferences and additional training on pesticides, herbicides and fertilizers application and disposal. The Tulsa Parks Department and Stormwater Management Division received training many times throughout the fiscal year.

The Tulsa County Conservation District administers the Oklahoma Conservation Commission's Yard-by-Yard program which aims to build resiliency in urban environments by promoting healthy soils water conservation and native vegetation.

Healthy soils means drought tolerance during times of heavy rain and encourages infiltration. Education to urban residents on water infiltration is key to reducing flooding in urban areas where there is so much impervious surface like streets and parking lots. These impervious surfaces carry pollutants like pesticides, herbicides, fertilizers, and other pollutants into the storm drains. This program helps education citizens that the storm drains empty into the local streams and creeks. These pollutants can wreak havoc on the critters and wildlife that call those areas home. In addition to maintaining healthy soils and cleaner water, another major goal of the new urban project is to provide food for pollinators, like bees and butterflies that need food sources and host plants in cities. To date, approximately 50 residences are enrolled in this program.

Tulsa's website contains guidance for pesticide and fertilizers application for both commercial and residential applicators. This website is located at www.cityoftulsa.org/sos and is regularly promoted.

Part II(A)(11) Employee Education

Status: Compliant and ongoing

Presentations were made to personnel from Tulsa Fire Department, Sewer Operations and Maintenance, and Street Maintenance among others on their responsibilities at facilities and job sites.

Employees in the Streets and Stormwater Department are eligible for promotional advancement upon completion of a "Stormwater Operator Certification" program conducted by the Stormwater Management group. This two day- sixteen hour course covers topics such as stormwater history in Tulsa, maintenance responsibilities, and Low Impact Development. It includes both classroom and field work and attendees are required to pass a test for certification. To date 160 employees have been certified. During this FY, 9 employees attended the training.

All City of Tulsa contractors as well as all employees that are required to apply pesticides, herbicides and fertilizers are required to be licensed under the Oklahoma Pesticide Applicators Law. In-house training regarding the application of various chemicals was conducted for city applicators during this reporting period. See Part II (A) (5) Pesticide, Herbicide, and Fertilizer Application.

City contractors responsible for herbicide, pesticide and fertilizer application, as well as landscape specialists and other lawn care providers were specifically educated on the proper use of chemicals, disposal thereof and spill prevention procedures. The City of Tulsa requires all contract applicators to be licensed under the Oklahoma Combined Pesticide Law and Rules (Title 2 of the Oklahoma Statues). This license requires each applicator to properly apply, dispose and address spills in an environmentally friendly manner.

Part II(A)(12) Monitoring Programs

Status: Compliant and ongoing

a.) Dry weather field screening program

The dry weather field screening program continued during this reporting period. The details of this program are previously mentioned in Part II (A) (6) (e).

b.) Watershed characterization program

See Section 4

c.) Industrial and high risk runoff

The following table is a list of facilities classified under the SWMP as "Industrial and High Risk Runoff". This designation requires them to conduct self monitoring of their stormwater runoff. A summary of the number of industries that conducted monitoring during the permit life are as follows:

I&HRR Facility Categories	# of facilities identified	# conducting monitoring
Municipal landfills	**1**	**0**
Other treatment, storage and disposal facilities of municipal waste (e.g. transfer stations, incinerators, etc.)	**6**	**0**
Hazardous waste treatment, storage, disposal and recovery facilities	**2**	**0**
Facilities that are subject to EPCRA Title III, Section 313	**47**	**0**
Industrial or commercial discharges the permittee determines are contributing a substantial pollutant loading to the MS4.	**1**	**1**

Letters informing industries of their responsibility to conduct monitoring were sent out at the end of FY 13-14. All monitoring results were required to be submitted to the Stormwater Management Division within one year. All monitoring results were reviewed and placed in the industry's activity file. Additional information regarding this program can be found at Part II (A) (8) Industrial & High Risk Runoff.

Legal Authority

The City of Tulsa utilizes several Ordinances to ensure compliance with OPDES Permit #OKS000201. The following is a list of the most commonly used Ordinances accompanied by a brief description.

Title 11-A Chapter 3 (Watershed Development Regulations) – This Ordinance allows for the regulation of the methods for handling and disposing of stormwater run-off; the development, excavation, grading, regrading, paving, land filling, berming and diking of land; allows for the regulation of development within flood plains in order to assure that development is not dangerous to health, safety or property due to stormwater run-off; and allows for the regulation of the connection to and use of the stormwater drainage system. Through this Ordinance, Tulsa permits construction activities that are one acre or greater.

Title 11-A, Chapter 5 (Pollution) – This Ordinance was adopted in November of 1995 in order to give Tulsa the legal authority needed to comply with all of the municipal separate storm sewer system discharge permit requirements that were not covered by existing Ordinances. It prohibits illicit discharges to the storm sewer; allows for the control and monitoring of stormwater runoff; provides Tulsa with the legal means to inspect and investigate potential sources of pollution to the storm sewer; and contains judicial enforcement remedies. This Ordinance was revised during 2006-2007 reporting period to include provision for recovery of cost incurred by Tulsa against violators of this Ordinance. Maximum amount of fines per violation per day is $1,000.00.

Title 11-C, Chapter 12 (Requirements For Industrial Users To Discharge To The Sanitary Sewer Systems) – This Ordinance provides general sewer use requirements; allows for wastewater discharge permit issuance and inspection of all industries that discharge to the sanitary sewer; prohibit the inflow of stormwater into the sanitary sewer system; and contains judicial enforcement remedies.

Title 24, Chapters 1 and 2 (Nuisances) - These Ordinances provides for abatement of nuisances, including litter, industrial wastes, sewage, etc. from any area lake, basin, public park, alley, highway or street through enforcement actions including total cost recovery to the City of Tulsa from the any person, firm corporation, partnership, or other legal entity who commits or who permits the creation or continuation of a nuisance.

Title 42, Chapter 11 (Planned Unit Development) – This ordinance encourages innovative land development while maintaining appropriate limitation on the character and intensity of use and assuring compatibility with adjoining and proximate properties. It also promotes greater flexibility within the development to best utilize the unique physical features of a particular site. Creative land use design and open space preservation are also promoted in this Ordinance. Further, the final purpose of this Ordinance is to achieve a continuity of function and design within the development.

Section 2

Proposed Changes to the Stormwater Management Program

The City of Tulsa is currently in the process of negotiating a renewal of Permit OKS000201. The permit changes the City of Tulsa is recommending are aimed to improve the performance of the Stormwater Management Program. Any changes made in the requirements of the permit during the negotiation process will be incorporated into the SWMP within 6 months of effective date of the final permit. This requirement is in accordance with Tulsa's MS4 Permit OKS000201 Part III(A)(1).

Section 3

Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under OAC 252.606-1-3(b)(3)(L) adopting and incorporating by reference 40 CFR 122.26(d)(2)(iv) and (d)(2)(v)

No revisions to the “Controls” have been made during this reporting period.

Section 4

A Summary of the Data/Monitoring Data Accumulated Throughout the Reporting Year

To comply with the permit, individual programs were created or adopted and then implemented. Implementation resulted in the creation of databases that track dry weather field screening and floatables monitoring. Data was collected during this reporting period, reviewed for accuracy and completeness and then entered into specific databases. Each program is explained in the following paragraphs along with associated data.

Dry Weather Field Screening

Dry weather field screening was continued during this reporting period in an ongoing effort to detect the presence of illicit connections and improper disposal. One hundred thirteen outfalls were screened, covering approximately 30,744 acres (47.99 square miles). Of the 103 outfalls screened, 41 contained dry weather flow. Once dry weather flow was located, the flow was sampled and tested for pH, temperature, appearance, conductivity, detergents, chlorine, copper, ammonia and fluoride. If contaminants were identified in concentrations above action levels, then dry weather flow follow-up activities were implemented. Dry weather flow follow-up procedures continued until the source was identified. When an illicit discharge was identified, it was eliminated. Specific numbers for this reporting period are as follows:

Total # of outfalls screened	**152**
Total area screened	30,744 acres 47.99 sq. mi.
# of outfalls that did not require follow-up (without flow)	103
# of outfalls with dry weather flows not requiring follow-up (flows present but pollutant concentration below action levels)	41
# of outfalls requiring dry weather flow follow-up (flow with concentrations of pollutants above the action levels)	8

Floatable Monitoring Summary

Data was obtained from five floatable monitoring locations Inspections were performed after rainfall events (> 0.1 in.) during this reporting period. If floatables were present during an inspection, they were collected and data was gathered

regarding the quantity in cubic yards and make-up in percent (organic and inorganic). A summary of the data is as follows:

Floatables Monitoring Summary

Station: Sheridan Park,10400 South 67th East Avenue

Date	Floatables Present	Collection (Cubic Yards)	% Organic	% Inorganic
7/2/2021	yes	0.5	100%	0%
7/13/2021	yes	0.5	90%	10%
7/20/2021	yes	0.1	100%	0%
8/24/2021	yes	0.75	100%	0%
9/8/2021	no	0		
10/1/2021	yes	1	90%	10%
10/6/2021	yes	0.5	100%	0%
10/14/2021	yes	0.25	100%	0%
10/15/2021	yes	0.25	100%	0%
10/28/2021	yes	0.25	100%	0%
11/2/2021	no	0		
11/3/2021	yes	0.25	50%	50%
11/12/2021	yes	6	80%	20%
12/7/2021	yes	3.5	90%	10%
12/16/2021	yes	0		
2/17/2022	yes	0		
3/6/2022	YES	0.25	100%	0%
3/18/2022	YES	1	90%	10%
3/21/2022	YES	0.25	100%	0%
4/12/2022	YES	0.25	100%	0%
4/16/2022	YES	1	80%	20%
4/28/202	no	0		
5/2/2022	yes	0.5	100%	0%
5/4/2022	yes	0.25	100%	0%
5/5/2022	yes	0.25	100%	0%
5/18/2022	no	0		
5/24/2022	no	underwater		
5/24/2022	yes	0.25	100%	0%
5/26/2022	no	0		
6/6/2022	yes	0.25	80%	20%
6/8/2022	yes	0.25	100%	0%
6/10/2022	yes	0.5	100%	0%

Total Cubic Yard	18.85		
Average Floatable Makeup (%)		94%	6%

Floatables Monitoring Summary

Station: Osage Detention, 1101 West Pine Street

Date	Floatables Present	Collection (Cubic Yards)	% Organic	% Inorganic
7/2/21	yes	3	50%	50%
7/13/21	no	0		
7/20/2021	yes	0.1	50%	50%
8/24/2021	yes	0.5	60%	40%
9/8/2021	no	0		
10/6/2021	yes	4	70%	30%
10/12/2021	yes	0.25	100%	0%
10/14/2021	no	0		
10/28/2021	yes	0.25	100%	0%
11/2/2021	yes	1	80%	20%
11/12/2021	yes	0.5	90%	10%
12/7/2021	yes	10	80%	20%
12/8/2021	yes	data lost		
12/16/2021	no	0		
12/21/2021	no	0		
2/17/2022	YES	1	100%	0%
3/5/2022	YES	0.25	100%	0%
3/17/2022	YES	4	100%	0%
3/21/2022	YES	3	90%	10%
3/29/2022	YES	0.5	80%	20%
4/4/2022	YES	3	100%	0%
4/12/2022	YES	0.25	30%	70%
4/13/2022	NO	0		
4/16/2022	YES	0.25	20%	80%
4/23/2022	No	0		
4/29/2022	No	0		
5/2/2022	yes	1.25	40%	60%
5/4/2022	under water			
5/5/2022	yes	0.5	20%	80%
5/12/2022	yes	0.25	90%	10%
5/14/2022	yes	0.25	80%	20%
5/24/2022	yes	0.75	100%	0%
5/24/2022	no	0		
5/26/2022	yes	0.5		
6/6/2022	yes	0.5	50%	50%
6/8/2022	yes	1.25	70%	30%
6/10/2022	need machine			

Total Cubic Yards	37.1		
Average Floatable Makeup (%)		73%	27%

Floatables Monitoring Summary

Station: Vensel Creek 11100 S. Yale Ave.

Date	Floatables Present	Collection (Cubic Yards)	% Organic	% Inorganic
7/2/21	yes	0.25	50%	50%
7/13/21	yes	0.25	100%	0%
7/20/2021	yes	0.1	100%	0%
8/24/2021	yes	0.75	75%	25%
9/8/2021	yes	0.25	50%	50%
10/1/2021	yes	2	100%	0%
10/14/2021	yes	1	90%	10%
10/15/2021	no	underwater		
10/28/2021	no	0		
11/2/2021	yes	0.5	100%	0%
11/3/2021	yes	0.5	100%	0%
11/12/2021	yes	8	90%	10%
12/7/2021	yes	4	90%	10%
12/16/2021	yes	data lost		
12/21/2021	yes	data lost		
2/17/2022	yes	1	100%	0%
3/6/2022	YES	0.5	90%	10%
3/18/2022	YES	2.5	80%	20%
3/21/2022	YES	1.25	100%	0%
4/12/2022	YES	0.75	100%	0%
4/16/2022	YES	1	80%	20%
4/23/2022	No	0		
4/28/2022	yes	0.5	100%	0%
5/2/2022	yes	0.5	0%	100%
5/4/2022	yes	0.5	100%	0%
5/2/2022	yes	0.75	100%	0%
5/12/2022	no	underwater		
5/24/2022	no	underwater		
5/24/2022	yes	0.25	50%	50%
6/6/2022	yes	0.25	100%	0%
6/8/2022	yes	0.25	90%	10%
6/10/2022	no	0		

Total Cubic Yards		27.6		
Average Floatable Makeup (%)			85%	15%

Floatables Monitoring Summary
Station: Reed Park 4200 S. Union Ave.

Date	Floatables Present	Collection (Cubic Yards)	% Organic	% Inorganic
7/2/21	no	0		
7/13/21	no	0		
7/20/2021	no	0		
8/24/2021	no	0		
9/8/2021	no	0		
10/6/2021	no	0		
10/14/2021	no	0		
10/28/2021	no	0		
11/2/2021	no	0		
11/12/2021	no	0		
12/7/2021	no	0		
12/16/2021	no	0		
2/17/2022	no	0		
3/5/2022	yes	0.25	100%	0%
3/17/2022	YES	3	100%	0%
3/21/2022	NO	0		
3/29/2022	NO	0		
4/4/2022	NO	0		
4/12/2022	YES	0.25	100%	0%
4/13/2022	NO	0		
4/16/2022	NO	0		
4/23/2022	No	0		
4/29/2022	No	0		
5/2/2022	no	0		
5/4/2022	no	0		
5/5/2022	no	0		
5/12/2022	no	0		
5/14/2022	no	0		
5/24/2022	yes	0.5	100%	0%
5/24/2022	no	0		
5/26/2022	no	0		
6/6/2022	no	0		
6/8/2022	no	0		
6/10/2022	yes	0.25	90%	10%

Total Cubic Yards	4.25		
Average Floatable Makeup (%)		98%	2%

Floatables Monitoring Summary

Station: 4800 W. 8th St.

