City of Wilmington, North Carolina

ANNUAL NPDES PERMIT REPORT

Prepared by:
City of Wilmington, NC
Stormwater Services
PO Box 1810
209 Coleman Drive
Wilmington, NC 28412

NPDES Permit No.: NCS000406

Reporting Year: July 1, 2021 – June 30, 2022

REPORTING CERTIFICATION

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

10/27/2022

Fredric T. Royal, P.E., CFM
Manager, Stormwater Services

Date

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INTRODUCTION

Stormwater Management Plan Overview

The North Carolina Division of Water Quality issued NPDES Phase II Permit NCS000406 to the City of Wilmington effective February 1, 2018. The Stormwater Management Plan is the City of Wilmington's program to comply with NPDES Phase II permit NCS000406 for stormwater discharges from Small Municipal Separate Storm Sewer Systems (MS4s). The plan defines strategies and guidelines necessary for protecting water quality and reducing pollutant discharges to the maximum extent practicable. The plan also includes reporting results for the current yearly reporting period from July 1, 2021 to June 30, 2022.

The plan is a guidance document to be used by the City staff and the general public. The plan is evolving and will address needs and priorities that will be reflected in compliance programs over the 5 year implementation schedule.

As required by EPA regulations for the NPDES Phase II stormwater programs, the following six minimum measures are addressed in the plan:

1. Public Education and Outreach
2. Public Participation and Involvement
3. Illicit Discharge Detection and Elimination
4. Construction Site Runoff Control
5. Post-Construction Runoff Control
6. Pollution Prevention and Good Housekeeping for Municipal Operations

Program Implementation Status

The City of Wilmington is pleased to report excellent progress for year 4 compliance with requirements of NPDES Phase II permit NCS000406. Primary areas of work include:

- Began inspection and maintenance of all city owned facilities with oil/water separators (18 locations).
- Continuation of Public Outreach and Public Participation efforts.
- Concentrated dry weather flow investigations in 2 impaired watersheds – Bradley Creek and Hewletts Creek.
- Continued mapping updates of stormwater infrastructure in previous annexation area and recent voluntary annexed area.
- Conducted Stormwater Control Measure (SCM) Inspection and Maintenance (I&M) training for our Stormwater Field Crews.
- The Heal Our Waterways Program continued its forward momentum this year with several collaborative grant projects, native plant outreach campaigns, and community events and presentations.

In the last year and a half, the City's Stormwater Services initiated a review of its MS4 program to achieve the following goals:

1. Prepare the City for the future DEQ audit and in understanding potential compliance issues (i.e., become "audit ready"),
2. Prepare for the re-permitting of the program and support development of what is needed for this SWMP submittal, pursuant to the reformatted version by DEQ and new permit requirements, and
3. Identify areas where improvements can be made to enhance program implementation.

Using the information gathered during the review through site visits, interviews, and program documentation, the City's consultant Moffatt & Nichol (M&N) developed a report that summarizes the program elements (6Minimum Measures) and documents how the City is meeting its permit requirements.

A series of recommendations were developed for each permit area to address any potential issues or gaps with compliance as well as overall program enhancement and audit preparation. Each recommendation is accompanied by an assessment of priority status, a qualitative assessment of budget implications, and a recommended implementation schedule.

We continue to have success with our public outreach and participation program and education to the public. The City remains focused on improving the water quality for the areas surrounding water bodies as indicated by UNCW's Center for Marine Science annual contract for ambient monitoring of water quality on creeks within the City.

CITY OF WILMINGTON STORMWATER SERVICES OVERVIEW

Comprehensive Stormwater Management

Comprehensive stormwater management takes into account both the quantity and quality of stormwater runoff and is reflected in five core components of Wilmington's Stormwater Services program:

Management & Planning

Master planning utilizes the existing GIS stormwater system inventory to develop a long range plan to improve drainage and water quality within an entire watershed. When planning on such a large scale, Stormwater Services seeks involvement and input from citizens and stakeholders. Management activities also include customer service – responding to customer concerns or inquiries and administrative services required for operation of the City stormwater utility.

Regulatory and Enforcement

Regulatory and enforcement activities are outlined in the City's existing stormwater ordinance requiring comprehensive stormwater management and creating technical standards for design and maintenance of private stormwater facilities that are associated with new development. The Engineering Department Stormwater review staff perform all stormwater management plan reviews and issues stormwater discharge permits.

Stormwater Services, Public Services Department, provides annual inspections for privately permitted

stormwater retention/wet pond facilities. These inspections are performed in order to ensure compliance with the approved operations and maintenance standards. Compliance with NPDES Phase II stormwater regulations also fall into this category.

Capital Improvement Program (CIP)

The stormwater utility provides dedicated funding and staff resources for planning, designing, and constructing capital improvement projects (CIP) and for performing routine maintenance and drainage infrastructure inspections and rehabilitation. The CIP projects are necessary when the existing storm drainage system is inadequate and can result in flooded streets, houses, and businesses. Capital improvement projects require collaboration among City departments, outside agencies, and citizens in affected areas. Whenever feasible, capital improvement projects incorporate innovative design such as stream restoration, green infrastructure, or stormwater control measures (SCM's) to improve water quality and reduce the volume of stormwater runoff. A current CIP, Clear Run Branch, includes a grant from the National Fish and Wildlife Foundation for funding assistance to re-establish a floodplain and restore the stream for water quality and aquatic habitat benefits.

Operations and Maintenance

The City of Wilmington's Stormwater Services Division, Operations and Maintenance Section, is responsible for maintaining the public drainage system. Maintenance activities are programmed in the following sections: open drainage, closed drainage, street sweeping/pipe and inlet clearing, and stormwater control measures (SCM's). The open drainage system consists of publicly accepted roadside swales, man-made ditches and channels and naturally occurring creeks and ponds. The closed drainage system consists of underground pipes, culverts, catch basins, manholes and related structures.

Both of these systems are maintained using manual and mechanical techniques to ensure that they remain free of debris, sediment and scour for proper drainage. Street sweeping provides preventative sweeping, vacuuming and other required maintenance to minimize the volume of gross solids; ie: trash, litter, debris, sediment, and other pollutants entering the open or closed drainage systems. Pervious pavement is also maintained by this section. SCM inspections and maintenance consists of activities necessary to manage over 90 city-owned SCM facilities; including wet ponds, constructed wetlands, bio-retention and infiltration facilities in functioning condition. As listed above, all O&M staff receive training on water quality, SCM maintenance and other best practices such as riparian buffer management.

Water Quality

Water quality monitoring is executed by the University of North Carolina at Wilmington under annual contract with the City. Monitoring is performed on specific creeks and waterways within the City limits. Monitoring tests for specific pollutants and resulting data is used to plan water quality improvements or as a part of capital improvement projects, guide outreach and education efforts, assess water quality at the sites monitored, identify persistent pollutant discharge areas or points, help to build a framework for future detection and tracing of pollutant sources and obtain project-specific grant funding.

In addition, Stormwater Services implements an extensive Outreach, Education, and Public Involvement

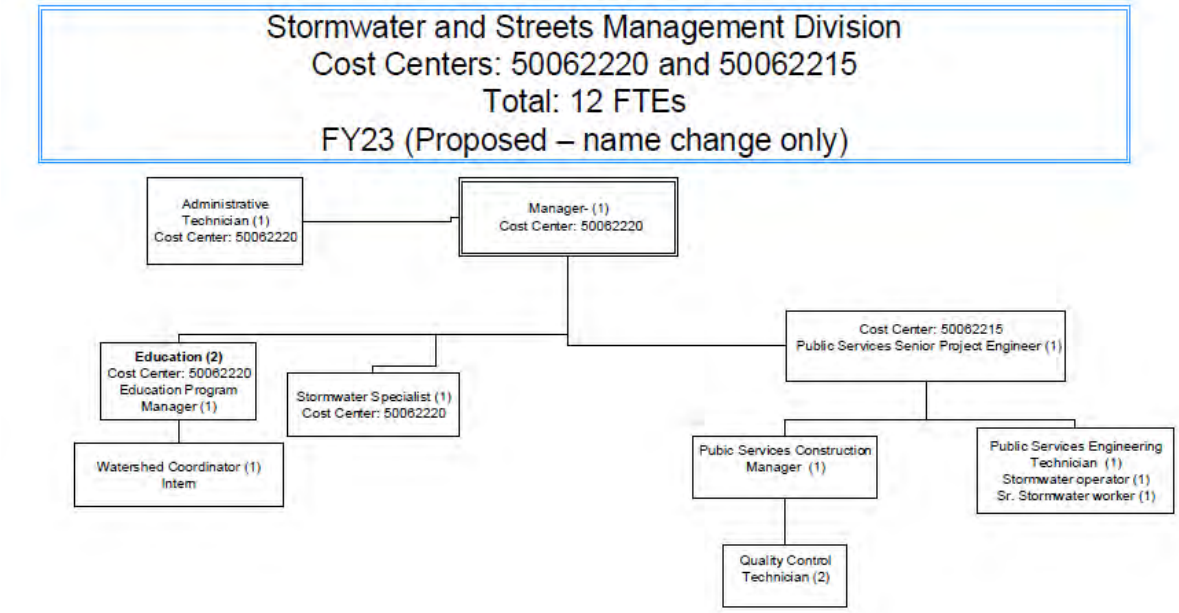
program that serves the citizens of Wilmington. The program includes a wide array of water quality education programming and materials. These programs include school presentations (using the watershed model and other materials), homeowner association outreach, raingarden design and installation, stormwater publications and giveaways, scheduled stream clean-up days, mass media advertising, special event exhibits, workshops, storm drain marking, and collaborative efforts such as grant projects with NC State University, UNC-Wilmington and other NGO's. Two ongoing/noteworthy USEPA 319 grant projects are:

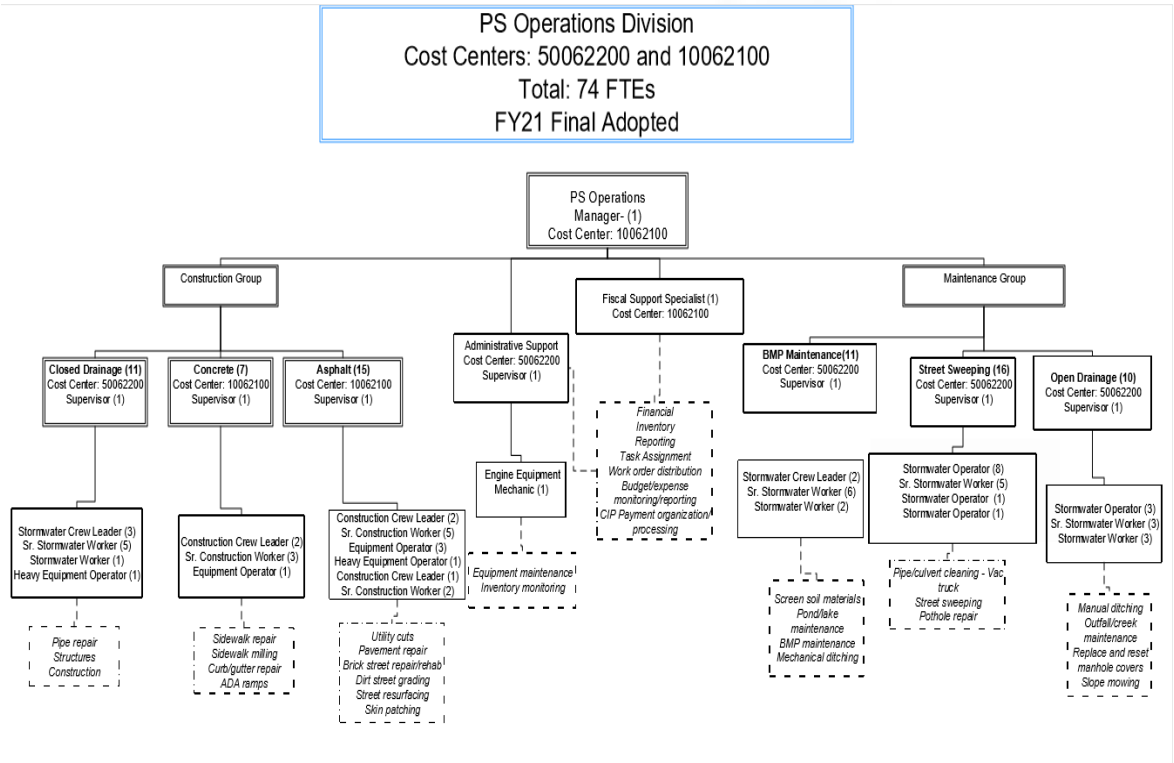
- Willard St. – wet pond to wetland retrofit (Jumping Run Branch).
- University Commons wet pond – retrofit to stormwater wetland (Clear Run Branch).
- Greenfield Lake Floating Wetlands (Squash Branch).

These efforts strive to improve water quality in the runoff entering waterbodies, educate and engage citizens in protecting and improving local water quality through awareness, education, behavior modification and action.

Management and Planning

Organization Chart of the Stormwater Services Division





Estimated FY 22-23 Stormwater Management Fund Budget for NPDES

	FY21-22 Adopted	FY 22-23 Adopted	
REVENUES			
Storm Water Utility Fees	9,660,407	10,157,052	
City Streets Storm Water Fees	3,042,744	3,150,000	
Storm Water Discharge permits	51,000	51,000	
NCDOT Drainage Maintenance	37,000	37,000	
Interest Earnings	20,000	65,000	
Miscellaneous	-	-	
Appropriated Fund Balance	-	-	
TOTAL REVENUES	12,852,468	14,730,039	
EXPENDITURES			
Public Services	6,564,992	6,710,640	
Non-departmental	1,498,901	1,552,083	
Debt Service	1,813,575	1,637,466	
Contingency	-	-	
Transfer to Capital Project Fund	2,975,000	4,829,850	
TOTAL EXPENDITURES	12,852,468	14,730,039	[1]

[1] The FY 2021 budget was adopted by the Wilmington City Council on June 14, 2022.

Regulatory and Enforcement

Public Services Code Enforcement

The City's stormwater ordinance required by this permit has been effective since November 1, 2009. Citizens can report suspected pollution through the Stormwater Hotline and the webpage reporting form. All complaints received by the Stormwater Division either from the public or from City staff is investigated; corrective action is prescribed; documented and followed until the violation is resolved.

A Enforcement/Civil Penalty Guidance tool has been developed and is now being used to ensure consistency and help to guide the decision making process for NOVs and Civil Penalty issuance. Any complaints received that have environmental impacts other than stormwater or fall outside the City's regulatory authority are referred to DENR DWQ Wilmington Regional Office.

In an effort to maximize voluntary compliance, the City has, and will continue to develop and distribute educational materials to targeted populations in an aggressive manner. Consequently, all complaints provide the opportunity to educate the public on the issues that threaten stormwater, the best management practices for prevention, the awareness of our city's stormwater program and the ordinance.

Compliance through Public Education

The stormwater code enforcement program goal is to maximize voluntary compliance through public education and to use enforcement through penalties as a last resort. Staff has found that most stormwater ordinance violations can be resolved through public education. Most of the people encountered violating the ordinances are not even aware of their wrongdoings. Teaching them why they are in violation and why it matters works because most people want to do the right thing. There are very few repeat offenders. In Fiscal Year 2020-2021, a total of 3 repeat offenders were identified. Our enforcement and civil penalties are reserved for; 1) serious discharges and spills with the potential of harming human health and the environment, 2) repeat offenders, and 3) as a last resort to achieve compliance.

The program developed an assortment of educational material for targeted audiences, as well as targeted pollutants that teach the public about our stormwater ordinance and pollution prevention. For other circumstance specific letters are written with instructions to guide violators to a solution and compliance expectations. This clear outline of the City's expectations is a powerful tool for preventing future pollution problems.

Yard Waste

Yard waste violations receive a face to face meeting (if possible) and a standardized letter explaining the ordinance and the reasons why it is necessary. Also highlighted are the expectations for compliance and civil penalties for any future violations. This letter is accompanied by a poster in English or Spanish and in various sizes. The poster's objective is to help educate landscape companies and their employees on the ordinance requirements that keep yard waste out of the drainage system and surface waters and the city's expectations.

Pet Waste

Pet waste education and action is a significant focus for Stormwater Services. Reports of pet waste violations receive a face to face meeting if possible. A brochure and flyer has been developed explaining

the dangers of pet waste bacteria in surface waters that includes the city's expectations of the ordinance and penalty amounts for any violations. Pet waste message flags are used and distributed with ordinance information at parks and public places, such as in specific neighborhoods in response to complaints. The pet waste flyer is also available in a poster size for educating the public in parks and common areas. Pet waste stations are planned and added each year in high pedestrian traffic areas as our budget allows.

Illicit Discharges

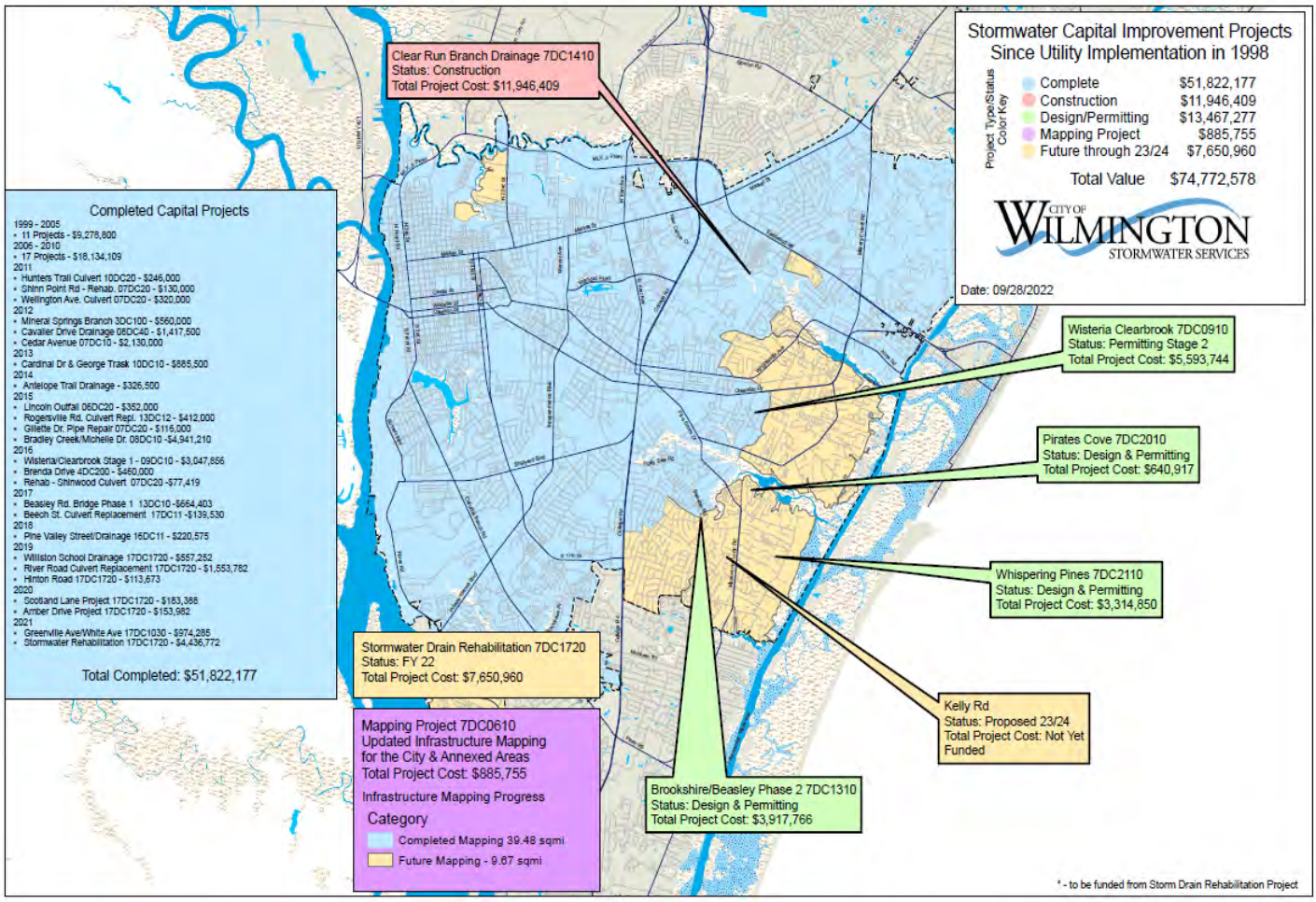
Reports of illicit discharges are addressed on a case by case basis. Informational posters and brochures for general use have been developed for distribution and others for specific common source types. These posters are distributed to specific types of businesses to display for employees in restaurants, vehicle maintenance businesses, construction site on industry specific issues and best management practices to avoid and prevent stormwater pollution.

Cape Fear Public Utility Authority

The Cape Fear Public Utility Authority (CFPUA) currently employs three Environmental Compliance Officers, one Environmental Compliance Supervisor, and one Environmental Compliance Manager that implement and enforce elements of the City's NPDES Wastewater Discharge Permit to include the City's Collection System Permit. As part of those requirements the group regulates sanitary sewer overflows (SSOs) and eliminates any wastewater or other polluted waters from leaving their system. They respond to reports and investigate leads generated by the public or monitoring results as part of their permit requirement and respond using public education, enforcement and maintenance. The CFPUA copies the City on all SSOs and follows up with monitoring results and clean up measures. The CFPUA has maintained right of entry on the properties that it services. The city and CFPUA are working together to keep open lines of communication, continue to build relationships and combine resources in a continued effort to locate chronic leaks and minimize release to MS4.

The CFPUA and the City continue to utilize the joint policy established in 2011 for the reporting and documentation of SSOs and leaks. This policy provides procedures for CFPUA to follow regarding reporting and documentation of SSOs the impact the City's MS4. These guidelines will enable the City to comply with Phase II reporting requirements as well as provide assistance to CFPUA in mitigating any potential threat to public health and environment. This policy is attached in Appendix D.

Capital Improvements



In-House Projects

Location	Pipe				Structures			BMP			Total Cost
	Amt.	Size	Type	Cost	Amt.	Type	Cost	Amt.	Type	Cost	
2702 Columbia Ave.	70 Ft.	36"	ADS	$ 44,665.06							$ 44,665.06
309 Yorkshire Dr.	24ft.	15"	RCP	$ 1,786.90							$ 1,786.90
7919 Masonboro Loop Rd.	20 ft.	24"	ADS	$ 3,075.95							$ 3,075.95
Total				$ 49,527.91			$ -			$ -	**$ 49,527.91**

Operations and Maintenance

Yearly Maintenance Activities Chart

	Amount	Unit of Measure	Total Labor Hrs.	Total Cost
SECTION 1: CONSTRUCTION				
STM1900 Flume	-	Each		$ -
STM1202 Ditch	-	Each		$ -
STM0603 Pipe Replacement	569.00	Ft.	2485.25	$ 197,350.74
STM0102 SCM		Each		$ -
STM2700 Stock Pile Material	42.00	Load	60.50	$ 7,282.84
STM0702 Structure Installation	2.00	Each	160.00	$ 11,558.12
			2,705.75	**$ 216,191.70**
SECTION 2: INSPECTION				
STM2000 Closed	4,109.00	Each	4553.42	$ 159,427.99
STM2001 Open	19.00	Each	528.50	$ 13,111.79
STM0100 SCM	46.00	Each	212.50	$ 7,168.11
STM0400 Survey			34.00	$ 1,053.31
			5,328.42	**$ 180,761.20**
SECTION 3: MAINTENANCE				
STM1101 Acreage Mowing	211.84	Acre	2062.00	$ 166,743.40
STM2600 Creek Walk Thru	98,279.00	Ft.	1889.50	$ 55,906.83
STM0801 Reset Cover	226.00	Each	282.50	$ 8,658.79
STM1400 Equipment Repair				$ 80,148.45
STM 1400 Equipment Maintenance				$ 8,202.85
STM1800 Haul Waste	105.00	Load	494.50	$ 54,247.56
STM1200 Manual Ditching	127,721.00	Ft.	2355.25	$ 73,110.50
STM1201 Mechanical Ditching	22,569.00	Ft.	2797.60	$ 180,002.75
STM0604 Pipe	63,972.50	Ft.	3459.00	$ 126,981.87
STM2400 Pot Hole	5,996.00	Each	3003.00	$ 87,969.38
STM2800 Right of Way				$ 46,317.58
STM0101 SCM	352.00	Each	4782.00	$ 215,919.24
STM1700 Screen Material				$ 732.70
STM1100 Slope Mowing	753,291.00	Ft.	2228.20	$ 176,397.24
STM0703 Structure	476.00	Each	449.50	$ 13,697.78
STM1300 Sweep Streets	7,578.40	Mile	6864.25	$ 790,696.62
STM2100 Yard			1421.75	$ 65,924.29
			32,089.05	**$ 2,151,657.83**
SECTION 4: REPAIR				
STM0600 Cave In	123.00	Each	413.75	$ 17,736.41
STM0701 Convert Structure	7.00	Each	290.50	$ 13,292.77
STM1203 Erosion	813.00	Ft.	248.25	$ 13,947.70
STM0601 Pipe Rehabilitation	44.00	Each	1411.50	$ 90,559.09
STM0800 Replace Cover	115.00	Each	148.75	$ 19,210.93
STM0700 Structure	31.00	Each	998.50	$ 49,720.65
STM1204 Flume		Each		$ -
STM0900 Tide gate repair		Each		$ -
			3,511.25	**$ 204,467.55**
Other				
STM0200 Assessment			421.50	$ 16,372.22
STM 1801 Haul Equipment			151.50	$ 10,444.46
STM2900 Projects			123.00	$ 8,908.85
STM1600 Pumping			350.50	$ 11,329.86
STM2500 Special Request			1486.50	$ 73,462.87
STM1500 Training			1840.00	$ 54,956.39
			4,373.00	**$ 175,474.65**

Water Quality

Monitoring Program Overview

In October 1997, the City of Wilmington contracted with the UNCW Center for Marine Science for a project with the goal of assessing water quality in Wilmington City watersheds under base flow conditions. Also, certain sites were analyzed for sediment heavy metals concentrations (EPA Priority Pollutants). New Hanover County also participated in this effort for tidal creeks outside of City jurisdiction. UNCW produced a combined report of results entitled Environmental Quality of Wilmington and New Hanover County Watersheds. Immediately below is an overview of their work methods. Following this overview is the executive summary of their most recent report.

The water quality data in these reports are presented from a watershed perspective. Some of the watersheds cross political boundaries (i.e. parts of the same watershed may lie in the County but not the City). Howe and Whiskey Creeks are examples. Water quality parameters analyzed in the tidal creeks include water temperature, pH, dissolved oxygen, salinity/conductivity, turbidity, nitrate, ammonium, orthophosphate, chlorophyll *a*, and in selected creeks fecal coliform bacteria. Similar analyses were carried out in the City watersheds with the addition of total nitrogen (TKN), total nitrogen (TN), total phosphorus (TP), total suspended solids (TSS) and biochemical oxygen demand (BOD) at selected sites.

Water Quality Methods

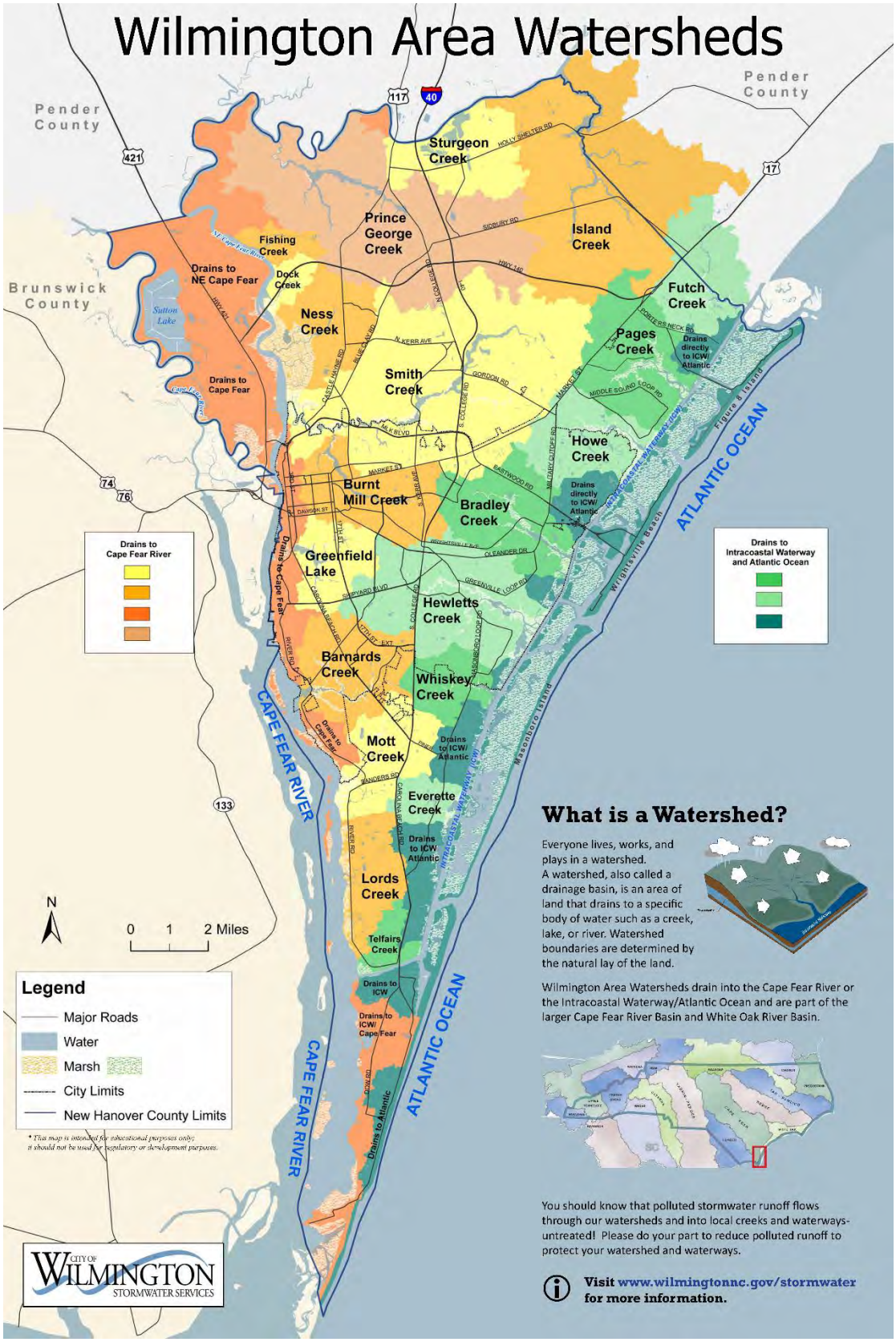
Field parameters were measured at each site using a YSI 6920 Multiparameter Water Quality Probe (sonde) linked to a YSI 650 MDS display unit. Individual probes within the instruments measured water temperature, pH, dissolved oxygen, turbidity, salinity, and conductivity. YSI Model 85 and 55 dissolved oxygen meters were also used on occasion. The instruments were calibrated prior to each sampling trip to ensure accurate measurements. The UNCW Aquatic Ecology laboratory is State-Certified for field measurements (temperature, conductivity, dissolved oxygen and pH) and for laboratory chlorophyll *a* measurements.

The analytical method used to measure chlorophyll *a* is described in Welschmeyer (1994) and US EPA (1997). Chlorophyll *a* concentrations were determined from the 1.0 micrometer glass fiber filters used for filtering samples for nitrate+nitrite and orthophosphate analyses. All filters were wrapped individually in aluminum foil, placed in an airtight container and stored in a freezer. During the analytical process, the glass filters were separately immersed in 10 ml of a 90% acetone solution. The acetone was allowed to extract the chlorophyll from the material for 18-24 hours. The solution containing the extracted chlorophyll was then analyzed for chlorophyll *a* concentration using a Turner AU-10 fluorometer. This method uses an optimal combination of excitation and emission bandwidths that reduces errors in the acidification technique.

Nutrients (nitrate, ammonium, total Kjeldahl nitrogen, total nitrogen, orthophosphate, and total phosphorus) and total suspended solids (TSS) were analyzed by a state-certified contract laboratory using EPA and APHA techniques. We also computed inorganic nitrogen to phosphorus molar ratios for relevant sites (N/P). Fecal coliform concentrations were determined using a membrane filtration (mFC) method (APHA 1995).

For a large wet detention pond (Ann McCrary Pond on Burnt Mill Creek) and for a constructed wetland on Kerr Avenue (at the headwaters area of Burnt Mill Creek) UNCW collected data from input (control) and outfall stations. This data was used to test for statistically significant differences in pollutant concentrations between pond input and output stations. The data were first tested for normality using the Shapiro-Wilk test. Normally distributed data parameters were tested using the paired-difference t-test, and non-normally distributed data parameters were tested using the Wilcoxon Signed Rank test. Statistical analyses were conducted using SAS (Schlotzhauer and Littell 1987).

Wilmington (New Hanover County) Watersheds Map



ENVIRONMENTAL QUALITY OF WILMINGTON AND NEW HANOVER COUNTY WATERSHEDS, 2021

by

Michael A. Mallin, Matthew R. McIver, Amy E. Grogan, Nicholas D. Picha and Lawrence B. Cahoon

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University of North Carolina Wilmington
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Executive Summary

This report represents results of Year 24 of the Wilmington Watersheds Project. Water quality data are presented from a watershed perspective, regardless of political boundaries. The 2021 program involved 6 watersheds and 20 sampling stations. In this summary we first present brief water quality overviews for each watershed from data collected between January and December 2021. As part of a change in priorities, sampling at Barnards, Howe, Motts and Whiskey Creek were suspended for the time being to emphasize upper Bradley Creek and the Greenfield Lake watershed, both of which are scheduled for restoration measures; also two new sites in Barnards Creek upstream in Carriage Hills were sampled.

Barnards Creek – Barnards Creek drains into the Cape Fear River Estuary. It drains a 4,173 acre watershed that consists of 22.3% impervious surface coverage, and a human population of approximately 12,200. In October 2021 sampling was initiated at two upper creek sites near Carriage Hills close to a wet detention pond (CHP-U and CHP-D). Early data show some potential dissolved oxygen and fecal bacteria issues, but we caution that is only based on three samples.

Bradley Creek – Bradley Creek drains a watershed of 4,583 acres, including much of the UNCW campus, into the Atlantic Intracoastal Waterway (AICW – Plate 1). The watershed contains about 27.8% impervious surface coverage, with a population of about 16,470. The uppermost site, BC-RD, is on upper Clear Run at Racine Dr., and subsequently drains downstream to BC-CA, Clear Run at College Acres. The two lower sites currently sampled are BC-NB, Bradley Creek north branch at Wrightsville Ave., and BC-SB, Bradley Creek south branch at Wrightsville Ave.). The sites were sampled six times in 2021.

High turbidity and suspended solids in 2021 were not problematic. Dissolved oxygen was stressed (< 5.0 mg/L) on most occasions at the two upper sites BC-RD and BC-CA. Nitrate and especially total phosphorus concentrations were elevated in Clear Run compared with the lower two sites on Wrightsville Avenue. Except for BC-RD, our Bradley Creek stations did not host significant algal blooms during the 2021 sampling trips. Fecal coliform bacteria counts were moderate at the lower two sites but particularly excessive at BC-RD and BC-CA, which had geometric mean counts of 823 and 750 CFU/100 mL, compared with the NC standard for safe waters of 200 CFU/100 mL.

Burnt Mill Creek – Burnt Mill Creek drains a 4,207 acre watershed with a population of about 23,700. Its watershed is extensively urbanized (39.8% impervious surface coverage) and drains into Smith Creek. Three locations were sampled during 2021, on six occasions. Fecal coliform conditions were rated Poor in at the lowermost station BMC-PP at Princess Place and Fair in the upper two sites BMC-AP1 above and BMC- AP3 below Anne McCrary Pond, the regional wet detention pond on Randall Parkway. Dissolved oxygen concentrations were Good in the two upper stations and Poor in the remaining lower creek site.

We note that fecal coliform counts significantly declined during passage through the detention pond. Several algal blooms occurred in the pond and one major bloom occurred at BMC-PP in May 2021. Several water quality parameters showed an increase in pollutant levels along the creek from the outfall

from the detention pond to the downstream Princess Place sampling station, including fecal coliform bacteria, nitrogen and phosphate, indicating non-point pollution sources continue to pollute the lower creek.

Greenfield Lake – This lake drains a watershed of 2,465 acres, covered by about 37% impervious surface area with a population of about 10,630. This urban lake has suffered from low dissolved oxygen, algal blooms, periodic fish kills and high fecal bacteria counts over the years. The lake was sampled at three tributary stream sites and three in-lake sites on 11 occasions. Of the tributaries of Greenfield Lake, Squash Branch (GL-SQB, near Lake Branch Drive), Jumping Run Branch at 17th Street and Jumping Run Branch at Lakeshore Dr.,GL-SQB suffered from low dissolved oxygen problems, as did GL-2340 in the main lake.

Algal blooms are chronically problematic in Greenfield Lake and have occurred during all seasons. In 2021 a massive summer-fall blue-green algal bloom of *Anabaena* occurred. In August this organism, combined with Microcystis aeruginosa produced measurable toxicity. Previously published studies found a statistically significant relationship within the lake between chlorophyll *a* and five-day biochemical oxygen demand (BOD5) meaning that the algal blooms are an important cause of low dissolved oxygen, and high BOD occurred congruent with the blooms in 2021. In 2021 all three tributary stations exceeded the fecal coliform State standard on >45% of occasions sampled and rated Poor; the in-lake stations were in Fair condition for fecal bacteria except for GL-2340, rated Poor.

Greenfield Lake is currently on the NC 303(d) list for impaired waters due to excessive algal blooms. The thesis work of former UNCW graduate student Nick Iraola assessed the five main inflowing tributaries to the lake to demonstrate that the largest inorganic nutrient loads came in from Jumping Run Branch and Squash Branch. We are pleased to say that a coalition of stakeholders (the City, Cape Fear River Watch, UNCW, NCSU and the engineering firm Moffat & Nichol) were awarded funds for 2020-2022 and UNCW has been sampling in support of future nutrient reduction efforts on Jumping Run Branch. Data show the Willard Street Wetland, between Willard St., 15th St. and 16th St. receives high nutrient and very high fecal coliform loads from inflowing drains, and elevated concentrations of those pollutants make it out of the wetland into Jumping Run Branch. An analysis of sediment phosphorus loads found elevated concentrations in Jumping Run Branch both upstream and downstream of the golf course. The engineering team is currently completing strategies to restore the wetland to reduce the pollutant load, and the City is planning to take action on those strategies.

Hewletts Creek – Hewletts Creek drains a large (7,478 acre) watershed into the Atlantic Intracoastal Waterway. This watershed has about 25.1% impervious surface coverage with a population of about 20,210. In 2021 the creek was sampled at four tidal sites on six occasions.

Only minor incidents of low dissolved oxygen occurred in Hewletts Creek in 2021. Turbidity was low and did not exceed the state standard, and no major algal blooms occurred. Fecal coliform bacteria counts were elevated somewhat at MB-PGR and NB- GLR, but no sites had a geometric mean that exceeded 200 CFU/100 mL; and the geometric mean of fecal bacteria counts at HC-3 was not over the state shellfishing standard.

Howe Creek – Howe Creek drains a 3,516 acre watershed into the ICW. This watershed hosts a population of approximately 6,460 with about 21.4% impervious surface coverage. Due to resource re-allocation, sampling was suspended here in 2020.

Motts Creek – Motts Creek drains a watershed of 3,342 acres into the Cape Fear River Estuary with a population of about 9,530; impervious surface coverage 23.4%. Due to Covid-19 and resource re-allocation, sampling was suspended here in 2020.

Smith Creek – Smith Creek drains into the lower Northeast Cape Fear River just upstream of where it merges with the Cape Fear River (Plate 1). It has a watershed of 16,650 acres that has about 21.3% impervious surface coverage, with a population of about 31,780. One estuarine site on Smith Creek, SC-CH, was sampled by UNCW under the auspices of the Lower Cape Fear River Program (LCFRP).

The dissolved oxygen standard for Smith Creek, which is rated as C Sw waters, is 4.0 mg/L, which was violated on only one of 8 occasions in our 2021 samples for a Fair rating. The North Carolina turbidity standard for estuarine waters (25 NTU) was not exceeded. There were no major algal blooms present in our 2021 sampling, although nitrate increased considerably over 2020. Fecal coliform bacterial concentrations exceeded 200 CFU/100 mL on only one of 8 sampling occasions in 2021 for a Fair rating.

Whiskey Creek – Whiskey Creek is the southernmost large tidal creek in New Hanover County that drains into the AICW (Plate 1). It has a watershed of 2,078 acres, a population of about 8,000, and is covered by approximately 25.1% impervious surface area. Due to resource re-allocation, sampling was suspended here for 2021.

Water Quality Station Ratings – The UNC Wilmington Aquatic Ecology Laboratory utilizes a quantitative system with four parameters (dissolved oxygen, chlorophyll *a*, turbidity, and fecal coliform bacteria) to rate water quality at our sampling sites. If a site exceeds the North Carolina water quality standard (see Appendix A) for a parameter less than 10% of the time sampled, it is rated Good; if it exceeds the standard 10-25% of the time it is rated Fair, and if it exceeds the standard > 25% of the time it is rated Poor for that parameter.We applied these numerical standards to the water bodies described in this report, based on 2021 data, and have designated each station as Good, Fair, and Poor accordingly.

Fecal coliform bacterial conditions for the entire Wilmington City and New Hanover County Watersheds system (20 sites sampled for fecal coliforms) showed 10% to be in Good condition, 45% in Fair condition and 45% in Poor condition. Dissolved oxygen conditions (measured at the surface) system-wide (20 sites) showed 40% of the sites were in Good condition, 30% were in Fair condition, and 30% were in Poor condition. For algal bloom presence, measured as chlorophyll *a*, 65% of the 20 stations sampled were rated as Good, 20% as Fair and 15% as Poor. For turbidity, 100% of sites were Good. It is important to note that the water bodies with the worst water quality in the system also have the most developed watersheds with the highest impervious surface coverage; Burnt Mill Creek – 39% impervious coverage; Greenfield Lake – 37% impervious coverage; Bradley Creek – 28% impervious coverage.

2021-2022 NPDES PROGRAM HIGHLIGHTS & ANNUAL REPORTING

Public Education & Outreach

- 14 instructional videos for New Hanover County 8th grade science classes created and delivered to 21 teachers and approximately 2000 students.
- Pet waste educational signs were posted in city parks with 469+ pet waste roll bags for cleanup, given away free to park visitors.
- A coordinated "There is No Poop Fairy" pet waste campaign ran across several mass media platforms in Spring 2022 on Port City Daily digital newspaper, Lamar Billboards, and WECT TV/digital/mobile/web.

Public Involvement & Participation

- 10 watershed cleanups involving 359 volunteers contributing 730 volunteer hours cleaned up 10.35 miles of creeks/watersheds within the city limits.
- 28 storm drain markers were placed in neighborhoods off Tanbridge Road, King Arthur, and Cavalier Drive utilizing 17 volunteers contributing 21.5 hours, and distributing 76 educational doorhangers.
- Public involvement in the form of public meetings, direct mail, public notices and/or one-on-one property owner meetings were conducted for Clear Run Branch, Red Berry Drive, Whispering Pines, Park Avenue, Greenville/White Avenue, Shandy Lane, Royal Palm Lane, Pirates Cove, and Wrightsville Green.

Illicit Discharge Detection and Elimination (IDDE)

- Stormwater infrastructure mapping has continued with the goal of mapping the public drainage system throughout the City. Re-mapping of previous annexation areas continues.
- Dry weather flow investigations goal was met this year.
- Education through PSAs regarding pet waste.

Post-Construction Site Runoff Controls

- Full implementation of recently modified Land Ordinance Code finalized and since December 2021.
- Continued site plan reviews of all new development and redeveloped sites.
- SW permit tracking mechanism continues to make progress.

Pollution Prevention and Good Housekeeping for Municipal Operations

- Three separate staff trainings this reporting year.
- I&M for 18 City owned facilities with oil/water separators began.
- Debris volumes collected from vacuum trucks and sweepers equals 259 tons and 1,512 tons, respectively.
- Purchase of specialized equipment for mechanical removal of aquatic weeds.

Voluntary Watershed Restoration Plan for Bradley & Hewletts Creeks

- Entered into the EPA 319 Grant "Phase II of Reducing Stormwater Runoff Volume on the UNC-Wilmington Campus" in January 2022 with local partners North Carolina Coastal Federation and UNC-Wilmington.
- Collaborated with the Wrightsville Green CIP project and used Heal Our Waterways Program funds to install 45 trees in existing SCMs and along drainage easements in the Bradley and Hewletts Creeks Watersheds.
- Two bioretention projects on UNC-Wilmington campus were installed and will treat a combined total of 28,701 gallons per each 1-year, 24-hour storm.

- The final FY22 volume reduction totals for Bradley Creek and Hewletts Creek were 46,502.84 gallons and 3,436.97 gallons, respectively. These totals include grant projects, rain barrel sales, the HOWBMP contract, and HOW-funded SCMs.

SECTION B: PUBLIC EDUCATION AND OUTREACH

1. Objectives for Public Education and Outreach

Distribute educational materials to the community or conduct equivalent outreach activities addressing impacts of storm water discharges on water bodies and the steps the public can take to reduce pollutants in storm water runoff.

2. BMPs for Public Education and Outreach

The permittee shall implement the following BMPs to meet the objectives of the Public Education and Outreach Program and shall notify the Division prior to modification of any goals.

BMP	Measurable Goals
a. Goals and Objectives	Defined goals and objectives of the Local Public Education and Outreach Program based on community wide issues.
b. Describe target pollutants and/or stressors	The permittee shall maintain a description of the target pollutants and/or stressors and likely sources.
c. Describe target audiences	The permittee shall maintain a description of the target audiences likely to have significant storm water impacts and why they were selected.
d. Describe residential and industrial/commercial issues	The permittee shall describe issues, such as pollutants, likely sources of those pollutants, impacts, and the physical attributes of stormwater runoff, in their education/outreach program.

Accomplishments:

A comprehensive public outreach/education and participation/involvement plan including goals, objectives, target pollutants, sources, and target audiences is included in the Public Education & Outreach Appendix of this report.

This plan defines the likely sources for each stormwater pollutant and includes suggested outreach messages, formats, and strategies for reaching target audiences and for getting the public involved. Staff regularly utilizes this information as a guide for planning, implementing, and evaluating outreach and participation efforts throughout the city. Community-based social marketing is the crux of the plan. The plan is updated and modified as pollutant sources, target audience demographics, public awareness, behavior, water quality, funding, and other program variables change over time. The plan received an update in Winter 2022.

e. Informational Web Site	The permittee shall promote and maintain, an internet web site designed to convey the program's message.

Accomplishments:

Stormwater Services hosts a comprehensive website at www.wilmingtonnc.gov/stormwater.
Staff regularly updates the website with pertinent program content including stormwater news, monthly rain barrel sale info, grant projects, Canines for Clean Water, Enviroscape, Annual UNCW Water Quality Report,

and a new webpage focused solely on stormwater capital and in-house drainage improvement projects. This year, new resources for Trees, Cyanobacteria/Blue-Green Algae, as well as how to report an algal bloom were added to the publications page of our website. New pet waste pollution videos created with WECT-NBC-TV6 were also added to the website and updates were made to the Regulations/NPDES and major projects.

In the near future, the City Communications Team will begin the lengthy process to update the city's web presence to a new platform. Stormwater Services will be involved in this transition and upgrade, which will require stormwater staff to re-create the stormwater webpages from scratch.

f. Distribute public education materials to identified target audiences and user groups.	The permittee shall distribute stormwater educational material to appropriate target groups (ex.: schools, homeowners, and/or businesses). Instead of developing its own materials, the permittee may rely on Public Education and Outreach materials supplied by the state, and/or other entities through a cooperative agreement, as available, when implementing its own program.

Accomplishments:

Stormwater content was incorporated into the city's booklet newsletter format in the spring. Content included articles about the community pet waste survey, floating wetlands in Greenfield Lake, grant projects in Bradley Creek watershed, stormwater outreach intern bio, and the UNCW water quality monitoring report of creeks and lakes that fall within the city limits. State classification and rating data are also included in the water quality report about each creek. The citywide newsletter was mailed to 45,000+ city residents.

The Enviroscape Watershed Education Program has been integrated into the 8th grade curriculum since 2005. The program reaches all 8th grade science classes in New Hanover County Schools each year. In FY21/22, 14 instructional videos were created in place of classroom presentations (due to the uncertainty of Covid19 at the time). The videos were exceptional and sent to 21 teachers to use for their classrooms serving about 2,000 students in total.

Two major community events – LakeFest & StriperFest - were cancelled due to Covid19, however the annual Earth Day Festival at Long Leaf Park returned and had the highest attendance and diversity ever. Stormwater had an interactive "Be a Stormwater Hero" photo booth and also an educational table with displays, giveaways, and educational information.

Education staff continued community pet waste cleanup promotion by posting the signs with free pet waste roll bags in city parks. This program continues to be very successful distributing over 469 roll bags this year. Stormwater compliance officers also responded to community complaints about pet waste.