Date	Floatables Present	Collection (Cubic Yards)	% Organic	% Inorganic
7/2/2021	yes	1	50%	50%
7/13/2021	yes	0.5	75%	25%
7/20/2021	yes	0.1	50%	50%
8/24/2021	yes	1.5	80%	20%
9/8/2021	yes	0.25	0%	100%
10/6/2021	yes	3	90%	10%
10/14/2021	no	0		
10/28/2021	yes	0.25	90%	10%
11/2/2021	yes	0.5	50%	50%
11/12/2021	yes	1.5	90%	10%
12/8/2021	yes	6	90%	10%
12/21/2021	yes	4	70%	30%
2/17/2022	yes	2	100%	0%
3/5/2022	yes	0.25	90%	10%
3/17/2022	YES	2	100%	0%
3/21/2022	YES	4	80%	20%
3/29/2022	YES	0.5	50%	50%
4/4/2000	YES	2	100%	0%
4/12/2022	YES	0.25	60%	20%
4/13/2022	NO	0	0%	0%
4/16/2022	YES	0.25	80%	20%
4/23/2022	No	0	0%	0%
4/29/2022	NO	0	0%	0%
5/2/2022	yes	0.5	60%	40%
5/4/2022	yes	0.25	40%	60%
5/5/2022	no	0	0%	0%
5/12/2022	yes	0.5	80%	20%
5/14/2022	yes	0.25	100%	0%
5/24/2022	yes	0.25	90%	10%
5/24/2022	no	0	0%	0%
5/26/2022	yes	0.25	0%	0%
6/6/2022	yes	0.75	80%	20%
6/8/2022	yes	0.5	50%	50%
6/10/2022	yes	0.25	100%	0%

Total Cubic Yards	33.35		
Average Floatable Make Up (%)		60%	21%

Watershed Characterization - Stream Monitoring Reports

CITY OF TULSA
WATERSHED CHARACTERIZATION PROGRAM

Comprehensive Watershed Characterization Assessment Year 1 (2021-2022):

City of Tulsa Streets and Stormwater
Stormwater Management Division
4502 South Galveston
Tulsa, OK 74107

Prepared by

Jessica Bootenhoff
Senior Environmental Monitoring Technician
Watershed Characterization Project

October 13, 2022

Table of Contents

Table of Figures

List of Tables

1.0 INTRODUCTION

1.1 Objective

The purpose of this document is to serve as a comprehensive report of results from the biological, habitat, and analytical assessments of Crow Creek, Dirty Butter Creek, Flat Rock Creek, Hager Creek, Harlow Creek, Mooser Creek and Nickel Creek. These assessments were performed in order to comply with requirements set forth in Part II(A)(13)(12)(b) and (13)(a) and (b) and Part IV(A)(1) and (2) of Oklahoma Pollutant Discharge Elimination System (OPDES) municipal stormwater (MS4) Permit No. OKS000201 for the City of Tulsa, Oklahoma (ODEQ, OPDES Permit OKS000201, 2011). In addition, assessment results are applied to Oklahoma Water Quality Standards. These standards are described in both (OWRB, 2020a) and (OWRB, 2020b). While these implementations describe a multitude of surface water quality standards, this document will compare and describe only the standards applicable to the parameters required in the Watershed Characterization Program sub section of the Municipal Separate Storm Sewer System permit (ODEQ, OPDES Permit OKS000201, 2011). All remaining parameter results without applicable water quality standards will still be included in this report.

The data presented in this comprehensive report was collected over a one-year period beginning in July of 2021 with completion in June of 2022 except for benthic macroinvertebrate data which requires a minimum of four sampling events within a two-year period. Field collection and assessment methodology followed project standard operating procedures (SOPs) as provided in the quality assurance project plans (QAPPs) for the biological component (CCRC & FTN, 2014) and the analytical component (CCRC & FTN, 2014). These QAPPs provide quality assurance and quality control procedures for all aspects of the watershed characterization program. They were submitted to and received approval from the Oklahoma Department of Environmental Quality as per MS4 permit requirements. All field data sheets were scanned electronically and archived at the City of Tulsa Stormwater Management Division. All field measurements (in situ measurements, flows, observations), biological information (taxonomic identification, organism counts), and analytical results were compiled in Excel spreadsheets and verified (data entry, formula calculations) per project QA/QC procedures (CCRC & FTN, 2014) (CCRC & FTN, 2014). All raw data, SOPs, and QAPPs are available upon request.

Waterbody	WBID	Latitude	Longitude	Watershed Area (mi^2)	Ecoregion
Crow Creek	OK120420010090_00	36.116389	-95.981667	2.99	Central Irregular Plains
Dirty Butter Creek	OK121300010140_00	36.205833	-95.968889	4.21	Central Irregular Plains
Flat Rock Creek	OK121300010120_00	36.215556	-95.956944	9.91	Central Irregular Plains
Hager Creek	OK120420020020_00	36.046389	-95.988056	4.04	Cross Timbers
Harlow Creek	OK120420010170_00	36.161389	-96.043611	5.69	Cross Timbers
Mooser Creek	OK120420010070_00	36.085278	-95.998889	3.79	Cross Timbers
Nickel Creek	OK120420020040_00	36.031944	-96.028056	12.29	Cross Timbers

Table 1 - Sampling sites and locations

Photograph of the sample location at Dirty Butter Creek

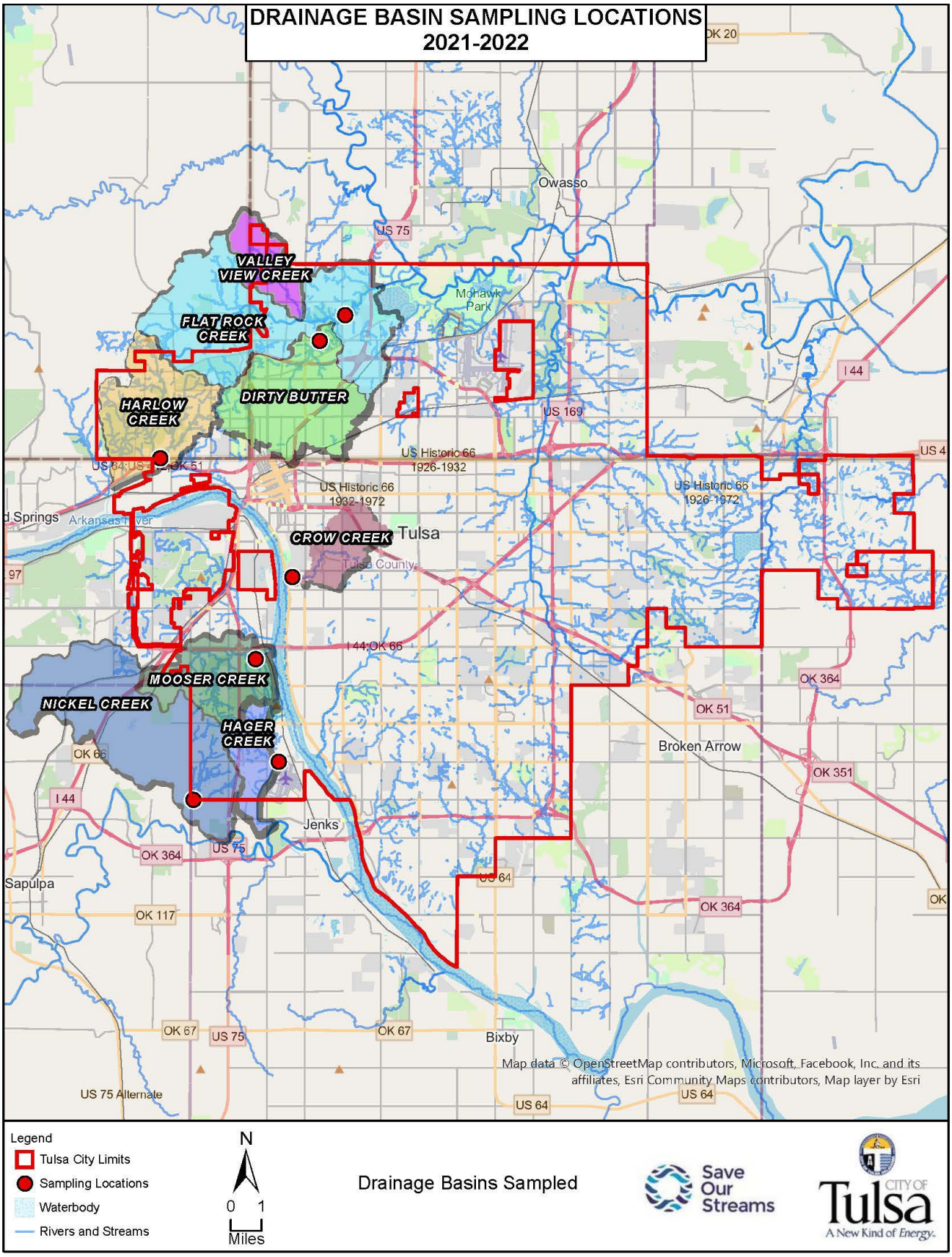


Figure 1 – City of Tulsa watershed map

2.0 BENEFICIAL USES

2.1 Agriculture

2.1.1 Total Dissolved Solids - Data collected on Total Dissolved Solids for the following streams indicates attainment of the agricultural beneficial use. Water quality standards require ten samples. The number of samples collected exceeds the number of samples required by water quality standards. If the sample mean is less than the yearly mean standard, and not more than 10% of samples exceed the sample standard, then the beneficial use is supported.

Waterbody	Sample Mean (mg/L)	Single Sample (mg/L)	Water Quality Standard (mg/L)
Dirty Butter Creek	249	430	Sample: 470, Yearly: 387
Flat Rock Creek	246	356	
Crow Creek	327	390	Sample: 1868, Yearly: 1496
Hager Creek	515	714	
Harlow Creek	267	310	
Mooser Creek	428	790	
Nickel Creek	243	301	

Table 2 – Total Dissolved Solids standards

Photograph of the sample location at Flat Rock Creek

2.2 Fish and Wildlife Propagation:

2.2.1 Dissolved Oxygen - Data collected on Dissolved Oxygen concentrations show that the beneficial use is undetermined or not supported for three of the seven streams. Water quality standards require ten samples. The number of samples collected exceeds the number of samples required. The Warm Water Aquatic Community (WWAC) subcategory of the Fish and Wildlife Propagation beneficial use designated for a stream shall be deemed to be fully supported with respect to the DO criterion if 10% or less of the samples from the stream are less than 6.0 mg/L from April 1 through June 15 and less than 5.0 mg/L during the remainder of the year. Dirty Butter Creek falls in the Habitat Limited Aquatic Community (HLAC) subcategory and shall be deemed fully supported if 10% or less of the samples from the steam are less than 4.0 mg/L from April 1 through June 15 and less than 3.0 mg/L during the remainder of the year. Streams marked with an asterisk have no flow or very little flow which may result in low dissolved oxygen concentrations.

Waterbody	Sample Mean (mg/L)	% of samples in exceedance	Water Quality Standard (mg/L)
Dirty Butter Creek	9.18	0%	April 1 – June 15: 4.0 June 16 – March 30: 3.0
Crow Creek	6.79	0%	April 1 – June 15: 6.0 June 16 – March 30: 5.0
Flat Rock Creek	9.02	0%	
Hager Creek*	7.00	17%	
Harlow Creek*	3.74	75%	
Mooser Creek*	7.16	25%	
Nickel Creek	8.00	0%	

Table 3 – Dissolved Oxygen standards

Photograph of YSI Professional Pro multi parameter field meter

2.2.2 Toxicants/Metals - Data collected indicate full support of the beneficial use for Toxicants and Metals for all streams. Five samples are required for water quality standards. The number of samples collected exceeds the number of samples required. Water quality standards are met if no more than one sample exceeds the acute standard and no more than 10% of samples exceeds the chronic standard.

Waterbody	Parameter	Sample Mean (µg/L)	Single Sample (µg/L)	Water Quality Standard (µg/L)
Dirty Butter Creek	Cadmium	0.63	1.00	Cd - Acute: 54.43, Chronic: 1.58 Cu - Acute: 28.65, Chronic: 18.40 Pb - Acute: 140.29, Chronic: 5.46 Zn - Acute: 167.79, Chronic: 151.97
	Copper	2.25	5.00	
	Lead	0.63	2.04	
	Zinc	10.17	12.00	
Flat Rock Creek	Cadmium	0.58	1.00	
	Copper	1.07	2.13	
	Lead	1.30	5.00	
	Zinc	10.00	10.00	
Crow Creek	Cadmium	0.63	1.00	Cd - Acute: 102.36, Chronic: 2.45 Cu - Acute: 48.56, Chronic: 29.69 Pb - Acute: 286.15, Chronic: 11.15 Zn - Acute: 269.64, Chronic: 244.23
	Copper	2.93	7.00	
	Lead	0.61	1.68	
	Zinc	10.03	10.30	
Hager Creek	Cadmium	0.58	1.00	
	Copper	2.10	5.00	
	Lead	0.52	0.70	
	Zinc	10.00	10.00	
Harlow Creek	Cadmium	0.63	1.00	
	Copper	2.67	5.10	
	Lead	0.83	2.94	
	Zinc	12.82	27.90	
Mooser Creek	Cadmium	0.58	1.00	
	Copper	3.45	5.00	
	Lead	0.68	2.23	
	Zinc	10.03	10.30	
Nickel Creek	Cadmium	0.58	1.00	
	Copper	2.52	5.00	
	Lead	0.61	1.27	
	Zinc	10.00	10.00	

Table 4 – Toxicants/Metals standards

2.2.3 pH (Hydrogen Ion Activity) - Data collected on pH readings show full support of the beneficial use for all streams. Water quality standards require ten samples. The number of pH measurements taken exceeds the number of required measurements. All pH measurements fell within the standard range. Water quality standards are met if no more than 10% of samples are outside the standard range: 6.5 – 9.0 s.u.

Waterbody	Sample Range (s.u)	Water Quality Standard Range (s.u)
Crow Creek	7.7 – 8.0	6.5 – 9.0
Dirty Butter Creek	7.8 – 8.0	
Flat Rock Creek	7.7 – 8.0	
Hager Creek	7.6 – 7.9	
Harlow Creek	6.8 – 7.2	
Mooser Creek	7.6 – 7.9	
Nickel Creek	7.5 – 7.8	

Table 5 – pH standards

2.2.4 Oil and Grease - Oil and Grease is based on visual assessment. No more than 10% of observations can show the occurrence of an oily sheen or oil/grease deposits. Visual observations do not indicate the presence of Oil and Grease pollution, supporting the beneficial use in all streams.

2.2.5 Suspended and Embedded Sediments - Using habitat assessment data to determine support of the beneficial use is conditional upon the support of turbidity data and fish collection data.

2.2.5.1 Turbidity – Data collected on Turbidity readings show full support of the beneficial use. Water quality standards are met when no more than 10% of samples exceed the sample standard. The number of samples collected exceeds the number of samples required.

Waterbody	Sample Mean (NTU)	% of samples in exceedance	Water Quality Standard (NTU)
Crow Creek	3.91	0%	50
Dirty Butter Creek	5.27	0%	
Flat Rock Creek	5.69	0%	
Hager Creek	6.06	0%	
Harlow Creek	16.61	8%	
Mooser Creek	12.58	8%	
Nickel Creek	10.40	0%	

Table 6 – Turbidity standards

2.2.5.2 Habitat Assessment - The resulting score of the habitat assessment on the streams can be compared to the average score of high quality sites within the same ecoregion provided by the Oklahoma Conservation Commission using a scoring workbook derived from OWRB (OWRB, 2001). Hager Creek, Harlow Creek, Mooser Creek and Nickel Creek are in the Cross Timbers ecoregion and Crow Creek, Dirty Butter Creek and Flat Rock Creek are in the Central Irregular Plains ecoregion.