Outreach staff presented to the Loblolly Garden Club in the spring. Topics covered included stormwater pollution, solutions, the impacts of polluted runoff on area waterways, on-the-ground stormwater solutions, and opportunities to get involved at the local level. A rain barrel was raffled off to one winner at the well-attended event.

Wilmington continues to struggle with a bacterial pollution problem, in part due to uncollected pet waste. Two new pet waste public service announcements – the Poop Fairy & Cheering the Scoop were filmed for use on our Youtube Channel and in mass media campaigns.

This spring, coordinated mass media campaigns ran on Lamar Billboards, Port City Daily online newspaper, and WECT digital, mobile, social media, and television platforms. Content was also included in Cape Fear's Going Green Magazine and city social media outlets. In addition, a community pet waste survey was implemented this spring. The timing of the survey was unfortunate due to the lateness of the citywide

newsletter being mailed, in which the survey was debuted. The survey was supposed to be out in the community and completed before the spring pet waste ad campaigns ran.

g. Maintain Hotline/Help line	The permittee shall promote and maintain a stormwater hotline/helpline for the purpose of public education and outreach.

Accomplishments:

The Stormwater Pollution Prevention hotline and web reporting tool were established in January 2010 to field calls from citizens, businesses, and employees to report illicit discharges and instances of potential or actual stormwater pollution. The hotline phone # is 910-341-1020 and the web address is www.wilmingtonnc.gov/reportstormwaterpollution.

Hotline/web reports are routed to the Stormwater Code Compliance Officers who track, investigate, and respond to each hotline report. Compliance officers routinely educate each violator, in addition to issuing necessary fines and/or notices of violation. The hotline and online reporting webform are advertised in a variety of ways including the website, City's cable TV channel, citywide newsletter, community events, outreach promotional giveaways, and large educational magnets on stormwater maintenance and compliance officer vehicles.

To summarize hotline/web reporting activity this past fiscal year:
17 calls were placed to the City's Stormwater hotline, 10 online webform reports were submitted, and 7 direct emails and 8 direct calls were received by the Compliance Officers related to stormwater violations.
The nature of the hotline reports is found in the Enforcement section of the Appendix. In addition, there are 21 stormwater complaints recorded under the previous Compliance Officer that the method of notification is unknown. The nature of the hotline reports are found in the Enforcement section of the Appendix.

h. Implement a Public Education and Outreach Program.	The permittee's outreach program, including those elements implemented locally or through a cooperative agreement, shall include a combination of approaches designed to reach the target audiences. For each media, event or activity, including those elements implemented locally or through a cooperative agreement the permittee shall estimate and record the extent of exposure.

Accomplishments:

The extent of exposure requirement is documented in tables in the Public Outreach/Education Appendix, as well as the Public Involvement Appendix. Documentation includes the date of event or activity, the type of event/activity, audience reached, who delivered the content, the method of delivery and/or message, and the resulting attendance or participation. In addition, agencies under contract with the city to help meet NPDES deliverables are included in the Appendix.

Plans for Future Program Implementation

The city's stormwater outreach and education program continues to implement a variety of outreach and educational events and programming. These activities educate and involve the community in stormwater runoff pollution and solutions and inspire action and behavior change.

Covid-19 again impacted education programming and presentations at the start of the fiscal year, but alternative measures were taken to provide community education, such as instructional videos and outdoor events.

Plans for the next fiscal year include:

- Fecal coliform bacteria education – analyze data from the community pet waste survey.
- Create stormwater content for citywide spring newsletter booklet reaching 45,000 recipients.
- Conduct Enviroscape watershed education presentations for 8th grade science classes in New Hanover County Schools – either in-person, virtually, or instructional videos, based on school requirements this coming year.
- Implement new BMPs for public education for our new stormwater permit/SWMP.

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SECTION C: PUBLIC INVOLVEMENT AND PARTICIPATION

1. Objectives for Public Involvement and Participation

Comply with State and local public notice requirements when implementing a public involvement and participation program.

2. BMPs for Public Involvement and Participation

The permittee shall implement the following BMPs to meet the objectives of the Public Involvement and Participation Program and shall notify the Division prior to modification of any goals.

BMP	Measurable Goals
a. Volunteer community involvement program	The permittee shall include and promote volunteer opportunities designed to promote ongoing citizen participation.

Accomplishments:

The City of Wilmington Stormwater Services contracts annually with Cape Fear River Watch (CFRW) and New Hanover Soil & Water Conservation District (NHSWCD) to implement NPDES public involvement and participation activities, as well as public education and outreach services.

Both agencies sign a multi-year contract with the City which specifies deliverables that help Stormwater Services fulfill and/or enhance many of the requirements for NPDES public education and public participation. In addition to full-time staff, each agency taps into a volunteer base and engages citizens to participate in stormwater outreach/education and involvement/participation efforts.

Services performed by CFRW & NHSWCD include volunteer watershed clean-ups, volunteer creek monitoring, volunteer storm drain marking, educational presentations for schools and the community, a monthly rain barrel sale, creek eco-tours, school field days, website content, community stormwater best management practice (BMP) installations, and more.

Each agency provides the City with four quarterly progress reports and invoices during the annual contract period for the services performed. The cumulative year-end 4th quarter progress report for each agency is included in the Public Involvement and Participation Appendix of this annual report. In addition, the city regularly monitors agency/contract performance throughout the fiscal year.

b. Mechanism for Public involvement	The permittee shall provide and promote a mechanism for public involvement that provides for input on stormwater issues and the stormwater program.

Accomplishments:

Additional stormwater capital projects and in-house projects were begun or continued this year and provided a means for regular public input with stormwater staff. In addition, the stormwater projects page was updated continually to provide the public with real-time information about projects that might impact them.

Public involvement in the form of public meetings, direct mail, public notices and/or one-on-one property owner meetings were conducted for Clear Run Branch, Red Berry Drive, Whispering Pines, Park Avenue, Greenville/White Avenue, Shandy Lane, Royal Palm Lane, Pirates Cove, and Wrightsville Green.

Community events, like the annual Earth Day Festival, also provide the community with a forum for directly interacting with stormwater staff and getting questions answered on the spot.

Our hotline also provides the public a means to report on stormwater pollution in the community. See below.

c. Hotline/Help line	The permittee shall promote and maintain a hotline/helpline for the purpose of public involvement and participation.

Accomplishments:

The Stormwater Pollution Prevention hotline and web reporting tool were established in January 2010 to field calls from citizens, businesses, and employees to report illicit discharges and instances of potential or actual stormwater pollution. The hotline phone # is 910-341-1020 and the web address is www.wilmingtonnc.gov/reportstormwaterpollution.

Hotline/web reports are routed to the Stormwater Code Compliance Officers who track, investigate, and respond to each hotline report. Compliance officers routinely educate each violator, in addition to issuing necessary fines and/or notices of violation. The hotline and online reporting webform are advertised in a variety of ways including the website, City's cable TV channel, citywide newsletter, community events, outreach promotional giveaways, and large educational magnets on stormwater maintenance and compliance officer vehicles.

To summarize hotline/web reporting activity this past fiscal year:
17 calls were placed to the City's Stormwater hotline, 10 online webform reports were submitted, and 7 direct emails and 8 direct calls were received by the Compliance Officers related to stormwater violations.
In addition, there are 21 stormwater complaints recorded under the previous Compliance Officer that the method of notification is unknown. The nature of the hotline reports are found in the Enforcement section of the Appendix.

Plans for Future Program Implementation

The city's stormwater involvement and participation program engages community volunteers primarily through contract agency activities. This year we have seen volunteer numbers increase with activities such as watershed cleanups and creek monitoring. These activities involve the community in hands-on solutions and inspire action and behavior change to improve area creeks and waterways. These activities can be viewed in the Appendix in more detail.

Plans for the next fiscal year include:

- Negotiate and establish outside-agency contractual partnerships in alignment with our NPDES permit term to engage the community in storm drain marking, creek monitoring, watershed cleanups, and education.
- Continue to engage the community with mailers, public meetings, and one-on-one meetings for capital and in-house projects
- Perform self-assessment of public outreach/education and involvement/participation BMPs and revise PE/PI plan as necessary

SECTION D: ILLICIT DISCHARGE DETECTION AND ELIMINATION (IDDE)

1. Objectives for Illicit Discharge Detection and Elimination

a. Implement and enforce a program to detect and eliminate illicit discharges into the MS4. b. Maintain a storm sewer system map, showing the location of all major outfalls and the names and location of all waters of the United States that receive discharges from those outfalls;
c. Prohibit, through ordinance, or other regulatory mechanism, non-storm water discharges except as allowed in this permit and implement appropriate enforcement procedures and actions;
d. Implement a plan to detect and address non-storm water discharges, including illegal dumping, to the MS4;
e. Inform public employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste; and
f. Address the categories of non-storm water discharges or flows (i.e., illicit discharges) in Part I.H of this permit only if you identify them as significant contributors of pollutants to the MS4.

2. BMPs for Illicit Discharge Detection and Elimination

The permittee shall implement the following BMPs to meet the objectives of the Illicit Discharge Detection and Elimination Program and shall notify the Division prior to modification of any goals.

BMP	Measurable Goals
a. Maintain adequate legal authorities	The permittee shall annually review the permittee's IDDE ordinances or other regulatory mechanisms, or adopt any new ordinances or other regulatory mechanisms that provide the permittee with adequate legal authority to prohibit illicit connections and discharges and enforce the approved IDDE Program.

Accomplishments:

The City continues to utilize the existing ordinances in place to address illicit discharges to its system. The City passed the Ordinance to amend Chapter 12 of the City Code on 9/15/2009 to address illicit discharges to the stormwater system and to protect public water and sewer systems. This Ordinance change went into effect on November 1, 2009.

The current Cape Fear Public Utility Authority (CFPUA) ordinance defines wastewaters that are required to be discharged into the sanitary sewer system. The City utilizes CFPUA's ordinance to address discharges of regulated wastewaters to the City's MS4 and other natural outlets.

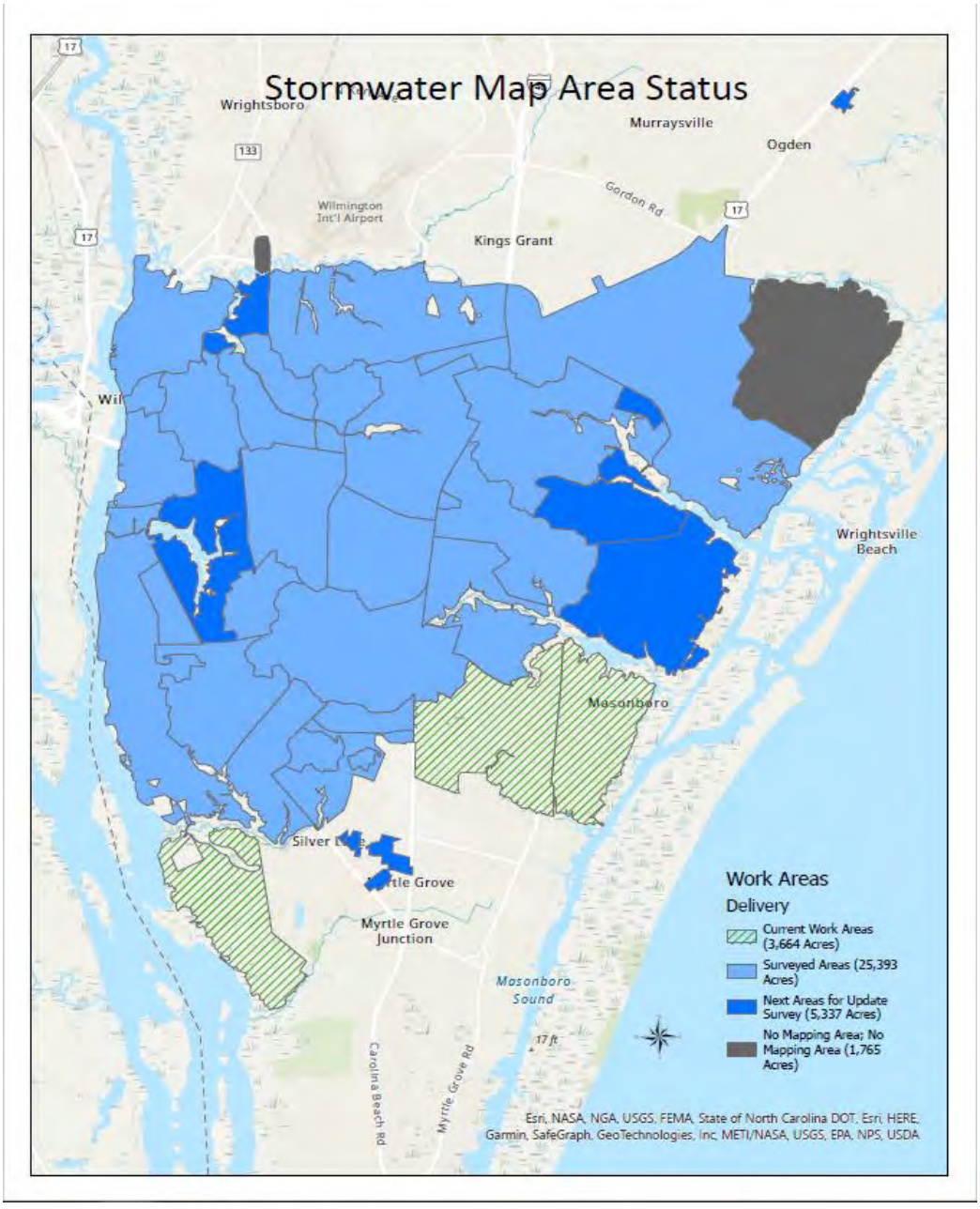
The City also utilizes a policy for reporting SSOs from the Cape Fear Public Utility Authority to the City (see Appendix D). Citizens can also call CFPUA hotline for SSOs – https://www.cfpua.org/703/Water-Sewer-Emergencies

The City will continue to review its ordinance annually to ensure we are providing adequate legal authority.

b. Maintain a Storm Sewer System Base Map of Major Outfalls.	The permittee shall maintain a current map showing major outfalls and receiving streams

The City continues to maintain and update a base map of major outfalls and receiving water bodies.

The City continues to make significant improvements and updates to the GIS inventory mapping of stormwater systems using the best available data. At this time, percentages mapped are shown in below figure of mapped areas with 97.5% of the City currently completed. This year, the City has continued to re-map "Annex 95-98" areas to bring the data into our current mapping standards as these areas were originally mapped in the early 2000s. Also, the River Lights (far southwest on map) will be fully mapped when the development has been completed, which may take several more years as streets are slowly turned over to the City. This development accounts for the remaining 2.5% that is unmapped. Thus, a 100% mapping completion may not take place for several more years.



c. Detect dry weather flows	The permittee shall maintain a program for conducting dry weather flow field observations in accordance with a written procedure for detecting and removing the sources of illicit discharges.

Accomplishments:
The City continues to use its data collection procedures established during the previous reporting years. Dry weather flow procedures are included in Appendix D.

City Staff has a goal to conduct 25% of total identified outfall investigations in the City per year for dry weather flow investigations. For this reporting year, staff conducted 27%. of total NPDES outfalls (Appendix D). This was an increase from the previous reporting year. Staff concentrated investigations in 2 impaired watersheds – Bradley Creek and Hewletts Creek. These two watersheds are important to the HOW program for the City's volunteer watershed restoration plan.

d. Investigate sources of identified illicit discharges.	The permittee shall maintain and evaluate annually written procedures for conducting investigations of identified illicit discharges.

Accomplishments:
The City has continued to utilize its existing ordinances and our Illicit Discharge Detection Elimination (IDDE) Policy and Procedures Manual. The purpose of this document is to provide a standard for guidance and information for the effective and efficient implementation of the Illicit Discharge Detection and Elimination Program within the City of Wilmington. The document outlines the investigation, testing, coordination with other authorities, GIS inventory, follow up, and documentation procedures to be taken to resolve a questionable dry weather flow. The City plans to reevaluate the IDDE Manual in the Fall 2022 and revise as necessary.

The City has completed its first full year of data input and documentation through the newly implemented *Munis*, our data management systems. All details of incidences reported are entered from the start of an incidence until the investigation is closed. This documentation into *Munis* has allowed for the extraction of data for evaluation of our program, and assessment to identify repeat offenders and chronic violators as well as serve as help us identify areas of the City with higher violation reports. See Appendix I.

e. Track and document investigations illicit discharges	The permittee shall track all investigations and document the date(s) the illicit discharge was observed; the results of the investigation; any follow-up of the investigation; and the date the investigation was closed.

Accomplishments:
The City continues to track illicit discharges in the stormwater system through our data management system. All details of incidences reported are entered from the start of an incidence until the investigation is closed. We continue reporting into the City's tracking database *Munis* (Appendix I).

f. Employee Training	The permittee shall implement and document a training program for appropriate municipal staff who as part of their normal job responsibilities, may come into contact with or otherwise observe an illicit discharge or illicit connection to the storm sewer system.

Accomplishments:
The City did not conduct any IDDE training within this reporting year, however, training is tentatively scheduled for winter 2022. The lack of training was a result of the vacant Compliance Officer position who

conducts the training. This position is currently being filled for the next reporting year.

g. Provide Public Education	The permittee shall inform public employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste.

Accomplishments:
The Stormwater Watch newsletter, and the Enviroscape Watershed Education Program remain big components of the City's efforts to educate the public on illegal discharges and improper disposal of waste.

Education staff continued community pet waste cleanup promotion by posting the signs with free pet waste roll bags in city parks. In addition, several PSAs were completed. Two new pet waste public service announcements – the Poop Fairy & Cheering the Scoop were filmed for use on our Youtube Channel and in mass media campaigns.

For more outreach efforts conducted this year, see Section B.(f).

h. Public reporting mechanism	The permittee shall promote, publicize, and facilitate a reporting mechanism for the public and staff to report illicit discharges and establish and implement citizen request response procedures.

Accomplishments:
The Stormwater Pollution Prevention hotline and web reporting tool were established in January 2010 to field calls from citizens, businesses, and employees to report illicit discharges and instances of potential or actual stormwater pollution. The hotline phone # is 910-341-1020 and the web address is www.wilmingtonnc.gov/reportstormwaterpollution.

See Section B.(g)

i. Enforcement	The permittee shall implement a mechanism to track the issuance of notices of violation and enforcement actions as administered by the permittee. This mechanism shall include the ability to identify chronic violators for initiation of actions to reduce noncompliance.

Accomplishments:
The City of Wilmington uses *Munis* data management system to track all requests for service. This includes illicit discharge reports from the public and from City staff. This system allows us to enter all relevant data from an investigation and then analyze, map, and track various aspects of the incident including enforcement actions and repeat offenders in order to identify chronic violators. For year 2021-2022, no civil penalties were issued for illicit discharges. See Appendix I for enforcement actions summary for this reporting year.

Assessment of Program Implementation
The City continues to maintain and update a base map of major outfalls and receiving water bodies as well as the stormwater inventory. In addition, the City will be continuously updating previous mapped areas that may have changed due to recent drainage improvement projects or for updated mapping standards. The City will continue with updating any stormwater mapping as necessary and report annually on the percent of changes.

Dry weather flow investigation's goal was fully met this year. Continue meeting set goal.

The City continues to utilize the Illicit Discharge Detection Elimination (IDDE) Policy and Procedures manual as the program evolves and will evaluate repeat offenders as needed. The manual will be re-evaluated this year and updated as necessary.

Employee training will be tentatively scheduled in fall 2022. The City has currently proposed in our draft SWMP to conduct training for 5 divisions twice over the next permit term. These divisions would include Stormwater field crews, Parks and Rec. field crews, Solid Waste field crews, Streets field crews and Engineering Inspectors.

Enforcement of IDDE violations will continued to be tracked through the City's management system. The City is currently in the process of filling the vacancy of the current Compliance Officer position that has been open for the past year.

The City contracted with Moffat and Nichol to perform a program review of its NPDES Phase II program in anticipation of our upcoming audit from the State in 2023. Moffatt & Nichol, as part of their scope of work, completed their review of the IDDE program. Recommendations are identified as BMPs in the City's draft SWMP provided to NC DEQ.

SECTION E: CONSTRUCTION SITE RUNOFF CONTROLS

The permittee relies on New Hanover County to comply with this minimum measure. The New Hanover County Sediment and Erosion Control Program effectively meets the requirements of the Construction Site Runoff Controls by permitting and controlling development activities disturbing one or more acres of land surface and those activities less than one acre that are part of a larger common plan of development. This program includes procedures for public input, sanctions to ensure compliance, requirements for construction site operators to implement appropriate erosion and sediment control practices, review of site plans which incorporates consideration of potential water quality impacts, and procedures for site inspection and enforcement of control measures.

New Hanover County Erosion Control Program information supplied in Appendix E.

SECTION F: POST-CONSTRUCTION SITE RUNOFF CONTROLS

1. Objectives for Post-Construction Site Runoff Controls

a. Implement and enforce a program to address storm water runoff from new development and redevelopment projects that disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale, that discharge into the small MS4. The program shall ensure that controls are in place that would prevent or minimize water quality impacts.
b. Implement strategies which include a combination of structural Stormwater Control Measures (SCM) and/or non-structural SCMs appropriate for the community;
c. Use an ordinance or other regulatory mechanism to address post-construction runoff from new development and redevelopment projects; and
d. Ensure adequate long-term inspection and maintenance of SCMs.

2. BMPs for Post-Construction Site Runoff Controls

The permittee shall implement the following BMPs to meet the objectives of the Post-Construction Stormwater Management Program. To the extent there is any conflict between this permit and the post-construction ordinances adopted by the permittee as approved by the Division, the post-construction ordinances shall apply to permit compliance.

BMP	Measurable Goals
a. Adequate legal authorities	Maintain through ordinance, or other regulatory mechanism, adequate legal authorities designed to meet the objectives of the Post-Construction Site Runoff Controls Stormwater Management program. The permittee shall have the authority to review designs and proposals for new development and redevelopment to determine whether adequate stormwater control measures will be installed, implemented, and maintained The permittee shall have the authority to request information such as stormwater plans, inspection reports, monitoring results, and other information deemed necessary to evaluate compliance with the Post-Construction Stormwater Management Program. The permittee shall have the authority to enter private property for inspections at reasonable times any facilities, equipment, practices, or operations related to stormwater discharges to determine whether there is compliance the Post-Construction Stormwater Management Program.

Accomplishments:

The City continues to utilize the Land Development Code that was amended and adopted on September 15, 2009 to provide post construction controls in order to meet the requirements of

the City's NPDES Phase II permit and to bring the ordinance into compliance with the Coastal Stormwater Legislation.

The City finalized draft updates to its Land Development Code in August 2021. Changes to that Code went in effect in December 2021. A major change in the Code is applying higher SA water quality standards to new development in the impaired Bradley Creek watershed. Changes to the new code have now been in effect for the 2022 calendar year.

b. Strategies which include Stormwater Control Measures (SCMs) appropriate for the MS4	Maintain strategies that include a combination of structural and/or non-structural SCMs implemented in concurrence with (a) above. Provide a mechanism to require long-term operation and maintenance of structural SCMs. Require annual inspection reports of permitted structural SCMs performed by a qualified professional. A qualified professional means an individual trained and/or certified in the design, operation, inspection and maintenance aspects of the SCM's being inspected, for example, someone trained and certified by NC State University for SCM Inspection & Maintenance. Within 12 months of the effective date of this permit, the permittee shall evaluate, and revise as needed, SCM requirements, to be at least as stringent as the minimum requirements in 15A NCAC 02H .1000.

Accomplishments:

The DWQ SCM manual was adopted when the stormwater ordinance was amended in 2009. This ordinance contains provisions addressing the use of combinations of structural and non-structural SCM's to manage stormwater runoff. Some examples of these include providing peak attenuation flow for the 2, 10 and 25 year storm event, requiring (new development) a 50 foot set back from surface waters, and stricter built-upon requirements for projects near SA waters.

The City Engineering Dept. reviews new development plans for structural and non-structural SCMs.

The Engineering Dept. employs four P.E.s for reviewing plans for new development and conducting site inspections for compliance with the City's Stormwater Ordinance. Engineering staff all are certified through the SCM Inspection and Maintenance Certificate offered through NC State's Biological and Agricultural Engineering Department.

This reporting year, the Plan Review Engineers in the Engineering Dept. have been working on code changes that will require annual reports of SCMs by a qualified professional. There are options to meet this requirement that are still being discussed. The City will be reviewing existing staff roles and responsibilities and making adjustments or recommendations to be considered for the next budget year.

c. Plan reviews	The permittee shall conduct site plan reviews of all new development and redeveloped sites that disturb greater than or equal to one acre (including sites that disturb less than one acre that are part of a larger common plan of development or sale). The site plan review shall address how the project applicant meets the performance standards and how the project will ensure long-term maintenance

Accomplishments:
The City continues to conduct site plan reviews utilizing the City's Land Development Code to provide post construction controls to meet the requirements of the City's Phase II permit. A summary of the plan review activities for this reporting year is available in Appendix F.

d. Inventory of projects with post-construction structural stormwater control measures	The permittee shall maintain an inventory of projects with post-construction structural stormwater control measures installed and implemented at new development and redeveloped sites, including both public and private sector sites located within the permittee's corporate limits that are covered by its post-construction ordinance requirements.

Accomplishments:
The City's Plan Review Engineers continue to update a spreadsheet of projects with stormwater control measures installed during the reporting year. This spreadsheet includes the dates permits were issued, review times for projects, types of projects (new development, redevelopment), and the types and numbers of SCMs per project location. This spreadsheet will continue to be used for future permits issued and evaluated or modified if data extraction is warranted. See Appendix F.

The previous goal in the last reporting year was to incorporate a new software, *EnerGov*, to help with the tracking of City issued stormwater permits. However, the software development is still behind schedule so any partial progress made during the last reporting year had to be reassessed. Currently while we wait on the software development, Engineering and Stormwater staff are using the above spreadsheet information to merge into a GIS application so the City can proceed with meeting this BMP until *EnerGov* can go live. Progress has been made with GIS application and is approximately 30% complete. This GIS application will also help keep track future permit renewals.

e. Deed Restrictions and Protective Covenants	The permittee shall provide mechanisms such as recorded deed restrictions and protective covenants that ensure development activities will maintain the project consistent with approved plans.

Accomplishments:
Current City of Wilmington stormwater management ordinance stipulates among other requirements for stormwater management after construction that:

Record (as-built) drawings for all stormwater management facilities certified by an authorized

registered professional must be provided to the City for permanent record.

When deemed necessary by the City, access is granted through permit conditions allowing the City and its agents and representatives adequate and perpetual access to the facility and sufficient area for inspection.

The following excerpt from the new stormwater ordinance became operational upon adoption City Council:

The approval of the stormwater permit shall require an enforceable restriction on property usage that runs with the land, such as recorded deed restrictions or protective covenants, to ensure that future development and redevelopment maintains the site consistent with the approved project plans.

Additionally, the existing ordinance has provisions to ensure that conveyance of the property does not terminate the original developer's obligations until a replacement permit has been issued. The original developer will be required to record in the deed conveying the property a notice of the existence of any stormwater devices and the purchaser's obligations to maintain and inspect them and to obtain a permit. There are also specific and detailed special requirements for property owner associations regarding operation and maintenance of stormwater devices, escrowing funds to ensure maintenance and remedies for the City in the event of failed compliance.

f. Provide a mechanism to require long-term inspection and maintenance of Stormwater Control Measures (SCMs).	The permittee shall implement or require an inspection and maintenance plan for the long-term operation of the SCMs required by the program. The inspection and maintenance plan shall require the owner of each SCM to perform and maintain a record of annual inspections of each SCM. Annual inspection of permitted structural SCMs shall be performed by a qualified professional.

Accomplishments:

The DWQ SCM manual was adopted when the stormwater ordinance was amended in 2009. This ordinance contains provisions addressing the use of combinations of structural and non-structural SCMs to manage stormwater runoff. With this adoption, the City also reviews and approves the I&M requirements and plans of the State through the review process. Inspection and Maintenance plan schedules may vary with SCM type.

g. Inspections	To ensure that all stormwater control measures are being maintained pursuant to its maintenance agreement, the permittee shall conduct and document inspections of each project site covered under performance standards, at least one time during the permit term. Before issuing a certificate of occupancy or temporary certificate of occupancy, the permittee shall conduct a post-construction inspection to verify that the permittee's performance standards have been met. The permittee shall document and maintain records of inspection findings and enforcement actions and make them available for review by the permitting authority.

Accomplishments:

Under the current stormwater management ordinance of the City, permitees of structural SCMs are required to properly maintain their stormwater management systems to ensure long term operation. The City conducts annual compliance inspections for privately owned stormwater SCM's in order to ensure maintenance responsibilities are being undertaken by property owners. Inspections were conducted by a City staff member who has completed the Stormwater SCM Inspection and Maintenance Certificate offered through NC State's Biological and Agricultural Engineering Department (certification #182). Recertification occurred in March 2021.

For this reporting year, a total of 37 private sites were inspected for their respective SCMs with 15 sites being out of compliance (see Appendix F).

The City also conducts inspections of facilities during the development and construction process. Before a Certificate of Occupancy is issued, compliance of permit conditions must be present.

City Stormwater field staff, who work on the maintenance of City owned SCMs, received their SCM Inspection and Maintenance certifications through NC State's program in November 2019. Approximately 5 staff members have certifications.

Stormwater Field Staff who conduct SCM maintenance on City owned devices went through training for SCM Maintenance, Permits and Certifications on July 28, 2021. This training can be found under the Pollution Prevention/Good Housekeeping section of this report (SectionG.2.i).

h. Educational materials and training for developers	The permittee shall make available through paper or electronic means, ordinances, post-construction requirements, design standards checklist, and other materials appropriate for developers. New materials may be developed by the permittee, or the permittee may use materials adopted from other programs and adapted to the permittee's new development and redevelopment program.

Accomplishments:
Currently all ordinances, design standards, application forms, SCM Manual and Technical Standards for developers are found online at the City's website. The city provides instruction online for the forms so that developers can provide the necessary documentation for the process review.

i. Enforcement	The permittee shall track the issuance of notices of violation and enforcement actions. This mechanism shall include the ability to identify chronic violators for initiation of actions to reduce noncompliance.

Accomplishments:
The City has tracked the issuance of violations through its current inspection process since the implementation of the stormwater ordinance. The City will continue to make improvements in the inspection process (as necessary) and its associated database for private SCMs. The City looks to identify repeat violators and work with owners of SCMs trough education for meeting their permit requirements.

Assessment of Program Implementation
The City will continue to utilize the Land Development Code to provide post construction controls to meet the requirements of the City's MS4 Phase II permit. Ordinances will be evaluated annually to determine if modifications are needed. Recent modification went into effect in December 2021.

Engineering Project Review Staff are working to provide a mechanism to track City issued permits and renewals. This progress will continue into the next reporting year with the goal of having a completed tracking tool.

City SCM Maintenance crews underwent training for better understanding of regulated maintenance requirements, stormwater permit contents and SCM types.

The City will be evaluating staff position needs in next year's budget for the requirement of SCM annual reports.

3. Post-construction Stormwater Runoff Controls for New Development

a. To fulfill the post-construction minimum measure program requirement the permittee may use the Department's model ordinance, design its own post-construction practices that meet or exceed the rules found in 15A NCAC 02H .1000, or develop its own comprehensive watershed plan that is determined by the Department to meet the post-construction stormwater management measure required by 40 Code of Federal Regulations § 122.34(b)(5) (1 July 2003 Edition).

b. The permittee shall meet the requirements of the post-construction program for construction projects that are performed by, or under contract for, the permittee. To meet this requirement, the permittee may either develop the necessary requirements for post- construction controls that will pertain to their own projects or develop procedures to ensure that the permittee meets these requirements by complying with another entity's Phase II Stormwater Management Programs for post-construction. If the permittee decides to rely on another program for compliance with these program areas for their own projects, they shall indicate in their Stormwater Management Plan that the permittee will fully comply with the requirements of the second party's post-construction programs.

c. Pursuant to 15A NCAC 02H .1017(9), to the extent allowable under State law, additional requirements shall apply to projects draining to sensitive receiving waters. For areas draining to Nutrient Sensitive Waters (NSW), where the Department has approved a locally implemented NSW Stormwater Management Program that addresses post-construction runoff, the provision of that program fulfills the MS4 post-construction requirement.

d. The design volume of SCMs shall account for the runoff at build out from all surfaces draining to the system. Drainage from off-site areas may be bypassed.

e. Pursuant to 15A NCAC 02H .1001(1)(c), to fulfill the post-construction minimum measure requirement for linear transportation projects, including undertaken by an entity other than North Carolina Department of Transportation (NCDOT), and are projects constructed to NCDOT standards that will be conveyed to the State upon completion, the permittee or regulated entity may use the Stormwater Best Management Practices Toolbox (Version 2, April 2014), including any subsequent amendments and editions, developed by the NCDOT. This NCDOT Stormwater BMP Toolbox is available at:https://connect.ncdot.gov/resources/hydro/Pages/Highway-Stormwater-Program.aspx

SECTION G: POLLUTION PREVENTION AND GOOD HOUSEKEEPING FOR MUNICIPAL OPERATIONS

1. Objective for Pollution Prevention and Good Housekeeping for Municipal Operations

a. Implement an operation and maintenance program that includes a training component and has the goal of preventing or reducing pollutant runoff from municipal operations.

b. Provide employee training to prevent and reduce storm water pollution from activities such as park and open space maintenance, fleet and building maintenance, new construction and land disturbances, and storm water system maintenance.

2. BMPs for the Pollution Prevention and Good Housekeeping for Municipal Operations

The permittee shall implement the following BMPs to meet the objectives of the Pollution Prevention and Good Housekeeping Program and shall notify the Division prior to modification of any goals.

BMP	Measurable Goals
a. Inventory of municipally owned or operated facilities	The permittee shall maintain, a current inventory of facilities and operations owned and operated by the permittee with the potential for generating polluted stormwater runoff. Also maintain a current inventory of the MS4 system and municipally owned structural SCMs.

Accomplishments:
The City currently keeps an updated inventory of known facilities with the potential for generating polluted runoff. This list is updated and updates as necessary.

The City currently has a Spill Prevention Control and Countermeasure plan (SPCC) for the Operations Complex and Police Headquarters and a separate Stormwater Pollution Prevention Plan (SPPP) for the Fleet Maintenance building located within the complex. These are currently being reviewed for possible updates.

The City has updated its list of all structural SCMs. These include permitted, non-permitted and grant related SCMs. Currently, there are over 90.

The City maintains a GIS layer for its MS4 system and updates it annually as necessary.

b. Inspection and Maintenance (I&M) for municipally owned or operated facilities	The permittee shall maintain and implement, evaluate annually and update as necessary an Inspection and Maintenance (I&M) program for municipal owned and operated facilities with the potential for generating polluted stormwater runoff. The I&M program shall specify the frequency of inspections and routine maintenance requirements.

Accomplishments:
The City's consultant M&N has spent this past reporting year reviewing and making recommendations

for the I&M of city facilities in preparation for our upcoming audit by the NC DEQ. M&N has helped the City to draft its SWMP for submission to the NC DEQ as required. The City will be conducting more thorough I&M measures at all of its identified facilities as proposed in the draft SWMP. Currently, inspections for our SPCC plan and SPPP are being conducted at the Police Headquarters, Fleet Maintenance and Operations Complex.

The City awarded a maintenance contract with a local contractor in January 2021 for all our Oil/Water separators. Due to budget constraints, the contract could not be executed until July 1, 2021. The City's contractor conducted inspections and/or maintenance at 12 locations this reporting year. An additional 6 locations are currently being inspected for maintenance. These locations were delayed due to the contractor having trouble finding their locations on site. After the completion of all the locations, the City will have the contractor inspect and maintain the oil/water separators on an annual basis.

c. Spill Response Procedures	The permittee shall have written spill response procedures for municipally owned or operated facilities.

Accomplishments:
Spill Response procedures are identified in the City's SPCC plans for the Operations Complex and Police Headquarters and also in the SPPP for Fleet Maintenance. The City will continue to follow these plans and make any changes if necessary and ensure documentation is occurring within the plans.

The City has been working to develop written spill response procedures as recommended by M&N in the City's Draft SWMP for the next reporting year.

The City will continue to review procedures with our Public Services Safety Specialist and also work to improve and implement procedures and training.

d. Streets, roads, and public parking lots maintenance	The permittee shall evaluate existing and new BMPs annually that reduce polluted stormwater runoff from municipally-owned streets, roads, and public parking lots within their corporate limits. The permittee must evaluate the effectiveness of these SCMs based on cost and the estimated quantity of pollutants removed.

Accomplishments:
The City currently utilizes BMPs that help reduce polluted stormwater runoff from streets, roads, and public parking lots within its jurisdictional area. Stormwater crews sweep City streets with curbing (on average) twice/month, NCDOT owned roads once/month, and City owned parking lots from once/month to once/quarter. City owned parking lots include City operations facilities, City Hall, parks locations, and recreation facilities.

In reporting year 2021-22, street sweepers swept 7,578 curb miles while collecting sediment, vegetation and trash potentially diverted from the stormwater sewer system. The amount of debris volume collected from Vacuum Trucks and Sweepers was 258.6 tons and 1512 tons, respectively.

In reporting year 2021-22, stormwater crews conducted hand maintenance of 127,721feet of ditch, 22,569 linear feet of ditch by mechanical methods, cleaned 63,972 linear feet of pipe, and removed blockages and cleaned 476 drainage inlets and manholes thus reducing debris, sediment, vegetation and trash potentially diverted from being discharged into our receiving waters.

Street sweeping is conducted more frequently in the downtown central business areas to help minimize the solids from entering the catch basins. Currently, the City conducts routine street sweeping in the Central Business District, 7 days/week to help prevent and reduce the amount of gross solids from

entering the downtown stormwater system.

The City continues to further look at all its field maintenance activities to determine if improvements to water quality can be incorporated.

e. Inspection and Maintenance (I&M) for municipally owned or maintained catch basins and conveyance systems	The permittee shall maintain and implement an I&M program for the stormwater sewer system including catch basins and conveyance systems that it owns and maintains.

Accomplishments:
The City currently has a program for the inspection and maintenance of all City owned storm sewer conveyance system. This program includes repair, inspection and maintenance of all City owned right of ways and officially accepted easements. This information is included in this report under *Operations/Maintenance – Yearly Maintenance Activities Table*. .

f. Identify structural stormwater controls	The permittee shall maintain a current inventory of municipally-owned or operated structural stormwater controls installed for compliance with the permittee's post-construction ordinance.

Accomplishments:
The City keeps and updates a SCM Manual for all its City owned SCMs. The manual includes all available State DWQ stormwater permits, O&M plans, and site mapping to review maintenance requirements and permit renewal dates along with any additional documentation that might be needed. This manual provides information that can be readily reviewed by maintenance crews to keep the SCMs in compliance. This manual is updated as needed when additional City facilities are constructed with permitted SCMs.

All City owned SCM are tracked for maintenance in *Munis.*

g. I&M for municipally-owned or maintained structural stormwater controls	The permittee shall maintain and implement an I&M program for municipally-owned or maintained structural stormwater controls installed for compliance with the permittee's post-construction ordinance. The I&M program shall specify the frequency of inspections and routine maintenance requirements. The permittee shall inspect and maintain municipally-owned or maintained structural stormwater controls in accordance with the schedule developed by permittee. The permittee shall document inspections and maintenance of all municipally-owned or maintained structural stormwater controls.

Accomplishments:
The City keeps and updates a SCM Manual for all its City owned sites. The manual includes all available State DWQ stormwater permits, O&M plans, and site mapping in order to review maintenance requirements and permit renewal dates along with any additional documentation that might be needed. This manual provides information that can be readily reviewed by maintenance crews in order to keep the SCMs in compliance. Documentation occurs with every SCM site visit and maintenance activity.

All City owned SCM are tracked for maintenance in *Munis.*

The City has worked with its consultant M&N to review City facilities and addressing I&M programs in the

City's Draft SWMP submitted to NC DEQ for review.

h. Pesticide, Herbicide and Fertilizer Application Management.	The permittee shall require that contractors are properly trained and that all permits, certifications, and other measures for applicators are followed. The permittee shall ensure municipal employees, as appropriate based on job classification, are trained and that applicable permits and certifications are maintained and follow to the MEP measures for applicators.

Accomplishments:
The City has compiled all pesticide, herbicide and fertilizer application certifications for its Parks and Recreation and Stormwater personnel to ensure that they are current. These certifications are updated and renewed annually. Currently, there are 15 certifications for Parks and Recreation staff and 2 certifications for Stormwater/Public Services staff.

The City continues to minimize the use of glyphosate and others as an herbicide, especially in aquatic environments, to help improve with water quality. The City purchased a specialty piece of equipment (Conver) for mechanical invasive aquatic weed removal and has been using it with good success of mechanical removal.

i. Staff training	The permittee shall implement an employee training program for municipal employees involved in implementing pollution prevention and good housekeeping practices.

Accomplishments:
Three separate trainings related to PP/GH were conducted over this reporting year. These can be found in Appendix G.

j. Prevent or Minimize Contamination of Stormwater Runoff from all areas used for Vehicle and Equipment Cleaning	The permittee shall describe and implement measures to prevent or minimize contamination of the stormwater runoff from all areas used for vehicle and equipment cleaning.

Accomplishments:
Maintenance and cleaning conducted at the City's Operations Complex continues to occur at a covered wash down station, located at the Solid Waste facility, equipped with an oil/water separator that accepts wash water and directs it to the sanitary sewer.

In addition, all vehicle maintenance is conducted within the Fleet Maintenance Building. All interior drains go directly to an oil/water separator and then to the sanitary sewer. As mentioned previously in this section (2.b), all City owned oil/water separators are now under an annual maintenance contract for inspection and cleaning. The City's SPPP for the Fleet Maint. Building addresses Good Housekeeping within the facility. A site plan checklist is posted within the facility and the site manager conducts daily inspections of the work areas.

Currently, all City Fire Stations have designated wash down areas for vehicle cleaning. The City has been reviewing fire station locations this past year and will be recommending site visits to ensure the facilities are working properly, education and SOPs (for locations lacking procedures) as part of its draft SWMP.

Assessment of Program Implementation
The City will continue to keep and update an inventory of its known facilities with the potential for generating polluted runoff an update as needed. Sites are identified by location, type of facility and potential pollution sources. Inspection and Maintenance programs have been addressed in the City's draft SWMP and will begin to be implemented in the next two years once approved by NC DEQ.

Continue annual contract with local consultant for oil/water separator inspection and maintenance at all facilities that are applicable.

The City will continue to utilize SCMs that help reduce polluted stormwater runoff from streets, roads, and public parking lots within its jurisdictional area. These SCMs will be evaluated annually to determine the effectiveness by looking at the amount of debris removed from public streets and parking lots.

Develop or modify procedures to address the routine inspections of City owned SCMs in the next years as outlined in the City's draft SWMP.

Continue Staff Training for PP/GH of municipal facilities and City owned SCMs as needed.

Review PP/GH programs, procedures, and recommendations for all City owned facilities with the potential to pollute in preparation for NC DEQs upcoming NPDES audit. Address any changes outlined in draft SWMP for PP/GH and begin implementing.

SECTION H: TOTAL MAXIMUM DAILY LOADS (TMDLs)

1. Objective

a. The permittee shall determine whether the MS4 discharges to receiving waters within a TMDL watershed and identify the pollutant(s) of concern (POC). For all TMDLs with a NPDES MS4 regulated WLA assigned to the permittee, the permittee shall determine whether the POC have potential to occur in MS4 stormwater discharges.

b. The permittee will utilize BMPs within the six minimum measures to address the permittee's assigned NPDES MS4 regulated stormwater waste load allocation (WLA) identified in the approved TMDL to the maximum extent practicable and to the extent authorized by law.

c. If subject to an approved TMDL with a NPDES MS4 regulated WLA assigned to the permittee, the permittee will be considered in compliance with the TMDL if the permittee complies with the conditions of this permit, including developing and implementing appropriate BMPs within the six minimum measures to address the permittee's MS4s NPDES regulated WLA to the maximum extent practicable (MEP). While improved water quality is the expected outcome, the permittee's obligation is to implement BMP's designed to address the NPDES regulated waste load allocation assigned to the permittee to the maximum extent practicable (MEP). The permittee is not responsible for attaining water quality standards (WQS). The Division expects attaining WQS will only be achieved through reduction from all point and nonpoint source contributors identified in the approved TMDL.

2. TMDL Plans

a. If the permittee has an existing TMDL Plan designed to address the NPDES MS4 regulated WLA assigned to the permittee, that includes monitoring to evaluate progress, and which addresses the POC through the six minimum control measures; it satisfies the objectives of this Section H.

b. The permittee may comply with a Department approved management strategy to address an impairment or TMDL, such as a Nutrient Management Strategy, to satisfy the objectives of this Section H.

c. The permittee may develop and submit, within 24 months, to the Department for approval of an alternative approach, such as an Integrated Report - Category 4(b) watershed plan, to satisfy the objectives of this Section H.

d. For new TMDLs that are not addressed by H.2. a, b, or c above, a TMDL Plan shall be developed according to H.3 below, and submitted to the Division. Time periods shown are from the later of the effective date of this permit or the TMDL as approved by EPA.

3. Best Management Practices (BMPs):

BMP	Measurable Goals
a. Identify, describe and map watershed, outfalls, and streams	Within 12 months the permittee shall prepare a plan that: • Identifies the watershed(s) subject to an approved TMDL with an approved Waste Load Allocation (WLAs) assigned to the permittee; and • Includes a description of the watershed(s); and • Includes a map of watershed(s) showing streams & outfalls • Identifies the locations of currently known major outfalls within its corporate limits with the potential of contributing to the cause(s) of the impairment to the impaired segments, to their tributaries, and to segments and tributaries within the watershed contributing to the impaired segments; and • Includes a schedule (not to exceed 6 months) to discover and locate other unknown major outfalls within its corporate limits that may be contributing to the cause of the impairment to the impaired stream segments, to their tributaries, and to segments and tributaries within the watershed contributing to the impaired segments.
b. Evaluate existing measures	Within 12 months the Permittee's plan: • Shall describe existing measures currently being implemented by the Permittee designed to achieve the MS4's NPDES WLA and to reduce the TMDL pollutant of concern to the MEP within the watershed to which the TMDL applies; and • Provide an explanation as to how those measures are designed to reduce the TMDL pollutant of concern. • The Permittee shall continue to implement the existing measures until notified by the Division.
c. Assessment of available monitoring data	Within 24 months the permittee's plan shall include an assessment of available monitoring data. Where long-term data is available, this assessment should include an analysis of the data to show trends.
d. Monitoring Plan	Within 24 months the permittee shall develop a Monitoring Plan for the permittee's assigned NPDES regulated WLA as specified in the TMDL. The permittee shall maintain and implement the Monitoring Plan as additional outfalls are identified and as accumulating data may suggest. Following any review and comment by the Division the permittee shall incorporate any necessary changes to monitoring plan and initiate the plan within 6 months. Modifications to the monitoring plan shall be approved by the Division. Upon request, the requirement to develop a Monitoring Plan may be waived by the Division if the existing and proposed measures are determined to be adequate to achieve the MS4's NPDES WLA to MEP within the watershed to which the TMDL applies.

BMP	Measurable Goals
e. Additional Measures	Within 24 months the permittee's plan shall: • Describe additional measures to be implemented by the permittee designed to achieve the permittee's MS4's NPDES WLA and to reduce the TMDL pollutant of concern to the MEP within the watershed to which the TMDL applies; and • Provide an explanation as to how those measures are designed to achieve the permittee's MS4's NPDES regulated WLA to the MEP within the watershed to which the TMDL applies.
f. Implementation Plan	Within 48 months the permittee's plan shall: • Describe the measures to be implemented within the remainder of the permit term designed to achieve the MS4's NPDES WLA and to reduce the TMDL pollutant of concern to the MEP; and • Identify a schedule, subject to Division approval, for completing the activities.
g. Incremental Success	The permittee's plan must outline ways to track progress and report successes designed to achieve the MS4's NPDES regulated WLA and to reduce the TMDL pollutant of concern to MEP within the watershed to which the TMDL applies.
h. Reporting	The permittee shall conduct and submit to the Division an annual assessment of the program designed to achieve the MS4's NPDES WLA and to reduce the TMDL pollutant of concern to the MEP within the watershed to which the TMDL applies. Any monitoring data and information generated from the previous year are to be submitted with each annual report.

4. If no MS4 NPDES regulated waste load allocation (WLA) is specified in the TMDL

At any time during the effective dates of this permit, if a TMDL has been approved that does not assign a WLA for the pollutant of concern to the municipal stormwater system, if there was no waste load allocation specified for the POC in the TMDL assigned to the municipal stormwater system, in lieu of developing a plan within this permit section, within 24 months the Permittee shall evaluate strategies and tailor BMP's within the scope of the six minimum permit measures to address the POC in the watershed(s) to which the TMDL applies, to the MEP and to the extent allowed by law.

Bradley & Hewletts Creeks – Voluntary Watershed Restoration Plan Accomplishments:

The Bradley and Hewletts Creeks Watershed Restoration Plan has continued to make progress over the 2021-2022 year in promoting volume-reducing best management practices (BMPs) to the public. The Heal Our Waterways (HOW) Program, which is the informal name of the restoration plan implementation, heavily influenced the demand for native plants in the area, helped incorporate greater representation for Bradley Creek into City of Wilmington policies, and contributed to the installation of several volume-reduction projects within the Bradley and Hewletts Creeks Watersheds.

As with previous years, two educational postcards were created and mailed, in the fall and spring, to 20,000+ residents and businesses within the Bradley and Hewletts Creek watersheds, as well as areas adjacent to the watersheds that drain directly into the Intracoastal Waterway. The fall 2021 postcard welcomed oyster season and made the connection between poor water quality and many of the closed shellfish harvesting beds in local tidal creeks. The spring 2022 postcard featured various species of native plants that are readily available at nurseries, easy to maintain, drought-tolerant, and work well in Stormwater Control Measures (SCMs), such as rain gardens.

The native plant theme was also applied to all Fall 2021 media campaigns with WECT, Lamar billboards, and National Public Radio affiliate, WHQR to coincide with the Native Plant Festival, held annually at the New Hanover County Arboretum in mid-September. All the campaigns ran concurrently from September – December 2022 and focused on how native plants can benefit local waterways. Several species were listed as examples and highlighted benefits included: little to no need for fertilizers and pesticides; water conservation; non-invasive tendencies; deeper root systems; and supporting local pollinators.

In addition to the Native Plant Campaign, the media partnership with WECT continued this year to raise more awareness about the monthly rain barrel sale and the HOW Program. WECT.com is viewed by an average of 2.9 million unique visitors per month. The HOW Program was featured in several “Homepage Takeovers” on WECT’s website homepage to advertise the monthly rain barrel sale and the return of the Wilmington Earth Day Festival. A new PSA was created for the Spring 2022 campaign to focus on the human connection to water quality. Several staff members were used as actors and read a script discussing how they enjoy waterways and how they can help protect them.

The native plant theme was also applied to the FY22 billboard campaigns for the HOW Program. The billboard featured a close-up of purple coneflowers and other native flowers with the phrase, “Creek-Friendly Yards… Plant Native Plants!” The billboard was posted next to a busy intersection near Bradley Creek to reach watershed residents. The campaign had two runs, from October – November 2021 and April – May 2022.

HOW also renewed its presence as an underwriting partner with local National Public Radio affiliate, WHQR. This year, the campaign included messaging about native plants and their benefits for water quality. The messaging was broken into fall and spring campaigns. The first ran from September – December 2021 and included 47 total announcements. The second ran from March – May 2022 and included a total of 47 announcements. Each week, WHQR reached about 40,000 listeners in the Wilmington Designated Market Area.

Several festivals returned to their in-person formats this year, including the Native Plant Festival, held at the New Hanover County Arboretum in September 2021, and the Wilmington Earth Day Festival, held at Long Leaf Park in April 2022. The HOW Program was present at both events and received significant attention from attendees. Educational materials for the Native Plant Festival focused on the benefits of native plants for

water quality, including complex root systems, reducing the need for fertilizers and pesticides, and supporting local pollinators. Attendees were able to learn more about stormwater runoff through the interactive "Stormwater Plinko" game, and each player won an entry into the free rain barrel raffle. Stormwater Plinko was also brought to the Wilmington Earth Day Festival, in addition to an interactive display that highlighted solutions to common stormwater pollutants. 60-gallon rain barrels were raffled off at both events to winners within the Bradley and Hewletts Creeks Watersheds.

The HOW Program maintained its online and social media presence. During FY22, the Heal Our Waterways home page received 2,351 unique views. Updates were posted monthly and new native plant resources were added to the Learning Library to support the outreach campaigns. The HOW Program's social media presence continued to grow as well, as both the Facebook and Instagram accounts surpassed 450 followers. A HOW-sponsored Instagram campaign also took place during the spring using a condensed version of the watershed-wide mailer postcard which featured various species of native plants.

New this year, the HOW Program worked with North Carolina Coastal Federation and University of North Carolina Wilmington to secure a 319 EPA Grant to continue stormwater improvements on campus. The grant was awarded in January 2022. A new rain garden was installed in front of Leutze Hall as the first project to help collect runoff from the roof and prevent it from entering Bradley Creek. The rain garden is estimated to infiltrate approximately 1,900 cubic feet, or 14,213 gallons, of stormwater runoff.

The 319 Grant Partnership with North Carolina State University (NCSU) continued this year. NCSU is currently working on monitoring within, and downstream of, two wet ponds that are currently slated for retrofits. The HOW Program contributed mulch and cantilever sign frames for the future projects. A bioretention area in front of a private apartment complex is projected to begin construction in late August, with the constructed wetlands and impermeable baffle following shortly after. The grant is currently slated to end in June 2023 but may request an extension due to unexpected delays in the construction process.

New Hanover Soil & Water Conservation District (NHSWCD) was once again granted a contract (HOWBMP) with the city to install SCMs on private properties in the watersheds. HOWBMP produced 7 total installations this year and identified interested potential participants for next year. Of this year's participants in the program, the homeowners were spread between Bradley and Hewletts Creeks and received rain gardens and one backyard wetland. The total volume reduction from the HOWBMP program this year was 326 cubic feet.

HOW Program staff continues to track SCM volume reduction projects that are in design or in the ground using the GIS Atlas, which was reformed in FY 17-18. This tracking tool allows HOW to analyze current impacts and assess stormwater volume reduction numbers from SCMs within the two target watersheds and continues to be a key factor in HOW's progress, both in scope and accuracy. The GIS Atlas tool was a vital component of calculating the volume reduction of several installations, including an infiltration cell placed in a cul-de-sac, a bioretention area constructed by UNCW (separate from the grant projects), and private rain gardens that were discovered during site visits. All these projects, and the data from reported SCMs from partnerships such as the 319 grants, HOWBMP, and monthly rain barrel sales, were recorded for FY22.

Annual Assessment & Evaluation of Plan Implementation:

The HOW Program continued to influence action and see progress towards reducing the hydrographs for both Bradley Creek and Hewletts Creek in FY22. There was heavy interest from the community in rain barrels and native plants, and the HOW Program continued to support installations within the priority watersheds to treat and manage stormwater runoff.

The Bradley Creek Watershed has several ongoing grant and large-scale CIP projects that saw progress this past fiscal year. The HOW Program collaborated with internal partners and external partners, such as the North Carolina Coastal Federation, North Carolina State University Biological Systems Engineering and Cooperative Extension, University of North Carolina Wilmington, to install large green infrastructure projects and prepare for continued installations in the coming fiscal year. This helped reach 95% of the 0.15 acre feet internal measure set for the Bradley Creek Watershed.

While the Hewletts Creek Watershed did not have as many large-scale projects, there were 32 smaller installations that included residential rain gardens, rain barrels, and tree plantings. The HOW Program partnered with New Hanover Soil & Water Conservation District, local stakeholders, the Wilmington Farmer's Market, and internal partners to achieve these goals. There were record rain barrel sales this year, which largely contributed to the number of projects within the Hewletts Creek Watershed. The Wade Wetland and past grant-funded SCM installations continue to function well and contribute to improved water quality. Bacteria levels were lower in Hewletts Creek this year, with one tidal station even meeting the State standard for safe shellfish harvest.

2022 marks the 10th anniversary of the adoption of the Bradley and Hewletts Creeks Watershed Restoration Plan. The HOW Program has grown significantly since the plan was first adopted and has seen progress towards reducing the hydrographs for both creeks. Over the years, 698,557 cubic feet and 59,622 cubic feet have been diverted from Hewletts Creek and Bradley Creek, respectively. Combined, this equals approximately 5,671,573 gallons of stormwater runoff per each 1-year, 24-hour storm. This is a significant achievement and highlights the importance of having the Watershed Restoration Plan in place. It was fitting that the HOW Program was also recognized by the Lower Cape Fear Stewardship Development Coalition with the "Stewardship Champion" award this year to help celebrate its 10th anniversary and successes.

Since the plan was officially adopted in 2012, there have been significant strides towards reaching the hydrograph reduction goals within the plan. The first benchmark is based on reducing the 2010 baseline hydrographs to the 2006 hydrographs. The 2006 hydrograph goal for Bradley Creek is to reduce the hydrograph from 14,096,887 cubic feet to 13,238,755 cubic feet. The 2006 hydrograph goal for Hewletts Creek is to reduce the hydrograph from 21,241,163 cubic feet to 19,901,257 cubic feet. So far, the total volume reduction is 59,614 cubic feet (6.9% of goal achieved) for Bradley Creek and 698,564 cubic feet (52% of goal achieved) for Hewletts Creek.

Ultimately, the HOW Program is continuing in its progress towards the Bradley and Hewletts Creeks Watershed Restoration Plan's 6 Objectives and 35 Actions. The information below outlines that progress towards the Objectives & Actions of the Bradley & Hewletts Creeks Watershed Restoration Plan.

Objective 1: Continue existing programs that address water quality impairments in both watersheds:

Objective	Action #	Specific Action	Timeline	Partners
1. Continue Existing Programs that Address Water Quality Impairments in Both Watersheds	Action 1-1	Implement and enforce existing stormwater requirements for new development and redevelopment	On-going	City of Wilmington – Stormwater Services, Engineering, Development Services; NC DWQ, WB
	Action 1-2	Continue to promote LID designs	On-going	City of Wilmington – Stormwater Services, Engineering, Development Services; NC DWQ, WB
	Action 1-3	Continue to cooperate with CCAP	On-going	City of Wilmington –Engineering, Development Services; NCCF, WB, New Hanover Soil & Water
	Action 1-4	Maintain existing educational	On-going	City of Wilmington - Stormwater

		programs		Services; NCCF, New Hanover Soil & Water, WB
	Action 1-5	Reflect plan in other City plans and NPDES annual permit report	As plans are updated	City of Wilmington – Stormwater Services, Engineering, Development Services: WB, NCCF
	Action 1-6	Continue education and code enforcement programs that reduce and eliminate sources of bacteria and pathogens related to human and pet wastes	On-going	City of Wilmington – Stormwater Services; WB

In support of Actions 1-1, 1-2, and 1-5, the HOW program continued to submit comments on site plans and participate in the Technical Review Committee (TRC) process to promote green infrastructure practices to private developers. The updated Land Development Code was officially approved in August 2021 and went into effect on December 1st, 2021. The updated Land Development Code includes the change applying SA waters standards to Bradley Creek for post-development stormwater requirements. The HOW Program was invited to continue in the review process with the next step of reviewing the technical standards for development. The stormwater technical standards went through an initial round of comments in May, and additional chapters will be released for review in the coming months, including streets, sidewalks, landscaping, etc.

HOW continued the fall and spring watershed mailers again this year in support of Action 1-4, with a greater focus on actions and impact. The fall mailer announced the start of oyster harvesting season and how stormwater runoff can influence the status of shellfish harvesting areas. Actions to prevent bacterial pollution were also included, supporting Action 1-2. The spring mailer focused on the benefits of native plants and included specific species and resources that property owners could use while planning their landscaping. Both postcards were mailed to over 20,000 residents within the target watersheds.

To also support Actions 1-2 and 1-4, all media partnerships with WECT, WHQR, and Lamar Billboards continued this year to educate residents on the benefits of native plants. The HOW website and all social media channels (FB, Twitter, & IG) continued to remain active throughout the year as well. The HOW Program also maintained its online newsletter, sending quarterly updates on topics such as the history of Hewletts Creek, grant updates, and more. There are currently 449 active Constant Contact newsletter subscribers.

Regarding Action 1-3, CCAP is a funding program that is coordinated through the New Hanover Soil and Water Conservation District (NHSWCD). Information about this program was shared with property owners within the Bradley and Hewletts Creeks Watershed areas. However, this was not a large area of focus this fiscal year as most projects were either in-house, installed through HOWBMP, or were funded by 319 grants.

The HOW Program also continued to promote LID through existing educational programs, such as the monthly visits to the Wilmington Farmer's Market, website materials, and visits to annual events. The Native Plant Festival and Wilmington Earth Day Festival were widely attended events this fiscal year and the HOW Program brought materials discussing "Stormwater Solutions" that property owners could easily incorporate. The HOW Program also presented again for NCSU Cooperative Extension's online "Backyard Sustainability" series.

Objective 2: Determine appropriate water quality classifications and designated uses where water quality impairment exists:

2. Determine Appropriate Water Quality Classifications and Designated Uses Where Water Quality Impairment Exists	Action 2-1	Work with SS, UNCW, WB and NCCF to conduct preliminary evaluations of water quality to determine where more intensive state (SS) water quality investigations are needed	Year 1, establish preliminary monitoring	City of Wilmington –Stormwater Services; UNCW, SS, WB, NCCF

	Action 2-2	Work with SS to establish new monitoring stations within impaired waters influenced by the Bradley Creek watershed	Year 2 based upon preliminary monitoring	City of Wilmington –Stormwater Services; UNCW, SS, WB, NCCF
	Action 2-3	Work with SS to establish new monitoring stations within impaired waters influenced by the Hewletts Creek watershed	Year 2 based upon preliminary monitoring	City of Wilmington –Stormwater Services; UNCW, SS, WB, NCCF
	Action 2-4	Evaluate the results of bacterial source monitoring in Banks Channel that is being conducted by UNC-CH	Study underway, evaluate results in Year 1	WB, UNC-CH, UNCW, NCCF
	Action 2-5	Request Use Attainability Study on SA waters along Wrightsville Beach shoreline in Banks Channel. These waters are automatically closed to Shellfish Harvest due to marinas, and have been polluted since 1947.	Year 2	WB, NCCF, NC DWQ
	Action 2-6	Request Use Attainability Study on SB waters now "Approved" for shellfish harvest in waters influenced by the Bradley Creek Watershed	Year 2	City of Wilmington, WB, NCCF, NC DWQ
	Action 2-7	Determine if there is potential to restore shellfish harvest in any additional waters classified as SB that are influenced by the Bradley Creek watershed	Years 4-5	City of Wilmington –Stormwater Services; UNCW, SS, WB, NCCF
	Action 2-8	Evaluate the status and trends in bacteria contamination within the entire Hewletts Creek watershed based upon more intensive data collected as part of plan implementation	Year 5	City of Wilmington –Stormwater Services; UNCW, SS, NC DWQ, NCCF

In accordance with Action 2-1, Dr. Mike Mallin's office with the University of North Carolina at Wilmington (UNCW) continues to conduct regular surface water sampling to determine what effects the program's volume reduction efforts are having on the health of the creeks. North Carolina State University is also currently monitoring stations within several wet ponds in the Bradley Creek Watershed that will be undergoing retrofits as part of the collaborative 319 Grant project.

This plan objective concentrates heavily on the classification of local waters and the appropriateness of current classifications considering today's conditions, but as with previous years, there was not much activity towards pursuing reclassification. Previous discussions with representatives from North Carolina Department of Environmental Quality (NCDEQ) indicated that reclassification of certain waterbodies would not be supported. This objective will be undergoing review in the coming fiscal year to establish goals that are achievable and more reflective of the current conditions of the State classification system.

Objective 3: Reduce the transport of bacteria from land to water by reducing and tracking volume reduction:

3. Track the reduction of the transport of bacteria from land to water	Action 3-1	Secure and budget funds for retrofits in the Bradley Creek watershed, deter-mine volume that can be reduced with funds, and track actual reductions using	Secure funds years 1 & 2, design retrofits year 3, install and track reductions years 4 & 5	City of Wilmington –Stormwater Services; UNCW, SS, NC DWQ, NCCF

		measurement tools		
	Action 3-2	Secure and budget funds for retrofits in the Hewletts Creek watershed, deter-mine volume that can be reduced with funds, and track actual reductions using measurement tools	Secure funds years 1 & 2, design retrofits year 3, install and track reductions years 4 & 5	City of Wilmington –Stormwater Services; UNCW, SS, NC DWQ, NCCF

Both Action 3-1 and Action 3-2 saw continued progress. This was accomplished through grants, inter-departmental partnerships, local rain barrel sales, and the HOWBMP contract program.

The North Carolina Coastal Federation's (NCCF) 319 grant for stormwater retrofits on UNCW's campus was a major contributor towards reducing the hydrograph of the Bradley Creek Watershed. A rain garden was installed in front of Leutze Hall in June 2022 and will treat approximately 14,213 gallons during each 24-hour storm. Additionally, UNCW pursued a bioretention project near DeLoach Hall that tied into an outdoor geology exhibit. The DeLoach Hall bioretention project is estimated to treat approximately 16,203 gallons of stormwater runoff during each 24-hour storm. The UNCW projects, in addition to the other projects completed within the Bradley Creek Watershed, helped achieve 95% of the internal volume reduction goal of 0.15 ac. ft. for the Bradley Creek Watershed.

The HOWBMP contract with New Hanover Soil and Water Conservation District installed several residential SCMs in both the Bradley and Hewletts Creek Watersheds this year. There were 6 total rain gardens and 1 backyard wetland between 7 homeowners with a total volume reduction of 326 cubic feet.

Rain barrels installations also continued at a high rate in the Bradley and Hewletts Creek Watersheds. Demand was at its highest this year, with rain barrels frequently selling out during the monthly rain barrel sale largely due to increased awareness of the program and supply chain interruptions. Social media campaigns run by the HOW Program and New Hanover Soil and Water Conservation District helped to push out more messaging about the rain barrel sale, and the monthly sale and giveaways hosted by the HOW Program contributed to the large distribution of rain barrels in FY22.

The HOW Program also set aside funds for contracted tree plantings this fiscal year. A total of 45 trees were planted in and near existing SCMs within both the Bradley Creek and Hewletts Creek Watersheds and within a drainage easement in the Wrightsville Green neighborhood. All trees are under an 18-month warranty by the contractor and will be replaced if needed.

Objective 4: Promote stormwater reduction efforts:

4. Promote Stormwater Reduction Efforts	Action 4-1	Promote use of GIS web based retrofit Atlas	Each year	City of Wilmington – Stormwater Services, Engineering, Development Services; WB, NCCF
	Action 4-2	Investigate cost effective methods of working with landowners to disconnect impervious surfaces	Year 1 & 2	NCCF, City of Wilmington, WB
	Action 4-3	Promote LID retrofits within private development	Each year	City of Wilmington – Stormwater Services, Engineering, Development Services; WB, NCCF.
	Action 4-4	Promote tree planting and retention	Each year	Wilmington Tree Commission; City of Wilmington - Development Services,

				Stormwater Services; Keep New Hanover Beautiful, NCCF, Coop Extension, WB
	Action 4-5	Promote stormwater reduction measures on City streets in future capital improvement projects	Dependent on Capital Improvement schedule	City of Wilmington - Stormwater Services, Engineering, Streets Divisions, Development Services; WB, NCCF
	Action 4-6	Pursue strategy with NCDOT to incorporate retrofits into highway upgrades	Years 1 – 5	City of Wilmington - Development Services, Stormwater Services; NCDOT, NCCF, WB
	Action 4-7	Promote LID retrofits in future publicly funded maintenance or redevelopment of City owned buildings, parks, parking lots, and drainage systems	Based upon project schedules	City of Wilmington – Engineering, Stormwater Services, Community Services, D Services; WB, NCCF
	Action 4-8	Promote and assist with LID retrofits at county schools	Ongoing based upon efforts at schools	NCCF, New Hanover County School System, CCAP
	Action 4-9	Encourage UNC-W to develop campus wide master plan to retrofit to reduce stormwater volume	Year 3	City of Wilmington - Stormwater Services, Development Services; UNCW, NCCF
	Action 4-10	Evaluate properties for retrofit or restoration potential.	Year 2	City of Wilmington - Stormwater Services, Development Services; WB
	Action 4-11	Evaluate existing stormwater ponds on public/private property for potential vol. reductions, retrofit them if feasible	Years 3 - 5	City of Wilmington - Stormwater Services; WB, NCCF

During FY22, the GIS Atlas continued to be an important tracking tool for the projects installed within the Bradley Creek and Hewletts Creek Watersheds. The GIS Atlas data is useful for creating trends over time and for justifying potential changes to the internal goals for volume reduction. The Hewletts Creek internal performance goal, for example, is currently under review to determine the level of volume reduction that would be most achievable annually, using the historical volume reduction data of projects installed in the watershed each year.

The HOW Program continued to promote LID retrofits on private properties through the TRC Review process, and on public properties as opportunities arose in support of Actions 4-3 and 4-7. An infiltration cell was incorporated into a street and drainage improvement project on Renee Court in the Bradley Creek Watershed. Using the GIS Atlas (Action 4-1), the infiltration cell is expected to infiltrate 1,937 cubic feet (14,488 gallons) of runoff from the cul-de-sac and a portion of Renee Court. The street historically experienced flooding, which will also be alleviated through this project.

This year, the HOW Program in collaboration with the Wrightsville Green CIP project, pursued a tree planting contract to install 45 within the Bradley Creek and Hewletts Creek Watersheds in support of Action 4-4. This was done using funds that were newly established specifically for stormwater tree planting projects and the Wrightsville Green CIP budget. Only native tree species were planted, such as live oaks, bald cypress, longleaf pines, and more.

Objective 5: Form and maintain partnerships:

5. Form and Maintain Partnerships	Action 5-1	Work with partners to educate stakeholders	Years 1 – 5	City of Wilmington - Stormwater Services, Development Services; NCCF, New Hanover Soil & Water, WB
	Action 5-2	Work with government agencies and NGOs to secure grants for retrofits and other	Years 1 – 5	City of Wilmington – Stormwater Services; Development Services; NCCF, WB, Cape Fear Public Utilities

		programs		
	Action 5-3	Provide strategies and policies for city departments to carry out plan by incorporating runoff reduction strategies into the CIP process.	Years 1 – 5	City of Wilmington - Stormwater Services; Development Services, and Finance Depts.; NCCF
	Action 5-4	Promote use of atlas among key City departments in their routine business	Years 1 – 5	City of Wilmington - Stormwater Services, Development Services; NCCF, WB
	Action 5-5	Promote existing technical training opportunities to advance plan	Years 1 – 5	Special training arranged by partners using their own funds and grants, City of Wilmington - Stormwater Services, Development Services; WB, NCCF
	Action 5-6	Work with UNCW on retrofit projects	Years 1 – 5	grants, capital improvements City of Wilmington - Stormwater Services; UNCW, NCCF

Partnering with local stakeholders continues to be one of the greatest avenues for project implementation and education. To achieve Action 5-1, the HOW Program renewed partnerships with local news outlets (WECT, WHQR, and Lamar Billboards), the Wilmington Farmer's Market, the Wilmington Earth Day Alliance, and the NC State University (NCSU) Cooperative Extension Office to spread messaging related to green infrastructure and native plants through social media and local events.

The HOW Program continued to interact with local stakeholders by bringing a monthly display to the Wilmington Farmer's Market, and attending restored in-person events such as the Native Plant Festival and the Wilmington Earth Day Festival. The festivals were highly attended and great outreach opportunities for the HOW Program, where many attendees signed up for the online newsletter and engaged with the interactive displays. The local NCSU Cooperative Extension Office also invited the HOW Program to present for the stormwater-specific presentation in its "Backyard Sustainability Series", which was a virtual training for residents in the area to discuss stormwater runoff and solutions.

The HOW Program's partnerships with North Carolina Coastal Federation and staff and professors at UNCW helped push forward stormwater retrofits on UNCW's campus. A second 319 grant was awarded in January 2022 to help install bioretention and pervious pavement projects throughout campus. One rain garden was installed in front of Leutze Hall in June 2022 and several pervious pavement projects are planned for next fiscal year, in and near the older section of campus. UNCW staff and professors have also worked to install some projects on their own, including a small section of pervious pavement while resurfacing a parking lot, a bioretention area near DeLoach Hall, and a solar-powered pump for a cistern previously provided by the HOW Program.

Internally, the HOW Program was introduced to the City's Engineering group on a relevant Multi-Use Path (MUP) project within the Bradley Creek Watershed. While the project is on a tight schedule and budget, the engineers of the project still met with the HOW Program to discuss ways to preserve more trees and potential locations for green infrastructure that could be incorporated post-construction to help mitigate runoff coming from the MUP.

Objective 6: Measure success and adapt plan based upon results:

6. Measure Success and Adapt Plan Based Upon Results	Action 6-1	Use atlas accounting system to track progress toward watershed goals.	Years 1 – 5	City of Wilmington - Stormwater Services, Development Services; NCCF, WB
	Action 6-2	Work with SS, WB, and UNCW to monitor water quality status and trends	Years 1 – 5	City of Wilmington - Stormwater Services, Development Services; NCCF, WB, UNCW
	Action 6-3	Conduct annual and five year assessment of plan's success	Yearly	City of Wilmington - Stormwater Services, Development Services; NCCF,

		and modify plan as needed		WB, UNCW

The GIS Atlas continues to be a vital tool for monitoring progress towards the volume reduction goals within the Bradley and Hewletts Creeks Watershed Restoration Plan, in accordance with Action 6-1. 16 projects were installed in the Bradley Creek Watershed for a total of 6,216.52 cubic feet of volume reduction, reaching 95% of the internal measure within the City's Strategic Plan. In the Hewletts Creek Watershed, there were 32 total projects for a total of 459.46 cubic feet of volume reduction. There was a record number of rain barrels sold this year through the monthly rain barrel sale, several of which went to owners within the Hewletts Creek Watershed. There were several tree plantings and residential rain gardens as well. However, these practices are smaller in nature and do not provide as large a volume reduction as the larger grant projects happening along Bradley Creek. The educational benefits of these projects, however, is still worth reporting.

UNCW continues to monitor both creeks for bacteria, dissolved oxygen, turbidity, and other water quality parameters. Four established stations were monitored for both Bradley Creek and Hewletts Creek, all of which were sampled six times throughout the year. Bradley Creek did not have many problems with turbidity and sediment pollution, but there were high counts of fecal coliform bacteria in the upper reaches of the creek and moderate counts at the tidal stations near the mouth of the creek. The upper reaches of the creek have notoriously seen high bacteria levels, and there are several grant and CIP projects in action to improve water quality in the creek. Hewletts Creek, on the other hand, saw improvements in bacteria levels. Only one station had one occurrence of high fecal coliform bacteria. The other stations were low, and the geometric mean at the mouth of the creek was lower than the State standard for safe shellfish harvest (14 CFU/100 mL). If the trend continues, the HOW Program may pursue a more dedicated monitoring study for the purpose of removing the shellfish impairment for portions of Hewletts Creek.

Staff this year also performed an internal review of the progress of the HOW Program and the actions within the Watershed Restoration Plan, supporting Action 6-3. Projects, funding, and partnerships continue to successfully reduce the hydrographs for both creeks and raise awareness about the HOW Program. There are a few actions that need to be updated to reflect changes in regulations and updates from the State and other changes, so staff will be coordinating with the original stakeholders that helped create the plan in the coming fiscal year. The group will discuss potential changes to keep the Watershed Restoration Plan as relevant as possible to the current climate and continue its successful influence within the community.

5. Information regarding North Carolina TMDLs

Information regarding North Carolina TMDLs is available at:

https://deq.nc.gov/about/divisions/water-resources/planning/modeling-assessment

APPENDICES

APPENDIX A: PROGRAM IMPLEMENTATION INCLUDING MODIFICATIONS AND JUSTIFICATION

None for this reporting year.

APPENDIX B: PUBLIC EDUCATION AND OUTREACH

Included in this section:

- BMP Reporting Table
- Public Outreach/Education and Involvement/Participation Plan including program goals, description of target pollutants, sources, and target audiences

DATE OF EVENT/ ACTIVITY	EVENT/ ACTIVITY	AUDIENCE	DELIVERED BY (AGENCY)	METHOD OF DELIVERY / MESSAGE	ATTENDANCE/ PARTICIPATION

BMP a. Define outreach/education program goals and objectives.
BMP b. Describe target pollutants and/or stressors
BMP c. Describe target audiences
BMP d. Describe residential and industrial/commercial issues
Outreach and education program goals and objectives, as well as a description of the target pollutants, sources/stressors, target audiences, and residential/commercial issues, as well as key outreach messages are thoroughly identified in the city's Public Outreach/Education & Participation/Involvement Plan, which is included in the Appendix. This plan is updated as necessary to reflect changes in target audience characteristics, demographics, awareness, behaviors, etc. The latest update to the plan was in Winter 2022.

BMP e. Informational Web Site (www.wilmingtonnc.gov/stormwater)					
Ongoing/Regular Updates	Stormwater Services website	General public, website viewers	Stormwater Services	Dedicated stormwater website	www.wilmingtonnc.gov/stormwater
7/5/21	Stormwater Services website	General public Website viewers	Stormwater Services	Updated Stormwater billing and rate information	www.wilmingtonnc.gov/stormwater
10/28/21	Stormwater Services website	General public Web viewers	Stormwater Services	Enviroscape - updated info for teachers to new Enviroscape Video series	www.wilmingtonnc.gov/stormwater
11/2/21	Stormwater Services website	General public Website viewers	Stormwater Services	Uploaded News: Greenfield lake floating wetlands	www.wilmingtonnc.gov/stormwater
11/3/21	Stormwater Services website	General public Website viewers	Stormwater Services	Uploaded News: Mowing invasive aquatic plants	www.wilmingtonnc.gov/stormwater
11/2/21	Stormwater Services website	General public Website viewers	Stormwater Services	Uploaded News: UNCW to study city retention ponds	www.wilmingtonnc.gov/stormwater
12/1/21	Stormwater Services website	General public Website viewers	Stormwater Services	Updated the Water Resources - Lesson Plans and Links document for teachers and students	www.wilmingtonnc.gov/stormwater
1/13/22	Stormwater Services website	General public Website viewers	Stormwater Services	Updated links to Land Development Code on Regulations page	www.wilmingtonnc.gov/stormwater
1/21/22	Stormwater Services website	General public Website viewers	Stormwater Services	Uploaded cyanobacteria flyers and resources	www.wilmingtonnc.gov/stormwater

3/9/22	Stormwater Services website	General public Web viewers Social media followers	Stormwater Services	Uploaded Kerr Avenue Wetland brochure	www.wilmingtonnc.gov/stormwater
4/5/22	Stormwater Services website	General public Web viewers Social media followers	Stormwater Services	News article - Report an Algal Bloom	www.wilmingtonnc.gov/stormwater
4/8/22	Stormwater Services website	General public Web viewers Social media followers	Stormwater Services	Earth Day News Item	www.wilmingtonnc.gov/stormwater
5/25/22	Stormwater Services website	General public Web viewers Social media followers	Stormwater Services	Updated CIP Stormwater projects page	www.wilmingtonnc.gov/stormwater
4/29/22	Stormwater Services website	General public Web viewers	Stormwater Services	Uploaded UNCW Water Quality Report to Publications webpage	www.wilmingtonnc.gov/stormwater
5/31/22	Stormwater Services website	General public Web viewers Social media followers	Communications Div.	Uploaded Stormwater Watch Newsletter	www.wilmingtonnc.gov/stormwater
6/7/22	Stormwater Services website	General public Web viewers Social media followers	Communications Div.	Citywide Newsletter with stormwater content - spring issue	www.wilmingtonnc.gov/stormwater

BMP f. Distribute public education materials and information to identified target audiences and user groups. For example, schools, homeowners, and/or businesses.

In addition to public outreach efforts in this category, two Stormwater Compliance Officers also distribute education materials to the public and to targeted user groups (i.e. pet owners, auto shops, restaurants, landscapers, residents, etc). The Compliance Officers issue NOVs and fines to citizens and businesses that have been identified as non-compliant with the City's stormwater ordinances. Information about these code enforcement actions are included in the Compliance/Enforcement section and the appendix.

Fall 2020 & Spring 2021 semesters	8th Grade Enviroscape Video Series	8th Grade Science Classes	Stormwater Services CFRW NHSWCD	Enviroscape Video Series - 13 instructional videos about watersheds, local water quality issues, estuaries nonpoint source pollution, BMPs, stewardship, etc.	Sent to 21 NHCS 8th grade science teachers

1/10/2022	8th Grade Enviroscape Video Series	8th Grade Science Classes	Stormwater Services CFRW NHSWCD	Enviroscape Video Series - 13 instructional videos about watersheds, local water quality issues, estuaries nonpoint source pollution, BMPs, stewardship, etc.	Sent to E.Moore- 8th grade science teacher at GLOW Academy
2/24/2021	Cape Fear Academy	1st Grade Classes	Stormwater Services	Virtual Zoom presentation about the impacts of stormwater runoff and marine debris	30 students
2/22/2022	8th Grade Enviroscape Video Series	8th Grade Science Classes	Stormwater Services CFRW NHSWCD	Enviroscape Video Series - 13 instructional videos about watersheds, local water quality issues, estuaries nonpoint source pollution, BMPs, stewardship, etc.	Sent N. Vulgaris - 8th grade science teacher at Lakeside
3/15/2022	Stormwater 101 Presentation to local Garden Club	Loblolly Garden Club	Stormwater ServicesHeal Our Waterways	Stormwater 101 PowerPoint presentation to Loblolly Garden Club at St. Paul's Episcopal Church activity centerDistributed stormwater educational and promo materials to group	20 Attendees
3/31/2022	Pet Waste Community Survey - online	Pet Owners	Stormwater Services	Pet owner survey to gauge attitudes, awareness, and behavior regarding pet waste	Survey advertised in: -45000 citywide newsletters -Social Media Posts -Going Green Magazine
4/23/2022	Lower Cape Fear Earth Day Celebration - in-person event	Virtual festival attendees, general public	Stormwater Services (SWS is an annual sponsor of the Lower Cape Fear Earth Day Festival)	Information about stormwater pollution and solutions, interaction with attendees, Stormwater Superhero activity	5000 attendees
6/30/2022	Pet Waste Tidy Bag Pet Dispensers	Pet owners	Stormwater Services	Supplement to signage program. Compliance officer distributes bag dispensers to pet owners to encourage pick up and proper disposal	469+ tidy bag pet waste dispensers distributed to pet owners throughout the city
Ongoing	Pet Waste Signage for Compliance Education Program	Pet Owners General Public	Stormwater Services	Rotating Signage program to address pet waste problems and complaints in the city. Signs have city pet waste ordinance and fine information on them. This year, we started giving away pet waste bag dispensers for free on each sign.	Pet Waste signage was placed in different city parks and areas of town with known problems or complaints. This year we started adding free roll bags to pet waste signage.

BMP g. Maintain Hotline/Help line

The Stormwater Pollution Prevention Hotline was established per NPDES requirements in January 2010 to field calls from the citizens, businesses, and city employees regarding illicit discharges and other reports of stormwater pollution. The hotline phone # is 910-341-1020 and the web reporting address is www.wilmingtonnc.gov/reportstormwaterpollution. Hotline/web reports are routed to the Stormwater Compliance Officers who track, investigate, and respond to all hotline reports. Compliance officers routinely educate offenders in addition to issuing necessary fines/violations. Information regarding hotline reports is included in the Enforcement Appendix section.

Ongoing	Stormwater Hotline advertised using various outreach methods: truck magnets, signs, billboards, presentations, etc.	General public	Stormwater Services	Hotline poster, website, GTV-8 and promo items (pens, magnets, sticky notes) are used to raise awareness of the Stormwater Hotline	17 calls were placed to the City's Stormwater hotline, 10 online webform reports were submitted, and 7 direct emails and 8 direct calls were received by the Compliance Officers related to stormwater violations. The nature of the hotline reports are found in the Enforcement section of the Appendix.
2/17/2022	Report Stormwater Pollution Hotline and Webform training for staff	Training for Compliance Officer and Stormwater staff that respond to hotline/ webform reports	Stormwater Education Manager	Training with handout/diagram	3 staff attended

BMP h. Implement Public Education & Outreach Program.

Media Advertising Campaigns

10/4/21 - 11/30/21	WECT-TV6 website, digital, mobile and targeted ad campaign	General public Mobile, digital, and web viewers	Stormwater Services	General stormwater awareness PSA videos and ads ran on digital, mobile, and social media outlets. Ad Content: "What Goes in Here, Ends up Here"	Target Audience: General public, Landscapers, Residents Ads Served: • 22.000 Pre-roll video ads with 78.5% View Thru Rate • 25,000 interstitial banners • 400,000 social media posts (FB/Inst) - 556,896 Facebook Ads Served with 424 Total Engagements Total cost: $4750
10/8/21	WECT-TV6 website, digital, mobile and targeted ad campaign	General public Mobile, digital, and web viewers	Stormwater Services	PSA new production of 2 pet waste commercials: -Cheering Section -Poop Fairy	Target Audience: Pet Owners Total cost: $550
October - November 2021	Lamar Digital Billboard Advertising	Motorists Pedestrians	Stormwater Services	"Know Where It Goes" stormwater pollution digital billboard - 5216 Oleander Drive	Target Audience: General publicReach: MotoristsFrequency: Rotating billboard shown for 8 seconds every minute 24/7 using rotating billboard locationsAds Served: 86,400 Total cost: $2000

Spring/Summer 2021 issue	Cape Fear's Going Green Magazine	Print and online	Stormwater Services	Ad - Cigarette butts are the #1 littered item in the world	10,000 copies printed and distributed
Winter 2022 Issue	Cape Fear's Going Green Magazine	Print and online	Stormwater Services	Ad - Know Where It Goes stormwater pollution ad	10,000 copies printed and distributed
5/15/22 - 6/15/22	Port City Daily/Local Voice Wilmington	Radio & Digital viewers	Stormwater Services	Digital Advertising, Leaderboard & Side Banner on Homepage, Obits, Environmental News with link thru to Stormwater Education webpage. - There is No Poop Fairy pet waste ads	Target Audience: General public Reach: 28,507 impressions Click Thrus: 42 Ads Served: 20 Unique Users Annually: 5,573,700 Total cost: $1600 *Glitch with campaign on PCD, 2 months of makeup ads will run July - Sept 2022.
May - June 2022	WECT-TV6 website, digital, mobile and targeted ad campaign	General public Mobile, digital, and web viewers	Stormwater Services	There is no Poop Fairy PSA and click thru ads ran on TV, digital, mobile, and social media outlets. Ad Content: "There is no Poop Fairy, Poo-llution threatens our health and waterways.Clean up After Pets!"	Target Audience: General public, Pet Owners, Veterinarians Ads Served: • 28 TV News Spots • 16,853 website ads served, 120 clicks, .72% CTR • 9,993 Pre-roll video ads with 91.47% completion rate • 193,625 social media posts (Insta & FB), 28701 engagements, 715 clicks, .37% CTR Total cost: $5175
5/16/22-6/19/22	Lamar Digital Billboard Advertising	Motorists Pedestrians	Stormwater Services	Litter/Turtle Billboard - There is No Poop Fairy! pet waste billboardOne larger bulletin size digital billboard at 6337 Oleander Drive	Target Audience: General publicReach: MotoristsFrequency: Rotating billboard shown for 8 seconds every minute 24/7 using rotating billboard locationsAds Served: 48,960 Total cost: $2500
Ongoing	Cape Fear Public Utility Authority (CFPUA)	General public, CFPUA customer service visitors	Stormwater Services	Provided CFPUA with stormwater education slides for their TV stations at CFPUA customer service locations	CFPUA visitors
Ongoing	City Offices	Employees Visitors to city offices	Stormwater Services	Stormwater educational slides on city office's Marlin Board streaming TVs	Office employees and visitors to Streets, Stormwater, Solid Waste buildings
News Coverage					
8/24/21	WWAY-TV3	TV News Online website	WWAY Reporter	Online newspaper article - Greenfield Lake experiencing dangerous blue-green algae bloom	190,000 TV households

8/24/21	WECT-TV6	Online newspaper readers	WECT News reporter	Print and online newspaper article - City of Wilmington warns of algae bloom at Greenfield Lake	Stats: -190,390 households served -3.67 million monthly page views -2.92 million page views in mobile news app
9/15/21	WECT-TV6	Online newspaper readers	WECT News reporter	Print and online newspaper article - To fight toxic algae bloom, crews install floating treatment 'wetlands' at Greenfield Lake	Stats: -190,390 households served -3.67 million monthly page views -2.92 million page views in mobile news app
9/16/21	WWAY-TV3	TV News Online website	WWAY Reporter	Online newspaper article - City installs system to reduce toxic algae bloom at Greenfield Lake	190,000 TV households
9/28/21	Star News Online	Online newspaper readers Radio listeners	Port City Daily staff	Online newspaper article - Could giant yoga mats full of plants help clean North Carolina's dirty lakes and ponds?	41,300 daily distribution of print newspapers
10/27/21	Spectrum News	TV News /Online Website	Rachel Boyd - Reporter	Algae bloom turned science project: Testing a solution for Greenfield Lake	Stats unknown.
11/1/21	Star News Online	Online newspaper readers Radio listeners	Port City Daily staff	Online newspaper article - The city of Wilmington recently spent $172,000 on a mower. Here's why.	41,300 daily distribution of print newspapers
1/3/22	UNCW Media Release	Media Outlets	UNCW	UNCW Media Release to major news outlets: State Attorney General awards UNCW researches 92K EEG grant. Grant will study City of Wilmington Retention Ponds	Stats unknown.
4/22/22	Port City Daily/Local Voice Wilmington	Online newspaper readers Radio listeners	Port City Daily staff	Online newspaper article - $7.7M project to reduce flooding on New Center, adjacent problem areas	41,300 daily distribution of print newspapers

Social Media

Ongoing	Posts on City of Wilmington, NC Facebook and Twitter pages	Social media viewers/ subscribers	City Communications	Social media posts about stormwater runoff, water pollution, capital projects, etc.	39,000 Facebook Followers 32,100 Instagram Followers 38,800 Twitter Followers

Distributing promos/giveaways

Ongoing	Public Meetings, events, displays, city buildings	General public	Stormwater Services	Distribute items or leave in strategic locations where citizens will pick them up	Promote stormwater messages via freebies/promos at events such as Earth Day, Canines for Clean Water, etc.

Ongoing	Canines for Clean Water program at community pet events (i.e. Rabies Clinics, Pawz in the Park, etc)	Pet owners	Stormwater Services NHSWCD	Pet owners sign a pledge to clean up after their pet and submit a photo of their pet to be featured on our website wilmingtonnc.gov/canines	Goodie bag includes Canines for Clean Water pet bandana, pet waste pick up bags, pet waste brochure, pens, notepads
Fall 2021 & Spring 2022	8th Grade Enviroscape Watershed Presentations	All 8th Grade NHC Schools Science Classes	Stormwater ServicesCFRWNHSWCD	New instructional Enviroscape Video Series about watersheds, local water quality issues, nonpoint source pollution, BMPs and stewardship. Virtual presentations included quiz/poll questions and interactive chat with students and teachers.	13 instructional videos provided to all 8th grade science teachers in New Hanover County Schools
3/15/2022	Stormwater 101 Presentation	Loblolly Garden Club	Stormwater Services	Stormwater 101 Presentation to members of the Loblolly Garden Club at St. Paul's Episcopal Church Activity Center https://loblollygardenclubnc.com/	20 Attendees
4/30/2022	UNCW Coastal Climate Expo at Battleship	General Public	Stormwater Services	Information about stormwater pollution, solutions, native plants, and educational promo items - water bottles, magnets, pens, kids stormwater maze, etc.	225 Attendees
2/24/2021	Cape Fear Academy	1st Grade Classes	Stormwater Services	Virtual Zoom presentation about the impacts of stormwater runoff and marine debris	30 students Wendell the Duck stormwater guide mailed to teacher
4/23/2022	Lower Cape Fear Earth Day Celebration	Virtual festival attendees, general public	Stormwater Services (SWS is an annual sponsor of the Lower Cape Fear Earth Day Festival)	Information about stormwater pollution, solutions, native plants, and educational promo items - water bottles, magnets, pens, kids stormwater maze, etc.	5000 attendees
Fall 2021 & Spring 2022 semesters	8th Grade Enviroscape Instructional Videos	All 8th Grade NHC Schools Science Classes	Stormwater Services CFRW NHSWCD	Instructional videos about watersheds, local water quality issues, nonpoint source pollution, 6 notorious pollutants, stewardship, wetlands, etc.	13 instructional videos developed for all 8th grade classes. Approximately 2200 students

Local Cable Access (GTV-8) & City's YouTube Channel

Airs on rotating schedule	GTV-8 City's cable access channel stormwater programming (slides)	Cable access TV viewers	Stormwater Services GTV-8	Monthly rain barrel sale to the public (updated content to reflect changes due to Covid-19)	Inform public about opportunity to purchase reduced cost rain barrels every month

Airs on rotating schedule	GTV-8 City's cable access channel stormwater programming (slides)	Cable access TV viewers	Stormwater ServicesGTV-8	Re-route your downspout slideshow	Inform public about re-routing downspouts to let water soak in, instead of runoff
Airs on rotating schedule	GTV-8 City's cable access channel stormwater programming (video slideshow)	Cable access TV viewers	Stormwater Services GTV-8	Shortnose Sturgeon narrated slideshow	Inform public about the Shortnose Sturgeon, an endangered species in the Cape Fear River
Airs on rotating schedule	GTV-8 City's cable access channel stormwater programming (slides)	Cable access TV viewers	Stormwater Services GTV-8	Pet waste ordinance slideshow, detailing ordinance rules and fines	Inform public of pet waste ordinance
Airs on rotating schedule	GTV-8 City's cable access channel stormwater programming (slides)	Cable access TV viewers	Stormwater Services GTV-8	Yard waste ordinance slideshow, detailing ordinance rules and fines	Inform public of yard waste ordinance
Airs on rotating schedule	GTV-8 City's cable access channel stormwater programming (slides)	Cable access TV viewers	Stormwater Services GTV-8	Stormwater hotline info slideshow	Inform public of water pollution/illicit discharge and hotline to report pollution
Airs on rotating schedule	GTV-8 City's cable access channel stormwater programming (slides)	Cable access TV viewers	Stormwater Services GTV-8	Stormwater Poster slideshow	Inform public about hotline, pet waste, yard waste, and where runoff drains
Airs on rotating schedule	GTV-8 City's cable access channel stormwater programming (PSA)	Cable access TV viewers	Stormwater Services GTV-8	:30 second PSA	Hard to Train a Human Pet Waste PSA 2014 (refilmed in Hi-Def)
Airs on rotating schedule	GTV-8 City's cable access channel stormwater programming (PSA)	Cable access TV viewers	Stormwater Services GTV-8	:30 second PSA	Yard Waste PSA 2014
Airs on rotating schedule	GTV-8 City's cable access channel stormwater programming (PSA)	Cable access TV viewers	Stormwater Services GTV-8	:30 second PSA	Stormwater Journey Animated PSA
Airs on rotating schedule	GTV-8 City's cable access channel stormwater programming (PSA)	Cable access TV viewers	Stormwater Services GTV-8	:30 second PSA	Not your Ashtray PSA

Airs on rotating schedule	GTV-8 City's cable access channel stormwater programming (PSA)	Cable access TV viewers	Stormwater Services GTV-8	:15 second PSA and :30 second PSA	Life of Litter PSA

CCTV & Marlin Information Boards

Airs on rotating schedule	GTV-8 marlin information boards	Employees	Stormwater Services	Stormwater education slides Rain Barrel slides Stormwater Basics PSA	Employees and visitors to city offices
Airs on rotating schedule	Cape Fear Public Utility Authority (CFPUA) CCTV	CFPUA viewers	Stormwater Services	Stormwater education slidesRain Barrel slidesStormwater Basics PSA	Employees and visitors to CFPUA offices

Brochures, Displays, Signs, Welcome Packets, Pamphlets

Permanent Signage	For all city wetlands and retention ponds	General public	Stormwater Services	Installed "caution" signage for algae and pollutants at	Installed at all city-owned retention ponds and stormwater wetlands
Ongoing Enforcement & Education Activity	Pet Waste Signage Program & Tidy Bag Dispenser Giveaways	Pet owners	Stormwater Services	Continued program to deploy educational pet waste signage in city easements where pet owners walk their dogs	Signage deployed to problem locations throughout the city on rotating basis. Pet waste bag dispensers posted with signs for the public to take.
7/1/22	Stormwater Services brochures delivered to CFPUA	CFPUA / Stormwater customers	Stormwater Services	Two CFPUA Offices received updated Stormwater Services General brochures to distribute to customers	2500 brochures

Newsletters

Spring 2022	Stormwater content included in citywide newsletter - The Wilmington Current; also separate Stormwater Watch newsletter created from content	City residents Special events	Stormwater Services Communications Div.	UNCW Annual Water Quality Report including articles about HOW grants, GFLake floating wetlands, stormwater intern, Earth Day, pet waste survey	45,000+ newsletters mailed to city residents

Grant Projects

EPA 319 Grant for UNCW Retrofits	Bradley Creek	Stormwater Services NCCF UNCW	Grant to install SCMs on the UNCW campus in the Bradley Creek Watershed	Collaboration with NCCF, City's Heal Our Waterways Program, and UNCW	Grant project began in January 2022.
CWMTF Grant - Floating Wetland Treatment Islands in GFLake (NCSU)	Greenfield Lake	Stormwater Services NCSU	Grant to install floating wetland treatment islands in Greenfield Lake	Collaboration with NCSU and COW Stormwater Services	Grant project began in February 2021.