Waterbody	Instream Habitat	Pool Bottom Substrate	Pool Variability	Canopy Cover	Presence of Rocky Runs and Riffles	Flow	Channel Alteration	Channel Sinuosity	Bank Stability	Bank Vegetation Stability	Streamside Cover	Total Score	Mean Score
Crow Creek	19.4	11.6	15.0	18.9	13.3	4.1	15.1	0.5	5.4	3.5	10.0	116.8	84.1
Dirty Butter Creek	19.1	9.7	19.6	19.9	7.5	14.1	11.1	3.1	5.1	2.7	10.0	121.9	
Flat Rock Creek	18.9	0.4	0.0	15.5	15.6	15.0	16.5	3.3	6.3	3.8	10.0	105.3	
Hager Creek	19.6	5.1	3.0	9.2	10.3	2.6	16.5	1.4	3.3	0.8	10.0	81.9	93.6
Harlow Creek	19.6	7.0	16.3	16.4	0.0	0.0	16.5	2.0	5.3	6.7	4.0	93.8	
Mooser Creek	18.9	9.4	18.7	17.0	7.5	0.6	15.1	2.2	7.0	3.6	10.0	110.0	
Nickel Creek	19.6	4.9	13.5	12.9	15.2	14.7	11.1	0.5	5.5	3.6	10.0	111.5	

Table 7 – Habitat assessment metric and total results with ecoregion mean score

2.2.6 Biological

2.2.6.1 Fish Collections – Below is the data recorded from fish collections performed on the streams.

Waterbody	Sample Composition	Fish Condition	Total Score	Score Key
Crow Creek	18	15	33	30+ Beneficial Use Supported; 23 – 29 Undetermined; <22 Impaired
Dirty Butter Creek	16	15	31	
Flat Rock Creek	20	15	35	
Hager Creek	14	11	25	
Harlow Creek	16	11	27	
Mooser Creek	16	13	29	
Nickel Creek	18	15	33	

Table 8 – Fish IBI scores

2.2.6.2 Benthic Macroinvertebrate Collections – Below is the data recorded from benthic macroinvertebrate collections during the summer and winter index periods and the final macroinvertebrate status (ODEQ, Continuing Planning Process, 2012).

Waterbody	Summer 2018 Score	Winter 2019 Score	Summer 2019 Score	Winter 2020 Score	Final Macroinvertebrate Assessment
Crow Creek	32%	67%	32%	52%	Not Attaining
Dirty Butter Creek	58%	52%	65%	59%	Undetermined
Flat Rock Creek	52%	67%	71%	59%	Undetermined
Hager Creek	81%	58%	94%	58%	Attaining
Harlow Creek	39%	48%	45%	64%	Not Attaining
Mooser Creek	75%	74%	69%	58%	Undetermined
Nickel Creek	75%	71%	94%	65%	Undetermined
>80% Attaining : 80 – 50% Undetermined : <50% Not Attaining					

Table 9 – Benthic macroinvertebrate metrics for summer and winter index periods and final assessment

Photograph of mayfly larvae

2.3 Primary Body Contact – Below is the data collected on *E. coli* and *Enterococcus* concentrations. Water quality standards require 10 samples. The number of samples collected exceeds the number of samples required. The monitoring period to support this beneficial use is May 1 through Sept 30. Water quality standards are met when the geometric mean does not exceed the standard.

Waterbody	*E. coli* Recreation Sample Geometric Mean (MPN/100mL)	*E. coli* Non-recreation Sample Geometric Mean (MPN/100mL)	Single Sample (MPN/100mL)	Water Quality Standard (MPN/100mL)
Crow Creek	740	347	33000	Recreational Period Geometric Mean: 126; Non-recreational Period Geometric Mean: 630
Dirty Butter Creek	420	10	1990	
Flat Rock Creek	197	16	310	
Hager Creek	316	160	1000	
Harlow Creek	172	68	1000	
Mooser Creek	202	96	1050	
Nickel Creek	174	93	1986	

Table 10 – *E. coli* totals

Waterbody	*Enterococcus* Recreation Sample Geometric Mean (MPN/100mL)	*Enterococcus* Non-recreation Sample Geometric Mean (MPN/100mL)	Single Sample (MPN/100mL)	Water Quality Standard (MPN/100mL)
Crow Creek	1027	149	2420	Recreational Period Geometric Mean: 33; Non-recreational Period Geometric Mean: 165
Dirty Butter Creek	359	7	2420	
Flat Rock Creek	617	10	2420	
Hager Creek	1165	133	2420	
Harlow Creek	633	28	1990	
Mooser Creek	758	90	1990	
Nickel Creek	504	35	1600	

Table 11 – *Enterococcus* totals

2.4 Anti-Degradation Policy

2.4.1 Nutrients - Analytical results for Total Phosphorus and Nitrate/Nitrite show no need for further investigation to show support of the beneficial use except for Harlow Creek. Water quality standards requires 10 samples. The number of samples collected exceeds the number of required samples. Water quality standards are met if no more than 10% of samples are out of range. While Nitrate/Nitrite concentrations have an action level, it is not a required parameter within the MS4 permit (ODEQ, OPDES Permit OKS000201, 2011).

Waterbody	Total Phosphorus Sample Mean (mg/L)	Nitrite - Nitrate Sample Mean (mg/L)	% of samples in exceedance	Water Quality Threshold (mg/L)
Crow Creek	0.05	1.18	0%	Total Phosphorus: 0.24 Nitrate/Nitrite: 4.95
Dirty Butter Creek	0.03	0.73	0%	
Flat Rock Creek	0.03	0.70	0%	
Hager Creek	0.04	0.23	0%	
Harlow Creek	0.17	0.29	25%	
Mooser Creek	0.04	0.25	0%	
Nickel Creek	0.04	0.24	0%	

Table 12 – Nutrient totals

3.0 SUMMARY

Hager Creek, Harlow Creek, and Mooser Creek were impaired for dissolved oxygen. Most of the low dissolved oxygen readings for Hager Creek and Mooser Creek were during high temperatures and no/low flows. Surrounding construction that took place throughout the sampling year did seem to impact the flow at Mooser Creek. Harlow Creek has no flow year-round and has low dissolved oxygen on a consistent basis. Hager Creek was the only stream with a lower than average habitat assessment score. Hager Creek has no or little flow for most of the year and scored low on several factors including pool variability, channel sinuosity, bank stability and bank vegetation stability. Benthic macroinvertebrate collections indicate that Crow Creek and Harlow Creek are impaired for two or more of the index periods. These streams had very few taxa from the EPT orders and very few individuals from the EPT orders that were present. All streams exceeded the geometric mean for both *E. coli* and *Enterococcus* for recreational period sampling. Harlow Creek was the only creek impaired for total phosphorus.

ANALYTE	Crow Creek											
	7/15/21	8/3/21	9/7/21	10/19/21	11/8/21	12/15/21	1/11/22	2/14/22	3/1/22	4/18/22	5/18/22	6/21/22
BOD(5) Day (BDL 3) mg/L	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Cadmium, Total (BDL 0.5) µg/L	1.00	1.00	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Conductivity µS	604	535	482	462	497	480	374	393	496	397	526	597
Copper, Total (BDL 0.5) µg/L	5.00	5.00	7.00	1.73	1.91	1.13	1.83	1.71	3.03	2.98	1.96	1.89
Dissolved Oxygen mg/L	8.09	7.17	7.19	8.60	9.15	8.14	12.76	12.90	12.56	10.37	7.01	6.79
Flow CFS	0.99	1.03	0.92	0.81	0.86	0.64	0.20	0.00	0.55	1.02	1.39	1.39
Hardness, Total (BDL 3.6) mg/L	240	210	190	200	210	220	210	200	200	200	240	220
Lead, Total (BDL 0.5) µg/L	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.67	0.50	1.68	0.50
Nitrogen, Kjeldahl, Total (BDL 0.50) mg/L	0.50	0.50	0.50	0.55	0.50	0.50	0.50	0.50	0.50	1.10	0.50	0.50
Nitrogen, Nitrate-Nitrite (BDL 0.2) mg/L	1.50	0.90	0.54	1.20	1.20	1.00	1.10	1.10	1.30	1.10	1.80	1.40
Nitrogen, Total as N (BDL 0.5) mg/L	1.50	0.90	0.54	1.80	1.20	1.00	1.10	1.10	1.40	1.10	1.80	1.40
Oxygen Demand, Chemical (BDL 20) mg/L	20	20	20	20	20	20	20	20	20	20	20	20
pH (s.u.)	7.88	7.80	7.78	7.87	7.88	7.80	7.67	7.90	7.99	7.75	7.92	7.86
Phosphorus, Total (BDL 0.010) mg/L	0.048	0.051	0.057	0.064	0.055	0.060	0.044	0.046	0.037	0.043	0.059	0.047
Phosphorus, Total Dissolved BDL (0.010) mg/L	0.038	0.045	0.053	0.060	0.050	0.048	0.019	0.022	0.023	0.019	0.031	0.033
Solids, Total Dissolved (BDL 10) mg/L	390	310	280	340	350	310	310	290	379	286	340	333
Solids, Total Suspended (BDL 2.0) mg/L	2.0	2.0	2.9	6.4	12.0	3.6	8.5	4.4	3.0	8.5	9.8	2.2
Temperature, Water °C	24.2	23.2	23.6	16.0	13.5	15.7	5.1	6.4	8.8	11.8	22.5	24.2
Turbidity (NTU)	1.07	0.79	0.66	1.27	1.17	2.22	4.88	5.15	4.98	5.22	16.90	2.59
Zinc, Total (BDL 10) µg/L	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.30	10.00
Results found to be below the detection limit are reported as the detection limit												

Table 13 – Complete analytical sampling results for all parameters for Crow Creek

ANALYTE	Crow Creek																
	7/15/21	8/3/21	8/31/21	9/7/21	9/21/21	10/19/21	11/8/21	12/15/21	1/11/22	2/14/22	3/1/22	4/18/22	5/9/22	5/18/22	5/19/22	6/16/22	6/21/22	6/27/22
E. coli MPN/100mL	222	248	1300	79	1200	117	308	980	980	72	173	1400	1700	870	33000	340	980	330
Enterococcus MPN/100mL	461	1050	2420	411	1550	225	119	153	113	153	50	460	2400	1400	2420	580	730	520
Results found to be below the detection limit are reported as the detection limit (BDL 1)																		

Table 14 – Complete analytical results for bacteria samples for Crow Creek

ANALYTE	Dirty Butter Creek											
	7/7/21	8/4/21	9/8/21	10/20/21	11/9/21	12/9/21	1/12/22	2/10/22	3/2/22	4/18/22	5/11/22	6/15/22
BOD(5) Day (BDL 3) mg/L	3.0	3.0	3.0	3.0	3.0	3.0	3.0	6.7	3.0	3.0	3.0	3.0
Cadmium, Total (BDL 0.5) µg/L	1.00	1.00	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Conductivity µS	609	347	303	312	298	269	250	310	374	354	375	559
Copper, Total (BDL 0.5) µg/L	5.00	5.00	5.00	2.80	1.06	1.00	0.99	1.20	1.12	0.97	1.50	1.32
Dissolved Oxygen mg/L	8.13	7.21	6.33	8.24	8.87	10.36	11.92	12.38	11.08	10.91	7.57	7.11
Flow CFS	9.06	3.73	3.48	3.84	3.91	4.73	4.23	1.89	4.53	3.68	5.96	4.67
Hardness, Total (BDL 3.6) mg/L	250	130	110	130	130	150	140	150	170	190	200	210
Lead, Total (BDL 0.5) µg/L	0.50	0.50	0.50	2.04	0.50	0.50	0.50	0.50	0.50	0.50	0.53	0.50
Nitrogen, Kjeldahl, Total (BDL 0.50) mg/L	0.62	0.50	0.50	0.84	0.50	0.50	0.50	0.93	1.20	0.50	0.50	0.51
Nitrogen, Nitrate-Nitrite (BDL 0.2) mg/L	0.77	0.31	0.44	0.48	0.61	0.51	0.86	0.84	0.84	1.10	1.00	0.98
Nitrogen, Total as N (BDL 0.5) mg/L	1.40	0.50	0.50	1.30	0.61	0.51	0.86	1.80	0.84	1.10	1.10	1.00
Oxygen Demand, Chemical (BDL 20) mg/L	20	20	20	20	20	20	20	20	20	20	20	20
pH (s.u.)	7.88	7.82	7.81	7.94	7.83	7.92	7.97	7.87	7.93	7.95	7.92	7.89
Phosphorus, Total (BDL 0.010) mg/L	0.026	0.031	0.032	0.034	0.020	0.014	0.031	0.016	0.037	0.017	0.022	0.036
Phosphorus, Total Dissolved BDL (0.010) mg/L	0.015	0.020	0.022	0.015	0.014	0.012	0.012	0.011	0.023	0.010	0.019	0.015
Solids, Total Dissolved (BDL 10) mg/L	430	200	160	200	200	150	200	210	335	273	315	320
Solids, Total Suspended (BDL 2.0) mg/L	2.0	8.0	5.0	18.0	2.0	7.7	2.0	4.3	14.0	2.8	7.9	6.8
Temperature, Water °C	24.5	23.6	24.3	17.8	15.2	10.0	5.9	5.6	7.6	11.5	21.7	24.3
Turbidity (NTU)	3.28	6.94	4.52	18.20	2.24	3.38	3.09	1.43	9.71	2.12	4.28	4.01
Zinc, Total (BDL 10) µg/L	12.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Results found to be below the detection limit are reported as the detection limit												

Table 15 – Complete analytical sampling results for all parameters for Dirty Butter Creek

ANALYTE	Dirty Butter Creek																
	7/2/21	8/4/21	8/31/21	9/8/21	9/21/21	10/20/21	11/6/21	12/9/21	1/12/22	2/10/22	3/2/22	4/18/22	5/9/22	5/11/22	5/16/22	6/15/22	6/16/22	6/27/22
E. coli MPN/100mL	1200	613	285	980	1990	133	115	41	1	1	1	12	200	120	440	260	230	280
Enterococcus MPN/100mL	488	2420	2420	2420	1730	153	38	5	1	1	10	2	140	45	230	100	66	110
Results found to be below the detection limit are reported as the detection limit (BDL 1)																		

Table 16 – Complete analytical results for bacteria samples for Dirty Butter Creek

ANALYTE	Flat Rock Creek											
	7/21/21	8/3/21	9/13/21	10/19/21	11/9/21	12/9/21	1/12/22	2/10/22	3/2/22	4/19/22	5/12/22	6/14/22
BOD(5) Day (BDL 3) mg/L	3.0	3.0	3.0	3.6	3.0	3.0	3.0	14.4	3.0	3.0	3.0	3.0
Cadmium, Total (BDL 0.5) µg/L	1.00	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Conductivity µS	546	396	311	299	289	288	268	392	429	381	570	646
Copper, Total (BDL 0.5) µg/L	0.50	0.50	1.19	1.54	1.05	1.00	0.89	1.35	1.30	1.02	1.35	2.13
Dissolved Oxygen mg/L	7.68	6.61	6.33	8.15	9.75	10.59	12.25	11.47	11.50	10.83	6.97	6.05
Flow CFS	5.28	4.90	3.33	6.18	8.34	4.27	3.94	2.22	5.03	3.98	5.59	8.25
Hardness, Total (BDL 3.6) mg/L	180	140	110	120	120	150	140	160	180	160	190	200
Lead, Total (BDL 0.5) µg/L	5.00	5.00	0.65	0.79	0.50	0.50	0.50	0.50	0.50	0.50	0.59	0.57
Nitrogen, Kjeldahl, Total (BDL 0.50) mg/L	0.50	0.50	0.50	0.77	0.50	0.50	0.50	0.50	0.80	0.50	0.50	0.64
Nitrogen, Nitrate-Nitrite (BDL 0.2) mg/L	0.29	0.31	0.27	0.39	0.52	0.43	0.82	0.90	0.71	0.78	0.81	0.62
Nitrogen, Total as N (BDL 0.5) mg/L	0.50	0.50	0.50	1.20	0.52	0.50	0.82	0.90	0.73	0.81	0.85	0.64
Oxygen Demand, Chemical (BDL 20) mg/L	20	20	20	20	20	20	20	20	20	20	29	20
pH (s.u.)	7.76	7.74	7.81	7.87	7.98	7.91	7.94	7.87	7.94	7.98	7.91	7.88
Phosphorus, Total (BDL 0.010) mg/L	0.031	0.034	0.039	0.034	0.024	0.014	0.027	0.026	0.033	0.014	0.033	0.043
Phosphorus, Total Dissolved BDL (0.010) mg/L	0.022	0.024	0.023	0.023	0.180	0.010	0.010	0.020	0.025	0.010	0.019	0.029
Solids, Total Dissolved (BDL 10) mg/L	300	230	160	200	180	220	120	320	282	272	311	356
Solids, Total Suspended (BDL 2.0) mg/L	8.3	5.2	11.0	20.0	2.9	5.7	4.9	9.0	5.7	4.8	11.0	12.0
Temperature, Water °C	24.4	24.1	22.9	17.1	15.0	9.2	5.4	6.3	8.8	12.4	23.8	26.6
Turbidity (NTU)	6.71	8.61	7.54	10.20	5.55	1.97	2.51	3.64	3.22	3.45	7.39	7.52
Zinc, Total (BDL 10) µg/L	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Results found to be below the detection limit are reported as the detection limit												