EPA 319 CFRW Grant for Jumping Run Branch tributary of Greenfield Lake (Phase 1)	Greenfield Lake	Stormwater Services CFRW UNCW Moffatt & Nichol	Grant to enhance a wet pond to filter nutrients before emptying into Greenfield Lake	Collaboration with CFRW, UNCW, Moffatt & Nichol, and COW Stormwater Services to improve the Greenfield Lake Watershed	Grant project ends in June 2022.
EPA 319 Grant for Bradley Creek	Bradley Creek	Stormwater Services NCSU	Grant to install SCMs on private property in the Bradley Creek Watershed	Collaboration with NCSU and COW Stormwater Services to implement SCMs on private property in conjunction with Clear Run Branch Stormwater Capital Improvement Project	Grant project began in March 2021.
EPA 319 Grant for Bradley Creek	Bradley Creek	Stormwater Services UNCW NCCF	Grant to install SCMs on UNCW property in the Bradley Creek Watershed	Collaboration with NCCF, City's Heal Our Waterways Program, and UNCW	Grant project began in January 2022.
Ongoing	Watershed restoration plan for Hewletts and Bradley Creeks, now being implemented by Watershed Coordinator	Hewletts & Bradley Creek watershed residents and businesses	Partners: Stormwater ServicesNC Coastal Federation Town of Wrightsville Beach Withers and RavenalUNCW	Heal Our Waterways program implementation. See TMDL section of report for status of restoration plan implementation	Watershed restoration plan implementation began in 2013. Program is called Heal Our Waterways

Participation on Boards/Committees

Quarterly Meetings	NC of Natural & Cultural Resources appointment	NC Aquarium at Fort Fisher	Stormwater Education Program Manager	Advisory Committee Appointment	Reappointed to 3-year term, thru 2022
Quarterly Meetings	New Hanover County Watershed Roundtable	Local water quality agencies, gov't, NGOs	Stormwater Education Program Manager	Participation in collaborative meeting	Ongoing

Employee Trainings

2/17/2022	Report Stormwater Pollution Hotline and Webform training for staff	Training for Compliance Officer and Stormwater staff that respond to hotline/ webform reports	Stormwater Education Manager	Training with handout/diagram	3 staff attended
7/28/2021	SCM Inspections and Maintenance Training	Maintenance & Operations Staff, Engineering	Stormwater Specialist	SCM Inspection & Maintenance Training	14 attendees
11/22/2021	Pollution Prevention/GH and Public Education (Cistern Training)	Fire Station staff	Stormwater Specialist Watershed Coordinator	PP/GH, Education, Cistern Training	14 attendees

6/16/2022	Pollution Prevention/ Good Housekeeping Training	Streets Staff Stormwater staff Field Staff	Stormwater Specialist	Video content Plans for training COW field crews and relevant depts.	8

Weekly Update Articles for City Council / City Staff / Media

Weekly	Weekly Email Update	City Council Employees Media	Various city staff	Weekly update of city news, events, projects, etc.	Stormwater information was included in 7 Weekly Updates

Citizen Contacts

Ongoing/ regularly	Stormwater office via phone, email or walk-in	Citizens/ Businesses	Stormwater Services	Responses to requests for information, literature, etc.	Information provided to 10 citizens based on the specific nature of contact

LEGEND:

COW = City of Wilmington

NHSWCD = New Hanover Soil & Water Conservation District

CFPUA = Cape Fear Public Utility Authority

CFRW = =Cape Fear River Watch

WECT-TV6 = NBC station

CUMULUS = radio stations

NCSU = NC State University

FB = Facebook

HOW = Heal Our Waterways program

CITY OF WILMINGTON
STORMWATER SERVICES

PUBLIC

OUTREACH & EDUCATION INVOLVEMENT & PARTICIPATION

PLAN

Winter 2022

Table of Contents

Plan Overview

Stormwater runoff is water from rain or irrigation that flows over land and into local creeks, streams and waterways. According to the US Environmental Protection Agency (EPA), stormwater runoff is the #1 source of surface water pollution.

Impervious surfaces are hard surfaces that rainwater cannot penetrate or naturally absorb, such as driveways, streets, parking lots and rooftops. Instead, runoff flows over these surfaces picking up pollutants such as pet waste bacteria, auto fluids, fertilizers, pesticides, litter, and yard debris and carries them through the stormwater drainage system, directly into area waterways.

In Wilmington, stormwater runoff travels through a complex, interconnected system of storm drains, pipes, ditches, creeks, and other natural and man-made features. In Wilmington, the storm drainage system consists of approximately:

- 18,508 storm drains, manholes, and other structures
- 312 miles of pipes/culverts
- 218 miles of open drainage (ditches and channels)
- 46 acres of retention ponds, infiltration basins, and lakes including Randall Pond, Silver Stream Pond, and Greenfield Lake
- 131 acres of stormwater BMPs such as Kerr Avenue Wetland, Park Avenue Bioretention Area, Wade Wetland, Silver Stream Pond, Independence Pond, the Stormwater Demonstration Site in Anne McCrary Park, etc.

This plan for Public Outreach/Education and Public Involvement/Participation is a component of the City of Wilmington's Stormwater Management Plan (hereinafter referred to as Stormwater Plan), as required by the State of North Carolina Department of Environment and Natural Resources Division of Water Quality Permit No. NCS000406. This federal stormwater permit authorizes the City of Wilmington to discharge stormwater from a municipal separate storm sewer system (MS4) to the receiving waters of the State within the Cape Fear River and White Oak River Basins, under Environmental Protection Agency's National Pollutant Discharge Elimination System (NPDES) Program.

As required by the NPDES Permit, the City of Wilmington's Stormwater Plan must detail the City's outreach and participation program for the five-year term of the stormwater permit. This document serves as the official Public Outreach/Education and Public Involvement/Participation Plan.

Public education and participation are essential tools to develop awareness, stewardship, and behavior change for stormwater pollution issues within the City of Wilmington. By successfully reaching out, creating awareness, and engaging citizens and businesses, we can reduce the impact of stormwater pollution on our local surface waters, preserving them as a healthy and vital resource for the Wilmington- area.

Since 1993, scientists at the UNC Wilmington Center for Marine Science Research have been assessing the water quality of Wilmington's major creeks and waterways within the city limits. Approximately 22 sampling sites assess the water quality of ten of Wilmington's creeks, as well as

Greenfield Lake, and the Cape Fear River. The findings are reported annually and serve as a valuable tool to gauge changes in local water quality and guide our outreach/education and involvement/participation efforts.

In addition, the City of Wilmington has established long-standing contractual relationships with Cape Fear River Watch & New Hanover Soil & Water Conservation District, which enables us to robustly satisfy our outreach/education and participation/involvement BMPs and program goals/objectives.

It is important to note that this plan is a working document; therefore the goals, objectives, pollutants, and target pollutants will change over time based on a variety of factors including audience awareness, behavior trends, local water quality data, observational data, etc.

Program Goals & Objectives

Goals:

The City of Wilmington Stormwater Services implements a Public Education/Outreach and Involvement/Participation Program based on community-wide issues with the overarching goals to:

- Raise awareness and educate the community about the impacts of polluted stormwater runoff on local waterways, including simple and attainable solutions to stormwater pollution
- Promote ongoing citizen participation by involving the public in community activities aimed at reducing and preventing stormwater pollution.

These goals inform, educate, and involve the public so they can make informed decisions and take responsibility for preventing polluted runoff from impacting area waterways.

As mentioned previously, the City of Wilmington has established long-standing contractual relationships with two outside agencies which enables us to further engage and involve the public in stormwater education and experiences.

Public Outreach/Education Objectives:

- Distribute educational handouts, publications, and digital and mobile materials to educate the public and increase awareness about stormwater pollution, environmental impacts, and solutions.
- Educate school children with established watershed education curriculum.
- Participate in community events to engage and educate the public about stormwater runoff.
- Include stormwater content in the citywide newsletter reaching approximately 44,000 residents and businesses.
- Develop mass media and social media campaigns to increase awareness of stormwater pollution, water quality, and solutions for the general public.
- Maintain a robust stormwater website featuring educational content and ways for the public to get involved in stormwater stewardship.

Public Participation/Involvement Objectives:

- Include the public in the development, implementation and review of the stormwater management plan.
- Develop and promote interactive, hands-on programs that engage citizens in stormwater stewardship and promote stormwater-friendly behaviors. These programs may be contracted with outside agencies.
- Maintain a robust stormwater website featuring educational content and ways for the public to get involved in stormwater stewardship.
- Promote the Stormwater Pollution Prevention Hotline and website form for the public to report instances of stormwater pollution

- Promote a mechanism for public involvement for citizens to provide input on stormwater issues and the stormwater program. Currently, citizens are notified and asked for input with in-house and capital improvement projects, which are often large-scale in scope. Public meetings, one-on-one meetings, public mailings/doorhangers are one method of promoting public input. Citizens can also always call our main stormwater number to ask questions or provide feedback.

In addition, our program utilizes the following concepts as a basis for outreach/education efforts and public involvement/participation programming:

- Social marketing (not to be confused with social media) is the backbone of outreach/education programming. Social marketing involves using commercial marketing principles and techniques to improve society by changing behaviors. Smokey the Bear and This is Your Brain on Drugs, are well-known examples of nationwide social marketing campaigns.

- Awareness is the first step towards behavior change.

- Education involves audiences who are aware of the issues and can be given more in-depth information to make informed decisions in their daily lives that positively impact stormwater. More detailed education results in further behavior change.

- Our waterways are important for many reasons including quality of life, tourism, the economy, recreation, aquatic habitat for many species, nurseries for seafood, to sustain life, etc.

- Polluted stormwater runoff flows directly into local waterways where it impacts water quality, aquatic habitat, shellfish harvesting, recreational water activities and access, etc.

- Storm drains and drainage conveyances (i.e. swales, ditches, pipes, etc.) carry stormwater directly to local waterways without any treatment. Only rain should go down the storm drain.

- Impervious surfaces increase the speed and volume of polluted stormwater runoff entering the stormwater drainage system and flowing into waterways.

- More impervious surfaces = more degraded water quality.

- The quality and amount of polluted stormwater runoff entering local waterways can be mitigated by installing appropriate BMPs (Best Management Practices).
  BMPs are any action or on-the-ground practice that reduces the amount of stormwater and pollution flowing into waterways. On-the-ground BMPs such as rain gardens, rain barrels, grassy swales, pervious pavement, and re-routing downspouts allow stormwater runoff to soak into the ground and be cleaned and filtered naturally. Actions are such things as picking up after pets, not blowing yard waste into storm drains, and putting litter in the trash can.

- Plants, shrubs, trees, and other vegetation can greatly reduce stormwater pollution by absorbing and filtering stormwater runoff.

- Everyone CAN and SHOULD make a difference to improve and protect our waterways.

Best Practices

The mission of City of Wilmington Stormwater Services is to provide comprehensive management of the stormwater drainage system in order to protect our community and the environment.

The City of Wilmington Stormwater Services strives to improve local water quality by creating awareness of stormwater runoff issues ultimately resulting in behavior change through public education, outreach, and community involvement. We also aim to involve the public by providing opportunities for the community to get involved in hands-on stormwater activities and to provide input and feedback on local stormwater issues.

Our program informs and creates awareness for citizens, businesses, and employees about the stormwater drainage system, sources of stormwater pollution, the impacts of stormwater pollution on local waterways. We also highly focus on solutions and practices we can do as individuals and as a community to mitigate stormwater pollution through personal stewardship and community action.

Our programming is based on the principles of social marketing, which is broadly defined as "using marketing principles and techniques to communicate and influence a target audience to voluntarily change a behavior for the benefit of individuals, groups, or society as a whole." Social marketing campaigns should appeal to the values of the target audience. Values can include saving money, protecting public health, improving the environment, opening waters to shellfish harvesting, preventing swimming advisories, being a good steward, etc.

Best practice for developing outreach/education and involvement/participation programming follows the steps below as illustrated in the EPA's Getting in Step: A Guide for Conducting Watershed Outreach Programs, 3rd Edition:

1) Identify Driving Forces, Establish Goals, and (SMART) Objectives
2) Identify the Target Audience(s)
3) Create your Message
4) Package your Message (format)
5) Distribute your Message
6) Evaluate your Plan/Campaign

Once driving forces/goals/objectives are developed, identifying and analyzing the target audience is one of the most critical steps for developing an outreach/education campaign. Target audiences are commonly identified by demographics, activities, occupation, location, current knowledge, attitudes and beliefs, behavior patterns, social/cultural behaviors, and education level.

It is also important to identify any potential barriers to adoption of stormwater-friendly behaviors within the target audience. Barriers can be physical, economic, psychological, time, inconvenience, lack of awareness, etc. For instance, some pet owners believe that leaving pet waste on the ground is a natural fertilizer, without realizing the negative bacterial impacts on

water quality and public health. Barriers should be addressed by your programming so that they are minimized or removed and the benefits to behavior change are positively conveyed.

Packaging/formatting and distributing your campaign messages are vital to achieving success with your campaign. The target audience should always be considered when determining the appropriate methods to reach them with campaign messages or efforts to involve them. Formats and distribution methods range from mass media outlets for messaging to large events and field trips to more intimate formats such as focus groups, neighborhood meetings, email newsletters, and presentations. Other outreach formats include print materials, giveaways, websites, and social media platforms.

For each of the identified pollutants in our plan, outreach messages will be created/adapted, packaged, and distributed for each specific target audience at the time of outreach. It is also important to form partnerships and community collaborations whenever possible, to jointly work on outreach/education campaigns with other agencies that have similar goals or may already have a similar program or message in place.

Evaluating your outreach/participation programs and activities is extremely important for determining success, areas for improvement or adjustment, and future directions for your program. "The success of outreach programs depends on how well they're conceived, planned, implemented, and adapted. Developing solid objectives and determining the appropriate target audience at the start is key to measuring success."

Building evaluation tools, like those suggested below, into your outreach campaign at the beginning, along the way, and at the conclusion of programming, is important for adapting your future programs so they are successful. There are several types of evaluation:

- *Process Evaluations* involve evaluating the campaign and components during implementation (i.e. budget, schedules, resources, staffing, activities, costs, materials, etc.)

- *Impact Evaluations* help you determine if you've met or impacted the goals and objectives of the program and measure the impact of the campaign on the target audience (i.e. pre-and post surveys, Google Analytics, water quality improvement, social indicators/behavior changes, increased awareness, changed attitudes, reduced barriers, etc.)

- *Contextual Evaluations* include indicators of how the campaign/program impacts the community, economy, politics, perceptions, cultural factors, etc.

- *Observation* includes monitoring audiences for changes in observed behavior (i.e. pet owners cleaning up after pets, lawn care companies are no longer blowing yard waste into streets, etc.)

Pollutant Summary Table

Target Pollutant(s)	Likely Source(s)/ Target Audience(s)	Responsible Party for Implementation
Fecal Coliform Bacteria	• Sewer Overflows • Residential • Commercial • Illicit Discharges (IDDE) • Wildlife/Waterfowl Sources • Bradley and Hewletts Creek Private Property Owners	• Public Education & Outreach • Public Involvement & Participation • Watershed Coordinator • IDDE / Stormwater Compliance
Litter	• Residential • Commercial • Schools	• Public Education & Outreach • Public Involvement & Participation • Watershed Coordinator • IDDE / Stormwater Compliance
Nutrients	• Sewer overflows • Residential • Commercial • Urbanization	• Public Education & Outreach • Watershed Coordinator • IDDE / Stormwater Compliance • Pollution Prevention/Good Housekeeping
Yard Waste (leaves, grass clippings, pine straw)	• Residential • Commercial • Municipal Operations	• Public Education & Outreach • Watershed Coordinator • IDDE / Stormwater Compliance • Pollution Prevention/Good Housekeeping
Sediment	• Construction	• Construction Site Runoff Control
Improper Disposal of Waste / Chemicals	• Residential • Commercial • Industry • Municipal Operations	• IDDE / Stormwater Compliance • Pollution Prevention/Good Housekeeping • Public Education & Outreach • Public Involvement & Participation
Illicit Discharge	• Residential • Commercial • Industry • Municipal Operations	• IDDE / Stormwater Compliance • Pollution Prevention/Good Housekeeping • Public Education & Outreach
Illegal dumping	• Residential • Commercial • Industry • Municipal Operations	• IDDE / Stormwater Compliance • Public Education & Outreach
General non- point source pollution	• Residential • Commercial • Schools	• Public Education & Outreach • Public Involvement & Participation • IDDE / Stormwater Compliance • Pollution Prevention/Good Housekeeping

Overview Target Pollutants, Sources, and Audiences:

The target audiences and pollutants identified in the Stormwater Management Plan (SWMP) are directly addressed by this Public Education/Outreach and Involvement/Participation Plan.
In addition, the City of Wilmington's Stormwater Compliance Officers are required to inform and educate property owners and the general public about the hazards associated with illicit discharges, illegal dumping and the improper disposal of waste, as well as the city's pet waste and yard waste regulations. The city has a robust program and many methods of reaching target audiences most likely to have an impact on the stormwater system.

By identifying target audiences enables the city to develop programming for these audiences. Programming includes direct classroom presentations, distributing educational materials to the community content in the City's public newsletter reaching 44,000 residents and businesses, mass media/social media campaigns, participating in community events to directly engage with residents and property owners, and hands-on activities such as watershed/creek cleanups, storm drain marking, and the CreekWatchers monitoring program.

Our program addresses major pollutants that have an impact Wilmington's waterways. These pollutants come mainly from nonpoint sources, however, we may address commercial and industrial sources of water pollution, particularly through our compliance and illicit discharge program. Most major industry lies outside of the city limits.

The following descriptions identify pollutants, sources, and audiences that have or are likely to have an impact on Wilmington's waterways, including residential and commercial business/industrial sources. Many of these identified pollutants, such as litter and yard waste, can also negatively impact the proper functioning of the stormwater drainage system.

These particular pollutants, sources, and audiences were chosen based on several sources including UNCW's water quality monitoring data, the City of Wilmington Stormwater Services maintenance activities, Stormwater Compliance Officers data on stormwater violations, education/outreach program data, New Hanover Animal Control statistics, and the Statewide Stormwater Survey of North Carolina residents, and 2019 SC Stormwater Survey, as well as anecdotal community observations.

Pollutant: Fecal Coliform Bacteria / Pet Waste

Fecal coliform bacteria is the #1 pollution problem impacting Wilmington's creeks and waterways, as identified through annual water quality monitoring by UNCW. Primary sources of this bacterial pollution is pet waste. Occasional, episodic sewer spills also contribute to bacterial pollution, but this is a less frequent source of contamination. Background sources like waterfowl in Greenfield Lake also impact bacterial levels. Fecal bacterial pollution has resulted in the direct closure of shellfish harvesting beds in tidal creeks throughout Wilmington.

UNCW has found a direct correlation between the amount of impervious surface coverage and the degradation of Wilmington's waterways. A watershed restoration plan is being implemented in two high priority creeks to reduce fecal bacterial pollution and eventually reopen shellfish harvesting in Bradley & Hewletts Creeks. Likely sources of fecal coliform pollution are pet owners and pet-related businesses, as well as sanitary sewer system overflows under management of the Cape Fear Public Utility Authority and background sources like birds and wildlife.

Target Audience:
Domesticated dog waste is a major source of bacterial pollution, especially considering their population (nearly 55,000 in New Hanover County), daily defecation rates, and bacterial production. One gram of dog waste (weight of a paperclip) can contain nearly 23 million fecal bacteria. Feral and outdoor cats are also a problem for these same reasons; steps should be taken to control their waste as well.

By right of ownership, a pet owner has the power to reduce pet waste-contaminated runoff by cleaning up after their pet. Survey data reports both females and males should be targeted, with a slightly higher % of males not picking up after pets. In addition to pet owners, targeting pet-related businesses will educate those in the profession about best practices for pet waste management and also serve as a conduit to deliver outreach messages to the public.

Bacterial pollution attributed to wildlife and waterfowl is not a source that can be easily managed, but the city and contracted staff at Cape Fear River Watch make efforts to educate the public about not feeding wildlife/waterfowl, particularly at Greenfield Lake. Feeding wildlife habituates them to stay in an area if there is a regular source of external food, adding both bacteria and nutrients to a waterbody.

Private property owners within the Bradley and Hewletts Creeks Watersheds are also able to reduce the volume of stormwater that can transport fecal coliform to these creeks by implementing best management practices (BMPs) on residential or commercial properties, through the assistance of the city's Heal Our Waterways (HOW) Program.

Pollutant: Nutrients / Yard Waste

Nutrient pollution, caused by nitrogen and phosphorous inputs, have been identified as a pollutant of concern for causing algal blooms, low dissolved oxygen levels, and resulting fish kills. Background sources of nitrogen and phosphorous can be attributed to wildlife/waterfowl. Greenfield Lake has experienced all of these issues. Likely sources of nutrient pollution include improper fertilization and/or improper yard waste disposal practices by landscaping companies and residents. UNCW water quality data has indicated algal blooms in local creeks, as well as low DO, and occasional fish kills.

Target Audience:
A direct link exists between nutrient pollution (nitrogen & phosphorous) and poor water quality. This has been researched by UNCW particularly on Greenfield Lake.

The target audiences for this pollutant are overwhelmingly male and include residents and landscaping companies. The city's Stormwater Compliance Officer routinely investigates and responds to complaints of landscaping companies and/or homeowners blowing yard debris into the street and storm drainage system.
The city and Cape Fear River Watch educate the public about not feeding wildlife/waterfowl, particularly at Greenfield Lake. Feeding wildlife habituates them to stay in an area if there is a regular source of external food, adding both bacteria and nutrients to a waterbody. In addition, the city has worked to educate the public about harmful cyanobacteria blooms that have unfortunately occurred in Greenfield Lake. Educational efforts have included cyanobacteria outreach materials, dedicated displays, and social media posts, as well as educational signs posted at every city-owned retention pond and wetland. In 2022, UNCW also began a study of city-owned retention ponds to

sample for algal blooms and toxins, fecal bacteria and other water quality measures and sample sediments for toxic chemicals, heavy metals, nitrogen and phosphorous.

Pollutant: Litter

Litter is ubiquitous and is especially problematic for the stormwater drainage system and for wildlife and aquatic habitat. Litter often takes a long time to degrade. It can be mistaken by fish, birds and other wildlife as a food source, resulting in them becoming sick or dying from ingestion. Aquatic and terrestrial wildlife can also become entangled in litter and die as a result. Litter introduces chemical pollutants and toxins into waterways, such as those contained in plastics and cigarette butts.

Litter is a stormwater issue associated with both commercial and residential areas. Watershed/creek cleanups contracted with Cape Fear River Watch, as well as routine maintenance by Stormwater crews, have identified litter as an ongoing problem in local watersheds. Likely sources are pervasive across the city and include businesses, residences, students/schools, motorists, construction sites, etc.

Target Audience:

Litter habits cannot be confined to a particular demographic in most cases. Therefore, targeting the general public is advisable. However, focusing on 8th graders during annual school presentations should be a priority, since they are in the developmental stage of learning and forming opinions, and often report littering behaviors themselves during these presentations.

The Stormwater Compliance Officer has dealt with numerous reports of illegal dumping activity in the city. Although it is difficult to track down the offender, property owners are held responsible for cleaning up illegal dump sites.

Pollutant: Sediment

Sediment is generated by the process of natural or accelerated erosion and consists of sand, dirt, clay, or soil particles. While natural erosion contributes sediment to waterways, the majority of sediment comes from areas where accelerated erosion has occurred, such as from land-disturbing activities like construction. Stormwater runoff carries these soil particles to local creeks and streams.

Sedimentation can clog the storm drain system or quickly fill in a waterbody potentially leading to flooding. Sedimentation also impacts bottom-dwelling organisms by smothering fish eggs, shellfish, coral and benthic (bottom-dwelling) plants. Sediment can cause water to become cloudy, also known as turbidity. Turbidity impairs the photosynthesis of aquatic plants, as well as the ability of aquatic animals to breathe, see prey/predators, and reproduce.

Sediment also serves as a "transport vehicle" for other pollutants such as nutrients, metals, and bacteria. These pollutants attach to sediment particles and cause additional water quality issues when the sediments are agitated (i.e. boating, hurricanes, wading, etc.) and can re-pollute the water column. UNCW has documented incidents of this.

With the prevalence of fecal coliform bacteria and the propensity for sediment to transport it to waterways, reducing sediment loading to creeks is beneficial for other pollutants of concern as well.

Target Audience:
The environmental consequences of sedimentation are not widely understood by citizens. Sources of sediment in our surface waters are primarily the result of human-related land disturbing activities. Construction, landscaping companies, and related industries may significantly contribute to sediment loading in area waterways. Homeowners can also be a source of sediment pollution for activities conducted on the homefront including blowing sediment, exposed soil, and having poorly vegetated areas.

Likely sources of sediment pollution in our area are the result of rapid construction across the city resulting in land-disturbing activities, erosion of creek banks, exposed soil in yards, improper disposal practices, and blowing sediment into the storm drainage system by residents and landscapers.

Pollutant: Chemicals / Improper Disposal of Waste

Chemicals are a pollutant focus for the damage they can cause to aquatic and terrestrial environments. Stormwater runoff washes harmful chemicals such as pesticides, pressure washing cleaners, vehicle washing soaps and other illicit discharges directly into our waterways. Most of these pollutant sources contain toxic chemicals that can persist in the environment, causing toxicity in humans and aquatic organisms.

Pesticides have been known to cause negative changes to amphibians and other aquatic organisms and bio-accumulate up the entire food chain to humans.
Instances of chemical pollution via illicit discharges or improper use or disposal are often found by pollution reports to our stormwater pollution hotline or detected via routine investigations by the Stormwater Compliance Officer. In addition, restaurant grease traps have been found to be non-functioning and contributing to water pollution by our Stormwater Compliance Officer.

Residents and business employees have reported the improper disposal of waste (i.e. motor oil and other chemicals) to the city. Sources are pervasive and result from businesses and residents illegally discharging chemicals or waste into the environment or using chemicals improperly resulting in leaks and spills.

Target Audience:
All citizens have the potential to contribute chemical pollution by washing items outdoors (i.e. driveways, homes, lawn furniture), by using pesticides and other chemicals on their property, or by improperly disposing of waste.

Businesses that wash surfaces outdoors often use cleaning agents containing chemicals that are harmful to our waterways. These chemicals are easily washed into the storm drainage system from impervious surfaces. Restaurants may clean equipment or dump mop washwater outdoors illegally. Grease traps have also been found to be non-functioning at area restaurants by the Stormwater Compliance Officers. The discharge of any type of wastewater or washwater into the storm drainage system is unlawful and carries associated fines that are addressed by our Stormwater Compliance Officer(s).

Pollutant: Illicit Discharges / Illegal Dumping

Any of the focus pollutants listed above could be a source of illicit discharge pollution or illegal dumping. This can happen when pollutants are purposefully or inadvertently handled in a way that results in pollution. For instance, pouring chemicals like pesticides or motor oil directly into a storm drain; dumping trash in a specific location; or a business with a broken sewer line or grease trap discharging into the environment.

Fortunately, the City of Wilmington employs two Compliance Officer that can detect and respond to instances of illegal dumping, illicit discharge and improper disposal of waste.
These officers can enforce city stormwater ordinances with notices of violation and associated fines. In addition, the city's Stormwater Pollution Prevention Hotline and web reporting form allows citizens, employees, and businesses to report instances of stormwater pollution or potential pollution. Compliance Officers respond to hotline and webform reports.

All of the pollutants above are woven into outreach materials, events, workshops, website and school presentations. The pollutants, sources, audiences, messages, etc. are described in more depth in the pages that follow.

Target Pollutant: FECAL COLIFORM BACTERIA

Fecal coliform bacteria are found in the guts and feces of domesticated and wild animals, as well as in human waste. Stormwater runoff carries bacterial pollution from uncollected pet waste and episodic sewer spills into local surface waters. Bacteria can contaminate waterways commonly used for recreational activities such as swimming and fishing and commercial shellfish harvest.

Likely Residential Sources: Pet Owners, Wild Animals/Waterfowl, Stray/Feral Animals, Illicit Discharges
Likely Commercial/Industrial Sources: Sewer Spills, Illicit Discharges, Pet-related Businesses (i.e. doggie daycare, doggie parks, boarding facilities, etc.), Multi-Family Apartment Complex Tenants, Schools
Other: Bradley & Hewletts Creek Residents and Businesses

Background/Environmental Impacts:

- Storm drains and drainage conveyances (i.e. ditches) carry polluted runoff directly to local waterways without any treatment. Only rain should go down the storm drain.
- Fecal coliform bacteria is the #1 pollution problem impacting Wilmington's creeks and waterways, as identified through annual water quality monitoring by UNC-Wilmington.
- The primary source of bacterial pollution is canine and outdoor cat waste. Occasional sewer spills also contribute to bacterial pollution, but this is an infrequent source of contamination.
- Background sources such as waterfowl/wildlife can create fecal bacterial pollution issues in waterbodies such as Greenfield Lake.
- Stormwater runoff washes bacteria, parasites, viruses, and nutrients from uncollected pet waste directly into our waterways.
- Fecal bacteria is an indicator bacteria. High levels of fecal coliform bacteria indicate the potential for diseases and infections by other pathogens upon contact. Pathogens such as roundworm, salmonellosis, toxoplasmosis, E. coli, and gastroenteritis can be contracted via contaminated water. These bacteria can make humans, pets, and other animals sick as well.
- Once in waterways, these pathogens can cause shellfish bed closures, recreational swimming advisories, and impaired aquatic habitat.
- There is a direct correlation between the amount of impervious surface coverage and fecal coliform bacteria counts and degradation in Wilmington's waterways, as cited by UNCW research.

Target Pollutant: FECAL COLIFORM BACTERIA (pet waste, sewer spills)

Key Outreach Messages:

- Outreach/Education messages should make the connection between uncollected pet waste to impaired water quality and human health impacts.
- Domesticated dog waste is a major source of bacterial pollution considering their population in New Hanover County (55,000 registered dogs in 2019), daily defecation rate, and bacterial production. Outdoor cats are also a problem for these same reasons and steps should be taken to control their waste outdoors as well.
- Although not a large source, educate the public about not feeding waterfowl/wildlife as it creates unnatural site fidelity that leads to increased fecal contamination, particularly in Greenfield Lake.
- Bacteria can cause diseases and infections in humans, pets, and wildlife.
- Debunk barriers and myths to cleaning up after pets (i.e. it's not fertilizer, it's okay to use a bag to pick it up with your hand, pet waste is still a problem even if it's in your own backyard, it can go in the landfill, etc.).
- Pet owners have a responsibility to clean up after pets and dispose of the waste properly, according to the city's pet waste ordinance.
    - Fully and immediately clean up after pets on any public property. *(Public property consists of streets, sidewalks, right of ways, parks, plazas, stream banks, public accesses, pathways, drainageways, storm drains, creeks, officially accepted easements, etc.)*
    - Carry a clean-up device (i.e. bag, scooper) at all times.
    - Show the clean-up device to a Code Enforcement Official, if requested.
    - Bag and dispose of pet waste in a closed trash receptacle or refuse container.
    - Do not flush pet waste down the toilet (Cape Fear Public Utility Authority ordinance).
    - Fines for non-compliance with the City's pet waste ordinance are $250 per occurrence in the city
- Pet waste left on private property carries the same impact on water quality.
- Utilizing BMPs, such as rain gardens, rain barrels, and re-routing downspouts to grassy areas allows polluted runoff and pet waste bacteria to soak into the ground and be cleaned and filtered naturally.
- Private property owners within the Bradley and Hewletts Creeks Watersheds can reduce the amount of stormwater that carries fecal coliform to these creeks by implementing best management practices (BMPs) on residential or commercial properties, through the assistance of the Heal Our Waterways (HOW) Program.

Target Audience Description *(Why Selected?)*	**Suggested Outreach/Education Strategies**
Pet Owners: A pet owner has the power to reduce bacteria in runoff by cleaning up after their pet regularly. Survey data shows both females and males should be targeted, with a slightly higher % of males not picking up.	• Educate pet owners about the City's pet waste ordinance using a variety of methods • Schools – include pet waste/bacterial education in Enviroscape 8th Grade watershed education presentations • Canines for Clean Water outreach program for pet owners to sign clean water pledge • Host Super Pooper Scooper photo booth to educate pet owners in a fun and interactive way • Participate in local pet-related events to provide direct education to pet owners and distribute pet waste brochures and fliers • Post the City's Pet Waste Ordinance signs on the city's pet waste stations • Pet Waste Rotating Signage Program – post pet waste educational and ordinance signs in city parks, areas with customer driven complaints, and in identified problem areas • Implement media/social media campaigns to educate the public about the dangers of uncollected pet waste, city's ordinance, and simple solutions • Include information in the citywide newsletter • Post outreach messages on stormwater website and GTV

	• Compliance Officers - utilize enforcement actions and fines when necessary for violations of the city's pet waste ordinance • Compliance Officers provide educational direct contact on site with the pet owners • Encourage community participation in storm drain marking program • Outreach/education and BMP installations to reduce bacteria via the Heal Our Waterways Program • Direct mail enforcement letter and pet waste brochure to neighborhoods with complaints or identified pet waste problem • Promote Stormwater Pollution Prevention Hotline & Web Reporting Tool to the public • Educate the public, particularly at Greenfield Lake about not feeding wildlife/waterfowl and the associated bacterial and nutrient problems
Pet-Related Businesses: Targeting pet-related businesses will educate those in the profession about best practices for pet waste management and also serve as a conduit to deliver outreach messages to the public. Businesses include doggie daycares, community bark parks, veterinarians, kennels, pet stores, etc.	• Encourage businesses to be models for environmental stewardship (i.e. install pet waste receptacles in parking lot islands, properly designed kennel runs for waste removal, DNA testing and fines for apartment complex residents, etc.) • Encourage businesses to post the pet waste educational poster and/or materials for customers to view • Pet Waste Rotating Signage Program – post pet waste educational and ordinance signs in city parks, areas with customer driven complaints, and in identified problem areas
Management / Residents of Multi-Family Apartment Complexes – Apartment complexes often experience problems with uncollected pet waste on their property due to the large number of inhabitants on the property. Management can play a key role in educating their residents about pet waste and implementing and enforcing a pet waste management policy on their property.	• Provide materials to educate the management of apartment complexes on how to institute a pet waste policy, as well as provide a consistent policy for enforcement • Encourage management to be make it easy for their residents to manage pet waste by installing pet waste receptacles around the property • Encourage management to post the pet waste education signage, large format poster, or brochure in common areas for their residents to view • Encourage DNA Testing Services for multi-family complexes to manage pet waste and hold residents accountable.
Assessment & Evaluation	
• Assess and evaluate local water quality utilizing the UNCW's annual water quality monitoring report, specifically fecal coliform counts in local waterways • Track Stormwater Pollution Prevention Hotline calls • Compliance Officer direct community outreach and assessment of compliance with city's pet waste ordinance • Track the # of pet waste educational signage and materials distributed to the community • Periodically assess the habits of pet owners and pet industry professionals by: - Direct observation of habits *(collects vs. doesn't collect, male vs female, where disposing of waste, etc.)* - Surveys of pet owners - Count of reported complaints to Stormwater Hotline regarding pet waste violations	

Target Pollutant: NUTRIENTS

Nutrients, such as nitrogen and phosphorus, found in fertilizers and yard waste, enter our waterways via stormwater runoff. High nutrient loads lead to algal blooms, low dissolved oxygen levels, fish kills, and impaired aquatic habitat.

Likely Residential Sources: Homeowners, Landscaping Maintenance Companies
Likely Commercial/Industrial Sources: Growth/Urbanization, Landscaping Companies, Schools

Background/Environmental Impacts:

- Storm drains and drainage conveyances (i.e. ditches) carry polluted runoff directly to local waterways without any treatment. Only rain should go down the storm drain!
- Lawn fertilization and yard waste maintenance are two of the most widespread watershed behaviors by both homeowners and landscaping companies.
- Improper application or over-application of fertilizer results in the introduction of nutrients into our waterways via stormwater runoff.
- Yard waste (i.e. grass clippings, leaves, pinestraw) are often improperly blown or directed into streets, storm drains, and ditches leading to clogged stormwater conveyances resulting in flooding of streets and property. Yard debris can also wash into waterways via blowing the material into streets and conveyances and by irrigation methods. This organic matter then washes through the stormwater drainage system introducing nutrients into waterways.
- Fertilizers and yard waste that end up in local surface waters impact aquatic ecosystems resulting in an overabundance of nutrients, a process known as eutrophication. Eutrophic water conditions cause algal blooms. Once the excess nutrients are used up in a water body, the algae will decompose using up the dissolved oxygen in the water, which aquatic organisms, like fish, need to survive. This can cause fish kills.
- Algal blooms produced from eutrophic conditions also prevent sunlight from reaching benthic (bottom-dwelling) aquatic plants and organisms.
- Some types of algal blooms are toxic to plants and animals, including humans. Domesticated animals have passed by ingesting or coming in contact with water containing cyanobacteria.

Target Pollutant: NUTRIENTS (fertilizers, yard waste)

Key Outreach Messages:

- A direct link exists between improper fertilizer application and yard waste disposal to poor water quality resulting in algal blooms, fish kills, and habitat degradation.
- Grasscycle! Leave grass clippings on the lawn to reduce or eliminate the need for fertilizer. Clippings conserve soil moisture and act as a natural fertilizer.
- Compost yard waste and use the resulting material in your landscape or garden.
- Contain yard waste using proper collection methods for City pickup.
- Before fertilizing, get an inexpensive (and sometimes free) soil test from NHC Cooperative Extension. It will tell you the exact nutrients your lawn needs and could save you time and money spent on fertilizing.
- Design and maintain lawns with the goal of absorbing runoff. For instance, minimize the use of lawn area and fertilizer by replacing with native trees, shrubs, plants and groundcover.
- Use alternatives to fertilizer such as organic fertilizer, compost, grasscycling, worm poop, etc.
- If fertilizer must be used, read the label and apply correctly. Improper application includes over-applying by frequency or volume, applying the wrong type, applying before rain, and failure to clean excess fertilizer from driveways and streets after application.
- Improper disposal of yard waste (leaves, grass clippings, pine straw) can clog the storm drainage system causing flooding of streets and property.
- Landscaping company employees should be trained on proper fertilization and yard waste disposal practices.
- Residents and businesses should be aware of and abide by the City's Yard Waste Ordinance:
    - It is unlawful to rake, sweep, blow, wash, direct or place any debris into the storm drainage system. (*The storm drainage system consists of streets, storm drains, ditches, swales, creeks, lakes, rights-of-way, dedicated easements, etc).*
    - Property owners shall keep all ditches, drains, swales, and other drainageways on their property free from obstructions which would impede the flow of water.
    - Fines for non-compliance with the City's yard waste ordinance are $250 per occurrence.
- Cyanobacteria or harmful algal blooms are the result of warmer conditions and excess nutrients. The community should be educated about this condition and their role in reducing nutrient inputs into waterbodies.
- Utilizing BMPs, such as rain gardens, rain barrels, and re-routing downspouts to grassy areas allows polluted runoff and nutrients to soak into the ground and be cleaned and filtered naturally.

Target Audience Description *(Why Selected?)*	**Suggested Outreach Strategies**
Residents: Many citizens improperly apply fertilizer and/or blow yard waste into the street or storm drain. This target audience is primarily male residents that self-apply fertilizer and manage yard waste disposal. Also target households that hire landscaping companies to maintain their property.	• Educate citizens about nutrient pollution including cyanobacteria, and the City's yard waste ordinance using a variety of methods • Distribute fertilizer and yard waste education materials during presentations and special events • Schools – include nutrient education in Enviroscape 8th Grade watershed education presentations • Utilize mass media/social media campaigns to inform residents about proper fertilization, proper yard waste disposal methods, grasscycling, composting, collecting yard waste for pick-up, and the improper disposal of yard waste • Include information in the citywide newsletter • Post outreach messages on stormwater website and GTV • Encourage community participation in storm drain marking program • Promote stormwater pollution prevention hotline • Compliance Officers - utilize enforcement actions and fines when necessary violations of the city's pet waste ordinance • Compliance Officers provide educational direct contact on site with landscapers and property owners • Encourage community participation in storm drain marking program

	• Promote Stormwater Pollution Prevention Hotline & Web Reporting Tool to the public
Landscaping Companies: Landscaping and turf maintenance companies frequently use fertilizers and produce a significant amount of yard waste on a regular basis. Employees in this field of work are often male. Outreach efforts should include Spanish translation materials.	• Post outreach materials in English and Spanish on stormwater website • Distribute large format education poster about yard waste disposal to landscaping companies, available in both English and Spanish, to post for employees • Emphasize proper staff training on practices like fertilization application and yard waste disposal • Compliance Officers - utilize enforcement actions and fines when necessary violations of the city's pet waste ordinance • Compliance Officers provide educational direct contact on site with landscapers and property owners

Assessment & Evaluation

- Assess and evaluate local water quality utilizing UNCW Center for Marine Science annual water quality reporting, specifically nitrogen, phosphorus, BOD, and algal bloom frequencies and locations
- Track Stormwater Pollution Prevention Hotline calls
- Compliance Officer direct community outreach and assessment of compliance with city's pet waste ordinance
- Periodically assess the habits of homeowners and landscape industry professionals by:
    - Direct observation of the fertilizer application habits of homeowners and landscape industry
    - Surveys of the fertilizer application habits of homeowners and landscape industry professionals

Target Pollutant: LITTER

Litter is generated as a result of improperly or carelessly discarded plastics, food wrappers, cigarette butts, etc. that wash into waterways via the storm drainage system. Litter impacts aquatic and terrestrial habitat, wildlife, and water quality. Plastic pollution is ubiquitous and is especially problematic for the drainage system and for wildlife and aquatic organisms. Litter often takes a long time to break down, if at all.

Likely Residential Sources: Residents/General Public, Motorists, Smokers, Youth
Likely Commercial/Industrial Sources: Restaurants, Retail Centers, Construction Sites, Schools

Background/Environmental Impacts:

- Storm drains and drainage conveyances (i.e. ditches) carry polluted runoff directly to local waterways without any treatment. Only rain should go down the storm drain!
- Litter is carried by stormwater runoff into the drainage system where it can clog storm drains and drainage conveyances and cause flooding on streets and property.
- Litter that washes into local surface waters can be mistaken by fish, birds and other wildlife as food and become sick or die from ingesting it. Wildlife also become entangled in litter and die as a result.
- Litter introduces chemical pollutants into waterways, such as those contained in plastics and cigarette butts.
- Cigarette butts are a major source of litter and contain many dangerous toxins that can leach into waterways. Butt filters often contain plastic fibers that don't degrade.
- Natural litter, like apple cores, banana peels, and fast-food waste can attract wildlife to roadways and endanger their survival.
- Littered creates the "Broken Window" effect. Littered areas beget litter, while areas that are cleaner tend to repel litter.

Target Pollutant: LITTER (plastics, cigarette butts, illegal dumping, etc.)

Key Outreach Messages:

- A direct link exists between wildlife impacts, habitat destruction, and poor water quality as a result of littering.
- Flooding of streets and property can often be attributed to the accumulation of litter in the drainage system.
- Wildlife, fish, and birds often mistake litter for food or become entangled in it, resulting in their demise.
- There are large areas of trash in our oceans, called Garbage Patches.
- Cigarette butts leach chemicals such as cadmium, lead, and arsenic into the aquatic environment within one hour of contact with water.
- Cigarette butts and plastics are the most littered items in the world.
- Small plastic pieces are often found in fish species that humans eat.
- Litter attracts wildlife to the side of the road where they are likely to get hit by oncoming vehicles.
- The majority of litter found on beaches comes from inland locations.
- Littering and illegal dumping is against NC law and carries associated fines.
- Everyone has a personal responsibility for making sure that trash is disposed of properly, so it doesn't become litter.

Target Audience Description *(Why Selected?)*	**Suggested Outreach Strategies**
General Public & Youth: Litter habits cannot be confined to a particular demographic in most cases. Therefore, targeting the general public is advisable. However, focusing on 8th graders during annual school presentations should be a priority, since they are in the developmental stage of thinking and forming opinions. Informal class polls conducted over the years, have indicated that most 8th graders admit to having littered at some point in their lives.	• Promote the impacts of littering on local waterways and wildlife. Specifically explain the negative impacts on wildlife using local species (i.e. plastic bags look like jellyfish to sea turtles). • Distribute litter education materials during presentations and special events • Schools – include litter education in Enviroscape 8th Grade watershed education presentations • Utilize mass media/social media campaigns to inform residents about the litter problem and solutions • Post outreach messages on stormwater website and GTV • Emphasize easy solutions to littering - using trash or recycling receptacles • Promote the 5 R's: Reduce, Reuse, Recycle, Refuse, Repurpose • Promote North Carolina's Swat-a-Litterbug Program • Include information in the citywide newsletter • Encourage community participation in storm drain marking program • Promote Stormwater Pollution Prevention Hotline & Web Reporting Tool to the public • Compliance Officers - utilize enforcement actions and fines when necessary • Compliance Officers provide educational direct contact on site with landscapers, developers, and property owners
Smokers: Cigarette butts are one of the largest environmental litter problems, both locally and worldwide. Target both male and female smokers.	• Display signs encouraging proper disposal of cigarette butts in public areas (i.e. Wave Transit buses) • Post outreach materials on stormwater website and GTV • Distribute pocket ashtrays at public events
Motorists and Pedestrians: Along roadways, motorists (52%) and pedestrians (23%) are the largest	• Educate citizens about North Carolina's Swat-A-Litterbug Program • Remind motorists about the proper disposal of trash by displaying educational signs on public transportation vehicles (i.e. Wave Transit buses) • Involve authorities in holding offenders responsible

contributors of litter. Target males and females.	• Publicize local cleanup events and the type of litter they're finding

Assessment & Evaluation

- Conduct an informal poll before 8th grade presentations to gauge how many students litter.
- Have Stormwater Maintenance crews continually provide field observations of problem litter areas for clean-up by community service workers or Cape Fear River Watch.
- Periodically assess the litter disposal habits of Wilmington residents by:
  - Direct observation of habits
  - Surveys of habits
  - Count reported violations to Stormwater Hotline

Target Pollutant: SEDIMENT

Sediment is generated by the process of natural or accelerated erosion and consists of sand, dirt, clay, or soil particles. Sedimentation occurs when stormwater runoff carries sediment from a disturbed land area or eroding stream bank to surface waters. Sediment can clog the stormwater drainage system, can quickly fill in a waterbody, and cause turbidity and problems for aquatic life.

Likely Residential Sources: Residential Yards/Driveways
Likely Commercial/Industrial Sources: Landscapers, Construction Sites

Background/Environmental Impacts:

- Storm drains and drainage conveyances (i.e. ditches) carry polluted runoff directly to local waterways without any treatment. Only rain should go down the storm drain!
- Both natural and accelerated erosion produce sediment. Natural erosion is the process of weathering that forms soil. Accelerated erosion is a result of land-disturbing activities by humans that loosen topsoil, making the land more prone to erode quickly (i.e. construction-related activities).
- While natural erosion contributes sediment to waterways, the majority of sediment comes from areas where accelerated erosion has occurred, such as with construction sites. Stormwater runoff carries soil particles from a disturbed area of land to local creeks and streams.
- Excessive sedimentation can fill in a water body or clog the storm drainage system, leading to flooding. Sedimentation also impacts bottom-dwelling organisms by smothering fish eggs, shellfish, coral and benthic (bottom-dwelling) plants.
- Sediment can cause a water to become cloudy, also known as turbidity. Turbidity impairs the photosynthesis of aquatic plants, as well as the ability of aquatic animals to breathe, see prey/predators, and reproduce.
- Sediment serves as a "transport vehicle" for other pollutants such as nutrients, metals, and bacteria. These pollutants attach to sediment particles and cause additional water quality issues when the sediment gets stirred up (i.e. boating, hurricanes, etc) and re-pollutes the water.
- Other sources of sediment include poorly vegetated areas in a yard or landscape.

Target Pollutant: SEDIMENT (sand, dirt, soil particles, exposed soil)

Key Outreach Messages:

- There is a direct link between sedimentation and poor water quality and impacts to aquatic ecosystems and habitat.
- Any land-disturbing activity including gardening, tilling, construction, etc. can produce sediment which can lead to flooding of streets and property when the sediment is carried into the storm drainage system via stormwater runoff.
- Mulch should be used to cover exposed soil and prevent it from washing away.
- Sediment should be collected off paved surfaces and not rinsed or blown into the stormwater drainage system.
- Residents can plant groundcover, shrubs, and trees to hold soil in place and prevent erosion. Installing native plants is preferred because they don't need fertilizers and pesticides. For properties with sandy soils, mix organic matter (i.e. compost) in with the sand to allow plants to grow better.
- Lack of vegetation along waterfront property and streambanks can produce significant erosion. Waterfront property owners should be encouraged to plant vegetative buffers and living shorelines to stabilize erosion.
- Developers should follow all sedimentation and construction site laws and practices.
- Construction site violations can be reported to the State Hotline: 1-866-STOP-MUD
- Utilizing BMPs, such as rain gardens, rain barrels, and re-routing downspouts to grassy areas, allows polluted runoff to soak into the ground and be cleaned and filtered naturally.

Target Audience Description *(Why Selected?)*	**Suggested Outreach Strategies**
General Public/Homeowners: The environmental consequences of sedimentation are not widely understood by citizens. Sources of sediment in our surface waters are primarily the result of human-related activities that disturb the land. Residential properties may have exposed soil or poorly vegetated areas. Target both males and females.	• Promote the impacts of sedimentation on local waterways using a variety of outreach methods • Distribute education materials during presentations and special events • Schools – include sediment education in Enviroscape 8th Grade watershed education presentations • Utilize mass media/social media campaigns to inform residents about the sedimentation issues • During HOA or community presentations, encourage homeowners to plant vegetation or apply mulch to anchor soil in place and prevent erosion • Post outreach messages on stormwater website and GTV • Encourage waterfront property owners to plant vegetative buffers or living shorelines. • The public should be made aware of the City's yard waste ordinance which also addresses sediment • Include information in the citywide newsletter • Encourage community participation in storm drain marking program • Utilize enforcement actions when necessary for violators of yard waste ordinance (sediment) ordinance • Promote the State's STOP MUD Hotline: 1-866-STOP-MUD • Promote Stormwater Pollution Prevention Hotline & Web Reporting Tool to the public
Construction, Landscape Professionals: Developers, landscapers, and related industries may significantly contribute to sediment loading in local waterways. Employees in this field of work are often male.	• Promote compliance with the land development code and sedimentation and erosion control laws • Post outreach materials on stormwater website and GTV

	• Construction workers and landscapers should be aware of the City's yard waste ordinance which prohibits sediment from being blown or making its way into streets and storm drains. • Provide landscaping companies with the yard waste poster that addresses sediment/debris to post in employee gathering areas
Assessment & Evaluation	
• Assess and evaluate local water quality utilizing UNCW Center for Marine Science annual water quality reporting, specifically Total Suspended Solids (TSS) and Turbidity • Track Stormwater Pollution Prevention Hotline calls	

Target Pollutant: CHEMICALS/IMPROPER DISPOSAL OF WASTE

Stormwater runoff washes harmful chemicals found in pesticides, pressure washing cleaners, vehicle washing soaps, and other illicit discharges directly into our waterways. All of these pollutants can contain toxic chemicals that can persist in the environment, causing toxicity in humans and aquatic organisms. In addition, these pollutants may be illegally dumped, poured or improperly disposed of which may cause entry into area waterways via the stormwater drainage system. Nothing but clean water, devoid of chemicals, should enter the drainage system.

Likely Residential Sources: Homeowners, Gardening, Vehicle/Boat Owners, etc.
Likely Commercial/Industrial Sources: Pressure Washers, Vehicle Washing Businesses, Turf/Landscape Professionals, Restaurants, Construction, etc.

Background/Environmental Impacts:

- Storm drains and drainage conveyances (i.e. ditches) carry polluted runoff directly to local waterways without any treatment. Only rain should go down the storm drain!
- An illicit discharge (ID) is any unlawful disposal, placement, emptying, dumping, spillage, leakage, pumping, pouring, emission, or other discharge of any substance other than stormwater that enters the stormwater drainage system.
- The City's Illicit Discharge ordinance specifies that it is unlawful to dispose of or discharge any substance other than stormwater into the storm drainage system. Fines are up to $10,000 per offense.
- Chemicals and cleaning agents used to wash cars, boats, driveways and other impervious surfaces are carried into storm drains and eventually into our waterways. These chemicals can destroy the external mucus layer on fish that protects them from bacteria and parasitic infections.
- Commonly used organophosphate pesticides are present in stormwater runoff and are toxic to aquatic life in receiving water bodies.
- Pesticides bio-accumulate up the food chain and are harmful to beneficial fish, insects, pets, wildlife, and humans, as well as entire aquatic ecosystems.

Target Pollutant: CHEMICALS/WASTE DISPOSAL (Pesticides, Pressure Washing, HHW, etc.)

Key Outreach Messages:

- There is a direct link between the use of chemicals on land (i.e. pesticides, pressure washing cleaners, etc.) and water quality and habitat impacts (i.e. frogs with six legs).
- Promote info on how to properly dispose of chemicals and other household chemicals, including promotion of Household Hazardous Waste Collection locations and events.
- Pressure washing surfaces, equipment, and vehicles using soaps or cleaning agents of any toxicity level can negatively impact water quality and aquatic habitat. These surfaces can only be washed legally with plain, clear water, unless there is an established, effective, legal, wastewater recapture system in place.
- If you must apply pesticides, read the labels and apply the correct amounts. Spot treat, and do not apply before rain.
- Alternatively, install native plants which do not require pesticides or fertilizers.
- Use alternatives to pesticides such as ladybugs, weeding by hand, and organic pesticides.
- Suggest less toxic, environmentally friendly alternatives to pesticides and other chemicals.
- The City's Illicit Discharge ordinance specifies that it is unlawful to dispose of or discharge any substance other than stormwater into the storm drainage system. Fines are up to $10,000 per offense.
    - Anyone found responsible for causing a polluting substance to enter the storm drainage system will be subject to a fine up to $10,000 per violation.
    - The city will have the authority to enter property to inspect for illicit discharges, and if found, to require that they be disconnected and permanently closed.
    - Commercial businesses will not be permitted to wash vehicles, equipment, or any other surfaces with any soaps or solvents or dislodge any other substance that may be harmful to surface waters, unless the resulting wastewater is diverted to the sanitary sewer system.
    - Restaurants will not be permitted to discharge any wastewater outside.
    - Dumpster lids must be kept closed and dumpster plugs in place.
    - Swimming pool water must be de-chlorinated before discharging.
    - Floor drains in old buildings, connected to the storm drainage system, will be required to be disconnected and permanently closed.
    - Residents and businesses will be expected to prevent harmful substances from running off into the storm drainage system.
- Fines for non-compliance with the City's illicit discharge ordinance are up to $10,000 per offense.
- Utilizing BMPs, such as rain gardens, rain barrels, and re-routing downspouts to grassy areas allows polluted runoff to soak into the ground and be cleaned and filtered naturally.

Target Audience Description *(Why Selected?)*	**Suggested Outreach Strategies**
Homeowners / Residents: All citizens have the potential to contribute chemical pollution by using or disposing of chemicals improperly. Target a higher % of males.	• Educate citizens about the City's Illicit Discharge ordinance and fines using a variety of outreach methods • Distribute education materials during presentations and special events • Schools – include pesticides education in Enviroscape 8th Grade watershed education presentations • Promote Household Hazardous Waste Collection Events and permanent locations • Utilize mass media/social media campaigns to inform residents about the chemicals and proper disposal practices • Post outreach materials on stormwater website and GTV • Include information in the citywide newsletter • Distribute educational info during special events • Enviroscape 8th Grade watershed education program • Encourage community participation in storm drain marking program • Utilize enforcement actions when necessary for violators of Illicit Discharge ordinance (i.e. fines)

	• Promote Stormwater Pollution Prevention Hotline & Web Reporting Tool to the public
Pressure Washers, Mobile Detailers, Equipment Cleaning Businesses: Businesses that wash surfaces often use cleaning agents containing chemicals that are harmful to our waterways. These chemicals can be easily washed into the storm drainage system. Target a higher % of males.	• Compliance Officers inform commercial businesses about the city's Illicit Discharge Ordinance, associated fines, and paths to compliance • Post outreach materials on stormwater website and GTV
Landscape/Turf Maintenance Professionals: Landscape/turf maintenance professionals frequently utilize pesticides in the maintenance of the landscape. Employees in this field are often male.	• Emphasize use of pesticides as a last resort; promote alternatives • Promote BMP & Rain Garden certification programs • Promote the installation of native plants to reduce pesticide use
Restaurants: Restaurants often clean equipment or dump mop wash water outdoors. The discharge of any type of wastewater into the storm drainage system is unlawful.	• Distribute educational info and posters to local restaurants • Make available the "Business Friendly Checklist" so businesses can see if they're utilizing stormwater-friendly practices • Encourage employee training on proper washwater disposal practices, proper chemical use and disposal, grease traps, etc. • Mark storm drains near restaurants • Give presentation to restaurant association
Assessment & Evaluation	
• Conduct a survey of restaurants to gauge compliance with local stormwater ordinances and stormwater-friendly practices • Assess and evaluate local water quality utilizing UNCW Center for Marine Science annual water quality reporting, specifically focusing on illicit discharge tested locations • Periodically assess the pesticide application habits of homeowners and landscape professionals by: - Direct observation of pesticide application habits of homeowners and landscape professionals - Surveys of pesticide application habits of homeowners and landscape professionals	

Target Pollutant: VEHICLE POLLUTION

Vehicle pollution comes from the intentional or unintentional disposal of vehicle fluids into our waterways, some of which washes off impervious surfaces into the drainage system or is disposed of improperly. Other avenues of contamination are from washing vehicles and boats with soaps/detergents over impervious surfaces. These fluids are insoluble and can easily contaminate water resources, as well as poison fish and other aquatic organisms.

Likely Residential Sources: Motorists, Backyard Mechanics
Likely Commercial/Industrial Sources: Vehicle Maintenance Repair Shops, Mobile Detailers, Vehicle Dealership Lots

Background/Environmental Impacts:

- Storm drains and drainage conveyances (i.e. ditches) carry polluted runoff directly to local waterways without any treatment. Only rain should go down the storm drain!
- Vehicles, including boats, have seals and gaskets that have the potential to leak a variety of fluids, such as oil and grease. An accumulation of these fluids on roadways and parking lots gets carried away by stormwater runoff which drains into waterways.
- Once vehicle pollution enters a body of water, it disperses quickly and forms a film on the water's surface, making oxygen transfer from the surface to the bottom difficult, as well as being toxic to fish and aquatic organisms.
- A common source of illegal dumping or draining of vehicle fluids is found to be the backyard mechanic.
- 1 quart of motor oil can contaminate 250,000 gallons of water.
- It is a common watershed behavior to wash vehicles on impervious (hard) surfaces
- Washing vehicles or boats can cause nutrients, heavy metals, hydrocarbons and grime to wash down the street and into waterways.
- Soaps and detergents used to wash vehicles or boats are carried into storm drains and eventually into our waterways. These chemicals can destroy the external mucus layer on fish that protects them from bacteria and parasitic infections.
- Vehicle washers are typically unaware of the content of washing soaps/detergents, why they shouldn't wash on impervious surfaces, and their impact on water quality.
- Wash vehicles, boats, or equipment on grassy areas that can absorb and naturally filter chemicals and washwater. This does not harm the lawn.
- Utilize commercial car washes because they recycle and/or treat their water onsite or discharge to the wastewater treatment system.

Target Pollutant: VEHICLE POLLUTION (vehicle/boat fluids, washing)

Key Outreach Messages:

- There is a direct link between the introduction of vehicle fluids and water quality degradation, habitat destruction and plant/animal death.
- All vehicles, machinery, and equipment that utilize vehicle fluids (i.e. oil, grease) for operation have the potential to leak and contribute to water pollution.
- Keep vehicles tuned up, check and repair leaks, check tire pressure, and recycle or properly dispose of vehicle fluids and batteries.
- Properly clean up vehicle leaks and fluid spills using an absorbent material (i.e. kitty litter) to soak up the spill. Sweep up the contaminated absorbent, put in a sealed bag, and place in the trash.
- Driving less, carpooling or using alternative transportation are some of the best ways to prevent vehicle pollution.
- On-site storage (i.e. fluids, batteries) has the potential to leak during filling, emptying, storage unit failure, or vandalism.
- Washing vehicles or boats using soaps/detergents can negatively affect water quality with chemicals, debris, or sediment that is washed off of vehicles, driveways, parking lots, etc.
- Wash vehicles on the grass using a phosphate-free detergent or use a commercial car wash which recycles and treats washwater, or set up a self-containment and capture system for the washwater.
- If you must wash on pavement, use plain, clear water and no chemicals.
- Commercial businesses should be aware of the City's Illicit Discharge ordinance specifies that it is unlawful to dispose of or discharge any substance other than stormwater into the storm drainage system. Fines are up to $10,000 per offense.
- Residential carwashing is exempted from enforcement; however the same principles are part of outreach/education efforts.

Target Audience Description *(Why Selected?)*	**Suggested Outreach Strategies**
Motorists, Backyard Mechanics, Vehicle Maintenance & Repair Shops, Auto Parts Stores, Boat/Vehicle Detailers All citizens of driving age have the potential to contribute to vehicle pollution by nature of driving a vehicle or washing it. For backyard dumping of auto fluids, target males. Businesses that sell vehicle and boat parts or perform maintenance or repair are likely to deal with vehicle fluids on a regular basis. Most employees are male. Vehicle washing businesses often use cleaning agents containing chemicals that are harmful to our waterways and aquatic habitat. These chemicals, along with other vehicle fluids, can be easily washed into the storm drainage system. Employees are typically male.	• Educate citizens about vehicle pollution and the City's Illicit Discharge ordinance and fines using a variety of outreach methods • Distribute education materials during presentations and special events • Distribute Auto/Boat Care educational poster to businesses for employees to learn about proper vehicle maintenance, fluid storage and disposal methods, and the City's Illicit Discharge ordinance • Schools – include vehicle pollution education in Enviroscape 8th Grade watershed education presentations • Utilize mass media/social media campaigns to inform residents about the vehicle pollution issues • Post outreach messages on stormwater website and GTV • Include information in the citywide newsletter • Encourage community participation in storm drain marking program • Utilize enforcement actions when necessary for violators of illicit discharge ordinance • Promote Stormwater Pollution Prevention Hotline & Web Reporting Tool to the public

Assessment & Evaluation

- Assess and evaluate local water quality utilizing UNCW Center for Marine Science annual water quality reporting

- Track Stormwater Pollution Prevention Hotline calls
- Periodically assess vehicle fluid disposal habits and vehicle washing of Wilmington residents and businesses
    - Direct observation of habits
    - Reported violations pertaining to chemical leaks or disposal habits to Stormwater Hotline
    - Surveys of habits
- Assess and evaluate local water quality utilizing UNCW Center for Marine Science annual water quality monitoring

Public Involvement & Participation:

*"In the end we will conserve only what we love; we will love only what we understand; and we will understand only what we are taught." (**Baba Dioum**, 1968).*

Public participation and involvement in the stormwater program creates awareness, understanding, and stewardship in citizens. Getting involved in hands-on stewardship is the best way to gain a better understanding of how stormwater impacts our world, the environment and human health.

Our program involves contracting with two outside agencies to help fulfill Public involvement and participation activities in the community. These agencies are:

- New Hanover Soil & Water Conservation District (NHSWCD)
- Cape Fear River Watch (CFRW)

Both agencies are responsible for recruiting and engaging volunteers and the community at large in the following activities:

- Storm Drain Marking
- Creek/Watershed Cleanups
- CreekWatcher Monitoring Program
- Canines for Clean Water

These agencies also provide reports for each program as well as quarterly reports of all activities conducted.

The city also engages the community through meetings, mailers, and doorhangers during planning and construction of capital and in-house stormwater projects. Citizens can attend public meetings, request one-on-one meetings, discuss projects with stormwater staff by phone or email, and provide other input during the process.

In addition, the city has developed and heavily promoted a Stormwater Pollution Prevention Hotline and web reporting form, for citizens, employees, and businesses to report stormwater pollution in the community. Reports can be made anonymously.

Citizens can also get involved with the city's Heal Our Waterways Program, which is the effort to implement the Bradley & Hewletts Watershed Restoration Plan. This plan relies on private property owners to engage and be willing to install Best Management Practices (BMPs), often with full-funding, in order to reduce the amount of bacterial pollution affecting Bradley & Hewletts Creek. Public participation is the crux of this program.

References Cited or Utilized in Plan Development:

Michael A. Mallin, Matthew R. McIver, Nicholas D. Iraola, and Amy E. Grogan. ENVIRONMENTAL QUALITY OF WILMINGTON AND NEW HANOVER COUNTY WATERSHEDS: The City of Wilmington Watersheds Project. Water quality monitoring conducted by UNCW with reports dating back to 1998. https://uncw.edu/cms/aelab/research.html

Mallin.M. Wading in Waste. Scientific American. June 2006.
https://uncw.edu/cms/aelab/reports%20and%20publications/2006/2006,sci%20amer,wading%20in%20waste.pdf
https://www.researchgate.net/publication/253372408_Effect_of_Human_Development_on_Bacterial_Water_Quality_in_Coastal_Watersheds

"South Carolina Residents Awareness of and Attitudes Toward Stormwater Pollution". Conducted for Clemson Extension's Carolina Clear Program by Responsive Management 2019.
https://www.clemson.edu/extension/carolinaclear/statewide-survey/clemson-2019-stormwater-report.pdf

Environmental Protection Agency. "EnviroAtlas 2021".
https://enviroatlas.epa.gov/enviroatlas/interactivemap/

Bartlett, Chrystal. Stormwater Knowledge, Attitude, and Behaviors: a 2005 Survey of North Carolina Residents. North Carolina Department of Environment and Natural Resources. 2005.

Cochran, D. "Re: Registered Vehicles." E-mail to StormwaterServicesIntern@wilmingtonnc.gov. Received from dcochran@nhcgov.com on 02 Apr. 2007.

"Center for Disease Control and Prevention: Respiratory and Enteric Viruses Branch." 3 Aug. 2006. Center for Disease Control and Prevention. <http://www.cdc.gov/ncidod/dvrd/revb/gastro/faq.htm>.

"Disease Listing, Escherichia Coli O157:H7, Gen Info." CDC Bacterial, Mycotic Diseases. 6 Dec. 2006. Center for Disease Control and Prevention.
<http://www.cdc.gov/ncidod/dbmd/diseaseinfo/escherichiacoli_g.htm>.

"Disease Listing, Salmonellosis, General Information." CDC Bacterial, Mycotic Diseases. 4 Nov. 2006. Center for Disease Control and Prevention.
<http://www.cdc.gov/ncidod/dbmd/diseaseinfo/salmonellosis_g.htm>.

"Division of Parasitic Diseases - Toxocariasis Fact Sheet." 20 Mar. 2002. Center for Disease Control and Prevention. 5 Sept. 2007 <http://www.cdc.gov/Ncidod/dpd/parasites/toxocara/factsht_toxocara.htm>.

Environmental Protection Agency. *Getting In Step Guide: A Guide for Conducting Watershed Outreach Campaigns.* Office of Water: Nonpoint Source Control Branch. 3rd edition. Washington, D.C. 2010.

Keep It in Your Bed...Secure Your Load. Raleigh, NC: North Carolina Department of Transportation, 2007

"Litter Data." E-mail to Benjamin D. Andrea. Received from researchplanning@nccourts.org on 12 Feb. 2007.

"Toolbox - Audience Data." www.ncstormwater.org. 21 Nov. 2001. North Carolina Department of Environment and Natural Resources. <http://www.ncstormwater.org/pages/toolkitaudiencedata.html>.

"Toxoplasmosis: Fact Sheet." CDC Parasitic Diseases. 23 Sept. 2004. Center for Disease Control and Prevention. 5 Sept. 2007 <http://www.cdc.gov/NCIDOD/dpd/parasites/toxoplasmosis/factsht_toxoplasmosis.htm>.

"VLAA - Facts about Butt Litter." www.litter.vic.gov.au. 13 Apr. 2007. Victorian Litter Action Alliance. <http://www.litter.vic.gov.au/www/html/2312-facts-about-butt-litter.asp>.

Wisconsin University and Wisconsin Department of Natural Resources.

NPDES PERMIT: PUBLIC INVOLVEMENT & PARTICIPATION (SECTION C)

1. Objectives for Public Involvement and Participation

Comply with State and local public notice requirements when implementing a public involvement and participation program.

2. BMPs for Public Involvement and Participation

The permittee shall implement the following BMPs to meet the objectives of the Public Involvement and Participation Program and shall notify the Division prior to modification of any goals.

BMP	Measurable Goals
a. Volunteer community involvement	The permittee shall include and promote volunteer opportunities designed to promote ongoing citizen participation.
b. Mechanism for Public involvement	The permittee shall provide and promote a mechanism for public involvement that provides for input on stormwater issues and the stormwater program.
c. Hotline/Help line	The permittee shall promote and maintain a hotline/helpline for the purpose of public involvement and participation.

APPENDIX C: PUBLIC INVOLVEMENT AND PARTICIPATION

Included in this section:

- BMP Reporting Table
- Cumulative Year End Reports for Contractual/Cooperative Agreements with:
  - New Hanover Soil & Water Conservation District
  - Cape Fear River Watch

DATE OF EVENT/ ACTIVITY	EVENT/ACTIVITY	AUDIENCE	DELIVERED BY (AGENCY)	METHOD OF DELIVERY / MESSAGE	ATTENDANCE/ PARTICIPATION
Some Public Involvement & Participation events/activities were cancelled or altered due to Covid-19 this past year.					

BMP a. Volunteer community involvement program

Contract Agreements for Public Involvement and Participation

The City of Wilmington contracts annually with Cape Fear River Watch (CFRW) and New Hanover Soil & Water Conservation District (NHSWCD) to implement additional public involvement and participation activities, as well as education and outreach activities. Both organizations sign a yearly contract with the City of Wilmington that includes specific deliverables that enable the City to meet many of its federal NPDES permit requirements. A year end summary report for each agency's specific contract deliverables is included in the Appendix. Below is a summary of each agency's annual service deliverables.

CFRW - Supports NPDES permit activities including: 8th grade classroom presentations, educational programs for Wilmington residents, volunteer storm drain marking, volunteer watershed cleanups and coordination, volunteer creekwatchers monitoring program, Kerr Ave. education, support for NPDES public meetings and education efforts, quarterly reporting/invoicing.

NHSWCD - Supports NPDES permit activities such as: 8th grade classroom presentations, fecal coliform/pet waste education, community presentations, local outreach events, LID education, environmental field days, educational website, volunteer storm drain marking, monthly rain barrel sale, Stewardship Development Awards Program coalition and planning member, Hewletts Creek education, support for NPDES public meetings and education efforts, quarterly reporting/invoicing.

Volunteer Watershed/Creek Litter Clean-ups

Ongoing	Watershed cleanups including the Annual Big Sweep event	Volunteers	CFRW volunteers	10 watershed cleanups were held. Areas cleaned included Greenfield Lake, Smith Creek, Cape Fear River, Burnt Mill Creek, Randall Pond, Etc.	10 total cleanups including annual International Coastal Cleanup event. 359 volunteers contributed a total of 730 volunteer hours Collected: -58.35 (96-gallon) bins of trash -32.2 (96-gallon) bins of recycling

Volunteer Storm Drain Marking

Ongoing campaign	Volunteer program to install storm drain awareness markers and educational doorhangers throughout the City	City residents, businesses, landscapers	Contract agencies: CFRW NHSWCD and their volunteers	Stormwater awareness activity. Volunteers place educational markers on storm drains and distribute educational doorhangers to residents in neighborhoods where markers are installed	CFRW: 14 storm drains marked, utilizing 9 volunteers and placing 41 educational doorhangers in the King Arthur/Cavalier Drive neighborhood. NHSWCD: 14 storm drains marked, utilizing 8 volunteers and placing 35 educational doorhangers in the Tanbridge Rd. neighborhood

Volunteer CreekWatchers Observation Monitoring

Every other month - two creek location reports	Volunteer monitoring of creek segments that drain to Cape Fear River or Intracoastal Waterway	CFRW volunteers are trained to do observations. City staff receive these reports and the Compliance Officers follow-up on any issues noted.	CFRW and volunteers	Volunteers conduct bi-monthly observations of area creeks and provide a rotating monitoring report and photos to Stormwater Services. Water quality issues or illicit discharges are reported immediately to the Stormwater Compliance Officer	12 Bi-Monthly volunteer observations including creek and corridor conditions, vegetation and wildlife present, litter quantity, and suggestions for remediation

Monthly Public Rain Barrel Sale

Monthly	Monthly rain barrel sale to the general public. Held the 2nd Thursday of each month at NHC Government Center with partner agency, NHSWCD.	General public	Stormwater Services NHSWCD RainBarrelUSA	Stormwater runoff reduction, watershed and water conservation education to rain barrel sale attendees.	166 total rain barrel sales this fiscal year

Community Events / Educational Programs for the Public

Fall 2021 & Spring 2022	8th Grade Enviroscape Watershed Presentations	All 8th Grade NHC Schools Science Classes	Stormwater Services CFRW NHSWCD	New instructional Enviroscape Video Series about watersheds, local water quality issues, nonpoint source pollution, BMPs and stewardship. Virtual presentations included quiz/poll questions and interactive chat with students and teachers.	13 instructional videos provided to all 8th grade science teachers in New Hanover County Schools
3/15/2022	Stormwater 101 Presentation	Loblolly Garden Club	Stormwater Services	Stormwater 101 Presentation to members of the Loblolly Garden Club at St. Paul's Episcopal Church Activity Center https://loblollygardenclubnc.com/	20 Attendees

4/23/2022	Lower Cape Fear Earth Day Celebration - in-person event	Virtual festival attendees, general public	Stormwater Services (SWS is an annual sponsor of the Lower Cape Fear Earth Day Festival)	Information about stormwater pollution and solutions, interaction with attendees, Stormwater Superhero activity	5000 attendees
Ongoing	Pet Waste Tidy Bag Pet Dispensers & Educational Signage	Pet owners	Stormwater Services	Part of the pet waste signage program. Tidy pet roll bags are distributed via pet waste signage to pet owners in city parks to encourage pick up and proper disposal	469 tidy bag pet waste dispensers distributed to community

Citizen Contacts

Ongoing/ regularly	Stormwater office via phone, email or walk-in	Citizens/ Businesses	Stormwater Services	Responses to requests for information, literature, etc.	10 contacts. Information provided regarding specific nature of contact

BMP b. Mechanism for Public involvement

Public Notices, Public Meetings & Community Input

7/5/2021	Targeted Mailings	Residents and businesses affected by the Red Berry drainage project	Stormwater Services	Project info notice distributed to local residents in advance of project work	86 letters
7/15/2021	Targeted Doorhanger notice	Residents and businesses affected by the Whispering Pines drainage project	Stormwater Services	Project info notice distributed to local residents in advance of project work	94 doorhangers
7/30/2021	Face-to-face meeting with property owners.	Residents and businesses affected by the Whispering Pines drainage project	Stormwater Services	Meeting with property owners in the project area.	2 meetings
8/5/2021	Targeted Mailings	Residents and businesses affected by the Clear Run drainage project	Stormwater Services	Project info notice distributed to local residents about large CIP project work	166 Letters
10/22/2021	Targeted Doorhanger notice	Residents and businesses affected by the Park Avenue drainage project	Stormwater Services	Project info notice distributed to local residents in advance of project work	10 doorhangers
10/22/2021	Targeted Doorhanger notice	Residents and businesses affected by the Greenville Avenue drainage project	Stormwater Services	Project info notice distributed to local residents in advance of project work	20 doorhangers
12/6/2022	Targeted Mailings	Residents and businesses impacted by Red Berry project	Stormwater Services	Targeted mailings to property owners.about upcoming public meeting	70 mailings
12/2/2022	Face-to-face meeting with property owner	2722 Shandy Lane resident	Stormwater Services	Meeting with property owners in the in-house project area.	1 meeting

12/8/2022	Face-to-face meeting with property owner	2525 Royal Palm Lane	Stormwater Services	Meeting with property owners in the in-house project area to discuss obtaining drainage easement on private property	3 property owners
12/21/2022	Targeted Doorhanger notice	Residents and businesses affected by the Greenville/White drainage project	Stormwater Services	Project info notice distributed to local residents in advance of project work	9 doorhangers
1/20/2022	Public Meeting - 4 hour drop in meeting	Residents and businesses impacted by Red Berry project	Stormwater Services	Meeting to review and gather resident comments about the Red Berry drainage project. Resident comments addressed construction timeline, impact to yards and property.	15 attendees
2/1/2022	Targeted Mailings	Residents and businesses impacted by Pirates Cove project	Stormwater Services	Targeted mailings to property owners.about upcoming drainage pjroject	19
2/11/2022	Neighborhood Tree Planting - post-construction installation	Residents impacted by Wrightsville Green project	Stormwater Services	Trees planted in Wrightsville Green in coordination with homeowners	20 trees planted
4/22/2022	Targeted Postcard Mailings	Residents and businesses impacted by Clear Run/College Acres project	Stormwater Services	Targeted mailings to property owners.about CIP drainage project	166 letters
5/26/2022	Targeted Mailings	Residents and businesses impacted by Pirates Cove project	Stormwater Services	Targeted mailing to residents about CIP drainage project	30 letters mailed
6/16/2022	Public Meeting	Residents and businesses impacted by Pirates Cove project	Stormwater Services	Public meeting	20 attendees

BMP c. Maintain Hotline/Help Line

The Stormwater Pollution Prevention Hotline was established per NPDES requirements in January 2010 to field calls from the citizens, businesses, and city employees regarding illicit discharges and other reports of stormwater pollution. The hotline phone # is **910-341-1020** and the web reporting address is **www.wilmingtonnc.gov/reportstormwaterpollution.** Hotline/web reports are routed to the Stormwater Compliance Officers who track, investigate, and respond to all hotline reports. Compliance officers routinely educate offenders in addition to issuing necessary fines/violations. Information regarding hotline reports is included in the Enforcement Appendix section. Hotline calls and webform reports vary each year. Compliance officers also receive calls directly on their personal work phone.

Ongoing	Stormwater Hotline advertised using various outreach methods: truck magnets, signs, billboards, presentations, etc.	General public	Stormwater Services	Hotline poster, website, GTV-8 and promo items (pens, magnets, sticky notes) are used to raise awareness of the Stormwater Hotline	17 calls were placed to the City's Stormwater hotline, 10 online webform reports were submitted, and 7 direct emails and 8 direct calls were received by the Compliance Officers related to stormwater violations. The nature of the hotline reports are found in the Enforcement section of the Appendix.
2/17/2022	Report Stormwater Pollution Hotline and Webform training for staff	Training for Compliance Officer and Stormwater staff that respond to hotline/webform reports	Stormwater Education Manager	Training with handout/diagram	3 staff attended

Cumulative Year End Contract Agency Reports

FY 21-22

CAPE FEAR RIVER WATCH
617 Surry Street
Wilmington, NC 28401
(910) 762-5606
www.capefearriverwatch.org

Quarterly Progress Report #4: April 1 – June 30, 2022

Cape Fear River Watch, Inc. (CFRW), under contract with the City of Wilmington Stormwater Services, will provide the following services for the time period consistent with the City's fiscal year from **July 1, 2021** through **June 30, 2022** for the agreed amount of **$15,510**. These contracted services, should be implemented as equitably as possible throughout the fiscal year, to assist the City in meeting requirements of its federal NPDES Stormwater Permit.

Public Education/Outreach

Total Allocated Cost: $6215 **Conduct Enviroscape Presentations for at least 1/3 of 8th grade science classes in New Hanover County Schools each semester for the entire school year.** The Enviroscape watershed education presentation is an integral component of the 8th grade science curriculum in New Hanover County Schools. Presentations will be done in coordination with other contracted or cooperating environmental agencies and will focus on the specific NC Essential Standard and Objectives for the Hydrosphere/Hydrology unit. Enviroscape instructors will be trained, certified, and follow all applicable Enviroscape presentation policies and procedures as set forth by the City of Wilmington Stormwater Services. A maximum of 3 trained Enviroscape instructors from each agency (which includes the Enviroscape supervisor) are permitted to deliver presentations in 8th grade. Enviroscape supervisors are responsible for ensuring that their agency's instructors are fully trained, certified, and observed accordingly and kept up to date on the script, photo aids, maps, props and other pertinent presentation information. Contracted Enviroscape supervisors will deliver a minimum of two presentations each semester (2 in the fall semester, 2 in the spring semester). Additional presentations given in other settings should not conflict or duplicate the integrated 8th grade NHCS Enviroscape presentations in any fashion; a summary should be provided in each quarterly report for any additional presentations given. **($2420)**

July 1 – September 30, 2021

8th Grade Enviroscape Presentations				
Date	**School / Teacher**	**Grade**	**# of presentations**	**# of students**
9/9/2021-9/30/2021	Enviroscape Video Production Prep	8th	Video Preparation	n/a
Other Enviroscape Presentations				
Date	**School / Group / Event**	**Grade**	**# of presentations**	**# of attendees**
8/09/2021	Sokoto House Youth Development Program	11th-college/adult	1	9

October 1 – December 31, 2021

8th Grade Enviroscape Presentations				
Date	**School / Teacher**	**Grade**	**# of presentations**	**# of students**
10/1/21-11/19/21	Enviroscape Video Production & Editing	8th	See below	n/a
Other Enviroscape Presentations				
Date	**School / Group / Event**	**Grade**	**# of presentations**	**# of attendees**

CFRW wrote scripts for two Enviroscape videos and assisted with initial script review and editing of all thirteen content-based videos. CFRW assisted with video production through storyboarding all fourteen videos (creating specific instructions on what and how to film), filming four videos, and presenting in four videos. CFRW assisted with video editing through editing five videos, which included cutting and assembling video footage, B roll footage, photographs, and text overlays. Throughout the project, CFRW collaborated with the City of Wilmington and the New Hanover County Soil & Water Conservation District through meetings and phone/email contact to plan and implement the video series.

January 1 – March 31, 2022

8th Grade Enviroscape Presentations				
Date	**School / Teacher**	**Grade**	**# of presentations**	**# of students**
Other Enviroscape Presentations				
Date	**School / Group / Event**	**Grade**	**# of presentations**	**# of attendees**

April 1 – June 30, 2022

8th Grade Enviroscape Presentations				
Date	**School / Teacher**	**Grade**	**# of presentations**	**# of students**
Other Enviroscape Presentations				
Date	**School / Group / Event**	**Grade**	**# of presentations**	**# of attendees**
4/7/22	Friends School	5th	1	15
5/20/22	Peace Rose Montessori School	3rd-5th	1	15

Provide educational programs and eco-tours for Wilmington residents related to water quality, water resources, and stormwater pollution. Educational programs include First Saturday Seminars, presentations to community and civic organizations, and other scheduled talks in the community. Educational programs for homeowners associations should be planned and coordinated with Stormwater Services. Educational programs will also include eco-tours and birding tours at Greenfield Lake and local creek paddling tours. Wildlife feeding education can be incorporated into these established educational activities, as well as provided by the boathouse staff for lake patrons. Efforts will be made by CFRW to inform the local media about educational programs.

Outreach and education activities for the Kerr Avenue Wetland can include activities such as outreach/education for business owners/operators and property owners in close proximity to the KA Wetland, group cleanups *(independent of the 10 cleanups service),* and presentations to groups. **($250 is allocated for Kerr Avenue education)**
($3795)

July 1 – September 30, 2021

First Saturday Seminars			
Date	**Topic**	**Speaker**	**Attendance**
8/07/2021	Angler's Willingness to Pay for Recreational Catch Improvements in the Cape Fear River (Virtual due to Covid-10)	Dr. Peter Schuhmann - UNCW	20 live; 140 post event video views
Other Presentations by CFRW Staff			
Date	**Group Served / Audience**	**Topic / Speaker**	**Attendance**
7/22/2021	Autism Society of North Carolina/K-12 students and staff	Natural resources – trees & plants/Marissa Blackburn	35
Greenfield Lake Eco-Tours & Paddle Tours on Creeks			
Date	**Group Served / Audience**	**Type of Tour / Topic / Location / Speaker**	**Attendance**
7/20/2021	Wonder Voyage/Church Youth Group & Adult Chaperones	Walking Ecotour & Paddleboat Tour/Watersheds, Pollution, & Water Quality/Greenfield Lake/Marissa Blackburn & Sara Marston	15
7/23/2021	Autism Society of North Carolina/6-12 students and staff	Walking Ecotour/Watersheds & Water Quality/Greenfield Lake/Marissa Blackburn & Jack Rucker	15

October 1 – December 31, 2021

First Saturday Seminars			
Date	**Topic**	**Speaker**	**Attendance**
10/2/21	Recent Trends in Solid Waste Management	Joe Suleyman – New Hanover County Waste Management	66 live; 29 post event video views
11/6/21	Gullah Geechee Heritage Trail	Brayton Willis – Brunswick County NAACP	24 live; 168 post event video views
12/4/21	Team Effort to Clean Up Greenfield Lake	Dr. Michael Mallin – UNCW; Dr. Larry Cahoon – UNCW; Amber Ellis – NC State Stormwater Engineering Group; Allison Bryan – Moffat & Nichol; Dana Sargent - CFRW	33 live; 321 post event video views
Other Presentations by CFRW Staff			
Date	**Group Served / Audience**	**Topic / Speaker**	**Attendance**
11/14/21	CFRW Membership	Annual Update on CFRW Work/Water Quality of the Cape Fear River Basin	65
11/16/21	Cape Fear Academy/11th & 12th graders (1 class)	Water Quality – Sample Processing (at CFRW Office)/Rob Clark	15
11/17/21	Cape Fear Academy/11th & 12th graders (2 classes)	Water Quality – Sample Processing (at CFRW Office)/Rob Clark	30
Greenfield Lake Eco-Tours & Paddle Tours on Creeks			
Date	**Group Served / Audience**	**Type of Tour / Topic / Location / Speaker**	**Attendance**
10/20/21	Wilmington Homeschool Group	Walking Ecotour & Paddleboat Tour/Watersheds, Pollution, & Water Quality/Greenfield Lake/Marissa Blackburn & Sara Marston	45
10/22/21	Community Members	Walking Ecotour/Watersheds, Pollution, & Water Quality/Greenfield Lake/Montanna Weitzel	2
10/29/21	Community Members	Walking Ecotour/Watersheds, Pollution, & Water Quality/Greenfield Lake/Montanna Weitzel	3
11/5/21	Community Members	Walking Ecotour/Watersheds, Pollution, & Water Quality/Greenfield Lake/Montanna Weitzel	3
11/12/21	Community Members	Walking Ecotour/Watersheds, Pollution, & Water Quality/Greenfield Lake/Montanna Weitzel	1

11/19/21	Community Members	Walking Ecotour/Watersheds, Pollution, & Water Quality/Greenfield Lake/Montanna Weitzel	6

January 1 – March 31, 2022

First Saturday Seminars			
Date	**Topic**	**Speaker**	**Attendance**
2/5/222	Lock & Dam #1 Fish Passage Modification	Dawn York – Moffat & Nichol and Cape Fear River Partnership	40 live; 204 post event video views
3/5/22	Contaminants in Cape Fear River Fish & Crabs	Mozhgon Rajaee – Oakland University; Abigail Joyce – Duke University; Dean Neff – Chef at Seabird; Veronica Carter - NC Coastal Federation & Leland Town Council Member	40 live; 215 post event video views
Other Presentations by CFRW Staff			
Date	**Group Served / Audience**	**Topic / Speaker**	**Attendance**
1/26/22	River Lights Community	CFRW & Water Quality/Rob Clark	30
2/3/22	NHC Master Gardeners	Plastics, Water Systems, & Pollution Prevention/ Audrey Dunn & Rob Clark	30
2/26/22	NC CATCH Educator Workshop	Fish Biology, Water Quality, Conservation/Marissa Blackburn & Becky Skiba	7
3/2/22	Martin Luther King Jr. Center After School Program/K-5th grade	Fish Anatomy & Biology, Water Quality, Conservation/Marissa Blackburn & Faith Kane	25
3/15/22	Envirothon Teams/6th-8th graders	Coastal Environmental Issues/Marissa Blackburn	75
3/24/22	Young Scientist Academy/local 6th-8th graders	Water Quality, Bacteria, Sample Processing at CFRW Office/Rob Clark & Marissa Blackburn	4
3/25/22	Young Scientist Academy/local 6th-8th graders	Water Quality, Bacteria, Sample Processing at CFRW Office/Rob Clark & Marissa Blackburn	7
3/27/22	Go Fish! Fest Outreach at NC Arboretum/Subsistence Fishers and Families	Contaminants in Cape Fear River Fish, Water Quality/Kemp Burdette, Dana Sargent, Marissa Blackburn, Phillip Green, Christopher Knutson, Marie Quillen	380
Greenfield Lake Eco-Tours & Paddle Tours on Creeks			
Date	**Group Served / Audience**	**Type of Tour / Topic / Location / Speaker**	**Attendance**
2/18/22	Young Scientist Academy/local 6th-8th graders	Water Quality Testing/Water Quality/Greenfield Lake Squash Branch/Marissa Blackburn & Rob Clark	12
3/18/22	Community Members/General Public	Birding Walk/Birds & Health of Greenfield Lake Ecosystem/Greenfield Lake/Marissa Blackburn & Becky Skiba	23
3/29/22	Community Members/General Public	Walking Ecotour/Watersheds, Pollution, & Water Quality/Greenfield Lake/Marissa Blackburn & Marie Quillen	6

April 1 – June 30, 2022

First Saturday Seminars			
Date	**Topic**	**Speaker**	**Attendance**
4/2/22	Energy Trends and Issues in NC and the Role of Offshore Wind	Roger Shew – UNCW	44 live; 125 post event video views
5/7/22	Plastics: Production to Disposal	Rob Clark – Cape Fear River Watch; Audrey Dunn – Cape Fear River Watch	30 in-person; 10 online live; 59 post event video views
Other Presentations by CFRW Staff			
Date	**Group Served / Audience**	**Topic / Speaker**	**Attendance**

4/1/22	Coastal Christian Middle School/7th grade	Lock & Dam #1 - Watersheds, Water Quality, Contaminants/Marissa Blackburn & Marie Quillen	46
4/22/22	Earth Day at Cameron Art Museum/General Public	Water Quality & Bacteria/Marissa Blackburn, Philip Green, and Marie Quillen	150
4/23/22	Earth Day at Longleaf Park/General Public	CFRW & Water Quality/Marie Quillen, Chris Knutson, Janet Stiegler, Jeannie Lennon, Debbie Dillard	250
4/27/22	Bellamy Elementary/4th grade	CFRW, Watersheds, Water Quality, Pollution/Marissa Blackburn & Audrey Dunn	50
4/27/22	Bellamy Elementary/4th grade	CFRW, Watersheds, Water Quality, Pollution/Marissa Blackburn & Audrey Dunn	49
4/30/22	Kerr Avenue Wetland Businesses	Kerr Avenue Wetland Outreach – Brochure Distribution, Outreach, and Cleanup/Marie Quillen, Chris Knutson, Rob Clark, Audrey Dunn	29 businesses/ 24 volunteers/ 146 lbs trash
4/30/22	NC Coastal Climate Science & Engineering Expo	Salt Water Intrusion & Ghost Forests/Marie Quillen, Faith Kane, & Chris Knutson	123
5/11/22	Friends School Environmental Field Day/3rd & 4th grade	Water Distribution & Movement on Earth/Marissa Blackburn	30
5/23/22	Pine Valley Environmental Field Day/3rd grade	Watersheds, Water Quality, Water Distribution on Earth/Marissa Blackburn & Anthony Rivera	100
5/25/22	Cape Fear Academy/9th-12th grade	Career Day: Environmental Science & Career Paths/Rob Clark	25
6/1/22	Community Members/General Public	State of the River – Water Quality Issues in the Cape Fear River Basin/Kemp Burdette – CFRW; Dana Sargent – CFRW; Roger Shew – UNCW; Dawn York – Moffat & Nichol and Cape Fear River Partnership plus additional panelists	250
6/10/22	Children's Museum of Wilmington/General Public – Young Children & Caregivers	Fish & Fish Anatomy/Marissa Blackburn	20
6/27/22	Local Youth 3rd-8th grade/CFRW Summer Campers	Watersheds, Water Quality, Bacteria/Marissa Blackburn, Anthony Rivera, & Jess Kotrick	13
6/28/22	Local Youth 3rd-8th grade/CFRW Summer Campers	Local Wildlife/Marissa Blackburn, Anthony Rivera, & Jess Kotrick	13
6/29/22	Local Youth 3rd-8th grade/CFRW Summer Campers	Plants, Natives, Invasives/Marissa Blackburn, Anthony Rivera, & Jess Kotrick	13
6/30/22	Local Youth 3rd-8th grade/CFRW Summer Campers	Environmental Stewardship/Marissa Blackburn, Anthony Rivera, & Jess Kotrick	13
Greenfield Lake Eco-Tours & Paddle Tours on Creeks			
Date	**Group Served / Audience**	**Type of Tour / Topic / Location / Speaker**	**Attendance**
4/5/22	Community Members/General Public	Walking Ecotour/Watersheds, Pollution, & Water Quality/Greenfield Lake/Marissa Blackburn	1
4/11/22	Community Members/General Public	Birding Walk/Birds & Health of Greenfield Lake Ecosystem/Greenfield Lake/Marissa Blackburn & Becky Skiba	5
4/26/22	Community Members/General Public	Walking Ecotour/Watersheds, Pollution, & Water Quality/Greenfield Lake/Marissa Blackburn & Marie Quillen	2
6/11/22	Residents of Old Wilmington/Homeowners	Guided GFL Paddle/Watersheds, Water Quality, Flora & Fauna/Greenfield Lake/Marissa Blackburn & Jess Kotrick	14

Public Involvement/Volunteer Efforts *Total Allocated Cost: $7953*

Encourage public participation by engaging city residents/businesses/civic groups in a volunteer Storm Drain Marking program in the city to involve and educate the community about stormwater pollution. A minimum of 1 volunteer day with at least 5 community volunteers and 14 drains marked is required. Agencies are welcome to do additional storm drain marking beyond this requirement. Educational doorhangers will be distributed to

surrounding residences/businesses during storm drain marking. Assist in identifying areas to mark drains, educate volunteers about stormwater pollution and the purpose of the storm drain marking program, train volunteers in marking and safety, use supplied markers, and help provide oversight of the program. A trained CFRW staff member and/or trained intern is required to be present during all storm drain marking activities and with each volunteer group. **($770)**

April 1 – June 30, 2022

Storm Drain Marking					
Date	**Name of Volunteer Organization/Business/Etc.**	**Specific Streets Marked within the City limits**	**# of Volunteers / Total Volunteer Hours Contributed**	**# of Drains Marked**	**# of Door Hangers Distributed**
6/9/22	Girl Scout Troop 2052	King Arthur Dr. Cavalier Dr.	9 Volunteers/ 13.5 Volunteer Hours	14	41

Coordinate volunteer clean-ups of city watersheds/tributaries 10x per year, once per month (with the exception of July and December). These cleanups will focus on tributaries that flow into Greenfield Lake, Smith Creek, Burnt Mill Creek, Barnards Creek, Mott Creek, the Cape Fear River, and as the need is discovered by the City.
10 monthly clean-ups will be completed including at least one site on the city's provided location map/list for the International Coastal Cleanup, an annual international clean-up event.

A cleanup location map and list will be provided to CFRW and a field trip can also be conducted by the city with CFRW, as necessary, to point out the cleanup locations. CFRW cleanups done in conjunction with Keep America Beautiful must be performed at the locations identified by the city, in order to be reimbursable under this contract.

In order to avoid duplication of cleanup activities, CFRW will provide a schedule to City Stormwater Services 1 month in advance of proposed cleanup event locations. CFRW will inspect these sites closer to the cleanup date to ensure that the specific location is still in need of a cleanup.

Local watershed clean-ups may also include volunteer efforts to remove wetland and aquatic invasive plants with a focus on Greenfield Lake, Kerr Ave, and the Mary Bridger Wetland, but should not be conducted in place of cleanups.

Any cleanups conducted on private property should include written permission obtained in advance of the cleanup by CFRW from the property owner. These "written permissions" should be included with the Watershed Cleanup Report and on the year-end compilation of documents on USB/DVD/CD submitted to the city.

Efforts should be made to inform the local media and social media outlets about upcoming cleanup events. In addition, significant water quality problems or suspected problems identified during cleanups will be reported ***immediately*** to the appropriate officials, including the city's Stormwater Compliance Officer, Corey Boyett at 910-341-0092 or 910-343-4777.