Table 17 – Complete analytical sampling results for all parameters for Flat Rock Creek

ANALYTE	Flat Rock Creek																
	7/21/21	8/3/21	8/31/21	9/13/21	9/21/21	10/19/21	11/9/21	12/9/21	1/12/22	2/10/22	3/2/22	4/19/22	5/9/22	5/12/22	5/19/22	6/14/22	6/16/22	6/27/22
E. coli MPN/100mL	145	86	197	147	291	26	13	172	3	3	13	44	310	310	180	340	230	120
Enterococcus MPN/100mL	1730	2420	2420	816	1050	167	3	44	5	4	2	15	550	190	520	440	170	140
Results found to be below the detection limit are reported as the detection limit (BDL 1)																		

Table 18 – Complete analytical results for bacteria samples for Flat Rock Creek

ANALYTE	Hager Creek											
	7/22/21	8/16/21	9/14/21	10/21/21	11/16/21	12/15/21	1/13/22	2/1/22	3/17/22	4/21/22	5/26/22	6/16/22
BOD(5) Day (BDL 3) mg/L	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Cadmium, Total (BDL 0.5) µg/L	1.00	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Conductivity µS	880	575	712	696	647	910	614	846	1019	1028	438	907
Copper, Total (BDL 0.5) µg/L	5.00	5.00	1.16	1.17	2.36	1.12	1.18	1.36	2.04	1.30	2.09	1.45
Dissolved Oxygen mg/L	6.70	5.53	1.47	4.31	8.96	6.59	12.44	9.95	6.40	7.10	8.68	5.92
Flow CFS	0.48	0.38	0.00	0.00	0.11	0.12	0.19	0.12	0.20	0.22	3.78	0.54
Hardness, Total (BDL 3.6) mg/L	280	190	230	280	290	350	160	360	290	170	190	270
Lead, Total (BDL 0.5) µg/L	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.70	0.50
Nitrogen, Kjeldahl, Total (BDL 0.50) mg/L	0.50	0.50	0.52	0.74	0.50	0.50	0.50	0.50	0.50	0.50	0.76	0.50
Nitrogen, Nitrate-Nitrite (BDL 0.2) mg/L	0.20	0.20	0.20	0.20	0.20	0.26	0.20	0.20	0.25	0.20	0.37	0.25
Nitrogen, Total as N (BDL 0.5) mg/L	0.50	0.50	0.52	0.78	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Oxygen Demand, Chemical (BDL 20) mg/L	20	20	20	20	20	20	20	20	NA	20	21	20
pH (s.u.)	7.81	7.71	7.59	7.75	7.90	7.73	7.92	7.92	7.90	7.81	7.73	7.77
Phosphorus, Total (BDL 0.010) mg/L	0.029	0.040	0.061	0.042	0.030	0.051	0.017	0.021	0.036	0.023	0.076	0.036
Phosphorus, Total Dissolved BDL (0.010) mg/L	0.021	0.026	0.038	0.033	0.020	0.034	0.010	0.012	0.024	0.012	0.038	0.027
Solids, Total Dissolved (BDL 10) mg/L	520	320	410	500	470	580	550	620	714	684	307	499
Solids, Total Suspended (BDL 2.0) mg/L	3.3	4.6	4.4	6.4	7.6	7.6	2.0	2.8	10.0	3.2	21.0	4.4
Temperature, Water °C	23.1	24.7	23.6	14.8	12.2	14.9	3.5	8.6	12.9	16.7	15.8	24.9
Turbidity (NTU)	3.25	5.78	6.65	2.00	2.81	3.54	2.30	1.80	3.14	3.25	34.10	4.08
Zinc, Total (BDL 10) µg/L	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Results found to be below the detection limit are reported as the detection limit												

Table 19 – Complete analytical sampling results for all parameters for Hager Creek

ANALYTE	Hager Creek																
	7/22/21	8/16/21	8/31/21	9/14/21	9/21/21	10/21/21	11/16/21	12/15/21	1/13/22	2/1/22	3/17/22	4/21/22	5/9/22	5/19/22	5/26/22	6/16/22	6/16/22	6/27/22
E. coli MPN/100mL	435	613	345	51	228	488	345	201	219	21	72	240	240	250	771	330	190	1000
Enterococcus MPN/100mL	1410	2420	2420	1050	770	613	152	249	45	19	51	730	870	1000	1300	770	770	1200
Results found to be below the detection limit are reported as the detection limit (BDL 1)																		

Table 20 – Complete analytical results for bacteria samples for Hager Creek

ANALYTE	Harlow Creek											
	7/21/21	8/2/21	9/8/21	10/18/21	11/15/21	12/2/21	1/13/22	2/14/22	3/15/22	4/6/22	5/16/22	6/22/22
BOD(5) Day (BDL 3) mg/L	3.0	3.0	3.0	10.0	10.0	9.8	3.0	3.0	3.0	3.0	3.0	3.0
Cadmium, Total (BDL 0.5) µg/L	1.00	1.00	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Conductivity µS	484	483	438	276	268	331	319	336	350	389	488	502
Copper, Total (BDL 0.5) µg/L	5.00	5.00	5.00	5.10	3.93	3.04	0.64	0.54	0.51	1.11	1.26	0.92
Dissolved Oxygen mg/L	3.00	2.35	0.99	2.03	0.62	3.90	6.43	7.96	7.99	4.74	2.77	2.11
Flow CFS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hardness, Total (BDL 3.6) mg/L	180	180	170	120	100	98	160	160	150	180	160	170
Lead, Total (BDL 0.5) µg/L	0.50	0.50	0.50	2.94	0.98	1.45	0.50	0.50	0.50	0.62	0.50	0.50
Nitrogen, Kjeldahl, Total (BDL 0.50) mg/L	0.50	0.50	0.50	2.70	1.60	2.50	0.50	0.69	0.50	0.71	0.50	0.50
Nitrogen, Nitrate-Nitrite (BDL 0.2) mg/L	0.46	0.40	0.20	0.20	0.20	0.20	0.21	0.20	0.20	0.25	0.35	0.58
Nitrogen, Total as N (BDL 0.5) mg/L	0.50	0.50	0.50	2.70	1.60	2.50	0.50	0.69	0.50	0.50	0.50	0.59
Oxygen Demand, Chemical (BDL 20) mg/L	20	20	20	48	120	70	20	20	20	20	27	20
pH (s.u.)	6.82	6.83	6.89	6.77	6.90	6.88	6.95	7.04	7.15	7.00	6.91	6.85
Phosphorus, Total (BDL 0.010) mg/L	0.031	0.063	0.095	0.373	0.610	0.560	0.039	0.032	0.039	0.071	0.032	0.064
Phosphorus, Total Dissolved BDL (0.010) mg/L	0.021	0.019	0.045	0.070	0.070	0.073	0.013	0.016	0.016	0.020	0.032	0.018
Solids, Total Dissolved (BDL 10) mg/L	310	300	270	200	210	280	230	280	257	266	303	294
Solids, Total Suspended (BDL 2.0) mg/L	13.0	6.7	10.0	170.0	62.0	320.0	9.6	6.4	14.0	25.0	14.0	18.0
Temperature, Water °C	20.5	21.5	21.5	13.6	9.2	8.6	5.6	5.8	9.6	14.5	20.0	22.4
Turbidity (NTU)	8.22	7.15	10.80	72.80	32.50	16.60	6.11	3.68	5.22	16.90	8.93	10.40
Zinc, Total (BDL 10) µg/L	10.00	10.00	10.00	27.90	16.20	19.70	10.00	10.00	10.00	10.00	10.00	10.00
Results found to be below the detection limit are reported as the detection limit												

Table 21 – Complete analytical sampling results for all parameters for Harlow Creek

ANALYTE	Harlow Creek																
	7/21/21	8/2/21	8/31/21	9/8/21	9/21/21	10/18/21	11/15/21	12/2/21	1/13/22	2/14/22	3/15/22	4/6/22	5/9/22	5/16/22	5/19/22	6/16/22	6/22/22	6/27/22
E. coli MPN/100mL	326	76	10	137	113	291	31	1990	25	1	82	190	650	160	210	330	140	1000
Enterococcus MPN/100mL	1990	1500	168	816	299	276	225	80	9	1	7	42	1000	180	550	460	980	1200
Results found to be below the detection limit are reported as the detection limit (BDL 1)																		

Table 22 – Complete analytical results for bacteria samples for Harlow Creek

ANALYTE	Mooser Creek											
	7/26/21	8/17/21	9/16/21	10/25/21	11/17/21	12/21/21	1/19/22	2/15/22	3/16/22	4/25/22	5/18/22	6/21/22
BOD(5) Day (BDL 3) mg/L	3.0	3.7	3.0	3.0	3.0	3.0	3.4	3.0	4.5	3.0	3.0	3.0
Cadmium, Total (BDL 0.5) µg/L	1.00	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Conductivity µS	673	604	512	459	348	451	463	845	1028	612	587	718
Copper, Total (BDL 0.5) µg/L	5.00	5.00	4.66	3.17	1.78	2.86	2.88	4.57	3.56	2.17	3.82	1.89
Dissolved Oxygen mg/L	5.97	3.33	2.69	5.00	8.41	10.84	11.83	11.61	9.16	8.42	3.12	5.53
Flow CFS	0.00	0.00	0.00	0.00	0.63	0.00	0.00	0.00	0.00	0.90	0.00	0.00
Hardness, Total (BDL 3.6) mg/L	260	220	160	260	160	280	270	180	300	250	240	260
Lead, Total (BDL 0.5) µg/L	0.50	0.50	0.50	0.50	0.50	0.98	0.50	0.50	0.50	0.50	2.23	0.50
Nitrogen, Kjeldahl, Total (BDL 0.50) mg/L	0.50	0.58	0.50	1.00	0.51	0.51	0.70	0.50	0.50	0.50	0.86	0.53
Nitrogen, Nitrate-Nitrite (BDL 0.2) mg/L	0.23	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.32	0.70
Nitrogen, Total as N (BDL 0.5) mg/L	0.50	0.76	0.50	1.00	0.51	0.51	0.70	0.50	0.50	0.50	0.68	0.72
Oxygen Demand, Chemical (BDL 20) mg/L	20	20	20	20	20	20	20	20	20	20	22	20
pH (s.u.)	7.72	7.64	7.55	7.68	7.55	7.70	7.93	7.90	7.67	7.80	7.56	7.67
Phosphorus, Total (BDL 0.010) mg/L	0.026	0.040	0.027	0.029	0.041	0.080	0.021	0.025	0.035	0.031	0.096	0.041
Phosphorus, Total Dissolved BDL (0.010) mg/L	0.017	0.019	0.015	0.018	0.021	0.023	0.010	0.018	0.014	0.013	0.027	0.030
Solids, Total Dissolved (BDL 10) mg/L	390	380	300	420	210	420	390	690	790	409	372	362
Solids, Total Suspended (BDL 2.0) mg/L	4.7	2.0	2.7	3.2	7.1	31.0	6.9	2.0	3.0	7.6	22.0	4.6
Temperature, Water °C	25.8	24.9	23.0	16.0	14.8	4.0	5.5	5.0	10.0	13.6	21.9	25.2
Turbidity (NTU)	5.39	10.90	3.77	4.19	8.69	39.40	3.33	3.80	5.52	8.01	55.40	2.56
Zinc, Total (BDL 10) µg/L	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.30	10.00
Results found to be below the detection limit are reported as the detection limit												

Table 23 – Complete analytical sampling results for all parameters for Mooser Creek

ANALYTE	Mooser Creek																
	7/26/21	8/17/21	8/31/21	9/16/21	9/21/21	10/25/21	11/17/21	12/21/21	1/19/22	2/15/22	3/16/22	4/25/22	5/9/22	5/18/22	5/19/22	6/16/22	6/21/22	6/27/22
E. coli MPN/100mL	126	127	138	138	1050	49	344	133	75	22	110	180	260	440	410	130	200	58
Enterococcus MPN/100mL	921	687	613	517	1990	68	727	104	48	6	160	200	580	550	1600	520	460	980
Results found to be below the detection limit are reported as the detection limit (BDL 1)																		

Table 24 – Complete analytical results for bacteria samples for Mooser Creek

ANALYTE	Nickel Creek											
	7/22/21	8/16/21	9/14/21	10/20/21	11/16/21	12/14/21	1/24/22	2/21/22	3/17/22	4/19/22	5/26/22	6/16/22
BOD(5) Day (BDL 3) mg/L	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Cadmium, Total (BDL 0.5) µg/L	1.00	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Conductivity µS	472	475	371	354	312	309	263	395	424	445	341	554
Copper, Total (BDL 0.5) µg/L	5.00	5.00	1.28	1.60	2.16	2.06	2.05	2.15	2.04	1.70	3.18	1.98
Dissolved Oxygen mg/L	6.39	5.46	5.07	7.07	8.20	10.15	13.13	9.97	8.20	8.54	8.49	5.31
Flow CFS	3.64	1.53	1.90	2.08	2.76	2.02	1.54	0.93	1.86	2.19	35.44	2.20
Hardness, Total (BDL 3.6) mg/L	160	150	140	140	150	170	160	180	150	180	130	180
Lead, Total (BDL 0.5) µg/L	0.90	0.50	0.50	0.63	0.54	0.50	0.50	0.50	0.50	0.50	1.27	0.50
Nitrogen, Kjeldahl, Total (BDL 0.50) mg/L	0.69	0.50	0.50	0.82	0.54	0.54	0.54	0.79	0.50	0.50	1.17	0.58
Nitrogen, Nitrate-Nitrite (BDL 0.2) mg/L	0.20	0.23	0.20	0.20	0.20	0.20	0.20	0.29	0.24	0.20	0.33	0.33
Nitrogen, Total as N (BDL 0.5) mg/L	0.69	0.50	0.50	0.82	0.54	0.54	0.54	1.10	0.50	0.50	1.50	0.91
Oxygen Demand, Chemical (BDL 20) mg/L	20	20	20	20	21	20	20	20	NA	20	33	20
pH (s.u.)	7.55	7.56	7.64	7.74	7.68	7.70	7.77	7.76	7.67	7.82	7.71	7.54
Phosphorus, Total (BDL 0.010) mg/L	0.043	0.029	0.032	0.033	0.035	0.017	0.012	0.040	0.026	0.022	0.134	0.042
Phosphorus, Total Dissolved BDL (0.010) mg/L	0.021	0.019	0.016	0.021	0.019	0.010	0.010	0.016	0.012	0.010	0.083	0.027
Solids, Total Dissolved (BDL 10) mg/L	260	260	210	230	240	220	98	300	289	301	241	267
Solids, Total Suspended (BDL 2.0) mg/L	12.0	4.9	6.0	8.4	11.0	3.6	6.4	14.0	13.7	12.0	26.0	8.5
Temperature, Water °C	24.8	26.0	23.8	16.6	10.4	7.9	1.7	8.6	13.7	14.3	16.2	26.6
Turbidity (NTU)	16.90	4.08	3.93	8.24	10.30	8.29	3.97	11.10	5.41	9.51	35.70	7.31
Zinc, Total (BDL 10) µg/L	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Results found to be below the detection limit are reported as the detection limit												

Table 25 – Complete analytical sampling results for all parameters for Nickel Creek

ANALYTE	Nickel Creek																	
	7/22/21	8/16/21	8/31/21	9/14/21	9/21/21	10/20/21	11/16/21	12/14/21	1/24/22	2/21/22	3/17/22	4/19/22	5/9/22	5/19/22	5/26/22	6/16/22	6/16/22	6/27/22
E. coli MPN/100mL	435	84	88	62	122	99	96	51	45	210	64	210	310	190	1986	120	130	99
Enterococcus MPN/100mL	1050	548	687	387	308	194	80	18	11	49	12	37	730	410	1600	210	230	490
Results found to be below the detection limit are reported as the detection limit (BDL 1)																		

Table 26 – Complete analytical results for bacteria samples for Nickel Creek

4.0 REFERENCES

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Responses Taken

For instances of Identified WQS exceedances, a follow up and response program was established in 2015. While it took some time to establish, it essentially identified any WQS exceedance as soon as the laboratory data was available. The only disadvantage with the follow up and response program is the turnaround time for samples to be analyzed in the labs would be days, weeks or even a month depending on the parameter. A total of 113 follow-ups were performed since the inception of the program in 2017. Also, in some cases the following months watershed characterization samples showed returned to acceptable levels, which eliminated the need for follow-up response. The most identified exceedance was in Bacteria, which the WQS is normally a geometric mean of at least 10 individual samples over time, not just one. In response to a single sample exceeding the geomean standard, the Sanitary Sewer Overflow records from the Water and Sewer Department are reviewed, and a Dry Weather Field screening procedure was taken to identify any potential illicit discharges. There were instances of sanitary sewer overflows found through DWFS follow-ups, but most yielded no results. Low flow/No flow conditions are likely contributors of elevated bacteria levels. Microbial Source Tracking DNA analysis is being used to point more definitively at Human or Pet Waste sources of bacteria. A singular GIS map is being developed to show instances of SSO's, Septic System Locations, and Microbial Source Tracking Results. In the future, this map can be included in the impacts identified section.