A summary of each clean-up event will be completed and submitted to Stormwater Services. ***Reports will be submitted using the supplied template and within 12 calendar days of the cleanup event.*** Reports will include: the specific watershed, the location within the watershed that was cleaned, number of community volunteers, hours worked, estimate of the quantity of waste

and recyclable materials removed, # of creek/ditch miles cleaned, photographs to document work including before and after photos of the cleanup site, volunteer photos, and documentation of efforts to secure volunteers and promote the event in the media and on social media. **($5973)**

July 1 – September 30, 2021

Watershed Clean-ups				
Date of Cleanup	**Watershed Name & Specific Area Cleaned** *(Include map # and specific location)*	**# of Creek or Ditch Ft/Miles Cleaned**	**Amount of Trash Collected** ***Please use this format:*** Trash: 4 96-gallon bins Recycling: 8 30-gallon bags Other: Tires, Bikes, Clothes	**# of Volunteers/ Total Volunteer Hours Contributed**
8/14/2021	Greenfield Lake GFL #1 – Railroad Right-of-way from 3rd – 17th St.	.30 miles	Trash: 7 96-gallon bins (415 lbs.) Recycling: 2 96-gallon bins (54 lbs.) Other: Tires, Clothes, Scrap Metal, & an Electronic Scale	24 volunteers/ 48 volunteer hours
9/11/2021	Greenfield Lake GFL #4- Along 13th St to Lakeshore (Start at Lee Dr.)	5 miles	Trash: 4 96-gallon (384 lbs.) Recycling: 2 96-gallon bins (196 lbs.) Other: Clothes, Bikes, Scrap Metal	56 volunteers/ 112 volunteer hours

October 1 – December 31, 2021

Watershed Clean-ups				
Date of Cleanup	**Watershed Name & Specific Area Cleaned** *(Include map # and specific location)*	**# of Creek or Ditch Ft/Miles Cleaned**	**Amount of Trash Collected** ***Please use this format:*** Trash: 4 96-gallon bins Recycling: 8 30-gallon bags Other: Tires, Bikes, Clothes	**# of Volunteers/ Total Volunteer Hours Contributed**
10/16/21	Greenfield Lake GFL #2 – 11th St. between Greenfield St. and Lakeshore Dr.	1.2 miles	Trash: 2.4 96-gallon bins Recycling: 1.2 96-gallon bins Other: Scrap Metal	25 volunteers/ 62.5 volunteer hours
11/13/21	Smith Creek SC #2 – Evans St. & Princess Place	1.0 mile	Trash: 4.3 96-gallon bins Recycling: 1.13 96-gallon bins Other: Tires, Bikes, TVs, Scrap Metal	39 volunteers/ 78 volunteer hours

January 1 – March 31, 2022

Watershed Clean-ups				
Date of Cleanup	**Watershed Name & Specific Area Cleaned** *(Include map # and specific location)*	**# of Creek or Ditch Ft/Miles Cleaned**	**Amount of Trash Collected** ***Please use this format:*** Trash: 4 96-gallon bins Recycling: 8 30-gallon bags Other: Tires, Bikes, Clothes	**# of Volunteers/ Total Volunteer Hours Contributed**
1/8/22	Greenfield Lake GFL #3 – Jumping Run to Lower Willard Pond	0.5 miles	Trash: 1.1 96-gallon bin Recycling: 10 30-gallon bags Other: Shopping Carts, Road Signs, Toys, and Clothes	25 volunteers/ 50 volunteer hours

2/12/22	Burnt Mill Creek BMC #4 - Drainage ditch that runs behind Jackson's Big Oak BBQ and BMC #5 - Ditch behind Crossroads Center	0.5 miles	Trash: 4.2 96-gallon bins Recycling: 1.7 30-gallon bags Other: Grocery Carts, Scrap Metal, Clothes, and Wood Debris	40 volunteers/ 80 volunteer hours
3/13/22	Burnt Mill Creek BMC #9 - McCumbers Ditch	0.25 miles	Trash: 7.19 96-gallon bins Recycling: 1.6 30-gallon bags Other: Children's Toys, Scrap Metal, Clothes, and Wood Debris	20 volunteers/ 40 volunteer hours

April 1 – June 30, 2022

Watershed Clean-ups				
Date of Cleanup	**Watershed Name & Specific Area Cleaned** *(Include map # and specific location)*	**# of Creek or Ditch Ft/Miles Cleaned**	**Amount of Trash Collected** ***Please use this format:*** Trash: 4 96-gallon bins Recycling: 8 30-gallon bags Other: Tires, Bikes, Clothes	**# of Volunteers/ Total Volunteer Hours Contributed**
4/9/22	Greenfield Lake GFL #2 Squash Branch, 11th St. between Greenfield St. and Lakeshore Dr.	0.5 miles	Trash: 13.2 96-gallon bins Recycling: 0.27 30-gallon bags Other: Bike, Scrap Metal, and Clothes	42 volunteers/ 84 volunteer hours
5/14/22	Burnt Mill Creek BMC #2 Emerson St. Ditch	0.3 miles	Trash: 7.01 96-gallon bins Recycling: 2.05 30-gallon bags Other: Fire extinguishers (5), Metal, and Furniture	46 volunteers/ 92 volunteer hours
6/11/22	Greenfield Lake GFL #1 Railroad Right-of-Way from 3rd to 17th St	0.8 miles	Trash: 7.95 96-gallon bins Recycling: 10.25 30-gallon bags Other: Carpet, Tires, and Scrap Metal	42 volunteers/ 84 volunteer hours

Conduct a volunteer CreekWatchers monitoring program and alert Stormwater Services when volunteers find problem areas. Every other month CreekWatcher volunteer monitoring activities will be conducted in at least 2 locations and will target high priority creeks or creek sections identified in cooperation with Stormwater Services. The monitoring reports submitted should rotate among the list of locations provided to CFRW by the City. Observation reporting months are August, October, December, February, April, and June. ***The CreekWatch Observation Monitoring Form with field observations and photo documentation will be submitted to Stormwater Services within 12 calendar days of monitoring.*** In addition, significant water quality problems identified during observation monitoring will be reported ***immediately*** to the appropriate officials, including the city's Stormwater Compliance Officer, Corey Boyett at 910-341-0092 or 910-343-4777. CreekWatchers should be trained community volunteers (not staff and interns) to help satisfy public involvement objectives **($1210)**

July 1 – September 30, 2021

CreekWatchers Reports			
Date of Report	**CreekWatcher Volunteer Name(s)**	**Watershed**	**Specific Creek Location Monitored** *(reference the list of locations provided)*

8/18/2021	Michelle & Ellie Beasley	Hewletts Creek	Lincoln Outfall
8/24/2021	Lauren Cromie	Bradley Creek	Circular Drive

October 1 – December 31, 2021

CreekWatchers Reports			
Date of Report	**CreekWatcher Volunteer Name(s)**	**Watershed**	**Specific Creek Location Monitored** *(reference the list of locations provided)*
10/23/21	Steve Currie	Greenfield Lake	South 17th & New Hanover Medical Park Dr.
10/23/21	Gloria Shirley	Burnt Mill Creek	Burnt Mill Creek / Wallace Park
12/22/21	Gloria Shirley	Burnt Mill Creek	Burnt Mill Creek / Wallace Park
12/22/21	Chris Klos	Burnt Mill Creek	Emerson St. near Kerr Ave./Randall Pkwy.

January 1 – March 31, 2022

CreekWatchers Reports			
Date of Report	**CreekWatcher Volunteer Name(s)**	**Watershed**	**Specific Creek Location Monitored** *(reference the list of locations provided)*
2/22/22	Gloria Shirley	Burnt Mill Creek	Burnt Mill Creek / Wallace Park
2/28/22	Tiffany Kios	Burnt Mill Creek	Shirley/Klein Rd.

April 1 – June 30, 2022

CreekWatchers Reports			
Date of Report	**CreekWatcher Volunteer Name(s)**	**Watershed**	**Specific Creek Location Monitored** *(reference the list of locations provided)*
4/23/22	Steven Currie	Greenfield Lake	South 17th & New Hanover Medical Park Dr.
4/25/22	Jim DePree & Deanna Bertino	Barnards Creek	Appleton Way/Golf Course
6/22/22	Gloria Shirley	Burnt Mill Creek	Burnt Mill Creek/Wallace Park
6/22/22	Lisa Malone	Burnt Mill Creek	Wilshire at Downey Branch

Contract Administration

Total Allocated Cost: $1342

Quarterly progress reports and invoices will be submitted in accordance with the following provisions:

Submit cumulative quarterly progress reports and invoices according to the following quarters: July 1 - Sept 30 (1st Quarter); October 1 - Dec. 31 (2nd Quarter); January 1 -March 31 (3rd Quarter); April 1 - June 30 (4th Quarter). The 4th quarter progress report will serve as a compiled year-end summary report and will be included in the City's NPDES annual report.

Quarterly reports and invoices are due within 12 calendar days of the quarter end date and will follow templates and instructions set forth by Stormwater Services.

If the reporting due date falls on a weekend or a city-observed holiday, reports are due the following weekday by 5pm. Any reports received late, including Quarterly Progress Reports, Quarterly Invoices, Cleanup Reports, CreekWatcher reports, year-end compilation of records/reports, etc. will result in an automatic overall reduction of the quarterly invoice payment amount according to the following schedule:

- **1-10 calendar days late - 10% reduction of the quarterly payment amount**
- **11+ calendar days late - 20% reduction of the quarterly payment amount**

The quarterly invoice should use the supplied template which shows the % of each service completed each quarter, invoice amount, and amount remaining to be paid. Invoices will be paid once the quarterly progress report and invoice(s) are received and reviewed by the City for adequate progress. Non-performance or inadequate progress may result in non-payment or reduction of payment. No pre-payment of services will occur.

Reports and invoices that do not follow templates/instructions will be returned for correction; payment will be processed once updated reports and invoices are received, reviewed, and approved.

CFRW will maintain all records and reports related to this contract on a fiscal year (FY) basis (July 1-June 30). These records should be retained for a period of at least 5 years. These files are public record and should be accessible at the contracted agency location. In addition, an annual compilation of all contract documents, records, reports, invoices, and pertinent educational materials or related materials will be provided to the City of Wilmington Stormwater Services on a USB Flash Drive, CD, or DVD for the entire contract year ***within 12 calendar days of the 4th quarter end date.***

Contact person: Stormwater Services requires one main point of contact for the implementation, management, communication and reporting of this annual contract. This staff person will be the individual that implements the majority of contract services, and therefore will be the most familiar with the contract. The designated contact person is: **Marissa Blackburn (\$1342)**

Other:

Do not assign a cost.

Assist Stormwater Services in implementing additional public outreach, education, involvement, and participation activities required by federal NPDES stormwater permit. Summary reports and information will be included in the City's NPDES yearly report to the State.

In addition, significant water quality problems or suspected problems identified while implementing contract services will be reported ***immediately*** to the appropriate officials, including the city's Stormwater Compliance Officer, Corey Boyett at 910-341-0092 or 910-343-4777.

Report compiled by: Marissa Blackburn **Date:** 6/30/2022

FY 21-22

NEW HANOVER SOIL & WATER CONSERVATION DISTRICT
230 Market Place Drive, Suite 100
Wilmington, NC 28403

Quarterly Progress Report #4: April 1 – June 30, 2022

New Hanover Soil & Water Conservation District (NHSWCD), under contract with the City of Wilmington Stormwater Services, will provide the following services for the time period consistent with the City's fiscal year from **July 1, 2021** through **June 30, 2022** for the agreed amount of **$26,600.** These contracted services, implemented as equitably as possible throughout the fiscal year, assist the City in meeting requirements of its federal NPDES Stormwater Permit.

Public Education/Outreach

Total Allocated Cost: $18,268

Conduct Enviroscape Presentations for at least 1/3 of 8th grade science classes in New Hanover County Schools each semester for the entire school year. The Enviroscape watershed education presentation is an integral component of the 8th grade science curriculum in New Hanover County Schools. Presentations will be done in coordination with other contracted or cooperating environmental agencies and will focus on the specific NC Essential Standard and Objectives for the Hydrosphere/Hydrology unit. Enviroscape instructors will be trained, certified, and follow all applicable Enviroscape presentation policies and procedures as set forth by the City of Wilmington Stormwater Services. A maximum of 3 trained Enviroscape instructors from each agency (which includes the Enviroscape supervisor) are permitted to deliver presentations in 8th grade. Enviroscape supervisors are responsible for ensuring that their agency's instructors are fully trained, certified, and observed accordingly and kept up to date on the script, photo aids, maps, props and other pertinent presentation information. Contracted Enviroscape supervisors will deliver a minimum of two presentations each semester (2 in the fall semester, 2 in the spring semester). Additional presentations given in other settings should not conflict or duplicate the integrated 8th grade NHCS Enviroscape presentations in any fashion; a summary should be provided in each quarterly report for any additional presentations given. Other efforts may include assisting with curriculum development, scheduling presentations, teacher relations, and training and observing instructors. **($2420)**

July 1 - September 30, 2021

8th Grade Enviroscape Presentations				
Date	**School / Teacher**	**Grade**	**# of presentations**	**# of students**
Other Enviroscape Presentations				
Date	**School / Group / Event**	**Grade**	**# of presentations**	**# of attendees**
7/21/21	Turtle Camp / Summer Camp	HS	2	28
7/28/21	Turtle Camp / Summer Camp	HS	2	28
8/3/21	Turtle Camp / Summer Camp	2	HS	16
8/4/21	Turtle Camp / Summer Camp	1	HS	15

Other:

- Participated in early discussions and planning for Enviroscape video series 2021-2022.
- Created a vision of the Enviroscape video series to prepare for the planning meeting on 8/31/21.
- Actively participated in the planning meeting on 8/31/21 where the format and programming of the Enviroscape video series were determined.
- Wrote 5 of the 13 scripts for the Enviroscape Video Series - completed on 9/17/21.
- Performed an overall initial edit of the completed scripts on 9/20/21.
- Developed a video production protocols document. Trained a City of Wilmington employee, Reh-Gingerich, on using the equipment and best practices on 9/17/21.
- Collaborated with Cape Fear River Watch intern in planning for video editing in a meeting on 9/21/21.
- Participated in a meeting of Video Production Managers on 9/14/21 and 9/30/21 to plan and coordinate the project.

October 1 – December 31, 2021

8th Grade Enviroscape Presentations				
Date	**School / Teacher**	**Grade**	**# of presentations**	**# of students**
Other Enviroscape Presentations				
Date	**School / Group / Event**	**Grade**	**# of presentations**	**# of attendees**

Other:

- Served as Video Production Manager, On-Screen Talent, Videographer, Video Editor, and Assistant Editor for the Enviroscape Video Series resulting in 14 educational films.
- Provided the On-Screen Talent for 6 of the films, totaling in approximately 18 hours of commitment. This included script memorization and time in front of the camera.
- Worked as videographer for 3 of the films, totaling in approximately 9 hours of commitment. This included planning, location selection, and filming.
- Worked as Video Editor for 9 of the films, totaling in approximately 45 hours of commitment. This included assembling raw material, obtaining B Roll footage and photographs, ensuring the logical sequencing of the material, and cutting and deleting footage to develop the final version of the films.
- Worked as Assistant Editor to Cape Fear River Watch for 5 of the films, totaling in approximately 5 hours of commitment. This included coordination with CFRW's intern to determine her tasks and timeline, obtaining B Roll footage and photographs when necessary, and requesting edits as needed.
- Coordinated filming material supply rental and training, including camera and microphone equipment.
- Attended a "Viewing Party" on December 13, 2021 to review the films.

January 1 – March 31, 2022

8th Grade Enviroscape Presentations				
Date	**School / Teacher**	**Grade**	**# of presentations**	**# of students**
Other Enviroscape Presentations				
Date	**School / Group / Event**	**Grade**	**# of presentations**	**# of attendees**
2/4/22	New Hanover County 4-H Envirothon Club	Middle	1	4

April 1-June 30, 2022

8th Grade Enviroscape Presentations				
Date	**School / Teacher**	**Grade**	**# of presentations**	**# of students**
Other Enviroscape Presentations				
Date	**School / Group / Event**	**Grade**	**# of presentations**	**# of attendees**
6/20/2022	Turtle Camp / Summer Camp	HS	2	28

Increase awareness and education in the city about pet waste/fecal coliform bacterial pollution and the City's pet waste ordinance. Implement education with city residents about pet waste, fecal bacteria, the impacts on water quality, the city's pet waste ordinance, and solutions. Provide outreach and education materials via K-12 education programs, public meetings, agency website, and by participating/staffing the Canines for Clean Water (C4CW) Program booth at a minimum of 3 pet-related events (with pets largely present at a minimum of 2 events). The expectation is to target well-attended pet events. **($1705)**

July 1 - September 30, 2021

Pet Events / Pet Waste Ordinance Education					
Date	**Event**	**Location**	**Method of Delivery**	**# and Name of Education Materials Distributed**	**# of signed Pet Waste Pledges**
7/31/21	Paws4People Garden Paw-ty	Greenfield Lake Amphitheater	C4CW Outreach Table	9 - C4CW goodie bags 9 - COW Pet Waste brochures 9 - COW C4CW brochures 9 - C4CW magnets 9 - C4CW pens 9 - C4CW pet waste bags and dispensers	9
9/8/21	Pooch Plunge	Legion Stadium Pool	C4CW Outreach Table	23 - C4CW goodie bags 23 - COW Pet Waste brochures 23 - COW C4CW brochures 23 - C4CW magnets 23 - C4CW pens 23 - C4CW pet waste bags and dispensers	23
9/11/21	C4CW Outreach Event	Empie Park's Dog Park	C4CW Outreach Table	9 - C4CW goodie bags 9 - COW Pet Waste brochures 9 - COW C4CW brochures 9 - C4CW magnets 9 - C4CW pens 9 - C4CW pet waste bags and dispensers	9

October 1 – December 31, 2021

Pet Events / Pet Waste Ordinance Education					
Date	**Event**	**Location**	**Method of Delivery**	**# and Name of Education Materials Distributed**	**# of signed Pet Waste Pledges**
10/2/2021	C4CW Outreach Event	Aunt Kerry's Pet Stop	C4CW Outreach Table	8 – C4CW goodie bags 8 – COW Pet Waste brochures 8 – COW C4CW brochures 8 – C4CW magnets 8 - C4CW pens 8 - C4CW pet waste bags and dispensers	8

January 1 – March 31, 2022

Pet Events / Pet Waste Ordinance Education					
Date	**Event**	**Location**	**Method of Delivery**	**# and Name of Education Materials Distributed**	**# of signed Pet Waste Pledges**
3/19/22	Paws4People Garden Paw-ty	Greenfield Lake Amphitheater	C4CW Outreach Table	26 - C4CW goodie bags 26 - COW Pet Waste brochures 26 - COW C4CW brochures 26 - C4CW magnets 26 - C4CW pens 26 - C4CW pet waste bags and dispensers	26

April 1 – June 30, 2022

Pet Events / Pet Waste Ordinance Education					
Date	**Event**	**Location**	**Method of Delivery**	**# and Name of Education Materials Distributed**	**# of signed Pet Waste Pledges**

Conduct at least 2 "Stormwater 101" education presentations to HOAs, garden clubs, community/civic groups, property management companies, businesses, college students, developers, or during watershed-wide meetings. 1 presentation may target college classes/students or county employees. Initiate direct contact with potential audiences, promote program, and schedule/deliver presentations. **($1100)**

January 1 – March 31, 2022

Stormwater 101 Presentations				
Date	**Organization / Audience**	**Method of Delivery**	**# and Name of Education Materials Distributed**	**# of attendees**
2/16/22	New Hanover County Safety Committee	Power Point	Direct link to District and City website sent to everyone after presentation.	22

April 1 – June 30, 2022

Stormwater 101 Presentations				
Date	**Organization / Audience**	**Method of Delivery**	**# and Name of Education Materials Distributed**	**# of attendees**

6/13/22	New Hanover County Master Gardeners	Power Point	Direct link to District and City website sent to everyone after presentation.	10

Provide educational contact with residents in the Hewletts Creek Watershed conservation easement areas and pursue opportunities as they arise to secure additional conservation easements within the City. Contact with residents may include an annual newsletter, educational presentations, easement education, etc. In addition, NHSWCD will provide stormwater education programs at the J.E.L. Wade Stormwater Wetland, as the need arises. **($1485)**

April 1 – June 30, 2022

Hewletts Creek Educational Contact					
Date	**Audience Name or School/Grade**	**Topic(s) and/or Activity**	**# and Name of Education Materials Distributed**	**# presentations**	**# of attendees**
6/22/22	Hewletts Creek Watershed Residents	Changing Tides Newsletter	650 – Changing Tides Newsletter https://soilwater.nhcgov.com/wp-content/uploads/2022/06/Volume14Summer2022ChangingTidesNewsletter-1.pdf	N/A	650

Facilitate additional environmental education presentations in the city that highlight issues such as stormwater, water quality, and LID for local residents, students, teachers, camps, business owners, etc. Presentation topics will tie into water quality, BMPs, wildlife, and water conservation issues. **($2915)**

July 1 - September 30, 2021

Environmental Education Presentations					
Date	**Audience Name or School / Grade**	**Topic(s) and/or Activity**	**# and Name of Education Materials Distributed**	**# of presentations**	**# of attendees**
7/1/21	MLK Center Summer Camp Kids' Program	Backyard Birds and Natural Habitats	N / A	2	28
9/22/21	NC Realtors	Promoting Living Shorelines for Erosion Control	N / A	1	93
9/22/21	Davis Recreation Center / Afterschool Program	Diggin' in the Dirt: Soils and Percolation	N / A	1	12
9/23/21	MLK Center / Afterschool Program	Diggin' in the Dirt: Soils and Percolation	N / A	1	12
9/28/21	Government Center Litter Cleanup Volunteers	The Impact of Litter in a Watershed	N / A	1	16
9/30/21	NC Realtors	Promoting Living Shorelines for Erosion Control	N / A	1	88

Other:

- Several school programs are planned and scheduled in the next quarter.

- Created an environmental education program menu and updated the contact/registration form. Visible here: https://soilwater.nhcgov.com/programs/education-and-outreach/ .
- Amy Renfranz, Program Coordinator, completed Project WET facilitator training and will be offering workshops for area educators in the next quarter.
- Renfranz attended a 3-day training on video production hosted by the N.C. Cooperative Extension Service (July 14-16, 2021) to enable her to create online educational content.
- Renfranz and Harrison participated in the N.C. Association of Soil & Water Conservation District's Conservation Employee Training in Wilmington, NC (August 23-26, 2021) which included stormwater control measures training and environmental education. Renfranz led a training on virtual education programming to 16 conservation employees.
- Renfranz and Harrison attended the Environmental Educators of North Carolina conference (September 9-11, 2021) which included training on education programs at pollinator gardens, composting/fertilizer best practices, and diversity and inclusion in environmental education.

October 1 – December 31, 2021

Environmental Education Presentations					
Date	**Audience Name or School / Grade**	**Topic(s) and/or Activity**	**# and Name of Education Materials Distributed**	**# of presentations**	**# of attendees**
10/13/21	Pine Valley / 2nd Grade	Weather Toolbox	N / A	4	100
10/15/21	Pine Valley / Kindergarten	Cloud Detectives	N / A	2	30
10/23/21	New Hanover County Residents / NHC Arboretum	Rain Gardens, Rain Barrels, and other Backyard Practices	10 - Rain Barrel Brochure 10 - Grant Programs Brochure	1	10
10/27/21	Davis Center 4-H Afterschool Program	Water Cycle and Weather	N / A	1	23
10/28/21	Winter Park Elementary / 5th Grade	Soil, Food, and Compost	N / A	3	72
10/28/21	MLK Center 4-H Afterschool Program	Water Cycle and Weather	N / A	1	28
10/29/21	Pine Valley / Kindergarten	Cloud Detectives	N / A	1	15
11/4/21	The Friends School	The Incredible Water Cycle Journey	N / A	1	22
11/5/21	Pine Valley / 5th Grade	The Incredible Water Cycle Journey	N / A	4	102
11/15/21	Pine Valley / 3rd Grade	Soil Scientists	N / A	5	124
11/17/21	Davis Center 4-H Afterschool Program	Soil & Water: Yours for Life	N / A	1	23
11/18/21	MLK Center 4-H Afterschool Program	Soil & Water: Yours for Life	N / A	1	28
11/19/21	Adult Participants in Professional Development Workshop	Don't Waste It! Workshop	N / A	1	8
12/16/21	Pine Valley / 1st Grade	Super Soil	N / A	3	62

January 1 – March 31, 2022

Environmental Education Presentations

Date	Audience Name or School / Grade	Topic(s) and/or Activity	# and Name of Education Materials Distributed	# of presentations	# of attendees
1/13/22	DC Virgo Elementary / 5th	Soil, Food, and Compost	N / A	3	45
1/26/22	Friends School of Wilmington	Soils & Erosion	N / A	1	19
2/4/22	NHC Arboretum Teachers and Educators	Methods of Teaching Environmental Educator Professional Workshop	12 – Methods of Teaching Environmental Education Workbooks	1	12
2/16/22	Pine Valley Elementary / 4th Grade	Soil, Food, and Compost	N / A	4	101
3/17/22	Gregory Elementary / 4th Grade	Soil, Food, and Compost	N / A	3	60

April 1 – June 30, 2022

Environmental Education Presentations					
Date	**Audience Name or School / Grade**	**Topic(s) and/or Activity**	**# and Name of Education Materials Distributed**	**# of presentations**	**# of attendees**
4/7/22	NHC Arboretum Teachers and Educators	Don't Waste It! Solid Waste, Composting, and Recycling Education Workshop	12 – Activity Guide and Lesson Plans	1	12
5/6/22	Adult Professionals	Stormwater Management & Flooding Prevention on Wetland Landscapes Workshop	N/A	1	12
5/13/22	NHC Arboretum Teachers and Educators	Using Observation to Improve Environmental Education Workshop	6 – Activity Guides	1	6

Organize/participate in community outreach events to engage citizens and provide stormwater education. NHSWCD will attend and provide stormwater, BMP, and rain barrel sale education at community outreach events (such as the New Hanover County Fair, Earth Day, etc). **($3300)**

July 1 - September 30, 2021

Community Outreach Events					
Date	**Event**	**Location**	**Method of Delivery**	**# and Name of Education Materials Distributed**	**# of attendees**
7/31/21	Tidal Creek Farmers Market	Tidal Creek Co-Op	Education, Retail, and Activity Booth	1 - NC Coastal Federation - "Smart Yards" 1- CoW Citizen's Guide to Protecting Wilmington's Waterways	16
8/28/21	Tidal Creek Farmers Market	Tidal Creek Co-Op	Education, Retail, and Activity Booth	3- NHSWCD Grant Programs for Water Quality Improvements Trifold 5 - NC Coastal Federation - "Smart Yards"	22
9/18/21	Native Plant Festival	NHC Arboretum	Education, Retail, and Activity Booth	5- NHSWCD Rain Garden Information Guide 5- NHSWCD Grant Programs for Water Quality Improvements Trifold 4 – NC SEA Grant Coastal Landscape Designs	774

				4- CoW Citizen's Guide to Protecting Wilmington's Waterways	
9/24/21	Plastic Ocean Project Event	Tidal Creek Co-Op	Education, Retail, and Activity Booth	N / A	6
9/25/21	Tidal Creek Farmers Market	Tidal Creek Co-Op	Education, Retail, and Activity Booth	N / A	8

October 1 – December 31, 2021

Community Outreach Events					
Date	**Event**	**Location**	**Method of Delivery**	**# and Name of Education Materials Distributed**	**# of attendees**
10/30/21	Wilmington Farmers Market	Tidal Creek Co-Op	Education, Retail, and Activity Booth	2 – NC SEA Grant Coastal Landscape Designs	15
10/30/21	Landfall Fall Festival	Landfall Recreation Center	Outreach Table - Backyard BMPs	5- NHSWCD Rain Garden Information Guide 5- NHSWCD Grant Programs for Water Quality Improvements Trifold 4 – NC SEA Grant Coastal Landscape Designs	25
11/8/21	Cape Fear Fair Exhibit	Cape Fear Fair	Outreach Table - Erosion Prevention & Soil Health	N / A	47,000

January 1 – March 31, 2022

Community Outreach Events					
Date	**Event**	**Location**	**Method of Delivery**	**# and Name of Education Materials Distributed**	**# of attendees**
2/26/22	TreeFest	Independence Mall	Outreach Table – Native Plant Gardening	250 – NC SEA Grant Coastal Landscape Designs 20 - NHSWCD Grant Programs for Water Quality Improvements Trifold 3- CoW Citizen's Guide to Protecting Wilmington's Waterways	1,050

April 1 – June 30, 2022

Community Outreach Events					
Date	**Event**	**Location**	**Method of Delivery**	**# and Name of Education Materials Distributed**	**# of attendees**
4/23/22	Wilmington Earth Day Festival	Long Leaf Park	Large-Scale Community Event	23 - NHSWCD Grant Programs for Water Quality Improvements Trifold	7,500
5/25/22	Wilmington Farmers Market	Tidal Creek Co-Op	Education, Retail, and Activity Booth	1 – NC SEA Grant Coastal Landscape Designs	15
6/24/22	Mud Day	Wilmington Children's Museum	Touch and Play: Regional Soils Activity Table	N/A	37
6/25/22	Wilmington Farmers Market	Tidal Creek Co-Op	Education, Retail, and Activity Booth	N/A	14

Promote/consult on Low Impact Development (LID) including stormwater Best Management Practices (BMPs). Activities can include providing education and technical assistance to property owners, education and promotion through local media or distributed publications, or providing comments to City Technical Review Committee. **($1163)**

July 1 - September 30, 2021

Provided CCAP site visit consultation at 51 Lennon Drive in Smith Creek in City of Wilmington. Approved for a rain garden and cistern. Completed 6 plans for New Hanover County Planning regarding soil types found on proposed building sites. Recommended LID within the means of the development and recommended using the county LID ordinance rules.

October 1 – December 31, 2021

Completed 5 plans for New Hanover County Planning regarding soil types found on proposed building sites. Recommended LID within the means of the development and recommended using the county LID ordinance rules.

January 1 – March 31, 2022

Completed 7 plans for New Hanover County Planning regarding soil types found on proposed building sites. Recommended LID within the means of the development and recommended using the county LID ordinance rules.

April 1 – June 30, 2022

Completed 5 plans for New Hanover County Planning regarding soil types found on proposed building sites. Recommended LID within the means of the development and recommended using the county LID ordinance rules.

Organize/facilitate at least 2 Environmental Field Days a year serving an entire grade at a New Hanover County School. Environmental field days will have a water quality education component. **($2640)**

July 1 - September 30, 2021

Environmental Field Days				
Date	**School / Grade**	**Topic(s) and/or Activity**	**# presentations**	**# of students**

Organized a meeting with area environmental educators from the Cape Fear Museum and NHC Arboretum to reinvigorate the Environmental Field Days program post-COVID. The first meeting took place on 8/26/21 with a follow up meeting on 9/15. The "task force" decided to focus on developing a field days program for third grade.

Renfranz is currently working to schedule field days programming at two elementary schools in the Spring.

October 1 – December 31, 2021

Environmental Field Days				
Date	**School / Grade**	**Topic(s) and/or Activity**	**# presentations**	**# of students**

Third Grade Field Days are scheduled at the Friends School of Wilmington and Pine Valley Elementary School on May 11 and May 23, 2022 – a collaborative project, coordinated by Renfranz, with the Cape Fear Museum, NHC Cooperative Extension, NHC Ability Gardens, Carolina Beach State Park, and Fort Fisher Aquarium.

January 1 – March 31, 2022

Environmental Field Days				
Date	**School / Grade**	**Topic(s) and/or Activity**	**# presentations**	**# of students**

April 1 – June 30, 2022

Environmental Field Days				
Date	**School / Grade**	**Topic(s) and/or Activity**	**# presentations**	**# of students**
5/11/22	Friends School of Wilmington / 3rd & 4th Grade	Soils, Water Quality, Plants	5	28
5/23/22	Pine Valley Elementary / 3rd Grade	Soils, Water Quality, Plants	5	110

Update and maintain agency website and social media outlets to include stormwater education materials, events, and the city's Report Stormwater Pollution hotline. The website will also provide links to stormwater educational materials in Spanish in an effort to reach more minorities in our region. The city's Report Stormwater Pollution hotline and online reporting form will be promoted and linked to from the NHSWCD website. NC Community Conservation Assistance Program (CCAP) and Heal Our Waterways (HOWBMP) project pictures will continue to be labeled and uploaded and a local map showing these project locations will be available on the website. The website will be promoted on local government TV and social media outlets. **($1540)**

July 1 - September 30, 2021

Social Media & Website Presentations				
Date	**Platform**	**Topic(s) and/or Activity**	**Shared External Links**	**# of Engagements**
7/28/21	Email	July Monthly E-Newsletter featuring thermal stormwater pollution	Viewable online: https://soilwater.nhcgov.com/wp-content/uploads/2021/07/July2021ENewsletter-1.pdf	Delivered to 1,663 people - 492 opened and read the newsletter
8/31/21	Email	August Monthly E-Newsletter featuring grant programs to improve water quality	Viewable online: https://soilwater.nhcgov.com/wp-content/uploads/2021/08/August2021ENewsletter-1.pdf	Delivered to 1,713 people - 543 opened and read the newsletter
9/30/21	Email	September Monthly E-Newsletter featuring rain barrels	Viewable online: https://soilwater.nhcgov.com/wp-content/uploads/2021/09/September2021ENewsletter.pdf	Delivered to 1,771 people - 386 people opened and read

October 1 – December 31, 2021

Social Media & Website Presentations				
Date	**Platform**	**Topic(s) and/or Activity**	**Shared External Links**	**# of Engagements**
10/29/21	Email	October Monthly E-Newsletter featuring Flood Prevention Workshop	Viewable online: https://soilwater.nhcgov.com/wp-content/uploads/2021/10/October2021ENewsletter.pdf	Delivered to 1,844 people - 809 opened and read the newsletter
11/29/21	Email	November Monthly E-Newsletter featuring new mission statement to protect water quality	Viewable online: https://soilwater.nhcgov.com/wp-content/uploads/2021/11/November2021ENewsletter.pdf	Delivered to 1,863 people - 945 opened and read the newsletter

12/29/21	Email	December Monthly E-Newsletter featuring Yard Waste	Viewable online: https://soilwater.nhcgov.com/wp-content/uploads/2021/12/December2021ENewsletterFinal.pdf	Delivered to 1787 people - 921 people opened and read the newsletter

January 1 – March 31, 2022

Social Media & Website Presentations				
Date	**Platform**	**Topic(s) and/or Activity**	**Shared External Links**	**# of Engagements**
1/28/22	Email	January Monthly E-Newsletter featuring watershed restoration plan funds	Viewable online: https://soilwater.nhcgov.com/wp-content/uploads/2022/01/January2022ENewsletter.pdf	Delivered to 1,817 people - 1,224 opened and read the newsletter
2/22/22	Email	February Monthly E-Newsletter featuring pressure washing	Viewable online: https://soilwater.nhcgov.com/wp-content/uploads/2022/02/February2022ENewsletter.pdf	Delivered to 1,824 people - 1,133 opened and read the newsletter
3/29/22	Email	March Monthly E-Newsletter featuring fertilizers	Viewable online: https://soilwater.nhcgov.com/wp-content/uploads/2022/03/March2022ENewsletter.pdf	Delivered to 1,834 people - 1,005 opened and read the newsletter

April 1 – June 30, 2022

Social Media & Website Presentations				
Date	**Platform**	**Topic(s) and/or Activity**	**Shared External Links**	**# of Engagements**
4/28/22	Email	April Monthly E-Newsletter featuring flood prevention workshop	Viewable online: https://soilwater.nhcgov.com/wp-content/uploads/2022/04/April2022ENewsletter.pdf	Delivered to 1,842 people - 1,262 opened and read the newsletter
5/27/22	Email	May Monthly E-Newsletter featuring new rain barrels	Viewable online: https://soilwater.nhcgov.com/wp-content/uploads/2022/05/May2022ENewsletter.pdf	Delivered to 1,853 people - 1,273 opened and read the newsletter
6/30/22	Email	June Monthly E-Newsletter featuring grasscycling	Viewable online: https://soilwater.nhcgov.com/wp-content/uploads/2022/06/June2022ENewsletter.pdf	Delivered to 1,855 people - 844 opened and read the newsletter

Other:

- Added a tab for "City of Wilmington Stormwater Services" under "Resources" on the website. Viewable online: https://soilwater.nhcgov.com/resources/city-of-wilmington-stormwater-services/.

Public Involvement/Volunteer Efforts *Total Allocated Cost: $1,210*

Encourage public participation by engaging city residents/businesses/civic groups in a volunteer Storm Drain Marking program in the city to involve and educate the community about stormwater pollution. A minimum of 1 volunteer day with at least 5 community volunteers and 14 drains marked is required. Agencies are welcome to do additional storm drain marking beyond this requirement. Educational doorhangers will be distributed to surrounding residences/businesses during storm drain marking. Assist in identifying areas to mark drains, educate volunteers about stormwater pollution and the purpose of the storm drain marking program, train volunteers in marking and safety, use supplied markers, and help provide oversight of the program. A trained NHSWCD staff member and/or trained intern is required to be present during all storm drain marking activities and with each volunteer group. **($1210)**

October 1 – December 31, 2021

Storm Drain Marking					
Date	**Name of Volunteer Organization/Business/Etc.**	**Specific Streets Marked within the City limits**	**# of Volunteers / Total Volunteer Hours Contributed**	**# of Drains Marked**	**# of Door Hangers Distributed**

Renfranz is currently working with Laney High School's Beta Club to determine a date and time for storm drain marking in the Spring 2022.

January 1 – March 31, 2022

Storm Drain Marking					
Date	**Name of Volunteer Organization/Business/Etc.**	**Specific Streets Marked within the City limits**	**# of Volunteers / Total Volunteer Hours Contributed**	**# of Drains Marked**	**# of Door Hangers Distributed**
3/21/22	Keep New Hanover Beautiful	Tanbridge Road	8 volunteers / 8 hours	14	35

Programs/Partnerships

Total Allocated Cost: $4152

Administer and partner with the City of Wilmington Stormwater Services to hold a public rain barrel sale. NHSWCD will promote the sale using methods such as local government television, agency website, community events, signage, and media contact. Rain barrel buyers will be asked to give their watershed location in order to educate them about watersheds and track/record volume reduction for the Heal Our Waterways Bradley/Hewletts Creek watershed restoration effort. **($1457)**

July 1 - September 30, 2021

Public Rain Barrel Sale			
Date of Sale	**Sale Location**	**# of 60 gallon barrels sold: # at sale / # outside of sale**	**# of 80 gallon barrels sold: # at sale / # outside of sale**
7/8/21	NHC Government Center	1 / 1	8 / 3
8/12/21	NHC Government Center	0 / 3	4 / 5
9/9/21	NHC Government Center	0 / 1	4 / 6

October 1 – December 31, 2021

Public Rain Barrel Sale			
Date of Sale	**Sale Location**	**# of 60 gallon barrels sold: # at sale / # outside of sale**	**# of 80 gallon barrels sold: # at sale / # outside of sale**
10/14/21	NHC Government Center	0 / 5	1 / 0
11/10/21	NHC Government Center	0 / 1	1 / 1
12/9/21	NHC Government Center	3 / 1	0 / 0

Due to supply chain issues occurring in the United States at this time, the production of rain barrels has slowed, and inventory is low. As of November 2021, the district sold its last 80-gallon barrel. Production is expected to increase in early 2022.

January 1 – March 31, 2022

Public Rain Barrel Sale			
Date of Sale	**Sale Location**	**# of 60 gallon barrels sold: # at sale / # outside of sale**	**# of 80 gallon barrels sold: # at sale / # outside of sale**
1/13/22	NHC Government Center	0 / 0	0 / 0
2/10/22	NHC Government Center	0 / 1	0 / 8
3/10/22	NHC Government Center	3 / 0	9 / 3

April 1 – June 30, 2022

Public Rain Barrel Sale		
Date of Sale	**Sale Location**	**# of 50 gallon barrels sold: # at sale / # outside of sale**
5/12/22	NHC Government Center	4 / 43
6/9/22	NHC Government Center	17 / 29

Serve as a partner organization on grant projects or initiatives that benefit local surface water quality and water resources within the city such as the Lower Cape Fear Stewardship Development Awards Program. The Stewardship Development program recognizes developers for demonstrating outstanding environmental stewardship such as stormwater reduction and LID practices through the protection and awareness of our water and natural resources. **($2695)**

July 1 - September 30, 2021

Attended Lower Cape Fear Stewardship Coalition Meetings on 7/14/21, 8/11/21, & 9/21/21. Served as nominating committee chair to install next year's officers. Currently have 5 potential applicants and 1 champion. Will be having an in-person event outdoors in April of 2022. Deadline for applications was also extended since the event will be later.

October 1 – December 31, 2021

Attended Lower Cape Fear Stewardship Coalition Meetings on 10/27/21 & 11/10/21. The committee is still searching for a "covid safe" venue. The group wants to tour Dreams (a former winner) to explore if it would be a good host site.

January 1 – March 31, 2022

Attended Lower Cape Fear Stewardship Coalition Meetings on 1/18/22, 2/9/22, and 3/16/22. The event will happen at Dreams of Wilmington on April 28th, 2022. There were 5 applicants from the area, and all applicants will be receiving recognition. Invites have been sent and winners have been notified.

April 1 – June 30, 2022

Attended Lower Cape Fear Stewardship Coalition meetings on 4/5/22, 4/29/22, and 6/28/22. The Award Luncheon was held on 4/29/22 at DREAMS of Wilmington. Approximately 95 people attended. Awards were as follows: Outstanding ~ Mansfield Sale & Service Inc, Greenland Farms, St. James Property Owners Association Ponds Management Program, and UNCW: The Hub. The Stewardship Champion was awarded the Heal Our Waterways program with the City of Wilmington Stormwater Services. At the last meeting of the year officer positions for the new year were discussed and the new budget as well. It was discussed how to encourage new membership to LCFSDC and potential sponsorships as well. The final item we discussed was when to have the new year kick-off retreat, which might be a day on Oak Island just to meet new and returning members. The next meeting is scheduled for July 14th at 10:00 am.

Contract Administration *Total Allocated Cost: $2970*

Quarterly progress reports and invoices will be submitted in accordance with the following provisions:

Submit cumulative quarterly progress reports and invoices according to the following quarters: July 1 - Sept 30 (1st Quarter); October 1 - Dec. 31 (2nd Quarter); January 1 -March 31 (3rd Quarter); April 1 - June 30 (4th Quarter). The 4th quarter progress report will serve as a compiled year-end summary report and will be included in the City's NPDES annual report.

Quarterly reports and invoices are due within 12 calendar days of the quarter end date and will follow templates and instructions set forth by Stormwater Services.

If the reporting due date falls on a weekend or a city-observed holiday, reports are due the following weekday by 5pm. Any reports received late, including Quarterly Progress Reports, Quarterly Invoices, other contract reporting, year-end compilation of records/reports, etc. will result in an automatic overall reduction of the quarterly invoice payment amount according to the following schedule:

- **1-10 calendar days late - 10% reduction of the quarterly payment amount**
- **11+ calendar days late - 20% reduction of the quarterly payment amount**

The quarterly invoice should use the supplied template which shows the % of each service completed each quarter, invoice amount, and amount remaining to be paid. Invoices will be paid once the quarterly progress report and invoice(s) are received and reviewed by the City for adequate progress. Non-performance or inadequate progress may result in non-payment or reduction of payment. No pre-payment of services will occur.

Reports and invoices that do not follow templates/instructions will be returned for correction; payment will be processed once updated reports and invoices are received, reviewed, and approved.

NHSWCD will maintain all records and reports related to this contract on a fiscal year (FY) basis (July 1-June 30). These records should be retained for a period of at least 5 years. These files are public record and should be accessible at the contracted agency location. In addition, an annual compilation of all contract documents, records, reports, invoices, and pertinent educational materials or related materials will be provided to the City of Wilmington Stormwater Services on a USB Flash Drive, CD, or DVD (June 1 – July 31) for the entire contract year ***within 12 calendar days of the 4th quarter end date.***

Contact person: Stormwater Services requires one main point of contact for the implementation, management, communication and reporting of this annual contract. This staff person will be the individual that implements the majority of contract services, and therefore will be the most familiar with the contract. The designated contact person is: **Dru Harrison. ($2970)**

Other:

Do not assign a cost.

Assist Stormwater Services in implementing additional public outreach, education, involvement, and participation activities required by federal NPDES stormwater permit. Summary reports and information may be included in the City's NPDES yearly report to the State.

In addition, significant water quality problems or suspected problems identified while implementing contract services will be reported ***immediately*** to the appropriate officials, including the city's Stormwater Compliance Officer, Corey Boyett at 910-341-0092 or 910-343-4777.

Report compiled by: Dru Harrison and Amy Renfranz **Date:** June 30, 2022

APPENDIX D: ILLICIT DISCHARGE DETECTION AND ELIMINATION (IDDE)

Dry Weather Flow Monitoring Locations

- Hewletts Creek Watershed. – 16 outfalls investigated.
- Bradley Creek Watershed – 12 outfalls investigated
- Barnards Creek Watershed - 1 outfalls investigated.
- Intracoastal WW Watershed – 8 outfalls investigated

Policy for Reporting and Documentation of Sanitary Sewer Overflows and System Leaks

Cape Fear Public Utility Authority and City of Wilmington

Purpose:

The purpose of this document is to establish agreed upon procedures for the Cape Fear Public Utility Authority (CFPUA) to follow regarding reporting and documentation of sanitary sewer overflows (SSO) that impact the City of Wilmington Municipal Separate Storm Sewer System (MS4). These guidelines will enable the City to comply with NPDES Phase II Stormwater permit reporting requirements as well as to provide assistance to CFPUA in mitigating any potential threat to public health or the environment.

Reporting Requirements:

All SSOs resulting in discharge to the City of Wilmington MS4, or causing possible contamination of stormwater discharging to the storm system, must be reported to the City within 48 hours of occurrence in accordance with City Code Chapter 12, section 12-24. Failure to comply may result in a notice of violation (NOV) for the CFPUA. Fines for non-compliance range up to $10,000 based on quantity, risk to the public, environment damage and degree of negligence as documented in the City Code. The following table documents the minimum information required for sanitary sewer overflows and sewage leaks that may impact the City's MS4.

	Date of Spill/Leak	Location	Volume	Corrective Action	NCDWQ Form	Analytical Data
SSO						
< 1000 gal	x	x	x	x		
> 1000 gal	x	x	x	x	x	x
System Leak	x	x	x	x	x	as needed

Spills greater than 1,000 gallons require an additional completed copy of the DWQ's Collection System Sanitary Sewer Overflow Reporting Form (CS-SSO) provided at the same time as when provided to the State. Failure to comply may result in an NOV for CFPUA. Clean up requirements are in accordance with the CFPUA's Clean up Procedure Policy. This information will also be used in documenting the compliance with the City of Wilmington's annual NPDES Phase II Stormwater report to NCDWQ.

City of Wilmington Contact Information:

Spills less than 1,000 gallons

Use the Pollution Prevention Hotline: 910-341-1020

Or go to: www.wilmingtonnc.gov/reportstormwaterpollution and fill out the online form.

Spills greater than 1000 gallons or system leaks

1) Corey Boyett
Public Services Compliance Officer
910-341-0092
Corey.Boyett@wilmingtonnc.gov

2) Brian Rostholder
Public Services Compliance Officer
910-341 -0191
Brian.Rostholder@wilmingtonnc.gov

3) Jim Quinn
Stormwater Specialist
910-341-4694
Jim.Quinn@wilmingtonnc.gov

4) Fred Royal
Stormwater Services Manager
910-341-5818
Frederic.Royal@wilmingtonnc.gov

(From Page 8 of City of Wilmington Illicit Detection and Elimination Program Manual)

Dry Weather Flow Inspection Program

In accordance with permit requirements for detecting dry weather flows, the City is developing and implementing a program for conducting inspections throughout the MS4 to detect dry weather flows. Dry weather flows are defined as any flow in the MS4 that occurs after a 72 hour period without rain. The objective is to identify and eliminate flows that contain pollutant or pathogen loads. Such flows vary in source, content, and frequency, thereby imparting variable impacts within the larger MS4 and the final receiving water bodies. Promptly identifying dry weather flows is instrumental in recognizing and addressing deleterious illicit discharges. As the program develops, procedures will be evaluated and modified with the aim of more effectively detecting and eliminating illicit discharges.

Employees of the City familiar with outfall inspection procedures will conduct the inspections. Inspections will be conducted only during dry periods to facilitate identification of only those flows unassociated with allowable stormwater flows. Furthermore, those outfalls located along tidally influenced reaches will be inspected at low tide; should the outfall still be submerged at low tide, the stormwater conduit will then be traced upgrade to the nearest manhole or observable location beyond tidal influence, where an inspection will be more likely to detect a dry weather flow. A similar modified observation procedure will be used for those points where direct inspection of the outfall point is not possible; observations will be made immediately upgrade in the system at an appropriate location for dry weather inspection.

The inspection itself will consist of an initial visual inspection of the outfall to determine the presence or absence of water or liquid flow. Photographs will be taken of the inspection location and saved along with the inspection record containing data describing the conditions observed at the outfall or observation point. The detection of any suspicious dry weather flow will prompt a service request for a field screening as described in later sections of this manual outlined as Steps 1-4, in which physical, chemical, and biological parameters may be analyzed to determine the nature and source of any illicit discharge.

The inspection records will be stored in the GIS as tables. Screen shots of the actual ArcPad routine and a diagram showing the database designed for storing these records is shown in Appendix E: *Field Data Collection of Dry Weather Inspections using ArcPad.*

Given that the City is located in a coastal area with tidal influence in parts of the MS4 and numerous groundwater sources infiltrating or directly routed into the MS4, our strategy for performing the observations will be adjusted accordingly. The initial location of all major outfall points has provided the starting point for the Dry Weather Flow Inspection Program. Each of the major outfall points will be inspected, photographed and have an observation record saved to the GIS database as described above. Following completion of this effort, a similar systematic inspection of major trunk lines and areas of interest will begin.

The selection of major trunk lines for inspection will be a strategically targeted effort to isolate

those portions of the drainage system that may be contributing to any dry weather flow. At this point, we envision inspections progressing up a selected trunk line from the outfall so that any contributing dry weather flow source areas can be identified and investigation into the source can begin. MS4 structures which have sewer cross pipes associated with them are at the greatest risk for sewage contamination; therefore along with the trunk line inspection effort, special attention will be given to inspecting any MS4 structures or junctions which have a sewer cross pipe passing through the structure. Any identified illicit discharge encountered during the both the trunk line and sewer cross pipe inspection process will result in a service request being generated.

The selection of major trunk lines and points along the trunk line for inspection will be scheduled with consideration given to several influencing factors including: weather conditions, the degree to which stormwater infrastructure mapping is reliable and complete within a given area, suspicion of negative inputs to the MS4 based upon annual water quality reports, 303d listings, and/or industrial land use designations. Also, indications of illicit discharge observations from the MS4 mapping crew will prompt inspections. Dry weather inspections will be performed at 25% of the total number of outfalls per year depending on weather conditions.

APPENDIX E: CONSTRUCTION SITE RUNOFF CONTROLS

Included in this section:

New Hanover County Erosion & Sedimentation Control Ordinance

New Hanover County Ordinance:

The following are excerpts culled from the New Hanover County Erosion and Sedimentation Control Ordinance:

The New Hanover County erosion and sedimentation control ordinance is adopted for the purposes of:

(1) Regulating certain land disturbing activity to control accelerated erosion and sedimentation in order to prevent the pollution of water and other damage to lakes, watercourses, and other public and private property by sedimentation; and

(2) Establishing procedures through which these purposes can be fulfilled.

General requirements of the permit include among others:

(a) *Plan required.* No person shall initiate any land disturbing activity which uncovers more than one acre without having an erosion control plan approved by the county. No land disturbing activity may be initiated until the county is notified of the date that the land disturbing activity will begin.

(b) *Protection of property.* Persons conducting land disturbing activity shall take all reasonable measures to protect all public and private property from damage caused by such activity.

(c) *More restrictive rules shall apply.* Whenever conflicts exist between federal, state, or local laws, ordinances, or rules, the more restrictive provision shall apply.

(e) *Inspections.* Any and all applicable intermediate inspections may be held in any trade (building, mechanical, electric and/or plumbing) if any land disturbing activity, on a tract, including single-family residences, is found not to be in compliance with any part of this article.

(f) *Building finals.* Building finals and/or certificates of occupancy may not be issued if any land disturbing activity, including single-family residences, is found not to be in compliance with any part of this article.

Mandatory Standards For Land Disturbing Activity

No land disturbing activity subject to the control of this article shall be undertaken except in accordance with the following mandatory standards:

(1) *Buffer zone*.

a. No land disturbing activity during period of construction or improvement to land shall be permitted in proximity to a lake or natural watercourse unless a buffer zone is provided along the margin of the watercourse of sufficient width to confine visible siltation within the 25 percent of the buffer zone nearer the land disturbing activity. Waters that have been classified as trout waters by the environmental management commission shall have an undisturbed buffer zone 25 feet wide or of sufficient width to confine visible siltation within the 25 percent of the buffer zone nearest the land disturbing activity, whichever is greater. Provided, however, that the county may approve plans which include land disturbing activity along trout waters when the duration of said disturbance would be temporary and the extent of said disturbance would be minimal. This subdivision shall not apply to a land disturbing activity in connection with the construction of facilities to be located on, over, or under a lake or natural watercourse.

b. Unless otherwise provided, the width of a buffer zone is measured from the edge of the water to the nearest edge of the disturbed area, with 25 percent of the strip nearer the land disturbing activity containing natural or artificial means of confining visible siltation.

c. The 25-foot minimum width for an undisturbed buffer zone adjacent to designated trout waters shall be measured horizontally from the top of the bank.

d. Where a temporary and minimal disturbance is permitted as an exception by subsection (1)a. of this section, land disturbing activities in the buffer zone adjacent to designated trout waters shall be limited to a maximum of ten percent of the total length of the buffer zone within the tract to be distributed such that there is not more than 100 linear feet of disturbance in each 1,000 linear feet of buffer zone. Larger areas may be disturbed with the written approval of the director.

e. No land disturbing activity shall be undertaken within a buffer zone adjacent to designated trout waters that will cause adverse temperature fluctuations, as set forth in 15 NCAC 2B.0211 "Fresh Surface Water Classification and Standards", in these waters.

(2) Graded slopes and fills. The angle for graded slopes and fills shall be no greater than the angle, from zero to nineteen degrees, which can be retained by vegetative cover or other adequate erosion control devices or structures. Only when approved by the county may slopes be steeper than two foot of run to one foot of rise. In any event, slopes left exposed will, within 15 working days or 30 calendar days, whichever is shorter, of completion of any phase of grading, be planted or otherwise provided with ground cover, devices, or structures sufficient to restrain erosion.

(3) Ground cover. Whenever land disturbing activity is undertaken on a tract comprising more than one acre, if more than one acre is uncovered, the person conducting the land disturbing activity shall install such sedimentation and erosion control devices and practices as are sufficient to retain the sediment generated by the land disturbing activity within the boundaries of the tract during construction upon and development of said tract, and shall plant or otherwise provide a permanent ground cover sufficient to restrain erosion after completion of construction or development. Except as provided in section 23-238(b)(5), provisions for a ground cover sufficient

to restrain erosion must be accomplished within 30 working days or 120 calendar days following completion of construction or development whichever period is shorter.

(4) Prior plan approval. No person shall initiate any land disturbing activity on a tract if more than one acre is to be uncovered unless, 30 or more days prior to initiating the activity, an erosion and sedimentation control plan for such activity must be both filed with and approved by the county. The county shall forward to the director of the division of water quality a copy of each erosion and sedimentation control plan for a land disturbing activity that involves the utilization of ditches for the purpose of dewatering or lowering the water table of the tract.

Design and Performance Standards.

(a) Except as provided in subsection (b)(2) of this section, erosion and sedimentation control measures, structures and devices shall be so planned, designed and constructed as to provide protection from the calculated maximum peak of runoff from the ten-year storm. Runoff rates shall be calculated using the procedures in the USDA, Soil Conservation Service's "National Engineering Field Manual for Conservation Practices," or other acceptable calculation procedures.

(b) In high quality water (HQW) zones, the following design standards shall apply:

(1) Uncovered areas in HQW zones shall be limited at any time to a maximum total area within the boundaries of the tract of 20 acres. Only the portion of the land disturbing activity within an HQW zone shall be governed by this section. Larger areas may be uncovered within the boundaries of the tract with the written approval of the director.

(2) Erosion and sedimentation control measures, structures and devices within HQW zones shall be so planned, designed and constructed to provide protection from the runoff of the 25-year storm which produces the maximum peak rate of runoff as calculated according to procedures in the United States Department of Agriculture Soil Conservation Service's "National Engineering Field Manual for Conservation Practices" or according to procedures adopted by any other agency of this state or the United States or any generally recognized organization or association.

(3) Sediment basins within HQW zones shall be designed and constructed such that the basin will have a settling efficiency of at least 70 percent for the 40-micron (0.04 mm) size soil particle transported into the basin by the runoff of that two-year storm which produces the maximum peak rate of runoff as calculated according to procedures in the United States Department of Agriculture Soil Conservation Services "National Engineering Field Manual for Conservation Practices" or according to procedures adopted by any other agency of this state or the United States or any generally recognized organization or association.

(4) Newly constructed open channels in HQW zones shall be designed and constructed with side slopes no steeper than three horizontal to one vertical if a vegetative cover is used for stabilization unless soil conditions permit a steeper slope or where the slopes are stabilized by using mechanical devices, structural devices or other acceptable ditch liners. In any event, the angle for side slopes shall be sufficient to restrain accelerated erosion.

(5) Ground cover sufficient to restrain erosion must be provided for any portion of a land disturbing activity in a HQW zone within 15 working days or 60 calendar days following completion of construction or development, whichever period is shorter.

Responsibility For Maintenance.

During the development of a site, the person conducting the land disturbing activity shall install and/or maintain all temporary and permanent erosion and sedimentation control measures as required by the approved plan or any provision of this article, the act, or any order adopted pursuant to this article or the act. After site development, the land owner or person in possession or control of the land shall install and/or maintain all necessary permanent erosion and sediment control measures, except those measures installed within a road or street right-of-way or easement accepted for maintenance by a governmental agency.

The full text of this article can be found under Chapter 23, Article VI of the Code of Ordinances County of New Hanover, North Carolina.

APPENDIX F: POST-CONSTRUCTION SITE RUNOFF CONTROLS

Included in this section:

Inspection Reporting Summary
Stormwater Detention Facility Compliance Inspection Report

Dates of Inspections	**July 2021**
Total # Sites Inspected	37
Response Letter Severity	
Level 1 (first letter)	15
Level 2 (second letter)*	0
Level 3 (third letter)**	0
# of Sites Requiring Maintenance	15

*If no response from first letter after 60 days, second letter is sent

Summary of Plan Review Activities 2021-2022

Project Name	Project Type	Type of Permit	Type of New SCM	Permit Number	Permit Issue Date	Pervious (Y or N)	# of new SCM's Onsite	Notes
NCSPA South Gate Upgrades	SWP HD	New Permit	Bayfilter	2021027	7/1/2021	N	1	
Wilmington Health (1305 Glen Meade Road)	SWP HD	New Permit	None	2021030	7/1/2021	N	0	Offsite SW PIL
Crossroads at Independence	SWP HD	Permit Revision	None	2019027R2	7/1/2021	N	0	No new SCM's
nCino Phase II-Building	SWP HD	Permit Revision	None	2005062R2	7/1/2021	N	0	Offsite Permit (Wet Pond)
Crossroads at Independence, Tract 2	SWP HD	New Permit	None	2021031	7/2/2021	N	0	Offsite Permit (Wet Pond)
Airlie View (aka Robert Holding Division)	Drain Plan	Permit Revision	None	2020029R1	7/8/2021	Y	0	No new SCM's
Headwaters Place at Hewletts Creek Mod	Drain Plan	Permit Revision	None	2020041R1	7/15/2021	Y	0	No new SCM's
1502 Kidder Street	Drain Plan	New Permit	None	2021033	7/21/2021	N	0	Drain Plan
Raleigh Street Storage	SWP HD	New Permit	Wet Pond	2021032	7/27/2021	N	1	
Melton Road Facility	SWP HD	New Permit	Wet Pond	2020028	8/2/2021	N	1	Level spreader at pond outfall to disperse flow over slope
The Pines at Research Park (USMS Office Upfit)	SWP HD	Permit Revision	None	2007030R1	8/11/2021	N	0	
Riverlights Conv V & VI	SWP HD	New Permit	(2) Wet Ponds, (7) Infiltration, (1) UG Infiltration	2021034	8/19/2021	N	10	
Riverlights SF 2 Mod	SWP HD	Permit Revision	None	2016012R3	8/19/2021	N	0	No new SCM's
College Acres Parking Lot	Drain Plan	New Permit	Permeable Pavement	2021036	8/20/2021	Y	1	Drain Plan
Peace Rose Montessori	Drain Plan	New Permit	None	2021037	8/27/2021	N	0	Drain Plan
Tru and Tapestry Hotel (MOD)	SWP HD	Permit Revision	None	2019049R1	8/31/2021	N	0	No new SCMs
Louie's Limited Variety Store	Drain Plan	New Permit	None	2021041	9/1/2021	N	0	Drain Plan
nCino Phase II-Building	SWP HD	Permit Revision	None	2005062R3	9/3/2021	N	0	Offsite Permit (Wet Pond)
Cottages at Bradley Creek	SWP HD	New Permit	(2) Infiltration Basins	2021039	9/7/2021	N	2	
Patel Storage	SWP HD	Permit Revision	None	2001027R1	9/8/2021	N	0	Offsite Permit (Wet Pond)
Argento at Riverlights	SWP HD	New Permit	None	2021038	9/15/2021	N	0	Offsite Permit (Wet Pond)
Fairfield Mixed Use Buildings 3 & 4	SWP HD	New Permit	None	2018043	10/13/2021	N	0	Offsite Permit (Wet Pond)
Cape Fear Moto Group	SWP HD	Permit Revision	None	2020032R1	10/18/2021	N	0	
240 Racine Drive Office Building (MOD)	SWP HD	Permit Revision	None	2021012R1	10/18/2021	N	0	Offsite Permit (Wet Pond)
Greenlawn Mausoleum Crypt MOD	SWP HD	Permit Revision	None	2019008R2	10/18/2021	N	0	No new SCM's
Long Leaf Park Improvements	Drain Plan	New Permit	None	2021042	10/18/2021	N	0	
The Healing Place	SWP HD	Permit Revision	None	2020038R1	10/21/2021	N	0	No new SCM's
Wilmington Surgcare Expansion	SWP HD	Permit Revision	None	2010014R1	10/26/2021	N	0	
Riverlights SF 2 SW Mod	SWP HD	Permit Revision	None	2016012R4	11/2/2021	N	0	No new SCMs
Harris Teeter Fuel #264 - Crossroads	SWP HD	New Permit	None	2021043	11/4/2021	N	0	Offsite Permit (Wet Pond)
Wilmington Marine Center	SWP LD	New Permit	None	2021044	11/8/2021	N	0	Low Density Permit
Barclay Place Ph 2	SWP HD	Permit Revision	None	960066R1	11/19/2021	N	0	Offsite Permit (Wet Pond)
Burnt Mill Business Park Lot 19	SWP HD	New Permit	None	2021046	11/29/2021	N	0	Offsite Permit (Wet Pond)
4926 Oleander Dr	Drain Plan	New Permit	Permeable Pavement	2021045	12/1/2021	Y	1	1 Permeable Pavement Area (3,748sf)
Cottages at Riverlights MOD	SWP HD	Permit Revision	None	2021020R1	12/4/2021	N	0	No new SCMs
Trinity Tire aka Express Oil	Drain Plan	New Permit	None	2021047	12/9/2021	N	0	Offsite Permit (Wet Pond)
NCNG Armory Parking Area Upfit	SWP HD	New Permit	None	2020014R1	12/14/2021	N	0	Redevelopment
Walker Auto & Truck-Wlmington	SWP HD	New Permit	None	2021040	1/4/2022	N	0	Redevelopment
East & Mason Subdivision (Lot 171 Mod)	SWP HD	Permit Revision	None	2021001R1	1/4/2022	N	0	No new SCMs
East & Mason Amenity	SWP HD	Permit Revision	None	2021001R1	1/4/2022	N	0	No new SCMs
Renaissance Apartments (MOD)	SWP HD	Permit Revision	None	2020023R1	1/4/2022	N	0	Offsite Permit (Wet Pond)
Michelle Drive Subdivision	Drain Plan	New Permit	None	2022002	1/12/2022	N	0	Drain Plan
Autumn Hall Commercial Buildings 3 & 4	SWP HD	Permit Revision	None	2006046R14	1/12/2022	N	0	Offsite Permit (Wet Pond)
Eden Village Modification	SWP HD	Permit Revision	None	2020039R1	1/12/2022	Y	0	No new SCMs
Dockside Place	Drain Plan	New Permit	None	2022001	1/12/2022	N	0	Drain Plan, original permit 2018007 expired
Cottages on Wrightsville	Drain Plan	New Permit	None	2022003	1/13/2022	N	0	
244 Peiffer Ave Minor Subdivision	Drain Plan	New Permit	None	2022004	1/20/2022	N	0	Drain Plan
Switchyard	SWP HD	New Permit	Low Density Outlet Swale, Permeable Pavement	2022006	2/4/2022	N	2	Low Density Permit
Summerwalk (NOV / MOD)	SWP HD	Permit Revision	(2) Constructed Wetlands	2016025R2	2/7/2022	N	0	Infiltration Basin Retrofits / Alternative Design
Flats @ Hanover (Metro Park)	SWP HD	New Permit	(2) Contech Storm Filters / UG Detention	2022005	2/7/2022	N	2	
Chemserve Terminal Storage Tank No. 8	SWP HD	New Permit	Infiltration Basins	2022009	2/11/2022	N	3	3 Infiltration Basins
320 Wood Dale Dr	Drain Plan	New Permit	None	2022008	2/11/2022	N	0	Drain Plan
CAVA Restaurant	SWP HD	New Permit	None	2022007	2/14/2022	N	0	Offsite Permit
Hubbard Pipe & Supply	Drain Plan	New Permit	None	2022011	2/16/2022	N	0	Drain Plan
Perkins Pet Cremation	Drain Plan	New Permit	None	2022012	2/25/2022	N	0	Pervious Only for Exceptional Design / No Credit Taken
H2 Turbo Wash West	SWP HD	Permit Revision	None	2022010	3/2/2022	N	0	Offsite Permit (Wet Pond)
Riverlights Conv V & VI (Townhome MOD)	SWP HD	Permit Revision	None	2021034R1	3/4/2022	N	0	No new SCMs
Fairfield Mixed Use Buildings 3 & 4	SWP HD	Permit Revision	None	2018043R1	3/7/2022	N	0	Offsite Permit (Wet Pond)
The Pointe at Barclay Phase III Hotel	SWP HD	New Permit	None	2021026	3/8/2022	N	0	Offsite Permit (Wet Pond)
Riverlights Marina Village SW Mod	SWP HD	Permit Revision	None	2015021R4	3/8/2022	N	0	
Azalea Landing	SWP HD	New Permit	Wet Pond (2), Infiltration Basin (1)	2022013	3/11/2022	N	3	
Blair Elementary Minor Mod	SWP HD	Permit Revision	None	2017010R1	3/20/2022	N	0	
Tommy's Carwash Oleander	SWP HD	New Permit	None	2022014	3/23/2022	N	0	Redevelopment
Wilmington Food Bank	SWP HD	New Permit	Infiltration Basin	2022015	3/28/2022	N	1	1 Infiltration Basin
Container Technology Inc.	Drain Plan	New Permit	None	2022017	4/1/2022	N	0	Drain Plan
Harris Teeter Fuel #210 (Mayfaire)	SWP HD	Permit Revision	None	2004048R1	4/6/2022	N	0	Offsite Permit (Wet Pond)
Project Hot Dog (aka 700 S 17th St.)	Drain Plan	New Permit	None	2022018	4/7/2022	N	0	Drain Plan
Thorpe Landscapes	Drain Plan	New Permit	None	2022020	4/14/2022	N	0	Drain Plan
Drumtrout (Fulton Station Retail-Lot #6) Unit #133	SWP HD	Permit Revision	None	2002012R1	4/18/2022	N	0	
RL SF3&4 Stormwater Mod	SWP HD	Permit Revision	None	2017031R3	4/25/2022	N	0	No New SCM's
Porsche Wilmington Expansion	SWP HD	Permit Revision	None	1999032R4	5/3/2022	N	0	No new SCM's
Riverlights MX-2A Townhomes	SWP HD	Permit Revision	None	2022023	5/6/2022	N	0	Offsite Permit (Infiltration Basin)
Smile Staight Orthodontics	SWP HD	New Permit	None	2022019	5/6/2022	N	0	Offsite Permit (Wet Pond)
SeaSo	Drain Plan	New Permit	None	2022022	5/9/2022	N	0	
Wilmington Food Bank	SWP HD	Permit Revision	None	2022015R1	5/11/2022	N	0	
Ansley Park (Mod 4)	SWP HD	Permit Revision	None	2019045R4	5/13/2022	N	0	No new SCM
Riverlights MX-3 (MOD)	SWP HD	Permit Revision	Infiltration Basin (1)	2021010R1	5/19/2022	N	1	1 Infiltration Basin
Melrose Place	SWP HD	New Permit	Underground Infiltration Trenches (2), Infiltration Basin (1), Permeable Pavement (2)	2022025	5/26/2022	Y	5	
Liberty Landing at Midtown	Drain Plan	Permit Revision	None	2021008R1	6/3/2022	N	0	Drain Plan
Cottages at Riverlights MOD R2	SWP HD	Permit Revision	None	2021020R2	6/10/2022	N	0	Offsite Permit (Wet Pond)
Masonboro Lodge Phase II	Drain Plan	Permit Revision	None	2014017R3	6/20/2022	N	0	No new SCM's
Cottages at Bradley Creek (Name Change)	SWP HD	Permit Revision	None	2021039R1	6/21/2022	N	0	Name Change
Reiser Site (aka Park Avenue Duplexes)	Drain Plan	New Permit	None	2022028	6/27/2022	N	0	Drain Plan
Covey Restaurant	SWP HD	New Permit	None	2/12/7436	44740	N	0	
The Canopies (fka Airlie Homes at Hooker)	Drain Plan	New Permit	None	2/13/7436	44740	N	0	Drain Plan

APPENDIX G: POLLUTION PREVENTION & GOOD HOUSEKEEPING FOR MUNICIPAL OPERATIONS

Three separate employee trainings were conducted this reporting year.

RCP Installation – Culvert Installation, Maintenance, and Resiliency
7/13/2022
13 staff trained

Good Housekeeping/Pollution Prevention for Municipal Facilities
6/16/2022
8 supervisors trained

SCM Inspection & Maintenance
7/28/21
14 staff trained

Bradley & Hewletts Creek Watershed Restoration Plan

- Heal Our Waterways Program
- Cumulative Year End Reports for Contractual/Cooperative Agreements with:
  - New Hanover Soil & Water Conservation District (HOWBMP)

DATE OF EVENT/ ACTIVITY	EVENT/ACTIVITY	AUDIENCE	DELIVERED BY (AGENCY)	METHOD OF DELIVERY / MESSAGE	ATTENDANCE/ PARTICIPATION
Events					
7/24/2021	Wilmington Farmer's Market @Tidal Creek Co-op	New Hanover County Residents	Heal Our Waterways	Booth with displays about the benefits of native plants on local water quality	45 Attendees
9/18/2021	Native Plant Festival	New Hanover County and Brunswick County residents	Heal Our Waterways	Booth with displays about the benefits of native plants on local water quality	774 attendees
9/25/2021	Wilmington Farmer's Market @Tidal Creek Co-op	New Hanover County Residents	Heal Our Waterways	Booth with displays about the benefits of native plants on local water quality	30 Attendees
10/31/2021	Wilmington Farmer's Market @Tidal Creek Co-op (Harvest Market)	New Hanover County Residents	Heal Our Waterways	Booth with displays about stormwater runoff and at-home solutions.	100 Attendees
11/13/2021	Alliance for Cape Fear Trees Tree Giveaway	New Hanover County Residents	Heal Our Waterways	Table with watershed maps to track residents' trees based on watershed boundaries. Raffled off one rain barrel	150 Attendees
11/20/2021	Wilmington Farmer's Market @Tidal Creek Co-op	New Hanover County Residents	Heal Our Waterways	Booth with displays about native plants and other stormwater solutions.	25 Attendees
3/26/2022	Wilmington Farmer's Market @Tidal Creek Co-op	New Hanover County Residents	Heal Our Waterways	Booth with displays about native plants and other stormwater solutions.	100 Attendees
4/23/2022	Wilmington Earth Day Festival	New Hanover County Residents	Heal Our Waterways	Interactive booth with displays about stormwater solutions and a rain barrel raffle.	750 Attendees
4/30/2022	Wilmington Farmer's Market @Tidal Creek Co-op	New Hanover County Residents	Heal Our Waterways	Booth with displays about native plants and other stormwater solutions.	100 Attendees

5/14/2022	Wilmington Farmer's Market @Tidal Creek Co-op	New Hanover County Residents	Heal Our Waterways	Booth with displays about native plants and other stormwater solutions.	50 Attendees
6/25/2022	Wilmington Farmer's Market @Tidal Creek Co-op	New Hanover County Residents	Heal Our Waterways	Booth with displays about native plants and other stormwater solutions.	30 Attendees

Presentations

9/14/2021	UNCW UNI Class Presentation	Undergraduate UNCW students	Heal Our Waterways	Walking tour of rain gardens on campus. Gave a "Stormwater 101" style presentation and used the rain gardens as examples of stormwater solutions.	25 Attendees
7/21/2021	NCCF Walking tour of UNCW SCMs	NCCF Stakeholder group and new employees	Heal Our Waterways; UNCW	Walking tour of rain gardens on campus. Answered questions from the stakeholders about the grant projects and rain gardens	20 Attendees
3/15/2022	Loblolly Garden Club Presentation	Loblolly Garden Club members	Heal Our Waterways/Stormwater Services	Presentation discussing stormwater solutions and simple changes to make around a property to benefit water quality.	20 Attendees
3/16/2022	Backyard Sustainability Series Presentation	New Hanover County, Brunswick County, Pender County residents	Heal Our Waterways, NCSU Co-operative Extension	Presentation discussing stormwater solutions and simple changes to make around a property to benefit water quality.	80 Attendees

Informational Website

Ongoing	Heal Our Waterways informational website healourwaterways.org	Watershed residents General public	Heal Our Waterways	Continuously updated, dedicated Heal Our Waterways website	2,970 pageviews 2,351 unique pageviews 1,703 entrances

Media Advertising Campaigns

9/21/2021-12/1/2021	WECT Fall Native Plants Campaign	Residents within the Bradley & Hewletts Creek Watersheds	WECT/Heal Our Waterways	Video pre-roll, weather channel display banners, and targeted Facebook posts featuring the monthly NHC rain barrel sale.	Ads Booked: 183,000 Ads Served: 502,088 Engagements: 646 Engagement Rate: 0.13%

9/15/21-12/6/21	WHQR PSA Fall Campaign	WHQR listeners	WHQR/Heal Our Waterways	PSA during drivetime announcing native plants benefits and resources	47 Spots during drivetime, once x 4 weekdays
10/4/21-11/15/21	Lamar Fall Billboard	All drivers at the corner of Oleander Drive and Greenville Loop Drive, within the Bradley Creek Watershed	Lamar Billboards/Heal Our Waterways	Billboard featuring Native Plants and the HOW Program web address.	1.5 months, 1 billboard Total cost: $1500
4/5/22 - 5/29-22	Lamar Spring Billboard	All drivers at the corner of Oleander Drive and Greenville Loop Drive, within the Bradley Creek Watershed	Lamar Billboards/Heal Our Waterways	Billboard featuring Native Plants and the HOW Program web address.	2 months, 1 billboard Total cost: $2000
3/15/22 - 5/23/22	WHQR PSA Spring Campaign	WHQR listeners	WHQR/Heal Our Waterways	PSA during drivetime announcing native plants benefits and resources	47 Spots during drivetime, once x 4 weekdays
4/23/22-6/20/22	WECT Spring Love Where You Live Campaign	Residents within the Bradley & Hewletts Creek Watersheds	WECT/Heal Our Waterways	Video pre-roll, weather channel display banners, and targeted Facebook posts featuring the monthly NHC rain barrel sale.	Ads Served: 310,859 Engagements: 570 Engagement Rate: 0.18%

News Coverage

9/19/2021	WHQR online article	All WHQR listeners and readers	Heal Our Waterways	WHQR did a brief interview with HOW at the Native Plant festival and featured some of the recommended plants	New Hanover County Residents

Social Media Campaigns

Ongoing	Twitter site campaign	Twitter followers Interested public	Heal Our Waterways	Dedicated Heal Our Waterways account handle	Currently have _290_ followers
Ongoing	Facebook site campaign	Facebook followers Interested public	Heal Our Waterways	Dedicated Heal Our Waterways page	Currently have 464_ page "likes", 511_ followers
Ongoing	Instagram site campaign	Instagram followers Interested public	Heal Our Waterways	Dedicated Heal Our Waterways account handle	Currently have _456_followers

Distributing promos/giveaways

Ongoing	Introductory application swag packets to HOWBMP site visits/applicants	Applicants to the HOWBMP Program	Heal Our Waterways; NHSWCD	Application "Swag Bag" with HOW giveaways, including grocery tote, pens, notepads, stickers, dry bag, and informational papers	6 Total Site Visits for the HOWBMP Program

7/24/2021	Rain Barrel Raffle from HOW Booth @ Wilmington Farmer's Market	Attendees that participated at the HOW booth	Heal Our Waterways	1 80-gallon rain barrel raffled to participant at HOW booth	1 Winner
9/18/2021	Rain Barrel Raffle from HOW Booth @ Native Plant Festival	Attendees that participated at the HOW booth	Heal Our Waterways	1 80-gallon rain barrel raffled to participant at HOW booth	1 Winner
9/25/2021	Rain Barrel Raffle from HOW Booth @ Wilmington Farmer's Market	Attendees that participated at the HOW booth	Heal Our Waterways	1 80-gallon rain barrel raffled to participant at HOW booth	1 Winner
10/31/2021	Rain Barrel Raffle from HOW Booth @ Wilmington Farmer's Market	Attendees that participated at the HOW booth	Heal Our Waterways	1 80-gallon rain barrel raffled to participant at HOW booth	1 Winner
11/13/2021	Rain Barrel Raffle from HOW Booth @ Alliance for Cape Fear Trees Tree Giveaway	Attendees that stopped to track their trees in relation to watershed boundaries were entered into the raffle	Heal Our Waterways	1 80-gallon rain barrel raffled to participant at HOW booth	1 Winner
11/20/2021	Rain Barrel Raffle from HOW Booth @ Wilmington Farmer's Market	Attendees that participated at the HOW booth	Heal Our Waterways	1 80-gallon rain barrel raffled to participant at HOW booth	1 Winner
3/26/2022	Rain Barrel Raffle from HOW Booth @ Wilmington Farmer's Market	New Hanover County Residents	Heal Our Waterways	1 60-gallon rain barrel raffled to participant at HOW booth	1 Winner (21 entries)
4/23/2022	Rain Barrel Raffle from HOW Booth @ Wilmington Earth Day Festival	New Hanover County Residents	Heal Our Waterways	1 50-gallon rain barrel raffled to participant at HOW booth	1 Winner
4/30/2022	Rain Barrel Raffle from HOW Booth @ Wilmington Farmer's Market	New Hanover County Residents	Heal Our Waterways	1 50-gallon rain barrel raffled to participant at HOW booth	1 Winner
5/14/2022	Rain Barrel Raffle from HOW Booth @ Wilmington Farmer's Market	New Hanover County Residents	Heal Our Waterways	1 50-gallon rain barrel raffled to participant at HOW booth	1 Winner
6/25/2022	Rain Barrel Raffle from HOW Booth @ Wilmington Farmer's Market	New Hanover County Residents	Heal Our Waterways	1 50-gallon rain barrel raffled to participant at HOW booth	1 Winner

Local Cable Access (GTV-8)

Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff WECT staff GTV-8 staff	Downspout disconnection and rain barrel public service announcements with local celebrity news anchor Jon Evans	Inform public about re-routing downspouts and installing and using rain barrels

Watershed Resident Mailings, Displays, Signs, Pamphlets

Fall 2021	Fall watershed mailer	All Bradley Creek and Hewletts Creek residents.	Heal Our Waterways	Postcard featuring the start of oyster harvest season with oyster benefits and ways to protect oyster reefs	Mailed to 21,443 addresses
Spring 2022	Spring Watershed Mailer	All Bradley Creek and Hewletts Creek residents.	Heal Our Waterways	Postcard featuring different species of native plants that can be commonly found and purchased.	Mailed to 21,460 addresses

Newsletters and E-newsletters

7/23/2021	"UNCW Rain Gardens Turn Two!"	Heal Our Waterways newsletter subscribers	Heal Our Waterways	Quarterly update featuring the UNCW rain gardens, events, and a native plant	382 Sent 27.1% Open Rate 13.7% Click Rate
11/19/2021	"Fall News & Updates"	Heal Our Waterways newsletter subscribers	Heal Our Waterways	Quarterly update featuring upcoming grant projects, events, and a new native plant	410 Sent 41% Open Rate 4% Click Rate
2/25/2022	"Winter Updates - Events, History, and More!"	Heal Our Waterways newsletter subscribers	Heal Our Waterways	Quarterly update featuring some history of Hewletts Creek, local events, and a testimonial.	418 Sent 27% Open Rate 1.3% Click Rate
4/20/2022	"HOW Spring Updates: Earth Day Edition!"	Heal Our Waterways newsletter subscribers	Heal Our Waterways	Quarterly update featuring the history of Earth Day and the upcoming Earth Day Festival.	427 Sent 41% Open Rate 3.1% Click Rate

Grant Projects

Began March 2021	EPA 319 Grant NCSU COW	Bradley Creek Watershed	NCSU-BSE, COW Stormwater, 2 Private Pond Owners	Two private pond retrofits and one COW-owned drainage swale modification in the upper Bradley Creek Watershed	Collaboration with NCSU-BSE, COW Stormwater, and University Landing/University Commons Property Owners
Began January 2022	EPA 319 Grant UNCW NCCF Phase II	Bradley Creek Watershed	UNCW, NCCF, COW Stormwater	Several planned stormwater retrofits on UNCW campus.	Collaboration with UNCW, NCCF, and City Stormwater

Watershed Coordinator Training and Networking Events

7/1/2021	"Trees and the Coming Hurricanes: Wind, Lightning, Surge, & Flood"	Arborists, stormwater professionals, coastal stakeholders	Alabama Cooperative Extension System	Webinar discussing potential impacts to trees during hurricanes.	Watershed Coordinator

7/28/2021	"Lunch and Learn for Supervisors and Stormwater Crews"	Stormwater services crews and supervisors	COW Stormwater Services; HOW	In-person training	Watershed Coordinator; Stormwater Supervisors; Stormwater Crews
7/28/2021	"Soak up the Rain Webinar Series: Phytotechnology: A Nature-Based Approach to Containing Contamination"	Stormwater professionals	EPA	Webinar discussing vegetation options for SCMs	Watershed Coordinator
7/29/2021	"Underground Stormwater Infrastructure Solutions, Deficiencies, and Maintenance Protocols"	Stormwater professionals	AQUALIS	Webinar discussing types of underground stormwater infrastructure	Watershed Coordinator
8/5/2021	GoToWebinar: "The Pathway to Green and Complete Streets: Steps, Success Stories, and Lessons Learned"	Stormwater professionals	EPA	Webinar discussing EPA's green streets handbook and examples	Watershed Coordinator
8/24/2021	GoToWebinar: Soak Up the Rain: Addressing Stormwater Flooding through Resilience Action Strategies and Sustainable Financing"	Stormwater professionals	EPA	Webinar featuring examples of resiliency programs from New England	Watershed Coordinator
9/8/2021	GoToWebinar: "Tree Planting, Inventory and Analysis for Human and Environmental Health"	Arborists, stormwater professionals	USDA Forest Service	Webinar featuring inventory and modelling systems to analyze tree impacts on human and environmental health	Watershed Coordinator
9/10/2021	GoToWebinar: "Erosion and Sediment: A Dirty Mess or Opportunity for Thoughtful Management"	Stormwater professionals	Center for Watershed Protection	Webinar discussing options for managing sediment in stormwater	Watershed Coordinator
9/22/2021	GoToWebinar: "Building Greener Boston: Creating and Connecting the Green Infrastructure Workforce"	Stormwater professionals	EPA	Webinar discussing how to support and develop a workforce for SCM maintenance	Watershed Coordinator
9/23/2021	GoToWebinar: Tracking Bacteria in Storm Water Runoff During Dry & Wet Weather"	Water Quality Professionals	EPA	Webinar discussing technologies for tracking bacteria	Watershed Coordinator
9/29/2021	GoToWebinar - Valuing Aquatic Ecosystem Health at a National Scale: Modeling Biological Indicators Across Space and Time	Water Quality Professionals	EPA	Webinar featuring methods to inventory biological indicators and assign value	Watershed Coordinator

10/5/2021	Funding Opportunities for Your Water Work	Water Quality Professionals	NC Watershed Stewardship Network	Online panel to discuss various grant opportunities in NC	Watershed Coordinator
10/25 - 10/26/2021	Project WET Workshop	Water Quality Professionals	NCDENR	Online training working through the Project WET educational activity book	Watershed Coordinator
12/8/2021	Retrofitting Existing SCMs	Stormwater professionals	NCSU-BSE	Online training providing examples of poor SCM maintenance and ways to improve water quality treatment	Watershed Coordinator
3/2/2022	Advancing Advocacy: Information Session	Stormwater professionals	NC League of Municipalities		Watershed Coordinator
3/4/2022	ARPA Stormwater Funding Program Stakeholder Session	Stormwater professionals	Division of Water Infrastructure	Virtual listening session and introduction to the potential ranking/prioritization process for the new ARPA funds	Watershed Coordinator
3/8/2022	ICS-100	Emergency Management Professionals	FEMA	Required online training for introduction to Emergency Management System	Watershed Coordinator
3/9/2022	ICS-200	Emergency Management Professionals	FEMA	Required online training for introduction to Emergency Management System	Watershed Coordinator
3/9/2022	ICS-700	Emergency Management Professionals	FEMA	Required online training for introduction to Emergency Management System	Watershed Coordinator
3/24/2022	Stormwater & Green Infrastructure & the Clean Watersheds Needs Survey	Stormwater professionals	National Stormwater Alliance	Introduction to EPA's Clean Watersheds Needs survey.	Watershed Coordinator
3/29/2022	SASMI: Conservation & Restoration Focus Group	Environmental professionals	South Atlantic Salt Marsh Initiative	Networking opportunity and group review of the Conservation and Restoration Topic Paper for the SASMI program	Watershed Coordinator

4/13/2022	Greenspace Preservation in Distressed Communities	Environmental professionals	USDA Forest Service	Presented research findings on the tension between distressed social conditions and environmental preservation in Atlanta's South River watershed	Watershed Coordinator
4/19/2022	BMPs & a Decentralized Approach to Green Infrastructure	Stormwater professionals	Invisible Structures & Plastic Solutions Inc.	Webinar discussing the benefits of underground and smaller infrastructure practices	Watershed Coordinator
4/21/2022	Rain Garden & Water Quality Certification	Stormwater professionals	NCSU-BSE	In-person training, part presentation, part hands-on, to learn how to properly design and size rain gardens	Watershed Coordinator
5/18/2022	EPA ORD Webinar: Green Infrastructure: Ecosystem Benefits and Applications	Stormwater professionals	USEPA	Online webinar presenting ways to monitor green infrastructure and how to quantify benefits of urban green space	Watershed Coordinator
5/29/2022	Webinar: Raining Praise on Urban Trees	Environmental professionals	University of Auburn	Provided an introduction to the important role played by urban trees and plants in moderating stormwater runoff that protects local water quality.	Watershed Coordinator
5/25/2022	Soak up the Rain Webinar: Green Infrastructure and the MS4 Permit	Stormwater professionals	USEPA	Discussions on how to incorporate green infrastructure into existing municipal code and promote green infrastructure	Watershed Coordinator
6/8/2022	Urban Forest Connections Webinar, "Engaging Community Residents in Heat Mitigation and Canopy Expansion"	Arborists, stormwater professionals	USDA Forest Service	Discussions on how to mitigate heat island effect using trees and tree canopies	Watershed Coordinator
6/13/2022 - 6/15/2022	ICS-300 Intermediate Incident Command System for Expanding Incidents	Emergency Management Professionals	NC Emergency Management	In-person course walking through the process of the Incident Command System	Watershed Coordinator

6/23/2022	Soak up the Rain Webinar: Building Equity into Nature-Based Solutions for Massachusetts Communities	Stormwater professionals	USEPA	Discussions of how to incorporate greater equity into planning and installing stormwater infrastructure	Watershed Coordinator
Citizen Contacts- Site Visits					
7/22/2021	3608 Pine Bark Court	Property owner	NHSWCD; COW; Rainstorm Solutions	HOWBMP Contract Site Visit	1 property owner; COW Staff; NHSWCD Staff; Rainstorm Solutions
7/22/2021	325 E. Blackbeard Road	Property owner	NHSWCD; COW; Rainstorm Solutions	HOWBMP Contract Site Visit	1 property owner; COW Staff; NHSWCD Staff; Rainstorm Solutions
7/27/2021	1716 Softwind Way	Property owner	NHSWCD; Rainstorm Solutions	HOWBMP Contract Site Visit	1 property owner; NHSWCD Staff; Rainstorm Solutions
7/27/2021	3420 Sparrow Hawk Court	Property owner	NHSWCD; Rainstorm Solutions	HOWBMP Contract Site Visit	1 property owner; NHSWCD Staff; Rainstorm Solutions
8/12/2021	3713 Needle Sound Way	Property owner	NHSWCD; Rainstorm Solutions	HOWBMP Contract Site Visit	1 property owner; NHSWCD Staff; Rainstorm Solutions
9/21/2021	5091 Edinboro Lane	Property owner	NHSWCD; COW;	HOWBMP Contract Site Visit	2 property owners; COW Staff; NHSWCD Staff;
	3241 Red Berry Drive	Property owner	NHSWCD	HOWBMP Contract Site Visit	1 property owner; NHSWCD Staff;
5/20/2022	321 Bretonshire Road	Property owners	COW	HOWBMP Contract Site Visit -- Interest Meeting & Drainage Discussion	2 property owners; COW Staff
BMP Projects Installed					
11/13/2021	3124 Kirby Smith Drive Serviceberry Trees	1 property owner	COW; Alliance for Cape Fear Trees	Trees received from tree giveaway	Total Volume Reduction: 0.21 cubic feet; 1.57 gallons
12/3/2021	3124 Kirby Smith Drive Rain Barrel 3	1 property owner	COW;	Rain barrel won through HOW raffle @ tree giveaway event	Total Volume Reduction: 10.6944 cubic feet; 80 gallons
12/3/2021	6230 Towles Road Rain Barrel	1 property owner	COW;	Rain barrel won through HOW raffle @ Wilmington Farmer's Market	Total Volume Reduction: 10.6944 cubic feet; 80 gallons
11/13/2021	438 Semmes Drive River Birch	1 property owner	COW; Alliance for Cape Fear Trees	Trees received from tree giveaway	Total Volume Reduction:

					0.42 cubic feet; 3.14 gallons
11/13/2021	438 Semmes Drive Bald Cypress	1 property owner	COW; Alliance for Cape Fear Trees	Trees received from tree giveaway	Total Volume Reduction: 0.29 cubic feet; 2.17 gallons
8/27/2021	418 N Colony Circle Rain Barrel	1 property owner	COW; NHSWCD	Rain Barrel sold through monthly rain barrel sale	Total Volume Reduction: 10.6944 cubic feet; 80 gallons
8/12/2021	6212 Wrightsville Avenue Rain Barrel 2	1 property owner	COW; NHSWCD	Rain Barrel sold through monthly rain barrel sale	Total Volume Reduction: 10.6944 cubic feet; 80 gallons
8/12/2021	6212 Wrightsville Avenue Rain Barrel 1	1 property owner	COW; NHSWCD	Rain Barrel sold through monthly rain barrel sale	Total Volume Reduction: 10.6944 cubic feet; 80 gallons
7/26/2021	3812 Sweetbriar Road Rain Barrel	1 property owner	COW; NHSWCD	Rain Barrel sold through monthly rain barrel sale	Total Volume Reduction: 10.6944 cubic feet; 80 gallons
9/30/2021	30 S Cardinal Drive Rain Barrel	1 property owner	COW;	Rain barrel won through HOW raffle @ Wilmington Farmer's Market	Total Volume Reduction: 10.6944 cubic feet; 80 gallons
10/21/2021	6628 Pleasant Pine Court Rain Barrel	1 property owner	COW;	Rain barrel won through HOW raffle @ Native Plant Festival	Total Volume Reduction: 10.6944 cubic feet; 80 gallons
7/8/2021	3220 Blue Jay Court Rain Barrel 3	1 property owner	COW; NHSWCD	Rain Barrel sold through monthly rain barrel sale	Total Volume Reduction: 10.6944 cubic feet; 80 gallons
7/8/2021	3220 Blue Jay Court Rain Barrel 2	1 property owner	COW; NHSWCD	Rain Barrel sold through monthly rain barrel sale	Total Volume Reduction: 10.6944 cubic feet; 80 gallons
7/8/2021	3220 Blue Jay Court Rain Barrel	1 property owner	COW; NHSWCD	Rain Barrel sold through monthly rain barrel sale	Total Volume Reduction: 10.6944 cubic feet; 80 gallons
7/8/2021	6502 Teaticket Lane Rain Barrel	1 property owner	COW; NHSWCD	Rain Barrel sold through monthly rain barrel sale	Total Volume Reduction: 10.6944 cubic feet; 80 gallons
3/10/2022	3616 Amber Drive Rain Barrel	1 property owner	COW; NHSWCD	Rain Barrel sold through monthly rain barrel sale	Total Volume Reduction: 8.0208 cubic feet; 60 gallons
12/3/2021	430 Kingston Road Rain Barrel	1 property owner	COW; NHSWCD	Rain Barrel sold through monthly rain barrel sale	Total Volume Reduction: 8.0208 cubic feet; 60 gallons

3/10/2022	3854 Edgewood Road Rain Barrel 1	1 property owner	COW; NHSWCD	Rain Barrel sold through monthly rain barrel sale	Total Volume Reduction: 10.6944 cubic feet; 80 gallons
3/10/2022	3854 Edgewood Road Rain Barrel 2	1 property owner	COW; NHSWCD	Rain Barrel sold through monthly rain barrel sale	Total Volume Reduction: 10.6944 cubic feet; 80 gallons
2/28/2022	2124 Lynwood Drive Wetland Bald Cypress	COW Drainage Wetland	COW	10 bald cypress planted in bioretention area/wetland	Total Volume Reduction: 2.1 cubic feet; 15.72 gallons
2/28/2022	University Commons Drainage Swale River Birch	COW drainage easement	COW	10 river birch planted in drainage easement	Total Volume Reduction: 4.15 cubic feet; 31.044 gallons
2/28/2022	Clearbrook Drive Infiltration Trench Long Leaf Pines	COW drainage easement	COW	5 long leaf pine planted next to infiltration trench	Total Volume Reduction: 0.75 cubic feet; 5.61 gallons
3/31/2022	Wrighsville Green CIP Bald Cypress	COW drainage easement	COW	4 bald cypress planted along drainage easement	Total Volume Reduction: 1.18 cubic feet; 8.827 gallons
3/31/2022	Wrighsville Green CIP Live Oak	COW drainage easement	COW	6 live oak planted along drainage easement	Total Volume Reduction: 3.51 cubic feet; 26.2566 gallons
3/31/2022	Wrighsville Green CIP Pin Oak	COW drainage easement	COW	4 pin oak planted along drainage easement	Total Volume Reduction: 3.51 cubic feet; 26.2566 gallons
3/31/2022	Wrighsville Green CIP Red Maple	COW drainage easement	COW	4 red maple planted along drainage easement	Total Volume Reduction: 1 cubic feet; 7.481 gallons
3/31/2022	Wrighsville Green CIP River Birch	COW drainage easement	COW	2 River Birch planted along drainage easement	Total Volume Reduction: 0.83 cubic feet; 6.209 gallons
9/1/2022	UNCW DeLoach Hall Rock Garden Bioretention Area	UNCW students and visitors	UNCW	Bioretention area tied into two downspouts and a cistern	Total Volume Reduction: 2,166 cubic feet; 16,202.81 gallons

4/1/2022	348 Brenda Drive Rain Garden	1 property owner	Property Owner	Rain garden installed by property owner	Total Volume Reduction: 63 cubic feet; 471.273 gallons
5/1/2022	1066 Headwater Cove Rain Barrel	1 property owner	HOW	Rain barrel won through HOW raffle @ Wilmington Farmer's Market	Total Volume Reduction: 8.0208 cubic feet; 60 gallons
5/10/2022	310 N Colony Circle Rain Barrel	1 property owner	HOW	Rain barrel won through HOW raffle @ Wilmington Farmer's Market	Total Volume Reduction: 8.0208 cubic feet; 60 gallons
5/1/2022	Renee Court Infiltration Cell	COW drainage project	COW	Infiltration cell in center of circle drive	Total Volume Reduction: 1,936.82 cubic feet; 14,488.42 gallons
6/30/2022	7226 Masonboro Sound Road Rain Garden	1 property owner	COW; NHSWCD	Rain garden installed through HOWBMP Program	Total Volume Reduction: 53 cubic feet; 396.47 gallons
6/23/2022	5202 Clear Run Drive Rain Garden	1 property owner	COW; NHSWCD	Rain garden installed through HOWBMP Program	Total Volume Reduction: 59 cubic feet; 441.35 gallons
5/16/2022	1716 Softwind Way Rain Garden	1 property owner	COW; NHSWCD	Rain garden installed through HOWBMP Program	Total Volume Reduction: 63 cubic feet; 471.27 gallons
6/30/2022	418 Clearbrook Drive Backyard Wetland	1 property owner	COW; NHSWCD	Rain garden installed through HOWBMP Program	Total Volume Reduction: 1,936.82 cubic feet; 14,488.42 gallons
6/30/2022	3713 Needle Sound Way Rain Garden	1 property owner	COW; NHSWCD	Rain garden installed through HOWBMP Program	Total Volume Reduction: 35 cubic feet; 261.82 gallons
5/24/2022	325 E Blackbeard Road Rain Garden	1 property owner	COW; NHSWCD	Rain garden installed through HOWBMP Program	Total Volume Reduction: 54 cubic feet; 403.95 gallons
6/23/2022	3420 Sparrow Hawk Court Rain Garden	1 property owner	COW; NHSWCD	Rain garden installed through HOWBMP Program	Total Volume Reduction: 35 cubic feet; 261.82 gallons
6/20/2022	Leutze Hall Rain Garden	UNCW students and visitors	NCCF; UNCW; HOW	Rain garden installed in front of Leutze Hall through 319 grant funds	Total Volume Reduction: 1,900 cubic feet; 14,212.99 gallons
5/28/2022	1100 Ullswater Lane Rain Barrel	1 property owner	COW; NHSWCD	Rain Barrel sold through monthly rain barrel sale	Total Volume Reduction: 6.68 cubic feet; 50 gallons
5/28/2022	1017 Browning Drive Rain Barrel 1	1 property owner	COW; NHSWCD	Rain Barrel sold through monthly rain barrel sale	Total Volume Reduction: 6.68 cubic feet; 50 gallons