In the case of TDS, many watersheds were on the border of an ecoregion that had no difference other than the stream segment ID that designated a more lenient WQS. If those streams would have the same standard as the other nearby streams, there would have been no exceedances for TDS. Other elevated TDS instances were nearby construction activities and recent rain events. These subsided before a definitive source could be found.

Below is a table of recorded exceedances and follow-ups taken. In most cases, a discernable source of the exceedance was not found.

Date	Stream name	Parameter	Measured value	Follow up result
Jul-17	Spunky Creek	Total Phosphorus	0.64 mg/L	Green Country WWT Effluent
Oct-17	Spunky Creek	Total Phosphorus	0.45 mg/L	Green Country WWT Effluent
Nov-17	Spunky Creek	Total Phosphorus	1 mg/L	Green Country WWT Effluent
Nov-17	Spunky Creek	TDS	400 mg/L	Green Country WWT Effluent
Dec-17	South Park Creek	Total Phosphorus	0.27 mg/L	Below WQS before Source ID

Dec-17	Spunky Creek	Total Phosphorus	0.92 mg/L	Green Country WWT Effluent
Dec-17	Spunky Creek	TDS	460 mg/L	Green Country WWT Effluent
Feb-18	Spunky Creek	Total Phosphorus	1.1 mg/L	Green Country WWT Effluent
Apr-18	Spunky Creek	Total Phosphorus	0.29 mg/L	Green Country WWT Effluent
Apr-18	Spunky Creek	TDS	530 mg/L	Green Country WWT Effluent
May-18	South Park Creek	TDS	810 mg/L	Below WQS before Source ID
May-18	Spunky Creek	Total Phosphorus	0.42 mg/L	Green Country WWT Effluent
May-18	Spunky Creek	TDS	400 mg/L	Green Country WWT Effluent
Jun-18	Ford Creek	Total Phosphorus	0.41 mg/L	
Jun-18	Spunky Creek	Total Phosphorus	0.71 mg/L	Green Country WWT Effluent
Jun-18	Spunky Creek	TDS	400 mg/L	Green Country WWT Effluent
Jul-18	Center Creek	TDS	530 mg/L	Average ambient range
Jul-18	Upper Mill Creek	TDS	690 mg/L	Continue to Monitor
Aug-18	Upper Mill Creek	TDS	650 mg/L	Follow- up, no source ID
Sep-18	Upper Mill Creek	TDS	670 mg/L	Follow- up, no source ID
Oct-18	Center Creek	TDS	640 mg/L	Continue to Monitor
Oct-18	Upper Mill Creek	TDS	670 mg/L	Average Ambient Range
Nov-18	Tupelo Creek	TDS	410 mg/L	Average Ambient Range
Nov-18	Upper Mill Creek	TDS	480 mg/L	Average Ambient Range
Nov-18	Sugar Creek	TDS	400 mg/L	Average Ambient Range
Nov-18	Cooley Creel	TDS	400 mg/L	Average Ambient Range
Nov-18	Center Creek	TDS	360 mg/L	Average Ambient Range
Nov-18	Brookhollow Creek	TDS	400 mg/L	Average Ambient Range
Nov-18	Adams Creek	TDS	380 mg/L	Average Ambient Range
Dec-18	Adams Creek	TDS	390 mg/L	Average Ambient Range
Dec-18	Center Creek	TDS	420 mg/L	Average Ambient Range

Dec-18	Coal Creek	TDS	420 mg/L	Average Ambient Range
Dec-18	Cooley Creel	TDS	400 mg/L	Average Ambient Range
Dec-18	Sugar Creek	TDS	390 mg/L	Average Ambient Range
Dec-18	Tupelo Creek	TDS	500 mg/L	Average Ambient Range
Dec-18	Upper Mill Creek	TDS	480 mg/L	On a steady decline, no source ID
Jan-19	Coal Creek	TDS	500 mg/L	Average Ambient Range
Jan-19	Tupelo Creek	TDS	470 mg/L	Average Ambient Range
Jan-19	Upper Mill Creek	TDS	470 mg/L	Average Ambient Range
Feb-19	Tupelo Creek	TDS	530 mg/L	Average Ambient Range
Feb-19	Upper Mill Creek	TDS	500 mg/L	No source ID
Mar-19	Coal Creek	TDS	520 mg/L	Exceedance too low to search for source
Mar-19	Tupelo Creek	TDS	500 mg/L	Exceedance too low to search for source
Mar-19	Upper Mill Creek	TDS	530 mg/L	Exceedance too low to search for source
May-19	Upper Mill Creek	TDS	510 mg/L	No source ID
Jul-19	Salt Creek	TDS	2100 mg/L	Strip pit contributions
Aug-19	Eagle Creek	TDS	450 mg/L	Well below cross timbers SWQS
Aug-19	Quarry Creek	TDS	500 mg/L	Well below cross timbers SWQS
Aug-19	Salt Creek	TDS	2100 mg/L	Strip pit contributions
Sep-19	Salt Creek	TDS	2100 mg/L	Strip pit contributions
Oct-19	Salt Creek	TDS	1900 mg/L	Strip pit contributions
Nov-19	Salt Creek	TDS	1800 mg/L	Strip pit contributions
Dec-19	Upper Mingo Creek	TDS	660 mg/L	DWFS
Jan-20	Douglas Creek	TDS	580 mg/L	Sample TDS upstream
Jan-20	Eagle Creek	TDS	1700 mg/L	On par with historical data
Jan-20	Salt Creek	TDS	1500 mg/L	Strip pit contributions
Jan-20	Upper Mingo Creek	TDS	680 mg/L	Sample TDS upstream
Feb-20	Douglas Creek	TDS	650 mg/L	Follow up
Feb-20	Salt Creek	TDS	1900 mg/L	Strip pit contributions

Feb-20	Upper Mingo Creek	TDS	680 mg/L	Follow up
Mar-20	Salt Creek	Phosphorus Total	0.43 mg/L	Follow up
Mar-20	Salt Creek	TDS	390 mg/L	Strip pit contributions
Mar-20	Upper Mingo Creek	TDS	480 mg/L	Shown ambient
Apr-20	Salt Creek	TDS	2000 mg/L	DWFS
Apr-20	Upper Mingo Creek	TDS	600 mg/L	Shown ambient
May-20	Douglas Creek	TDS	520 mg/L	Shown ambient
May-20	Quarry Creek	TDS	390 mg/L	Re-sample
May-20	Salt Creek	TDS	1900 mg/L	Strip pit contributions
May-20	Upper Mingo Creek	TDS	490 mg/L	Shown ambient
Jun-20	Douglas Creek	TDS	560 mg/L	Shown ambient(nonpoint)
Jun-20	Salt Creek	TDS	1900 mg/L	Strip pit contributions
Jun-20	Upper Mingo Creek	TDS	660 mg/L	Shown ambient
Jul-20	Crow Upstream	Total Nitrogen	6.0 mg/L	Re-sample
Jul-20	Upper Mill Downstream	TDS	650 mg/L	Check conductivity
Jul-20	Upper Mill Upstream	TDS	720 mg/L	Check conductivity
Jul-20	Sugar Upstream	TDS	420 mg/L	Check conductivity upstream
Jul-20	Coal Upstream	TDS	1500 mg/L	Check conductivity upstream
Aug-20	Upper Mill Downstream	TDS	630 mg/L	Check upstream re-sample results
Aug-20	Upper Mill Upstream	TDS	740 mg/L	Re-sample
Aug-20	Coal Upstream	TDS	1300 mg/L	Re-sample
Sep-20	Upper Mill Downstream	TDS	620 mg/L	Continue with last month's follow-ups
Sep-20	Upper Mill Upstream	TDS	800 mg/L	Continue with last month's follow-ups
Sep-20	Tupelo Upstream	TDS	410 mg/L	Continue with last month's follow-ups
Oct-20	Upper Mill Downstream	TDS	420 mg/L	Continue with last month's follow-ups

Oct-20	Upper Mill Upstream	TDS	1000 mg/L	Continue with last month's follow-ups
Oct-20	Tupelo Upstream	TDS	530 mg/L	Continue with last month's follow-ups
Oct-20	Sugar Upstream	TDS	480 mg/L	Continue with last month's follow-ups
Nov-20	Upper Mill Downstream	TDS	770 mg/L	Site runoff
Nov-20	Upper Mill Upstream	TDS	940 mg/L	Investigate ONE GAS
Nov-20	Tupelo Upstream	TDS	490 mg/L	Check conductivity upstream
Nov-20	Coal Downstream	TDS	470 mg/L	Check conductivity upstream
Dec-20	Coal Downstream	TDS	450 mg/L	DWFS
Feb-21	Tupelo Downstream	TDS	490 mg/L	Near standard
Mar-21	Tupelo Downstream	TDS	430 mg/L	Near standard
Mar-21	Sugar Downstream	TDS	460 mg/L	Follow-up
Mar-21	Sugar Upstream	TDS	400 mg/L	Follow-up
Mar-21	Coal Downstream	TDS	530 mg/L	Near standard
Mar-21	Coal Upstream	TDS	410 mg/L	Near standard
Apr-21	Upper Mill Downstream	TDS	630 mg/L	Average Ambient Range
Apr-21	Upper Mill Upstream	TDS	770 mg/L	Average Ambient Range
Apr-21	Tupelo Upstream	TDS	490 mg/L	Average Ambient Range
Apr-21	Coal Downstream	TDS	530 mg/L	Average Ambient Range
Apr-21	Coal Upstream	TDS	390 mg/L	Average Ambient Range
May-21	Upper Mill Downstream	TDS	650 mg/L	Average Ambient Range
May-21	Upper Mill Upstream	TDS	720 mg/L	Average Ambient Range
Jun-21	Upper Mill Downstream	TDS	600 mg/L	Average Ambient Range
Jun-21	Upper Mill Upstream	TDS	710 mg/L	Average Ambient Range
Jun-21	Tupelo Downstream	TDS	390 mg/L	Average Ambient Range

Jun-21	Tupelo Upstream	TDS	580 mg/L	Average Ambient Range
Jun-21	Sugar Downstream	TDS	400 mg/L	Average Ambient Range
Jun-21	Coal Downstream	TDS	410 mg/L	Average Ambient Range
Jun-21	Coal Upstream	TDS	420 mg/L	Average Ambient Range
Jun-21	Coal Upstream	TDS	420 mg/L	Average Ambient Range

Public Education

Areas of the City of Tulsa with a high number of septic systems were targeted with digital ads through Over the top (OTT) video streaming and music streaming advertisements. The same was attempted with areas where pet waste might be at high concentrations as well. Development of a more defined area of zip code targeting using GIS and geofencing is continuing to progress.

The Annual Creek Clean-Up for the City of Tulsa was again a virtual event. This allowed for 30 different clean-up locations throughout the city and over 600 participants registered. The program also included the City of Tulsa Parks department and the Solid Waste department as collaborators to assist with locations and supply distribution. The continued success of the virtual format for the Creek Clean-up will most likely result in continuing to execute in this manner.

Section 5

Annual Expenditures for the Reporting Period/Budget for the Year Following Each Annual Report

	FY 2021/2022 Budget	FY 2022/2023 Budget
Section Name		
Warehouse	22,922	24,764
Customer Care	247,537	367,081
Security (Direct charge fund 560)	63,000	63,000
Asset Management Admin (plus 1614)	848	880
Security	257,997	244,162
Building Operations – Administration	-	-
Building Operations – Contracts	2,733	3,021
Building Maintenance	51,851	18,556
Custodial Services	12,510	12,510
IT Capital Direct Charges	36,000	36,000
Engineering Services Administration	155,749	149,821
Engineering Administration – Stormwater	482,690	565,067
Reproduction changed to Central Services	281,188	355,656
Design Services – Administration	44,022	46,672
Design	906,365	1,005,360
Hydrology and Hydraulics	46,570	46,570
Alert System	151,716	147,956
Field Engineering – Administration	54,937	52,114
Construction Inspection	516,066	569,095
Call OKIE – Encroachments	61,269	70,243
Field Surveys	170,214	190,699
Planning and Project Management Administration	54,019	56,550
Project Management	17,814	25,175
Infrastructure Management	141,900	156,412
Graphics / CADDS	204,663	281,018
Floodplain Management	2,430,703	2,587,434
Planning Stormwater/General	132,913	190,721
Engineering Graphics	135,406	250,862
Right of Way	140,320	177,041
Streets & Stormwater – Administration	151,680	160,707
SS Payroll & Accts Payable	32,340	43,633
SS – Stormwater Fund	4,847,761	5,512,276
S&SW Dir Internal IT	54,508	66,464

Stormwater & Land Management Admin	**1,109,816**	**1,253,786**
Detention, Ditch, Concrete Channel	**1,364,934**	**1,849,851**
Channel Maintenance and Ditching	**2,226,085**	**3,028,879**
Storm Sewer Maintenance	**849,323**	**1,662,474**
Stormwater Quality	**1,453,652**	**1,549,673**
Stormwater Vegetation	**2,824,279**	**3,521,697**
Household Pollutant Collection	**45,100**	**48,400**
Land Reclamation Site	**-**	**99,125**
STREET MAINT & INSPECTIONS - ADMIN	**166,429**	**189,601**
STREET MAINTENANCE -- PATCHING	**929,718**	**996,859**
Paving Cut Administration	**47,480**	**46,042**
S&SW Mowing and Sweeping	**2,260,959**	**2,275,730**
S&SW Invest/Inspection	**615,274**	**918,780**
S&SW Stormsewer Cleaning	**862,077**	**898,213**
S&SW Stormsewer Repairs	**1,828,580**	**2,497,811**
Water and Sewer Admin.	**22,996**	**27,969**
Water & Sewer Dept. – Stormwater	**69,242**	**166,943**
W&S Admin Internal IT	**3,800**	**3,780**
Quality Assurance – Administration	**10,728**	**11,923**
Quality Assurance – Operations Support	**1,825**	**1,825**
Laboratories	**156,978**	**168,664**
Distribution Systems - Administration	**13,894**	**19,079**
Field Cust. Serv. Rep. I (Meter Reading)	**59,807**	**66,986**
Field Cust. Serv. Rep. II (Meter Turn On/Off)	**-**	**-**
Sewer O & M – Admin	**70,544**	**79,983**
Lift and Pump Stations	**329,149**	**307,862**
General Site Services changed to P&R Fac Sys Land & Gen Maint	**352,937**	**396,625**
Horticulture changed to P&R Uti Svs Horticulture	**105,054**	**113,951**
Park - Fac Svs Forestry - New split from Horticulture	**55,502**	**59,758**
Fin Dir Internal IT	**5,583**	**7,224**
Utilities Administration	**718,002**	**823,707**
IT Administration	**41,859**	**41,488**
IT Operations	**158,329**	**255,826**
IT Client Services	**253,247**	**388,090**
Sewer O & M – Support Services / Dispatch	**16,874**	**20,955**
Transfer to Capital Projects	**6,150,000**	**5,425,000**
Debt Service	**2,214,000**	**2,158,400**
Total	**39,304,269**	**44,860,476**

Section 6

A Summary of Enforcement Actions, Inspections, and Public Education

A. Enforcement Actions

It is the philosophy of the City of Tulsa to bring responsible parties into compliance through education prior to initiating any enforcement action. Enforcement actions are taken only when deemed necessary to ensure permit compliance.