5/28/2022	1017 Browning Drive Rain Barrel 2	1 property owner	COW; NHSWCD	Rain Barrel sold through monthly rain barrel sale	Total Volume Reduction: 6.68 cubic feet; 50 gallons
6/16/2022	100 Hooker Road Rain Barrel	1 property owner	COW; NHSWCD	Rain Barrel sold through monthly rain barrel sale	Total Volume Reduction: 6.68 cubic feet; 50 gallons
6/9/2022	1807 S. Churchill Drive Rain Barrel	1 property owner	COW; NHSWCD	Rain Barrel sold through monthly rain barrel sale	Total Volume Reduction: 6.68 cubic feet; 50 gallons
6/3/2022	125 White Oak Drive Rain Barrel	1 property owner	COW; NHSWCD	Rain Barrel sold through monthly rain barrel sale	Total Volume Reduction: 6.68 cubic feet; 50 gallons
6/17/2022	305 Englewood Drive Rain Barrel 1	1 property owner	COW; NHSWCD	Rain Barrel sold through monthly rain barrel sale	Total Volume Reduction: 6.68 cubic feet; 50 gallons
6/17/2022	305 Englewood Drive Rain Barrel 2	1 property owner	COW; NHSWCD	Rain Barrel sold through monthly rain barrel sale	Total Volume Reduction: 6.68 cubic feet; 50 gallons
6/15/2022	3500 Whispering Pines Court Rain Barrel	1 property owner	COW; NHSWCD	Rain Barrel sold through monthly rain barrel sale	Total Volume Reduction: 6.68 cubic feet; 50 gallons
6/15/2022	5309 Autumn Drive Rain Barrel	1 property owner	COW; NHSWCD	Rain Barrel sold through monthly rain barrel sale	Total Volume Reduction: 6.68 cubic feet; 50 gallons
6/9/2022	1743 41st Street Rain Barrel	1 property owner	COW; NHSWCD	Rain Barrel sold through monthly rain barrel sale	Total Volume Reduction: 6.68 cubic feet; 50 gallons

COW = City of Wilmington
HOW = Heal Our Waterways
HOWBMP = Heal Our Waterways Best Management Program
NCCF = North Carolina Coastal Federation
NCSU = North Carolina State University
NHSWCD = New Hanover Soil & Water Conservation District
FB = Facebook
UNCW = University of North Carolina at Wilmington

FY22 Heal Our Waterways Program Volume Reduction Summaries

BMP Owner	BMP Type	Gallons	Volume Reduction (cu ft)	Volume Reduction (ac ft)
Bradley Creek Watershed Volume Reduction Data				
30 S Cardinal Drive Rain Barrel	Rain Barrel	80.00	10.69	0.0002
6212 Wrightsville Avenue Rain Barrel 1	Rain Barrel	80.00	10.69	0.0002
6212 Wrightsville Avenue Rain Barrel 2	Rain Barrel	80.00	10.69	0.0002
6230 Towles Road Rain Barrel	Rain Barrel	80.00	10.69	0.0002
UNCW DeLoach Hall Rock Garden Bioretention Area	Bioretention Area	16,202.81	2,166.00	0.0497
Wrightsville Green CIP HOA Trees	Trees	74.95	10.02	0.0002
University Commons Swale River Birch	Trees	31.04	4.15	0.0001
1716 Softwind Way Rain Garden	Rain Garden	471.27	63.00	0.0014
Renee Court Infiltration Basin	Infiltration Basin	14,488.42	1,936.82	0.0445
UNCW Leutze Hall Rain Garden	Rain Garden	14,212.99	1,900.00	0.0436
1066 Headwater Cove Rain Barrel	Rain Barrel	60.00	8.02	0.0002
1100 Ullswater Lane Rain Barrel	Rain Barrel	50.00	6.68	0.0002
1017 Browning Drive Rain Barrel 1	Rain Barrel	50.00	6.68	0.0002
1017 Browning Drive Rain Barrel 2	Rain Barrel	50.00	6.68	0.0002
5202 Clear Run Drive Rain Garden	Rain Garden	441.35	59.00	0.0014
100 Hooker Road Rain Barrel	Rain Garden	50.00	6.68	0.0002
TOTAL BRADLEY CREEK WATERSHED VOLUME REDUCTION:		**46,502.84**	**6,216.52**	**0.14271**
TOTAL NUMBER OF PROJECTS BRADLEY CREEK WATERSHED				**16.00**
Drains To ICW2 Volume Reduction Data				

TOTAL DRAINS TO ICW2 VOLUME REDUCTION:		-	-	-
TOTAL NUMBER OF PROJECTS DRAINS TO ICW2				-
Hewletts Creek Watershed Volume Reduction Data				
6502 Teaticket Lane Rain Barrel	Rain Barrel	80.00	10.69	0.0002
3220 Blue Jay Court Rain Barrel 1	Rain Barrel	80.00	10.69	0.0002
3220 Blue Jay Court Rain Barrel 2	Rain Barrel	80.00	10.69	0.0002
3220 Blue Jay Court Rain Barrel 3	Rain Barrel	80.00	10.69	0.0002
6628 Pleasant Pine Court Rain Barrel	Rain Barrel	80.00	10.69	0.0002
3812 Sweetbriar Road Rain Barrel	Rain Barrel	80.00	10.69	0.0002
418 N Colony Circle Rain Barrel	Rain Barrel	80.00	10.69	0.0002
438 Semmes Drive Bald Cypress	Tree	2.17	0.29	0.0000
438 Semmes Drive River Birch	Tree	3.14	0.42	0.0000
3124 Kirby Smith Drive Rain Barrel 3	Rain Barrel	80.00	10.69	0.0002
3124 Kirby Smith Drive Serviceberry Trees	Tree	1.57	0.21	0.0000
348 Brenda Drive Rain Garden	Rain Garden	471.27	63.00	0.0014
598 Clearbrook Drive Long Leaf Pine	Tree	5.61	0.75	0.0000
Lynwood Bioretention Bald Cypress	Tree	15.71	2.10	0.0000
3854 Edgewood Road Rain Barrel 1	Rain Barrel	80.00	10.69	0.0002
3854 Edgewood Road Rain Barrel 2	Rain Barrel	80.00	10.69	0.0002
430 Kingston Road Rain Barrel	Rain Barrel	60.00	8.02	0.0002
3616 Amber Drive Rain Barrel	Rain Barrel	60.00	8.02	0.0002
325 E Blackbeard Rd Rain Garden	Rain Garden	403.95	54.00	0.0012
310 N Colony Circle Rain Barrel	Rain Barrel	60.00	8.02	0.0002
7726 Masonboro Sound Road Rain Garden	Rain Garden	396.47	53.00	0.0012
418 Clearbrook Drive Backyard Wetland	Wetland	179.53	24.00	0.0006

3713 Needle Sound Way Rain Garden	Rain Garden	261.82	35.00	0.0008
325 East Blackbeard Road Rain Garden	Rain Garden	403.95	54.00	0.0012
3420 Sparrow Hawk Court Rain Garden	Rain Garden	261.82	35.00	0.0008
1807 S. Churchill Drive Rain Barrel	Rain Barrel	50.00	6.68	0.0002
125 White Oak Drive Rain Barrel	Rain Barrel	50.00	6.68	0.0002
305 Englewood Drive Rain Barrel 1	Rain Barrel	50.00	6.68	0.0002
305 Englewood Drive Rain Barrel 2	Rain Barrel	50.00	6.68	0.0002
3500 Whispering Pines Court Rain Barrel	Rain Barrel	50.00	6.68	0.0002
5309 Autumn Drive Rain Barrel	Rain Barrel	50.00	6.68	0.0002
1743 41st Street Rain Barrel	Rain Barrel	50.00	6.68	0.0002
TOTAL HEWLETTS CREEK WATERSHED VOLUME REDUCTION:		**3,436.97**	**459.46**	**0.01055**
TOTAL NUMBER OF PROJECTS HEWLETTS CREEK WATERSHED				**32.00**
Drains To ICW3 Volume Reduction Data				
TOTAL DRAINS TO ICW3 VOLUME REDUCTION:		-	-	-
TOTAL NUMBER OF PROJECTS DRAINS TO ICW3				-
TOTAL COMBINED VOLUME REDUCTION (All Watersheds):				
TOTAL COMBINED VOLUME REDUCTION (All Watersheds):		**49,939.81**	**6,675.98**	**0.15**
TOTAL NUMBER OF PROJECTS (All Watersheds)				

Volume Reduction Goals	Goal (ac.ft)	Gallons	Actual (ac.ft.)	% Achieved	# of Projects
Bradley Creek FY22	**0.15**	**46,502.84**	**0.1427**	**95.14**	**16**
Hewletts Creek FY22	**1.00**	**3,436.97**	**0.0105**	**1.05**	**32**

FY 21-22

NEW HANOVER SOIL & WATER CONSERVATION DISTRICT
230 Market Place Drive, Suite 100
Wilmington, NC 28403

HOWBMP Quarterly Progress Report #4: April 1 – June 30, 2022

Heal Our Waterways- Best Management Practice Installations (HOWBMP) Program

NHSWCD mission is to protect and enhance water quality throughout New Hanover County through land conservation, stormwater management, technical support to citizens and organizations, and conservation education and outreach activities.

To achieve this mission, NHSWCD has contractual relationships with city, county, and state organizations. These partnerships enable NHSWCD to deliver enhanced water quality projects and programs, as well as professional technical assistance to citizens and businesses.

SCOPE OF SERVICES:

New Hanover Soil & Water Conservation District will serve as the program/project manager to implement the Heal Our Waterways- Best Management Practice Installations Program (HOWBMP). The HOWBMP Program supports the City council-adopted Bradley & Hewletts Creek Watershed Restoration Plan, with the goal of reducing the volume of polluted stormwater runoff entering the creeks, to improve water quality.

NHSWCD will provide program and project management, implementation, reporting, and evaluation for the installation of BMPs within the designated watersheds in conjunction with the City's Heal Our Waterways Program. This includes the execution of a BMP project from start to finish following Standard Operating Procedure (SOP) guidelines and includes activities such as, but not limited to, program promotion and outreach, cultivating and identifying BMP project opportunities, collaboration, coordination, and timely communication with property owners and contractors, property owner and HOA research and verification, technical assistance, design/engineering, permitting, contracting, construction, media relations, budgeting, selection and reimbursement of contractors, monitoring of completed projects, and reporting. NHSWCD will utilize contractors with the proper credentials and qualifications for the work performed.

BMPs will be identified for the purpose of reducing runoff volume and pollution into Bradley Creek, Hewletts Creek, and the associated areas that "drain directly" into the Intracoastal Waterway. A potential BMP project's pre-approval documentation should be provided to the City in written/email form and include the required BMP, Property Ownership, Contractor, and Ranking Sheet documentation, as listed in the SOP. NHSWCD will receive a written/email response from the City to approve or deny the project, with justification. City approval must be acquired before installation, construction, or other contracted work. Acceptable BMPs for the

program are listed on the GIS Atlas Sheet. Projects that NHSWCD evaluate and deem to be unworthy of funding and installation will still require the proper documentation and justification to the City, which will be included in the City's GIS Atlas.

A recommended minimum of 5-8 volume-reduction BMPs resulting in a total of approximately 700-1000 cubic feet of volume reduction should be installed during each annual contract period. However, collaboration and written approval from the City would allow flexibility for unexpected project opportunities to deviate from the recommended minimum. BMP projects should be evaluated and prioritized based on several variables including volume reduction, benefit, cost, and proximity to impaired waterbodies, etc.

During site evaluations, NHSWCD will utilize the required checklists to evaluate the site and potential BMP(s), as well as communicate program specifics to the property owner. For instance, NHSWCD will educate property owners about the Heal Our Waterways Program background, the HOWBMP Program, the specific BMP being evaluated, maintenance expectations and annual spot checks for the potential BMP, and will distribute pertinent info to the homeowner (maintenance guide, BMP info sheet, HOW Brochure, business cards, etc.)

Once BMPs are installed to satisfaction, NHSWCD will provide the property owner with more specific BMP maintenance information on-site, obtain a signed Maintenance Agreement from the property owner, distribute Creek Friendly yard signage and other pertinent information and program items.

Monitoring, or spot-checks, of completed BMP installations will be performed annually by NHSWCD for compliance. Monitoring will be required for five years for residential sites, and ten years for commercial or municipal/other BMP sites. NHSWCD will maintain a Spot Check Tracking Summary excel database for all installations and submit it at the end of each annual contract period. Refer to the SOP for the specific data to be included in this database.

The BMP installations will be funded by the City with a lump-sum allocation at the beginning of the annual contract period. Any unused funds from this allocation will be reimbursed to the City by July 30th. NHSWCD will issue any necessary tax forms to contractors or property owners.

CONTRACT REPORTING:

BMP Project Packets:

Please refer to the Standard Operating Procedures (SOP) for a list of the documentation requirements for BMP projects.

Reporting Due Dates & Payments:

Cumulative quarterly reports and invoices will be submitted in accordance with the following quarters:

- July 1 - Sept 30 (1st Quarter)
- October 1 - Dec. 31 (2nd Quarter)
- January 1 -March 31 (3rd Quarter)
- April 1 - June 30 (4th Quarter)

The 4th quarter report and invoice(s) will serve as a compiled year-end summary and will be included in the City's NPDES stormwater permit reporting and audit records. As the State NPDES Program requirements evolve, so may the requested reporting requirements from the City.

Quarterly reports and invoices are due <u>within 12 calendar days</u> of the quarter end date and will follow templates and instructions set forth by City Stormwater Services. However, 4th quarter reports, invoices, and USB flash drive compilation will be due earlier than July 12th because of the fiscal year-end payment cutoff deadline; the City will notify the agency of the due date during the 4th quarter.

If the reporting due date falls on a weekend or a city-observed holiday, reports are due the following weekday by 5pm. Any reports received late, including Quarterly Reports, Quarterly Invoices, other contract reporting, year-end USB flash drive compilation of records/reports, etc. will result in an automatic overall reduction of the quarterly invoice payment amount according to the following schedule:

- **1-10 calendar days late - 10% reduction of the quarterly payment amount**
- **11+ calendar days late - 20% reduction of the quarterly payment amount**

Reports and invoices will be paid once the quarterly progress report and invoice(s) are received and reviewed by the City for adequate progress. Reports and invoices that do not follow templates/instructions will be returned for correction; payment will be processed once updated reports and invoices are received, reviewed, and approved. Non-performance or inadequate progress may result in non-payment or reduction of payment. No pre-payment of services will occur.

<u>Quarterly Reports:</u>

Quarterly reports should use the supplied template and include a summary of any contract-related work performed within the quarter, and should list out the site visits and potential or installed BMP projects that were conducted in the quarter in a bulleted list.
Additionally, NHSWCD will submit all materials for any BMP projects that were completed within the quarter as one PDF file with the title format: ***<u>LastName_SiteAddress.</u>***
If there was no activity in the quarter, a quarterly report should still be dated, indicate there was no activity in the quarter, and submitted.

<u>Quarterly Invoices:</u>

There are two invoices that should be submitted each quarter.

The cumulative Quarterly Fee Invoice should use the supplied template which shows the % of service completed each quarter, invoice amount, and amount remaining to be paid. If there was no activity conducted in the quarter, a Quarterly Fee Invoice should still be dated, updated to indicated there was no activity in the quarter, and submitted.

The cumulative Lump Sum Invoice should show the itemized receipts for any installed BMPs in the quarter. If there was no activity in the quarter, the Lump Sum Invoice should still be dated, updated to indicate there was no activity in the quarter, and submitted. Also, the 4th Quarter Lump Sum Invoice should show the final balance and if there are any unspent funds. If the balance is less than the full lump sum amount provided, NHSWCD will disperse a reimbursement check to the City of Wilmington **by July 30th.**

Public Records Retention & USB Flash Drive

NHSWCD will maintain all records and reports related to this contract on a fiscal year (FY) basis (July 1-June 30). These records should be retained for a period of at least 5 years. These files are public record and should be accessible at the contracted agency location and available for inspection and NPDES program audits.

In addition, an annual compilation of all contract/project documents, records, reports, invoices, pertinent educational materials or other contract-related materials, will be provided to the City of Wilmington Stormwater Services on a USB Flash Drive, CD, or DVD using the guidelines provided in the SOP for the entire contract year (July 1 – June 30). ***The City will notify the agency of the due date during the 4th quarter.***

FEE SCHEDULE:

Lump Sum: NHSWCD shall receive a lump sum of **$30,000** annually according to contract terms to specifically fund Best Management Practice (BMP) installations in the Hewletts and Bradley Creek Watersheds and drains directly to ICW areas. Copies of invoices for these BMP installations will be provided to the City with the quarterly reports/invoices and as part of the BMP packet for each project. Any unused funds from this allocation will be reimbursed to the City **by July 30th.**

Program Admin Fee: NHSWCD shall provide quarterly reports, invoices, BMP project packets, and other associated materials according to the schedule defined in Contract Reporting for the total fee amount of **$11,318** to execute the HOWBMP program.

Total Cost: The total cost of the Project shall not exceed **$41,318** without written approval of the City. Such approval shall be in the form of a written amendment to this Agreement approved by the City Manager or City Council, if required, and signed by the parties.

Contact person: Stormwater Services requires one main point of contact for the management, implementation, communication and reporting of this annual contract. This staff person will be the individual that implements the majority of contract services, and therefore will be the most familiar with the contract. The designated contact person is: **Dru Harrison.**

July 1 – Sept 30, 2021

Site Visits at the following Locations:

- 3608 Pine Bark Ct. – Suggested a rain garden
- 325 E Blackbeard Rd – Suggested a rain garden
- 1716 Softwind Way – Suggested a rain garden
- 3420 Sparrow Hawk Ct – Suggested a rain garden and a cistern
- 3713 Needle Sound Way – suggested rain garden or constructed wetland depending on perc test

- 5091 Edinboro Ln – suggested a pervious pavement project to capture stormwater running off of driveway

No BMPs were installed this quarter.

Additionally, the NHC Soil & Water Conservation Specialist, Haley Moccia, was interviewed, along with the City of Wilmington Interim Watershed Coordinator, Anna Reh-Gingerich, on a local podcast known as Water Loop. Both spoke about the Heal Our Waterways program and shared how the HOWBMP program helps improve the water quality in Bradly and Hewlett's Creeks. It was also shared how residents can participate in this program and where they can go to apply to participate in the program. The podcast has not been released yet, so Haley will share the link in a future report to the interview when it is published. It is understood that this outreach information is being counted in this quarter and the future update in a different quarterly report will not count toward the completion percentage of the contract.

Oct 1 – Dec 31, 2021

Staff left District in November to pursue another job. Month of October was spent summarizing work and leaving instructions as to how to proceed with approved and waiting list projects. Position should be filled by mid-February.

Rain garden was approved for Radcliffe 1716 Softwind Way for $3,290.74. A project was submitted for Pattison 112 King Arthur Dr for pervious pavement. A cross section of pavement is required for approval.

No BMPs were installed this quarter.

Jan 1 – March 31, 2022

New Conservation Specialist hired to fill position. Job was started on March 8, 2022.

Site Visits at the following Locations:

- 3241 Red Berry Dr. – Suggested pervious pavement and tree planting

No BMPs were installed this quarter.

Additionally, Bill Aldridge with Rainstorm Solutions was contacted to move ahead on installing the approved rain garden for Radcliffe 1716 Softwind Way for $3,290.74. Bill still needs to send an updated price estimate for materials for the pervious pavement project for Pattison 112 King Arthur Dr, as well as a cross section of the pavement for approval.

April 1 – June 30, 2022

No Site Visits were conducted this quarter.

Annual compliance checks were performed on 26 previously installed BMPs on 6/16/2022 and on 6/17/2022. After the first round of compliance checks, four rain gardens were deemed to be out of

compliance and emails were sent to participants outlining the remedial changes each participant needed to perform to bring their BMP back into compliance. We are performing second spot checks for the four out of compliance rain gardens on 8/17/2022.

Final project approvals and installations for the HOWBMP program were performed this quarter. The following projects were approved, installed, and paid:

ADDRESS	BMP TYPE	Volume Reduction (cuft)	AMOUNT
1716 Softwind Way	Rain Garden	63	$3,290.74
325 E Blackbeard Rd	Rain Garden	54	$3,085.33
5202 Clear Run Dr	Rain Garden	61.95	$3,226.53
3420 Sparrow Hawk Ct	Rain Garden	35	$3,115.35
7226 Masonboro Sound Rd	Rain Garden	53	$3,167.83
418 Clearbrook Dr	Constructed Wetland	24	$2,997.86
3713 Needle Sound Way	Rain Garden	35	$2,846.06
Total:		**325.95**	**$21,729.70**

The City of Wilmington will receive a $8,270.30 refund in unspent funds.

Follow up checks were performed on all 6 rain gardens and the 1 constructed wetland, and all passed the installation requirements and functioned properly.

Additionally, S&WCD staff participated in the Wilmington Earth Day Festival at Long Leaf Park on 4/23/2022. S&WCD had a vendor booth at the festival where the HOWBMP program was taught and advertised to those that were interested.

Report Compiled By: Dru Harrison & Bryan Dadson **Date:** 6/30/2022

APPENDIX I: REGULATORY ENFORCEMENT ACTIONS

In 21-22 the Public Services Department Compliance Officer provided stormwater education and investigated approximately 53 requests. The majority were reports of illicit discharges to the storm drainage system followed by reports of violation of the Pet Waste section of the Stormwater Ordinance. The following table is a detail summary of the requests for compliance intervention for stormwater pollution issues.

ENFORCEMENT ACTIONS 2021-2022

	Reporting period (FY13)	July 1 2021 - June 30 2022				
ID	**Nature of Complaint**	**Number of Reports**	**Resolved thru Public Education**	**NOVs Incidents**	**Referred to DWQ**	**# Civil Penalties**
1	Pet Waste	4	100.0%	0	N/A	0
2	Outreach	1	N/A	N/A	N/A	N/A
3	Illicit Discharge/Sediment	47	100.0%	9	1	0
3a	Illicit Connection	0	N/A	0	0	0
3b	Dry Weather Flow	0	N/A	0	0	0
3c	SSO	1	100.0%	2	2	0
	Totals	53		9	1	0

DEFINITIONS: Nature of Complaint

Illicit Discharge/Sediment (Part 1, Sec. 12-22)

Complaints include reports of illicit discharges as defined by the ordinance. Reports include allowable as well as illegal discharges which is determined after the investigation is completed. Assessment when completed prescribes corrective action and can sometimes elevate to enforcement. All resolution of an incident typically includes education provided to the responsible party regarding stormwater pollution and awareness of the city ordinance as well as the potential fines for non-compliance and repeat offenders. Written NOVs are issued for serious offences.

Illicit Connection (Part 1, Sec. 12-23)

Reports are the result of an illicit connection that impacted the City's stormwater system with an illegal discharge. Assessment when completed prescribes corrective action and can sometimes elevate to enforcement. All resolution of an incident typically includes education provided to the responsible party regarding stormwater pollution and awareness of the city ordinance as well as the potential fines for non-compliance and repeat offenders. Written NOVs are issued for serious offences.

SSO (Part 1, Sec.12-24)

Sewer overflows from the CFPUA system, both reportable and not reportable. Process is described in Illicit Discharge Section. Resolution of the incident also includes reviewing the DWQ SSO reporting form for cause and ensuring distribution of educational material pertaining to

preventing grease related spills to residents near and contributing to the incident.

Pet Waste (Part 2, Sec. 12-28)

The pet waste complaint category included any report of violation of the City's Pet Waste Ordinance. These complaints which are reported by citizens or city employees, due to their nature, may not be substantiated after the investigation. Resolution of an incident includes distributing educational material to all parties involved on the adverse health effects of pet waste pollution, and prevention, as well as the City's ordinance requirements and the potential fines for violations.

Blockages (Part 2, Sec. 12-29)

Blockage reports include any complaint reported which were thought to have the potential to impede the flow of stormwater in the City's maintained drainage system. Resolution of the incident includes education to citizens involved directly or within the immediate area of the incident explaining how to prevent willful blockages of the stormwater system.

Yard Waste (Part 2, Sec. 12-29)

Yard waste complaints include calls the City received reporting violations of the City's stormwater ordinance which prohibits the intentional raking, sweeping, blowing, washing, directing or placing of yard waste into any part of the public drainage system which might impede the flow of water through the system or compromise water quality. Resolution of an incident includes removal of debris and distribution of educational material and/or explanation of the ordinance with the possible fines.

APPENDIX J: MAJOR OUTFALL LOCATIONS AND DESCRIPTION TABLE

Watershed	Latitude	Longitude	Size	Material	Number	Classification	Map Date	Condition
Barnards Creek	34.15865	-77.91188	6.0 X 8.0	RCP	Double	NPDES outfall found	2/20/2012	Good
Barnards Creek	34.16482	-77.92585	60	RCP	Double	NPDES outfall found	2/20/2012	Good
Barnards Creek	34.16657	-77.92957	60	RCP	Triple	NPDES Industrial outfall found	11/21/2011	Good
Barnards Creek	34.16113	-77.93105	42	RCP	Single	NPDES outfall found	11/2/2011	Good
Barnards Creek	34.16134	-77.93815	18	RCP	Quad	NPDES Industrial outfall found	11/14/2011	Good
Bradley Creek	34.20898	-77.83556	3.0 X 5.0	RCP	Single	NPDES outfall found	1/6/2012	Good
Bradley Creek	34.21320	-77.82715	2.0 X 4.0	RCP	Single	NPDES outfall found	8/29/2000	Good
Bradley Creek	34.21952	-77.84568	90	CAP	Double	NPDES outfall found	1/13/2012	Good
Bradley Creek	34.21911	-77.85177	72	CMP	Double	NPDES outfall found	1/13/2012	Good
Bradley Creek	34.20939	-77.83654	54	RCP	Single	NPDES outfall found	1/6/2012	Good
Bradley Creek	34.23066	-77.85234	54	CMP	Double	NPDES outfall found	1/13/2012	Good
Bradley Creek	34.23284	-77.84028	54	CMP	Double	NPDES outfall found	1/13/2012	Good
Bradley Creek	34.21585	-77.82498	48	CMP	Single	NPDES outfall found	1/31/2012	Good
Bradley Creek	34.21997	-77.86130	42	CMP	Single	NPDES outfall found	1/13/2012	Good
Bradley Creek	34.22630	-77.85231	42	CMP	Single	NPDES outfall found	1/13/2012	Good
Bradley Creek	34.20829	-77.83101	36	RCP	Single	NPDES outfall found	1/6/2012	Fair
Bradley Creek	34.20899	-77.83554	36	CMP	Single	NPDES outfall found	1/6/2012	Poor
Bradley Creek	34.20900	-77.83553	36	CMP	Single	NPDES outfall found	1/6/2012	Fair
Bradley Creek	34.21669	-77.83399	30	CMP	Single	NPDES outfall found	1/31/2012	Fair
Bradley Creek	34.21427	-77.83470	24	RCP	Single	NPDES outfall found	1/13/2012	Good
Bradley Creek	34.21440	-77.83926	24	RCP	Double	NPDES outfall found	1/13/2012	Good
Bradley Creek	34.22066	-77.83784	24	RCP	Single	NPDES outfall found	1/31/2012	Good
Burnt Mill Creek	34.22878	-77.90517	11.0 X 12.0	RCP	Double	NPDES outfall found	2/28/2012	Good
Burnt Mill Creek	34.22870	-77.88923	5.0 X 6.0	CMP	Double	NPDES outfall found	2/28/2012	Good
Burnt Mill Creek	34.24617	-77.93366	72	SMP	Single	NPDES outfall found	2/28/2012	Fair

Burnt Mill Creek	34.23148	-77.91302	66	RCP	Single	NPDES outfall found	11/24/2010	Good
Burnt Mill Creek	34.24430	-77.92571	60	RCP	Single	NPDES outfall found	9/29/2010	Good
Burnt Mill Creek	34.23402	-77.91972	54	RCP	Single	NPDES outfall found	10/26/2010	Good
Burnt Mill Creek	34.23232	-77.91568	42	RCP	Double	NPDES outfall found	11/9/2010	Good
Burnt Mill Creek	34.23397	-77.91877	42	RCP	Single	NPDES outfall found	11/24/2010	Good
Burnt Mill Creek	34.23989	-77.92258	36	RCP	Single	NPDES outfall found	10/5/2010	Good
Burnt Mill Creek	34.24025	-77.92318	36	RCP	Single	NPDES outfall found	10/5/2010	Good
Burnt Mill Creek	34.25344	-77.92354	30	RCP	Double	NPDES outfall found	3/2/2012	Good
Drains directly to ICW	34.19570	-77.83301	48	RCP	Single	NPDES outfall found	1/6/2012	Good
Drains directly to ICW	34.19629	-77.82915	48	RCP	Single	NPDES outfall found	1/6/2012	Good
Drains directly to ICW	34.22229	-77.81978	48	IRON	Single	NPDES outfall found	1/17/2012	Good
Drains directly to ICW	34.22234	-77.81985	48	IRON	Single	NPDES outfall found	1/17/2012	Good
Drains directly to ICW	34.19503	-77.83000	36	RCP	Single	NPDES outfall found	11/22/2011	Good
Drains directly to ICW	34.19904	-77.82758	36	RCP	Single	NPDES outfall found	1/6/2012	Good
Drains directly to ICW	34.22121	-77.81566	36	RCP	Single	NPDES outfall found	1/17/2012	Good
Drains directly to ICW	34.22432	-77.81658	30	CMP	Single	NPDES outfall found	1/17/2012	Good
Drains directly to ICW	34.22433	-77.81659	30	CMP	Single	NPDES outfall found	1/17/2012	Good
Drains directly to ICW	34.22432	-77.81658	24	CMP	Single	NPDES outfall found	1/17/2012	Good
Drains directly to ICW	34.16461	-77.85628	2.5 X 5.0	CMP	Single	NPDES outfall found	7/19/2011	Fair
Greenfield Lake	34.19852	-77.93558	4.0 X 6.0	CMP	Triple	NPDES outfall found	2/22/2012	Good
Greenfield Lake	34.20094	-77.93381	60	RCP	Double	NPDES outfall found	2/22/2012	Good
Greenfield Lake	34.21255	-77.93161	60	CMP	Quad		2/22/2012	Good

Greenfield Lake	34.21429	-77.93563	48	RCP	Single	NPDES outfall found	2/23/2012	Good
Greenfield Lake	34.20127	-77.93568	42	RCP	Double	NPDES outfall found	2/22/2012	Good
Greenfield Lake	34.19964	-77.93615	36	RCP	Single	NPDES outfall found	2/22/2012	Good
Greenfield Lake	34.20462	-77.93537	36	RCP	Single	NPDES outfall found	2/22/2012	Good
Greenfield Lake	34.20751	-77.92997	30	RCP	Triple	NPDES outfall found	2/22/2012	Good
Hewletts Creek	34.18153	-77.86851	5.0 X 16.0	OTHER	Other	NPDES outfall found	11/17/2011	Good
Hewletts Creek	34.18020	-77.87198	90	CMP	Single	NPDES outfall found	11/3/2011	Good
Hewletts Creek	34.19421	-77.85211	60	CMP	Single	NPDES outfall found	11/21/2011	Fair
Hewletts Creek	34.17296	-77.85090	48	RCP	Double	NPDES outfall found	7/28/2011	Good
Hewletts Creek	34.18735	-77.85761	48	RCP	Single	NPDES outfall found	11/3/2011	Good
Hewletts Creek	34.19359	-77.85549	48	RCP	Triple	NPDES outfall found	11/18/2011	Good
Hewletts Creek	34.17112	-77.85107	42	RCP	Single	NPDES outfall found	7/19/2011	Good
Hewletts Creek	34.17879	-77.86842	42	RCP	Single	NPDES outfall found	2/16/2001	Good
Hewletts Creek	34.19498	-77.85447	42	RCP	Double	NPDES outfall found	11/18/2011	Good
Hewletts Creek	34.19680	-77.84352	42	CMP	Single	NPDES outfall found	11/22/2011	Fair
Hewletts Creek	34.20042	-77.86258	42	CMP	Single	NPDES outfall found	11/8/2011	Fair
Hewletts Creek	34.18468	-77.85373	36	RCP	Single	NPDES outfall found	2/26/2001	Good
Hewletts Creek	34.17878	-77.86844	30	RCP	Single	NPDES outfall found	11/7/2011	Good
Hewletts Creek	34.19419	-77.85209	18	RCP	Single	NPDES outfall found	2/6/2001	Good
Hewletts Creek	34.19430	-77.88617	2.0 X 4.4	RCP	Single	NPDES outfall found	2/24/2011	Good
Hewletts Creek	34.19471	-77.88822	6.0 X 8.0	RCP	Triple	NPDES outfall found	2/2/2011	Good
Hewletts Creek	34.19793	-77.88484	7.7 X 15.0	CAP	Single	NPDES outfall found	2/24/2011	Good
Howe Creek	34.24536	-77.82717	7.0 X 9.0	RCP	Double	NPDES outfall found	5/16/2007	Good
Howe Creek	34.25450	-77.82624	72	RCP	Single	NPDES outfall found	2/1/2012	Good
Howe Creek	34.24701	-77.82334	66	CMP	Single	NPDES outfall found	2/1/2012	Good
Howe Creek	34.24211	-77.82454	60	RCP	Single	NPDES outfall found	1/31/2012	Good
Howe Creek	34.24226	-77.82714	48	RCP	Single	NPDES outfall found	1/31/2012	Good

Howe Creek	34.24700	-77.82333	48	CMP	Single	NPDES outfall found	2/1/2012	Good
Howe Creek	34.26158	-77.82611	48	RCP	Single	NPDES outfall found	2/1/2012	Good
Howe Creek	34.24225	-77.82718	42	RCP	Single	NPDES outfall found	1/31/2012	Good
Howe Creek	34.25029	-77.82655	42	RCP	Single	NPDES outfall found	2/1/2012	Good
Howe Creek	34.25030	-77.82655	42	RCP	Single	NPDES outfall found	2/1/2012	Good
Howe Creek	34.24083	-77.82759	36	RCP	Single	NPDES outfall found	5/16/2007	Good
Howe Creek	34.24304	-77.82263	36	RCP	Double	NPDES outfall found	2/1/2012	Good
Howe Creek	34.24519	-77.82714	36	RCP	Single	NPDES outfall found	2/1/2012	Good
Howe Creek	34.24551	-77.82710	36	RCP	Single	NPDES outfall found	2/1/2012	Good
Howe Creek	34.24749	-77.82369	36	CMP	Single	NPDES outfall found	2/1/2012	Good
Cape Fear River	34.20807	-77.95086	10.0 X 10.0	RCP	Single	NPDES outfall found	3/15/2011	Good
Cape Fear River	34.21225	-77.94608	5.8 X 8.4	RCP	Triple	NPDES outfall found	3/25/2011	Good
Cape Fear River	34.19774	-77.95482	66	RCP	Single	NPDES Industrial outfall found	11/14/2011	Good
Cape Fear River	34.20913	-77.94735	48	RCP	Double	NPDES outfall found	4/1/2011	Good
Cape Fear River	34.18028	-77.95095	36	RCP	Single	NPDES Industrial outfall found	11/14/2011	Good
Cape Fear River	34.16995	-77.94822	30	RCP	Single	NPDES Industrial outfall found	11/29/2011	Good
Cape Fear River	34.21504	-77.94755	24	RCP	Single	NPDES Industrial outfall found	3/21/2011	Good
Cape Fear River	34.17135	-77.94984	18	RCP	Single	NPDES Industrial outfall found	2/21/2012	Good
Cape Fear River	34.17294	-77.94902	18	RCP	Single	NPDES Industrial outfall found	11/29/2011	Good
Cape Fear River	34.18391	-77.95205	18	RCP	Single	NPDES Industrial outfall found		Good
Cape Fear River	34.24197	-77.95273	3.0 X 10.0	RCP	Single	NPDES outfall found	6/10/2011	Good
Cape Fear River	34.21631	-77.94661	54	RCP	Single	NPDES Industrial outfall found	3/15/2011	Good
Cape Fear River	34.21646	-77.94663	54	RCP	Single	NPDES Industrial outfall found	4/11/2011	Good
Cape Fear River	34.22374	-77.95034	54	RCP	Single	NPDES outfall found	9/28/2009	Good
Cape Fear River	34.23969	-77.95146	48	RCP	Single	NPDES outfall found	5/27/2011	Inaccessible
Cape Fear River	34.24087	-77.95156	42	RCP	Single	NPDES outfall found	6/8/2011	Good
Cape Fear River	34.24089	-77.95155	42	RCP	Single	NPDES outfall found	6/8/2011	Good
Cape Fear River	34.24333	-77.95131	36	RCP	Single	NPDES outfall found	6/10/2011	Good

Cape Fear River	34.24991	-77.95037	36	RCP	Single	NPDES outfall found	6/14/2011	Good
Cape Fear River	34.25033	-77.94992	36	RCP	Single	NPDES outfall found	6/14/2011	Good
Cape Fear River	34.25729	-77.94434	36	RCP	Single	NPDES Industrial outfall found	6/10/2011	Good
Cape Fear River	34.24314	-77.95131	30	CPP	Single	NPDES outfall found	6/10/2011	Good
Cape Fear River	34.24977	-77.95055	30	RCP	Single	NPDES outfall found	6/14/2011	Good
Cape Fear River	34.25050	-77.94980	30	RCP	Single	NPDES outfall found	6/14/2011	Good
Cape Fear River	34.22764	-77.95054	24	CMP	Single	NPDES outfall found	5/16/2011	Good
Cape Fear River	34.22889	-77.94994	24	CMP	Single	NPDES outfall found	9/28/2009	Fair
Cape Fear River	34.24200	-77.95272	24	RCP	Single	NPDES outfall found	6/10/2011	Good
Cape Fear River	34.24319	-77.95121	24	CMP	Single	NPDES outfall found	6/10/2011	Fair
Cape Fear River	34.24964	-77.95067	24	RCP	Single	NPDES outfall found	6/14/2011	Good
Cape Fear River	34.25245	-77.94726	24	RCP	Single	NPDES Industrial outfall found	6/14/2011	Good
Cape Fear River	34.25728	-77.94432	24	RCP	Single	NPDES Industrial outfall found	6/10/2011	Good
Cape Fear River	34.24335	-77.95138	12	RCP	Single	NPDES outfall found	6/10/2011	Poor
Cape Fear River	34.25565	-77.94679	12	VCP	Single	NPDES Industrial outfall found	6/14/2011	Poor
Cape Fear River	34.23014	-77.94946	Inaccessible - submerged	RCP	Single	NPDES outfall	5/25/2011	Inaccessible
Smith Creek	34.25505	-77.87846	6.8 X 8.0	RCP	Single	NPDES outfall found	2/21/2012	Good
Smith Creek	34.25536	-77.87357	9.0 X 11.0	RCP	Double	NPDES Industrial outfall found	2/21/2012	Good
Smith Creek	34.25739	-77.94108	Not Found	UNKNOWN	Single	NPDES outfall submerged	2/28/2012	Unknown
Smith Creek	34.25711	-77.90656	7.0 X 8.0	RCP	Single	NPDES outfall found	2/21/2012	Good
Smith Creek	34.25756	-77.91249	6.0 X 7.0	RCP	Single	NPDES Industrial outfall found	2/21/2012	Good
Smith Creek	34.25718	-77.90675	72	RCP	Triple	NPDES outfall found	2/21/2012	Good
Smith Creek	34.25403	-77.89263	66	RCP	Single	NPDES outfall found	2/21/2012	Good
Smith Creek	34.25297	-77.93964	48	RCP	Single	NPDES outfall found	2/28/2012	Good
Smith Creek	34.25437	-77.90027	48	RCP	Single	NPDES outfall found	2/21/2012	Good
Smith Creek	34.25718	-77.88761	42	RCP	Single	NPDES outfall found	2/21/2012	Fair
Smith Creek	34.25761	-77.91556	42	RCP	Single	NPDES Industrial outfall found	2/21/2012	Good

Whiskey Creek	34.16376	-77.86289	72	CMP	Single	NPDES outfall found	3/27/2001	Good
Whiskey Creek	34.16654	-77.86775	42	RCP	Single	NPDES outfall found	7/18/2011	Good
Whiskey Creek	34.16362	-77.86228	36	RCP	Single	NPDES outfall found	3/27/2001	Good
Whiskey Creek	34.16670	-77.86858	36	RCP	Single	NPDES outfall found	7/18/2011	Good
Whiskey Creek	34.16671	-77.86860	36	RCP	Single	NPDES outfall found	7/18/2011	Good
Whiskey Creek	34.16779	-77.87648	5.5 X 7.0	CMP	Single	NPDES outfall found	7/18/2011	Good

APPENDIX K: DEFINITIONS

Act
See Clean Water Act.

Built-upon Area
That portion of a development project that is covered by impervious or partially impervious surface including, but not limited to, buildings; pavement and gravel areas such as roads, parking lots, and paths; and recreation facilities such as tennis courts. "Built-upon area" does not include a wooden slatted deck, the water area of a swimming pool, or pervious or partially pervious paving material to the extent that the paving material absorbs water or allows water to infiltrate through the paving material.

Clean Water Act
The Federal Water Pollution Control Act, also known as the Clean Water Act (CWA), as amended, 33 USC 1251, et. seq.

Common Plan of Development
A construction or land disturbing activity is part of a larger common plan of development if it is completed in one or more of the following ways:

- In separate stages
- In separate phases
- In combination with other construction activities

It is identified by the documentation (including but not limited to a sign, public notice or hearing, sales pitch, advertisement, loan application, drawing, plats, blueprints, marketing plans, contracts, permit application, zoning request, or computer design) or physical demarcation (including but not limited to boundary signs, lot stakes, or surveyor markings) indicating that construction activities may occur on a specific plot. It can include one operator or many operators.

Department
Department means the North Carolina Department of Environment and Natural Resources

Division (DWQ)
The Division of Water Quality, Department of Environment and Natural Resources.

Director
The Director of the Division of Water Quality, the permit issuing authority.

Dry Weather Flow
Any flow in the MS4 that occurs after a 72 hour period without rain.

EMC
The North Carolina Environmental Management Commission.

Illicit Discharge
Any discharge to a MS4 that is not composed entirely of stormwater except .discharges pursuant to an NPDES permit (other than the NPDES MS4 permit), allowable non-

stormwater discharges, and discharges resulting from fire-fighting activities.

Industrial Activity
For the purposes of this permit, industrial activities shall mean all industrial activities as defined in 40 CFR 122.26.

Large or Medium Municipal Separate Storm Sewer System
All municipal separate storm sewers that are either:

(a) Located in an incorporated place with a population of 100,000 or more as determined by the Decennial Census by the Bureau of Census; or
(b) Located in the counties with unincorporated urbanized populations of 100,000 or more, except municipal separate storm sewers that are located in the incorporated places, townships or towns within such counties; or
(c) Owned or operated by a municipality other than those described in paragraph (a) or (b) and that are designated by the Director as part of the large or medium separate storm sewer system.

Major municipal separate storm sewer outfall (or "major outfall")
Major municipal separate storm sewer outfall (or "major outfall") means a municipal separate storm sewer outfall that discharges from a single pipe with an inside diameter of 36 inches or more or its equivalent (discharge from a single conveyance other than circular pipe which is associated with a drainage area of more than 50 acres); or for municipal separate storm sewers that receive storm water from lands zoned for industrial activity (based on comprehensive zoning plans or the equivalent), an outfall that discharges from a single pipe with an inside diameter of 12 inches or more or from its equivalent (discharge from other than a circular pipe associated with a drainage area of 2 acres or more).

Municipal Separate Storm Sewer System (MS4)
Pursuant to 40 CFR 122.26(b)(8) means a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains):

(a) Owned or operated by the United States, a State, city, town, county, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under Section 208 of the Clean Water Act (CWA) that discharges to waters of the United States or waters of the State.
(b) Designed or used for collecting or conveying stormwater;
(c) Which is not a combined sewer; and
(d) Which is not part of a Publicly Owned Treatment Works (POTW) as defined in 40 CFR 122.2

Non-stormwater Discharge Categories
The following are categories of non-stormwater discharges that the permittee shall address if it identifies them as significant contributors of pollutants to the storm sewer system: water line flushing, landscape irrigation, diverted stream flows, rising groundwater, uncontaminated groundwater infiltration, [as defined in 40 CFR 35.2005(20)], uncontaminated pumped groundwater, discharges from potable water sources, foundation drains, air conditioning condensation, irrigation water, springs, water from crawl space pumps, footing drains, lawn watering, individual residential car washing, flows from riparian habitats and wetlands, dechlorinated swimming pool discharges, and street wash water (discharges or flows from fire fighting activities are excluded from the definition of illicit discharge and only need to be addressed where they are identified as significant sources of pollutants to waters of the United States).

Non-structural SCM
Non-structural SCMs are preventive actions that involve management and source controls such as: (I) Policies and ordinances that provide requirements and standards to direct growth to identified areas, protect sensitive areas such as wetlands and riparian areas, maintain and/or increase open space, provide buffers along sensitive water bodies, minimize impervious surfaces, and/or minimize disturbance of soils and vegetation; (2) policies or ordinances that encourage infill development in higher density urban areas, and areas with existing storm sewer infrastructure; (3) education programs for developers and the public about minimizing water quality impacts; (4) other measures such as minimizing the percentage of impervious area after development, use of measures to minimize directly connected impervious areas, and source control measures often thought of as good housekeeping, preventive maintenance and spill prevention.

Outfall
Outfall means a point source as defined by 40 CFR 122.2 at the point where a municipal separate storm sewer discharges to waters of the United States and does not include open conveyances connecting two municipal separate storm sewers, or pipes, tunnels or other conveyances which connect segments of the same stream or other waters of the United States and are used to convey waters of the United States.

Permittee
The owner or operator issued this permit.

Point Source Discharge of Stormwater
Any discernible, confined and discrete conveyance including, but not specifically limited to, any pipe, ditch, channel, tunnel, conduit, well, or discrete fissure from which stormwater is or may be discharged to waters of the state.

Redevelopment
Means any rebuilding activity unless that rebuilding activity;
(a) Results in no net increase in built-upon area, and
(b) Provides equal or greater stormwater control than the previous development.

Representative Storm Event

A storm event that measures greater than 0.1 inches of rainfall and that is preceded by at least 72 hours in which no storm event measuring greater than 0.1 inches has occurred. A single storm event may contain up to 10 consecutive hours of no precipitation. For example, if it rains for 2 hours without producing any collectable discharge, and then stops, a sample may be collected if a rain producing a discharge begins again within the next 10 hours.

Storm Sewer System
Is a conveyance or system of conveyances which are designed or used to collect or convey stormwater runoff that is not part of a combined sewer system or treatment works. This can include, but is not limited to, streets, catch basins, curbs, gutters, ditches, man-made channels or storm drains that convey stormwater runoff.

Stormwater Associated with Industrial Activity
The discharge from any point source which is used for collecting and conveying stormwater and which is directly related to manufacturing, processing or raw material storage areas at an industrial site. Facilities considered to be engaged in "industrial activities" include those activities defined in 40 CFR 122.26(b)(l4). The term does not include discharges from facilities or activities excluded from the NPDES program

Stormwater Control Measure (SCM)
Measures or practices used to reduce the amount of pollution entering surface waters. SCMs can be structural or non-structural and may take the form of a process, activity, physical structure or planning (see non-structural SCM).

Stormwater Management Program (SWMP)
The term Stormwater Management Program (SWMP) refers to the stormwater management program that is required by the Phase I and Phase II regulations to be developed by MS4 permittees.

Stormwater Plan
The Stormwater Plan is the written plan that is used to describe the various control measures and activities the permittee will undertake to implement the stormwater management program. The Stormwater Plan is a consolidation of all of the permittee's relevant ordinances or other regulatory requirements, the description of all programs and procedures (including standard forms to be used for reports and inspections) that will be implemented and enforced to comply with the permit and to document the selection, design, and installation of all stormwater control measures.

Stormwater Runoff
The flow of water which results from precipitation and which occurs immediately following rainfall or as a result of snowmelt.

Total Maximum Daily Load (TMDL)
A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources. A TMDL is a detailed water quality assessment that provides the

scientific foundation for an implementation plan. The implementation plan outlines the steps necessary to reduce pollutant loads in a certain body of water to restore and maintain water quality standards in all seasons. The Clean Water Act, Section 303, establishes the water quality standards and TMDL programs.

Watershed Restoration Plan

For purposes of this permit, a Watershed Restoration Plan is any plan developed in consultation with the Division for voluntary implementation with the intent of enhancing water quality and/or implementing stormwater BMPs within 303(d) listed waters.