During this reporting period 296 investigations were conducted identifying 33 illicit discharges to the storm sewers. Title 11-A Chapter 5 (Pollution Ordinance) was adopted November 1995 and continues to be utilized for the removal of non-storm water discharges (see Section 6). This Ordinance allows the City of Tulsa to recover cleanup cost from the responsible party.

A summary of the investigations conducted by the Stormwater Management Division are as follows:

Number of Investigations	Description of Investigations
26	Construction (relating to construction site potential violations)
10	Hazmat (relating to potential discharges of pollutants from fire department responses involving the hazardous materials unit)
257	Stormwater (relating to potential releases of pollutants to the storm sewer or violations of the pollution ordinance)
3	Drug Labs (relating to the potential release of pollutants from drug lab remediation to the storm sewer or violations of the pollution ordinance)
296	Total number of investigations for this reporting year

- Construction Site – Erosion Control

    - The Stormwater Management Division conducted 1,545 construction site inspections resulting in 9 enforcement actions. These actions consisted of issuing a notice of violation that may involve fines and cost recovery. The total amount of fines and penalties collected was $200.

- Industrial, Commercial and Residential Sites

    - Tulsa continued to use the Industrial and High Risk Runoff program to identify, monitor and control pollutants from municipal landfills; treatment, storage and disposal facilities for municipal waste; facilities subject to EPCRA Title III, Section 313 reporting requirements; and any other industrial or commercial discharge the City determined had the potential to contribute substantial pollutant loading to the City's storm sewer system. This program contains procedures for inspecting, monitoring and controlling pollution from the aforementioned sources. A database of industrial storm water sources discharging to the City's storm sewer continues to be maintained. During this reporting period, 419 industrial stormwater inspections were conducted. Six enforcement actions were taken against industries or facilities in order to eliminate illegal or illicit discharges. $100 in fines was levied during this fiscal year.

B. Inspections

The following is a summary of inspections that were conducted during this reporting period. These inspections were previously mentioned in other sections of this report.

Sewer Operations Maintenance and SM conducted the following:

- Sanitary sewer lines TV inspected – 71 miles

SM conducted the following inspections:

- Storm sewer lines inspected – 11 miles
- Industrial and commercial storm water runoff inspections – 419
- Construction site erosion control inspections – 1,545

Development Services conducted the following number of inspections:

- 531 construction site inspections were conducted with attention on erosion controls measures.

Engineering Services conducted the following inspections:

- Daily inspections at construction projects (141 city and 92 privately funded Infrastructure Development Process (IDP) projects).

C. Public Education Programs

The public education programs utilized by the City of Tulsa have been described in Section 1 of this report. The City of Tulsa understands that public education plays a major role in reducing non-point source pollution and improving stormwater runoff quality. Tulsa believes that it is better to prevent non-point source pollution at the source through education than to control it after it is generated. Many educational programs used by the City of Tulsa to meet permit requirements are completed through the cooperative efforts of other groups, such as The M.e.t. and the Tulsa County Conservation District, as well as various City of Tulsa departments. Through activities such as educational events, presentations, school visits, summer day camps, conferences, television/radio commercials, billboards etc. education material was viewed many millions of times during this reporting period. See below for more information on Tulsa's Public Education Program's.

Attachment A "Public Education 2021-2022" lists the educational material distributed during this reporting period by the City of Tulsa.

Attachment B "Education Events 2021-2022" lists the educational activities performed during this period by the City of Tulsa.

Attachment C "Children's Education Activities 2021-2022" lists various educational activities performed for children's groups.

Attachment A: Education materials distributed or used in FY 21-22

	Illicit Discharge	Animal Waste	Antifreeze	Motor Oil	Paint	Fertilizer	Pesticides	LID	Compost	Yard Waste	Erosion	Floatables	Master Gardener	HHPCF	Customer Care Line/Website	# Distributed
General Brochure*	x	x	x	x	x	x	x	x	x	x	x	x		x	x	1187
Pet Waste	x	x					x								x	122
Pesticides	x					x	x						x	x	x	75
Motor Oil	x		x	x										x	x	22
Fertilizer	x					x							x	x	x	97
Pollution Prevention Plan	x														x	3
Grass and Leaves	x									x					x	35
Litter Flyer*	x		x	x			x			x					x	275
SWQ Folder	x														x	411
Landscaping BMP*	x					x	x			x			x		x	199
Drawstring Backpack															x	536
LID	x					x	x	x		x					x	4
Outside Washing	x		x	x											x	43
HHPCF Brochure*	x		x	x	x	x	x	x							x	771
Activity Pages	x	x	x													68
Mingo Cutout Activity	x															280
Runoff Card*	x	x	x	x	x	x	x			x		x			x	1293
Rain Gauge	x														x	1098
Pencils	x															751
Educational Display	x	x	x	x	x	x	x	x	x	x	x	x	x		x	4
Tumblers															x	309
Pet Waste Bags	x	x														884
Pens	x														x	488
Cleanup Shirts	x														x	358
Seed Packets	x														x	1369
SOS Tote Bags	x					x	x								x	658
SOS Facemasks															x	145
Risk of Flooding Info	x											x			x	121
Floodplains Map	x														x	53
Adopt a Stream Flyer	x														x	319
Bobbers																811
SOS Chip Clip															x	631
HPCF Chip Clip															x	426
Rain Barrel	x															340
Construction BMP	x														x	1
Pond Maintenance	x	x													x	4
Car Washing	x		x	x											x	1
HPCF Fridge Maget	x		x	x	x	x	x	x							x	581
SOS- Litter Breakdown	x											x			x	952
Total Materials																**14319**
Titles with an (*) have a Spanish Translation																

Attachment B: Events in FY 21-22

Date	Event Nam	Decription	# attended
7.12.2021	Facebook	Crow Creek Event	37
7.12.2021	Facebook	Crow Creek Event	2
7.16.2021	Instagram	Crow Creek Event	37
7.17.2021	Facebook	Crow Creek Event	22
7.17.2021	Twitter	Crow Creek Event	60,000
7.20.2021	Instagram	Crow Creek Event	30
7.20.2021	Facebook	Crow Creek Event	12
7.20.2021	Twitter	Crow Creek Event	60,000
7.20.2021	Twitter	HHP	60,000
7.20.2021	Twitter	HHP	60,000
7.21.2021	Drillers Game	Formerly "Bark in the Park". Dog owners brought pets to baseball game. We spoke with fans about stormwater quality	5,163
7.22.2021-7.23.2021	Tulsa County Free Fair	Tulsa held a free fair.	200
7.24.2021	Twitter	Activity Book	60,000
7.28.2021	Drillers Game	Formerly "Bark in the Park". Dog owners brought pets to baseball game. We spoke with fans about stormwater quality	3,699
7.9.2021	Facebook	HHP	17
8.1.2021	Stormwater Newsletter	Stormwater Newsletter sent out to residents of Tulsa	1,912
8.11.2021	Drillers Game	Formerly "Bark in the Park". Dog owners brought pets to baseball game. We spoke with fans about stormwater quality	4,175
8.14.2021	Facebook	HHP	8
8.16.2021	PPI Meeting	Monthly Meeting Discussing Flood Insurance	14
8.16.2021	Pre-Delvelopment Meeting	This meeting was for the expansion of Retail store with a library. The owners said they will not be adding any LID techniques.	14
8.18.2021	Drillers Game	Formerly "Bark in the Park". Dog owners brought pets to baseball game. We spoke with fans about stormwater quality	3,446
8.24.2021 - 8.25.2021	SWOCC	Stormwater Operators Certification Course for Streets and Stormwater employees.	9
8.26.2021	Facebook	HHP	10
8.26.2021	Twitter	HHP	60,000
8.30.2021	Pre-Delvelopment Meeting	This was a meeting for a residential development. The owner will not be adding any LID techniques	14
8.31.2021	Facebook	Fish Collection	53
8.31.2021	Instagram	Fish Collection	37
8.5.2021	1st Thursday	Monthly Environmental Meeting	178
8.9.2021	Pre-Delvelopment Meeting	This meeting was for the expansion of St. Fransis Hospital. The owners said they will not be adding any LID techniques.	14
9.16.2021	PPI Meeting	Monthly Meeting Discussing Flood Insurance	10
9.18.2021	Monarch on the Mountains	Yearly Event that showcase Monarch Butterflies.	500
9.2.2021	1st Thursday	Monthly Environmental Meeting	50
9.28.2021	Facebook	HHP	14
10.19.2021	Oxley Nature Training	Internal Training for Parks	12
10.21.2021	TPS	Carver Middle School stormwater education	100
10.22.2021	Twitter	HHP	60,000
10.23.2021	Fishing Derby	Close to home fishing program at Hunter Park	49
10.25.2021	Pre-Delvelopment Meeting	This meeting was for a construction of a Kum and Go. The owner stated they would not use any LID techniques	10
10.29.2021	TPS	Central Middle School stormwater education	173
10.29.2021	Twitter	Trash for Treat	60,000
10.29.2021	Facebook	Trash for Treat	16
10.29.2021	Instagram	Trash for Treat	20
10.30.2021	Trash for Treat	Zinc park cleanup and Halloween Event	57
10.4.2021	Pre-Delvelopment Meeting	This meeting was for a construction of a warehouse at an existing manufactoring plant. The owner will not be adding any LID techniques	14
10.6.2021	Facebook	Fishing Derby	8
10.6.2021	Twitter	Fishing Derby	60,000
10.8.2021	Instagram	Adopt a Stream	40
10.8.2021	Facebook	Adopt a Stream	45
10.9.2021	Twitter	HHP	60,000
11.1.2021	Pre-Delvelopment Meeting	This meeting was for a construction of a Churches Chicken. The owner stated they will not be using LID techniques	14
11.1.2021	Pre-Delvelopment Meeting	This meeting was for a multi family living unit. The owner stated they would not be using any LID techniques.	14
11.12.2021	TPS	Edison Middle School stormwater education	238

Date	Event Name	Decription	# attended
11.13.2021	Instagram	TPS and Fishing Derby	17
11.15.2021	Pre-Delvelopment Meeting	This meeting was for a construction of a fast food chain and oil change business. The owner stated they would not be using any LID techniques.	13
11.18.2021	PPI Meeting	Monthly Meeting Discussing Flood Insurance	16
11.19.2021	TPS	Hale Middle School stormwater education	433
11.2.2021	Flu Shot	Gave out Stormwater Quality Information to city employees getting flu shots	47
11.23.2021	Twitter	HHP	60,000
11.23.2021	Facebook	HHP	7
11.23.2021	Instagram	HHP	5
11.29.2021	Pre-Delvelopment Meeting	This meeting was for a construction of a leased office building. The owner stated they would not be using any LID measures.	13
11.29.2021	Pre-Delvelopment Meeting	This meeting was for the construction of a manufactoring center. The owner stated they would not be using any LID measures.	15
11.4.2021	1st Thursday	Monthly Environmental Meeting	24
11.4.2021	Leave no Trace	Tulsa Urban Wilderness Coalition	40
11.5.2021	TPS	East Central Middle School stormwater education	120
11.5.2021	Twitter	HHP	60,000
11.6.2021	Instagram	HHP	6
11.8.2021	Pre-Delvelopment Meeting	This meeting was for a construction of a Bar and Grill. The owner stated they would not be using any LID techniques.	19
12.1.2021	Stormwater Newsletter	Stormwater Newsletter sent out to residents of Tulsa	1,912
12.1.2021	City Life Newsletter	Utility Bill Stuffer	140,600
12.10.2021	TPS	Rogers Middle School stormwater education	33
12.13.2021	Pre-Delvelopment Meeting	This meeting was for the construction of a subdivision. The owner stated they would not be using any LID measures on this project.	13
12.13.2021	Pre-Delvelopment Meeting	This meeting was for the construction of a manufactoring facility. The owner stated they would not be using any LID measures.	16
12.16.2021	TPS	Webster Middle School stormwater education	45
12.18.2021	Facebook	HHP	12
12.2.2021	1st Thursday	Monthly Environmental Meeting	35
12.27.2021	Facebook	HHP	7
12.27.2021	Twitter	HHP	60,000
12.3.2021	TPS	Memorial Middle School stormwater education	296
12.4.2021	Twitter	HHP	60,000
12.6.2021	Twitter	SWQ Annual Report	60,000
1.10.2022	Pre-Delvelopment Meeting	This meeting was for the construction of an Indian Wellness Center. The owner stated that they would not be using any LID techniques on this project.	15
1.21.2022	TPS	Central Middle School stormwater education	80
1.3.2022	Pre-Delvelopment Meeting	This meeting was for the construction of a convenient store. The owners stated that they would not be using any LID techniques on this project.	14
1.31.2022	Pre-Delvelopment Meeting	This meeting was for the construction of a self storage unit. The owner stated that they would not be using any LID techniques on this project.	11
1.6.2022	1st Thursday	Monthly Environmental Meeting	78
1.7.2022	TPS	Thoreau Middle School stormwater education	180
1.7.2022	Instagram	Species Spotlight	63
1.8.2022	Twitter	HHP	60,000
2.11.2022	TPS	Hale Middle School stormwater education	330
2.14.2022	Pre-Delvelopment Meeting	This meeting was for the construction of a community center. The owner stated that they would not be using any LID techniques for this project.	18
2.14.2022	Pre-Delvelopment Meeting	This meeting was for the construction of park townhomes. The owner stated that they would not be using any LID techniques for this project.	12
2.15.2022	Flyer Drop Off	The Met will have a pollution drop off event and I gave HHP flyers for it	1,500
2.16.2022	SDHMAB	Update on quarterly information. Discussed Spring outreach and educational events.	20
2.17.2022	PPI Meeting	Monthly Meeting Discussing Flood Insurance	22
2.2.2022	ORU	Jacob talked about general stormwater quality information	20
2.21.2022	Pre-Delvelopment Meeting	This meeting was for the construction of an office/warehouse. The owner stated that they would not be using any LID techniques for this project.	11
2.21.2022	Pre-Delvelopment Meeting	This meeting was for the construction of a food establishment. The owner stated that they would not be using any LID techniques for this project.	16
2.25.2022	Twitter	HHP	60,000
2.28.2022	Pre-Delvelopment Meeting	This meeting was for the construction of a Dunkin Donuts. The owner stated that they would not be using any LID techniques for this project.	16
2.28.2022	Pre-Delvelopment Meeting	This meeting was for the construction of an office. The owner stated they would not be using any LID techniques for this project.	14
2.28.2022	Twitter	Rain Barrel	60,000
2.28.2022	Facebook	Rain Barrel	180
2.3.2022	PPI Meeting	Monthly Meeting Discussing Flood Insurance	17
2.3.2022	1st Thursday	Monthly Environmental Meeting	115

Date	Event Name	Decription	# attended
2.7.2022	Pre-Delvelopment Meeting	This meeting was for the construction of a tire shop. The owner stated that they would not be using any LID techniques for this project.	13
2.9.2022	Twitter	HHP	60,000
2.9.2022	Facebook	HHP	56
3.10.2022-3.13.20202	Home and Garden Show	We had a 10x40 SWQ booth with education, fish tanks, promo items, and commercials	19,385
3.11.2022	TPS	Rogers Middle School stormwater education	5
3.11.2022	Twitter	Home and Garden Show	60,000
3.11.2022	Instagram	Home and Garden Show	10
3.14.2022	Facebook	City Cleanup	61
3.14.2022	Twitter	City Cleanup	60,000
3.14.2022	Youtube	City Cleanup	124
3.14.2022	Youtube	City Cleanup	23
3.14.2022	Instagram	City Cleanup	75
3.15.2022	New Channel 6	City Cleanup	
3.21.2022	Twitter	City Cleanup	60,000
3.21.2022	Facebook	City Cleanup	468
3.22.2022	Facebook	Rain Barrel	79
3.22.2022	Instagram	Rain Barrel	31
3.25.2022	TPS	Webster Middle School stormwater education	27
3.25.2022	Facebook	HHP	14
3.28.2022	School Presentation	Went to Crossover Preparatory Academy to discuss pollution in the storm drain.	30
3.29.2022	Waterfowl Mitigation Meeting	Meeting discussing the effects of animal waste in our watersheds.	20
3.29.2022	Twitter	City Cleanup	60,000
3.3.2022	1st Thursday	Monthly Environmental Meeting	46
3.3.2022	PPI Meeting	Monthly Meeting Discussing Flood Insurance	15
3.4.2022	TPS	Memorial Middle School stormwater education	285
3.7.2022	Pre-Delvelopment Meeting	This meeting was for the expansion of a Hallond Hall High School. The owner stated they would not be using any LID techniques for this project.	19
4.1.2022	TPS	Met Junior High	30
4.1.2022 - 4.30.2022	Great Tulsa Cleanup	Park and Creek Cleanup Event	648
4.11.2022	Twitter	City Cleanup	60,000
4.11.2022	Instagram	City Cleanup	38
4.11.2022	Facebook	City Cleanup	61
4.12.2022	Twitter	Rain Barrel	60,000
4.12.2022	Instagram	Rain Barrel	15
4.13.2022	Drillers Game	Formerly "Bark in the Park". Dog owners brought pets to baseball game. We spoke with fans about stormwater quality	3,192
4.13.2022	Facebook	Rain Barrel	107
4.16.2022	Twitter	HHP	60,000
4.18.2022	Pre-Delvelopment Meeting	This meeting was for the construction of a housing development. The owner stated they would not be using any LID techniques for this project.	12
4.20.2022	Facebook	Environmental Expo	10
4.21.2022	Environmental Expo	Environmental Expo at Guthrie Green	400
4.21.2022	Facebook	City Cleanup	5
4.22.2022	WIN Newsletter	Newsletter sent out to residents of Tulsa	700
4.22.2022	Twitter	City Cleanup	60,000
4.22.2022	Twitter	Rain Barrel	60,000
4.22.2022-4.23.2022	Rain Barrel Event	Rain Barrel sale.	240
4.23.2022	Fishing Derby	Close to home fishing program at Mohawk Park	70
4.23.2022	Neighborhood Association Meeting	Crow Creek Neighborhood Association	42
4.28.2022	Girl Scouts Meeting	Met with a group of girl scouts to discuss the importance of stormwater quality	11
4.4.2022	Pre-Delvelopment Meeting	This meeting was for the expansion of an office/warehouse. The owner stated they would not be using any LID techniques for this project.	15
4.6.2022	Twitter	City Cleanup	60,000
4.7.2022	PPI Meeting	Monthly Meeting Discussing Flood Insurance	16
4.8.2022	TPS	Thoreau Middle School stormwater education	98
5.1.2022	Stormwater Newsletter	Stormwater Newsletter sent out to residents of Tulsa	1,912
5.10.2022	Twitter	Watershed Quarterly	60,000

Date	Event Name	Decription	# attended
5.18.2022	Facebook	Rain Barrel	8
5.19.2022	Twitter	Rain Barrel	60,000
5.21.2022	Twitter	Rain Barrel	60,000
5.21.2022	Facebook	Rain Barrel	10
5.21.2022	Facebook	City Cleanup	87
5.23.2022	Building Inspections Meeting	City Hall	8
5.23.2022	Pre-Delvelopment Meeting	This meeting was for the construction of townhouses. The owner stated they would not be using any LID techniques.	15
5.25.2022	Drillers Game	Formerly "Bark in the Park". Dog owners brought pets to baseball game. We spoke with fans about stormwater quality	3,427
5.25.2022	Internal Training	Permit required internal training for the Water and Sewer Department	64
5.26.2022	Pre-Delvelopment Meeting	This meeting was for the construction of a shopping center. The owner stated they would not be using any LID techniques	12
5.28.2022	Instagram	HHP	13
5.28.2022	Facebook	HHP	28
5.6.2022	Crow Creek Event	Crow Creek Event at Philbrook Museum	80
5.6.2022	Twitter	Crow Creek Event	60,000
5.6.2022	Instagram	Crow Creek Event	8
5.7.2022	Facebook	HHP	18
6.13.2022	Day Camp	Stormwater Presentation at Greenwood Cultural Center	7
6.13.2022	Pre-Delvelopment Meeting	This meeting was for the construction of a veterans hospital. The owners stated that they would not be using LID techniques on this project.	19
6.13.2022	Pre-Delvelopment Meeting	This meeting was for the construction of a residential subdivision. The owners stated that they would not be using any LID techniques.	20
6.15.2022	Drillers Game	Formerly "Bark in the Park". Dog owners brought pets to baseball game. We spoke with fans about stormwater quality	4,504
6.16.2022	Day Camp	Stormwater Presentation at Church of Restoration	16
6.17.2022	Twitter	Adopt a Stream	60,000
6.19.2022	Facebook	Adopt a Stream	29
6.2.2022	PPI Meeting	Monthly Meeting Discussing Flood Insurance	16
6.2.2022	Pre-Delvelopment Meeting	This meeting was for the construction of a school. The owners stated that they would not be using LID techniques.	18
6.2.2022	Pre-Delvelopment Meeting	This meeting was for the construction of a RV Park. The owners stated that they would be using bio-swales as a LID technique.	18
6.23.2022	Facebook	Crow Creek Event	18
6.24.2022	Twitter	Crow Creek Event	60,000
6.25.2022	Pride	Tulsa's Pride Event. Brought information and giveaways from out Stormwater Quality Program.	1,000
6.25.2022	Crow Creek Work Day	Volunteer work day at the Crow Creek Meadow.	12
6.25.2022	Twitter	Pride Event	60,000
6.25.2022	Facebook	Pride Event	97
6.25.2022	Instagram	Pride Event	61
6.27.2022	Day Camp	Stormwater Presentation at Greenwood Cultural Center	3
6.27.2022	Pre-Delvelopment Meeting	This meeting was for the construction of a Hotel. The owner stated that they would not be using any LID techniques	10
6.29.2022	Drillers Game	Formerly "Bark in the Park". Dog owners brought pets to baseball game. We spoke with fans about stormwater quality	4,040
6.29.2022	Zoo Signs	Signs are placed at the entrance of the Tulsa Zoo that discusses pollution in the storm drain	699,402
6.29.2022	Day Camp	Stormwater Presentation at Reed Park	32
6.30.2022	Instagram	Crow Creek Event	23
6.6.2022	Flood Preparedness Expo	Flood preparedness meeting discussing Tulsa's Class 1 National Flood Insurance Ranking.	18
6.6.2022	Pre-Delvelopment Meeting	This meeting was for the expansion of a high school. The owners stated that they would not be using LID techniques for this project.	12
6.6.2022	Pre-Delvelopment Meeting	This meeting was for the construction of a school. The owners stated that they would not be using LID techniques.	18
6.7.2022	Park Department Meeting/ Internal Training	Parks deparment meeting discussing the success of the Great Tulsa Cleanup. Also, discussed our permit.	24
6.9.2022	Day Camp	Stormwater Presentation at Greenwood Cultural Center	15

Attachment C: Tulsa Kids Education FY 21-22

Date	Event Name	Description	# Attended
10.21.2021	TPS	Carver Middle School stormwater education	100
10.23.2021	Fishing Derby	Close to home fishing program at Hunter Park	49
10.29.2021	TPS	Central Middle School stormwater education	173
10.30.2021	Trash for Treat	Zinc park cleanup and Halloween Event	57
11.5.2021	TPS	East Central Middle School stormwater education	120
11.12.2021	TPS	Edison Middle School stormwater education	238
11.19.2021	TPS	Hale Middle School stormwater education	433
12.3.2021	TPS	Memorial Middle School stormwater education	296
12.10.2021	TPS	Rogers Middle School stormwater education	19
12.16.2021	TPS	Webster Middle School stormwater education	45
1.7.2022	TPS	Thoreau Middle School stormwater education	180
1.21.2022	TPS	Central Middle School stormwater education	80
2.11.2022	TPS	Hale Middle School stormwater education	330
3.4.2022	TPS	Memorial Middle School stormwater education	285
3.11.2022	TPS	Rogers Middle School stormwater education	5
3.25.2022	TPS	Webster Middle School stormwater education	27
3.28.2022	School Presentation	Went to Crossover Preparatory Academy to discuss pollution in the storm drain.	30
4.1.2022	TPS	Met Junior High	30
4.8.2022	TPS	Thoreau Middle School stormwater education	98
4.23.2022	Fishing Derby	Close to home fishing program at Mohawk Park	70
4.28.2022	Girl Scouts Meeting	Met with a group of girl scouts to discuss the importance of stormwater quality	10
6.9.2022	Day Camp	Stormwater presentation at Greenwood Cultural Center	15
6.13.2022	Day Camp	Stormwater presentation at Greenwood Cultural Center	7
6.16.2022	Day Camp	Stormwater presentation at Greenwood Cultural Center	16
6.27.2022	Day Camp	Stormwater presentation at Greenwood Cultural Center	3
6.29.2022	Day Camp	Stormwater presentation at Reed Park	32
Total			**3054**

Section 7

Identification of Water Quality Improvements or Degradation

No water quality improvements or degradation were noted during this reporting period. The City of Tulsa has preliminarily identified some factors that appear to be negatively influencing the health of Tulsa's streams. We are also developing a baseline condition which will allow us to better determine improvements or degradation in water quality. Additional personnel recently added have begun to research further the issue of water quality degradation and any info collected will be reported on in the future.

Section 8
Watershed Characterization Program

In accordance with MS4 Permit #OKS000201 requirement Part IV(C)(8) the City of Tulsa submitted the Comprehensive Assessment of the Watershed Characterization Project in the FY 2014-2015 Annual Report. In this report, the Comprehensive Assessments and Summary Reports have been combined and are presented to satisfy both those Permit requirements.

Section 9
Co-permittee Reports

Appendix A

Oklahoma Department of Transportation

Annual Report

For Reporting Period:
July 1, 2021 through June 30, 2022

OKLAHOMA Transportation

200 N.E. 21st Street
Oklahoma City, OK 73105-3204
www.odot.org

September 15, 2022

Roy Teeters, Storm Water & Land Management Division Manager
Department of Streets and Storm Water
City of Tulsa
4502 S. Galveston Ave.
Tulsa, OK 74107

Attention: Jacob Hagen

Dear Mr. Hagen:

Enclosed is the Oklahoma Department of Transportation portion of the Fiscal Year 2019 Annual Report to be submitted to the Oklahoma Department of Environmental Quality in accordance with the Tulsa Municipal Separate Storm Sewer System (MS4) Permit Number OKS000201. This report covers the period from July 1, 2021 through June 30, 2022.

Please provide this office with one copy of the Annual Report as it is submitted. If you have any questions or require further information, please contact the Assistant Division Manager for Environmental Programs, David Saulsberry at 405-824-5358.

Sincerely,

B. Taylor

Brian Taylor, P.E.
Chief Engineer

Enclosure

OKLAHOMA Transportation

200 N.E. 21st Street
Oklahoma City, OK 73105-3204
www.odot.org

Annual Report

For

July 1, 2021 through June 30, 2022

"The mission of the Oklahoma Department of Transportation is to provide a safe, economical, and effective transportation network for the people, commerce and communities of Oklahoma."

OKLAHOMA Transportation

200 N.E. 21st Street
Oklahoma City, OK 73105-3204
www.odot.org

CERTIFICATION STATEMENT

NPDES Permit No. OKS000201
Review of Storm Water Annual Report

I certify under penalty 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 gathered and evaluated 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 fine and imprisonment for knowing violations.

B. Taylor

09/14/2022

Brian Taylor, P.E.
Chief Engineer

Date

OKLAHOMA Transportation

200 N.E. 21st Street
Oklahoma City, OK 73105-3204
www.odot.org

FISCAL YEAR 2022 ANNUAL REPORT BY THE OKLAHOMA DEPARTMENT OF TRANSPORTATION (ODOT) ON TULSA MS4 PERMIT # OKS000201

September 15, 2022

Status

The Oklahoma Department of Transportation (ODOT) has implemented and is in compliance with the Storm Water Management Plan. The following items demonstrate activities undertaken for this annual reporting period.

Expenditures

As part of ODOT's Storm Water Management Program, the Tulsa metro area highway system shoulders are swept to remove sediment and debris. In Fiscal Year 2022, 19,643 bags of litter were removed at the cost of $148,659. There are four two mile- increment Adopt-a-Highway locations in the Tulsa metro where litter is picked up twice a year, and five one mile increment Adopt-a-Highway Corporation locations where litter is picked up once per month.

Erosion and Sediment Control

The department continues to monitor and inspect construction sites across the state with the goal to maintain compliance for the OKR10 and OKR04 permits. Storm water personnel conducted 113 site visits over the year. Currently, the department has contracted out several sites across District 8 for weekly stormwater inspections and monthly environmental compliance inspections. The storm water team has also re-vamped the inspection form which has been distributed agency wide. Updates to this form include being a fillable PDF, a QR code to link directly to the OKR10 as well as a reviewer signature line in addition to the inspector signature line.

In March of 2022, Environmental Programs Division launched an environmental liaison position in District 4. This position is acting as the environmental point of contact for the district and conducts monthly stormwater inspections for every project within the district. This role is also present for planning meetings during pre-construction, documents site conditions prior to construction and is aiding with non-

compliance issues as well as Notice of Termination stabilization assistance. This position has proven to be successful and hopefully will continue to lead to added successes for the rest of the state.

ODOT's Roadway Division has published the 2019 standard drawings for sediment and erosion control BMPs. The standard drawings will be effective for projects in February 2023 lettings. ODOT, Oklahoma Department of Environmental Quality (ODEQ) and the Oklahoma Association of General Contractors (AOGC) continue to partner together with innovative solutions in construction stormwater management. A group representing all three agencies is putting together the first annual Contractor Construction Compliance Conference (C-4) in October of 2022.

Non-Traditional MS4 Program

The agency is still planning to obtaining an individual non-traditional MS4 permit. Preparations are being made for this agency wide, and hope to begin the negation process up soon. In the meantime, the ODOT stormwater team, along with a hired consultant are still in the process of addressing five of the six Minimum Control Measures. This is in efforts to plan and implement minimum control measures as well as data management in preparation for when the permit is obtained.

Illicit Discharge Detection and Elimination Program (IDDE)

ODOT Maintenance facilities continue to use the guidance document which was developed to assist ODOT personnel in identifying and reporting an Illicit Discharge. As well as the storm water program having opportunity for IDDE reporting on their webpage. Discussion on tracking Highway Spills from accidents is ongoing between ODOT Environmental Division, Maintenance personnel and the Highway Patrol. For this fiscal year, there were no reported illicit discharges reported.

Good Housekeeping / Pollution Prevention Plans (GHPPP)

ODOT has completed an inventory survey of facilities statewide to develop training on Good Housekeeping and Pollution Prevention. Funding for facility upgrades and/ or relocation is being pursued by the Agency. Currently, each of the eight Field Districts are evaluating location, condition and need to determine which County facility will be moved or rebuilt on site. These upgrades will further the Good Housekeeping /Pollution Prevention Minimum Control Measure by adding updated secondary containment devices and retention facilities. In addition, ODOT has developed a Good Housekeeping Pollution Prevention Plan Facility template. The templates are being completed for facilities in the regulated areas to satisfy DEQ requirements. GHPPP's and training are being developed.

Public Education/ Litter Program

The agency is a member of the Central Oklahoma Storm Water Alliance (COSWA) and participates in their outreach events such as the home and garden show. Efforts are also being made to add to online education regarding stormwater in the transportation industry.

In partnership with the Oklahoma Turnpike Authority, both ODOT and OTA continue the statewide anti-litter campaign, by updating programming and filing reports in line with the Transportation Cabinet's modernization efforts. The litter hot-line (1-888-5-LITTER), is available to report littering anywhere across the state. Callers can report the offenders tag number. The people observed littering are sent a postcard requesting them to help "Keep Our Land Grand". Littering is against the law and offenders can be fined from $200 to $2000. Approximately 50 calls per month are received and handled.

Every year, school-age children participate in our annual poster contest. This year's contest is sponsored by ODOT, Oklahoma Department of Environmental Quality, Oklahoma Turnpike Authority, Cherokee Nation, OG&E, Oklahoma's Credit Union, Oklahoma Office of Management Enterprises – Web & Citizen Experience, Oklahoma Tourism & Recreation Department – State Parks Division, Keep Oklahoma Beautiful, Ardmore Beautification Council, Oklahoma City Beautiful, Oklahoma Rural Water Association, Solid Waste Institute of Northeast Oklahoma, Oklahoma State Department of Education, Oklahoma Department of Public Safety/Oklahoma Highway Patrol, and the Oklahoma Highway Safety Office. The resulting contest Calendar, Entry Form, and Promotional Poster is created and printed for distribution to all Oklahoma public schools, tribal and home schools, charter, private, parochial, and religious schools, juvenile correctional centers, businesses, libraries, towns, city, county, state, and federal government agencies, Oklahoma's government offices, the House of Representatives, the Senate, chambers of commerce, managers/mayors, sheriffs, district attorneys, Corps of Engineers Lakes, Correctional Libraries, Oklahoma Lake Associations, all of the Dept. of Transportations in the US 50 States, Adopt-a-Highway groups, Oklahoma Military Bases, Oklahoma Military Recruitment Centers, Oklahoma Tribal Nations, USDA Conservation Districts, Oklahoma Universities, Colleges, and Vocational-Technical Schools, Oklahoma Tag Agencies, Oklahoma Newspapers, Radio Stations, and TV Stations, Oklahoma Schools of the Deaf and Blind, Main Street Associations, ODOT Field Districts & Maintenance & Construction Offices Statewide, TPC Contest Judges, TPC Contest Sponsors, to the citizens of the State of Oklahoma, and to all the State Winners, Teachers, and to 160 Poster Honorable Mention students and teachers. 30,000 posters, entry forms, and 2023 Trash Poster Calendars are being printed and will be distributed this winter in December throughout Oklahoma and the United States.

Adopt-a-Highway/ TRASH-OFF

ODOT'S anti-litter efforts are still on-going and include 138 separate "Adopt-a-Highway" groups who remove litter from their two-mile section of state highways at an interval of four times a year, and the "TRASH-OFF", an annual volunteer spring roadside cleaning sponsored by ODOT. Tulsa has 63 "Adopt-a-Highway" groups covering 126 miles at a minimum of four times a year.

Each Spring, the Annual ODOT TRASH-OFF is held, to go along with the annual Great American Cleanup. Groups have expanded TRASH-OFF day to TRASH-OFF week or month. ODOT, in partnership with Keep Oklahoma Beautiful, distributes trash bags, gloves, vests, water, etc., all over the state of Oklahoma for the annual TRASH-OFF. Last year, this effort resulted in excess of over three million pounds of litter and debris collected from Oklahoma roadsides and public areas. This saved taxpayers over an estimated five million dollars. In addition, ODOT is the Executive Patron Sponsor of Keep Oklahoma Beautiful's annual November Environmental Excellence Awards Banquet/Celebration, where ODOT presents two environmental Trash-Off awards given to judged/chosen participants for "Best First

"Rookie" Effort" and "Best Overall Trash-Off Effort". Over 600 winners, finalists, guests, and attendees participate in this in-person Environmental Excellence Awards Celebration event held at the National Cowboy and Western Heritage Museum.

Herbicide Application

The application of herbicides is performed by Oklahoma Department of Transportation employees. ODOT closely follows the procedures, rules, and regulations contained in the Oklahoma Pesticide Applicators Law. ODOT requires all its applicators to be licensed and are subject to the implementing regulations of this law. ODOT partners with the Oklahoma Department of Agriculture to offer the Pesticide Applicators test required for a license during our annual workshops.

ODOT has a contract with the Oklahoma State University/ Oklahoma Cooperative Extension Service to provide annual herbicide applicator workshops and assistance to the agency. Four Pesticide Application Certification Schools were conducted in FFY2022, totaling in 49 ODOT staff.

Wildflowers

In the spring of 2016, a memorandum of agreement was signed by ODOT in partnership with the Federal Highway Administration and the Missouri, Texas, Iowa, Kansas and Minnesota DOTs designating Interstate 35 as the Monarch Highway. The goal is to protect more of the Monarch Butterfly's natural habitat by allowing milkweed and native flowers to grow in the right-of-way where possible. In anticipation of the collaboration, ODOT began refraining from mowing highway rights-of-way statewide, except where necessary, until July when the flowers are primed for seed dispersal. Mowing was continued in urban areas and safety zones, which includes medians and rights-of-way up to 30 feet from the pavement's edge. A pollinator garden was also planted by ODOT staff at the Oklahoma City Welcome Center. The garden is a registered Monarch Waystation and was remodeled in 2020. It is a 935 sq ft plot (.02 ac) containing five types of milkweed, Black-eyed Susans, purple coneflower and other types of wildflowers. The garden will serve as an educational tool for the public to help them recognize and protect milkweed and other native wildflowers.

On April 30, 2020, ODOT applied to join the National Monarch Candidate Conservation Agreement with Assurances (Monarch CCAA) for Energy and Transportation Lands and received their Certificate of Inclusion in Nov of 2020. By signing the agreement, the Oklahoma Department of Transportation joined 21 other Energy and Transportation organizations in voluntarily committing to implementing monarch conservation measures on a portion of their organization's managed lands.

The monarch butterfly was petitioned for listing under the Endangered Species Act (ESA) in 2014. In December of 2020, the US Fish and Wildlife Service (USFWS) decided to list the species as a candidate for an Endangered listing. In anticipation of a listing decision ODOT along with other national partners has committed, through the CCAA, to adopt acres within their land system for targeted conservation measures that will provide needed habitat for the monarch butterfly and that could potentially influence

the future listing decision. This agreement provides immediate regulatory certainty to ODOT and avoids potential gaps in regulatory coverage in the event the species is listed.

During the 2021 Monarch season, ODOT participated in tabling events such as the grand opening of the newly remodeled Oklahoma Welcome Center and a Pollinator Week celebration alongside local partners. In November 2021, ODOT assisted the City of Norman in seeding a 9-acre cloverleaf on I-35/SH-9 with native plants for pollinators. On June 21, 2022 ODOT joined other State monarch partners at the Oklahoma City Pollinator Party and Skydance Bridge lighting event to celebrate National Pollinator Week.

Collection and Recycling

ODOT's Maintenance personnel recycled approximately 625 gallons of used oil and 200 pounds of used filters. The oil is picked up by a private contractor five times a year.

Mowing

A total of 18,780 acres was mowed in four cycles this year at the cost of $418,67.

Appendix B

Oklahoma Turnpike Authority

Annual Report

For Reporting Period:
July 1, 2021 through June 30, 2022

OKLAHOMA
Turnpike Authority

August 31, 2022

Mr. Jacob Hagen
Stormwater Quality Manager,
Stormwater Department, City of Tulsa
4502 S. Galveston Ave.
Tulsa, Oklahoma 74107

Dear Mr. Hagen:

Enclosed is the Oklahoma Turnpike Authority's portion of the Annual Report to be submitted to the Oklahoma Department of Environmental Quality (DEQ) in accordance with the City of Tulsa Municipal Separate Storm Sewer System (MS4) Permit Number OKS000201. This report covers the period from July 1, 2021 through June 30, 2022.

Please provide this office with one copy of the Annual Report as it is submitted to DEQ.

Sincerely,

Darian L. Butler
Darian L. Butler (Aug 31, 2022 21:20 CDT)

Darian L. Butler, P.E.
Director of Engineering

NPDES Permit No. OKS000201
July 1, 2021 through June 30, 2022
Annual Report for
Oklahoma Turnpike Authority (OTA)

Overview

This report summarizes the OTA stormwater management activities for Turnpike areas in the City of Tulsa Municipal Separate Storm Sewer System (MS4) area. The Creek Turnpike Maintenance yard and approximately 29% of the Creek Turnpike roadway are within Tulsa's MS4 boundary. The roadway areas include 5.7 miles of roadway in the south Tulsa area that crosses parts of the Vensel Creek, Fry Ditch, and Haikey Creek watersheds. The roadway areas also include 4 miles in the east Tulsa area that crosses parts of the Spunky Creek and Adams Creek watersheds. The Creek Turnpike statistics shown in the remainder of this report refer to the entire Creek Turnpike, not just the portions that are in the Tulsa MS4 area. Construction on the Gilcrease Turnpike began on January 31, 2020. The Gilcrease will add approximately 0.7 miles of roadway to the Tulsa MS4 area in the Arkansas River watershed and is scheduled to be completed in October, 2022.

1. Status of the Implementation of the Storm Water Management Program.

   Responsibilities of OTA outlined in the NPDES Part 2 Application have been met.

   Structural Controls and Storm Water Collection System Operations:

   OTA's commitment to a superior functioning storm water system is demonstrated by its regular inspections all of the below ground storm water carrying structures. All of the drainage structures on the Creek Turnpike are inspected every other year. 156 culverts and stormwater structures on the Creek Turnpike were inspected in 2021 and will be inspected next in 2023.

   Above ground storm water controls are monitored daily by the maintenance staff who are equipped to handle any flow problems that could potentially arise. Examples of

such controls would be detention areas, roadside ditches, and culverts. To ensure the storm water is flowing efficiently, OTA mows 4 to 7 cycles per season. Approximately 1641 acres are mowed per cycle.

Areas of New Development and significant redevelopment:

A five (5) year capital plan has been developed by the Turnpike Authority to identify future construction projects. This Capital Plan is updated yearly to incorporate priority areas and any lessons learned are incorporated into future projects. OTA shall continue to look for opportunities to use low impact development and adopt Best Management Practices to minimize the impact that runoff discharges have to receiving streams.

Roadways:

All storm grates and drains used to move water off of the roadway were cleaned quarterly during this period.

OTA requires a storm water management plan for all construction projects. The OTA requires contractors to obtain necessary permits for placement of dredge or fill material (from the US Army Corps of Engineers) as well as floodplain and watershed permits (from relevant municipalities).

Approximately 2500 cubic yards of litter were collected and properly disposed by providing 33 trash containers along the Creek Turnpike.

Finally, OTA Maintenance covers sand piles at Creek Turnpike Maintenance yards with tarps to prevent sand from washing off in the rain or from the wind.

Pesticide, Herbicide, and Fertilizer Application:

The OTA requires all turnpike herbicide applicators as well as all contract applicators to be licensed and subject to all of the regulations under the Oklahoma Herbicide Applicators Law including re-certification. Applicators receive yearly training on pesticides, herbicides, and fertilizer chemicals from the Oklahoma Vegetation Management Association (OKVMA). The OTA has seven certified applicators on the Creek Turnpike. Approximately 485 gallons of herbicide were applied around sign footings, fences, center median and at various other locations within the limits of the right of way.

Illicit Discharge and Improper Disposal:

The bridges and culverts on the Creek Turnpike are inspected every other year. The next round of inspections will take place during the 2023 annual report period.

OTA's maintenance staff collects and recycles oil. The oil is picked up twice a year at the maintenance yard by a private contractor. Batteries and tires were returned to locations where new ones could be purchased.

Construction Site Runoff:

The OTA understands the significance of construction site runoff and the adverse effects it can cause. As a result, strict guidelines are set forth to ensure that each construction site has adequate controls for reducing pollutants. As stated previously, all construction plans that are produced by or for the OTA have a mandatory Storm Water Management Plan and Erosion Control Plan.

These sheets provide information such as location/description of project, sequence of erosion control activities, area disturbed, name of receiving waters, soil stabilization practices, structural practices, offsite vehicle tracking, a layout drawing showing exactly where soil stabilization and structural practices should be placed, and references to the OTA Standard Specification for all Storm Water Guidelines. The most optimal approach and recommendations are discussed and agreed upon prior to project implementation to ensure the best option is chosen for the project.

During construction, the approved storm water management plan is monitored and enforced regularly by the OTA's on-site representative. Upon project completion, OTA conducts a final inspection and assures that the work areas are restored to compliance level.

Public Education:

The OTA dedicates space on its website to the subject of Storm Water Management. On the site there are links to the Phase I Annual Reports. The site includes a phone number to allow the public to contact OTA with suggestions, comments, or questions about OTA's stormwater program.

A stormwater pollution prevention bookmark was produced which included 10 suggestions for preventing stormwater pollution. This bookmark was distributed to members of the public at OTA headquarters and other locations. The bookmark can also be seen by going to OTA's website.

The OTA is also part of the anti-litter campaign, "Oklahoma Keep Our Land Grand." As part of this campaign, the OTA offers a toll free number to call to report littering as well as a place to report it on the website. Individuals who are reported littering are sent a postcard to remind them that littering is a punishable offense and that the goal is

to keep Oklahoma land looking grand. For the period July 2021 – June 2022, the Oklahoma Transportation System (including OTA and ODOT) received 387 littering report calls for the whole system.

Landscape:

OTA partners with the organization "Up With Trees" to landscape areas in and around the major interchanges in the Tulsa and Broken Arrow communities. OTA also partners with "Color Oklahoma" and maintains two wildflower plots on the right of way adjacent to the Creek Turnpike.

2. Proposed Storm Water Management Program Changes.

   The OTA does not propose any changes to the Storm Water Management Program.

3. Revision to the Assessment of Controls and the Fiscal Analysis.

   OTA proposes no revision to the assessments of controls. The Fiscal Analysis is as shown on the City of Tulsa's Report.

4. Monitoring Data Accumulated Throughout the Reporting Year.

   Refer to the Regional Storm Monitoring Report.

5. Annual Expenditures for the Reporting Period with a Breakdown for the Major Elements of the Storm Water Management Program.

Description	Cost
Inspection	4,500.00
Mowing	168,955.48
Sweeping	49,207.00
Trash Collection and Disposal	147,094.15
Herbicide	17,609.45
Total	$ 387,366.08

6. A Summary Describing the Number and Nature of Enforcement Actions, Inspection and Public Education Program.

   All enforcement actions in OTA's watershed are issued by the City of Tulsa in concurrence with the OTA. None occurred during the year covered by this report.

7. Identification of Water Quality Improvements or Degradation.

   OTA was not able to identify any water quality improvements or degradations during this report period.

8. Regional Monitoring Report.

   Please see the City of Tulsa's report.

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 persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Darian L. Butler
Darian L. Butler (Aug 31, 2022 21:20 CDT)

Darian L. Butler, P.E.
Oklahoma Turnpike Authority

08/31/2022

Date