# City of Wilmington, North Carolina

# ANNUAL NPDES PERMIT REPORT

**Prepared by:**
City of Wilmington, NC
Stormwater Services
PO Box 1810
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Wilmington, NC 28412

**NPDES Permit No.:** NCS000406

**Reporting Year:** July 1, 2020 – June 30, 2021

**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.

10/29/21

Fredric T. Royal, P.E., CFM

Date

Manager, Stormwater Services

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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, 2020 to June 30, 2021.

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 3 compliance with requirements of NPDES Phase II permit NCS000406. Primary areas of work include:

- Identified and inspected 18 City-owned sites for Pollution Prevention/ Good Housekeeping (PP/GH) review with our consultants Moffatt & Nichol.
- Continued mapping updates of stormwater infrastructure along with improvements to the GIS database design, such as SCM database improvements and previous annexation area inventory updates.
- Continuation of Public Outreach and Public Participation efforts.
- Conducted IDDE training for City Engineering and Code Enforcement Staff.
- Conducted Stormwater Control Measure (SCM) Operation and Maintenance (O&M) training and/or certification for our Stormwater Field Crews.
- The Heal Our Waterways Program continued its forward momentum this year with more installations, widespread social media campaigns, and greater awareness among City departments.

Wilmington continues to move forward with implementing the necessary goals and objectives as outlined in the permit. Considerable emphasis related to Illicit Discharge Detection and Elimination and Good Housekeeping/ Pollution Prevention has been made during the past year and with planning for site

visits conducted with Moffatt & Nichol consultants to make programmatic improvements to prepare the City for a future audit of our stormwater program by NC DEQ in the upcoming years. 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.

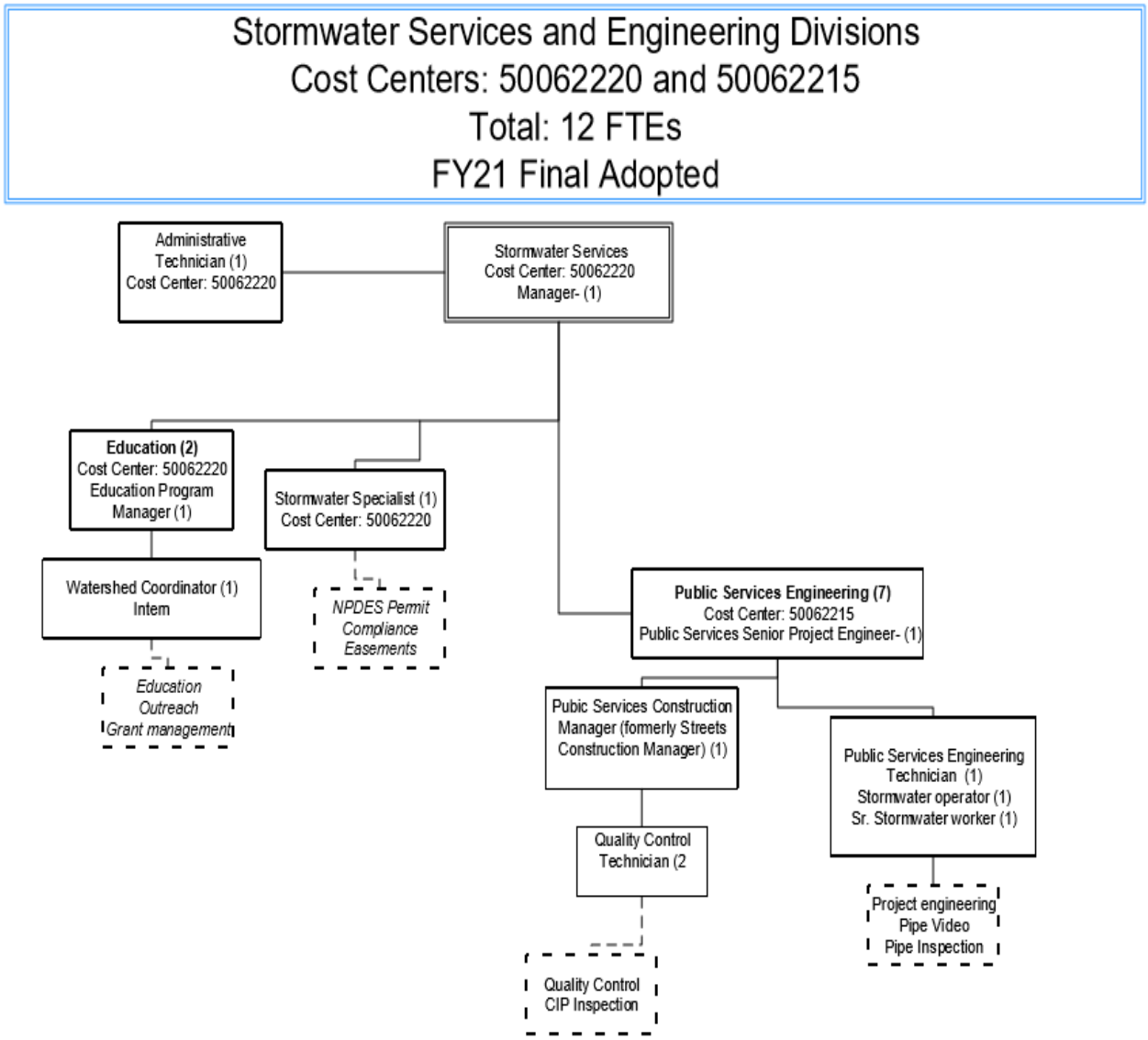
In addition, Stormwater Services implements an extensive Outreach, Education, and Public Involvement program that serves the citizens of Wilmington. The program includes a wide array of water quality education programming and materials. These programs include school presentations (using the watershed 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).

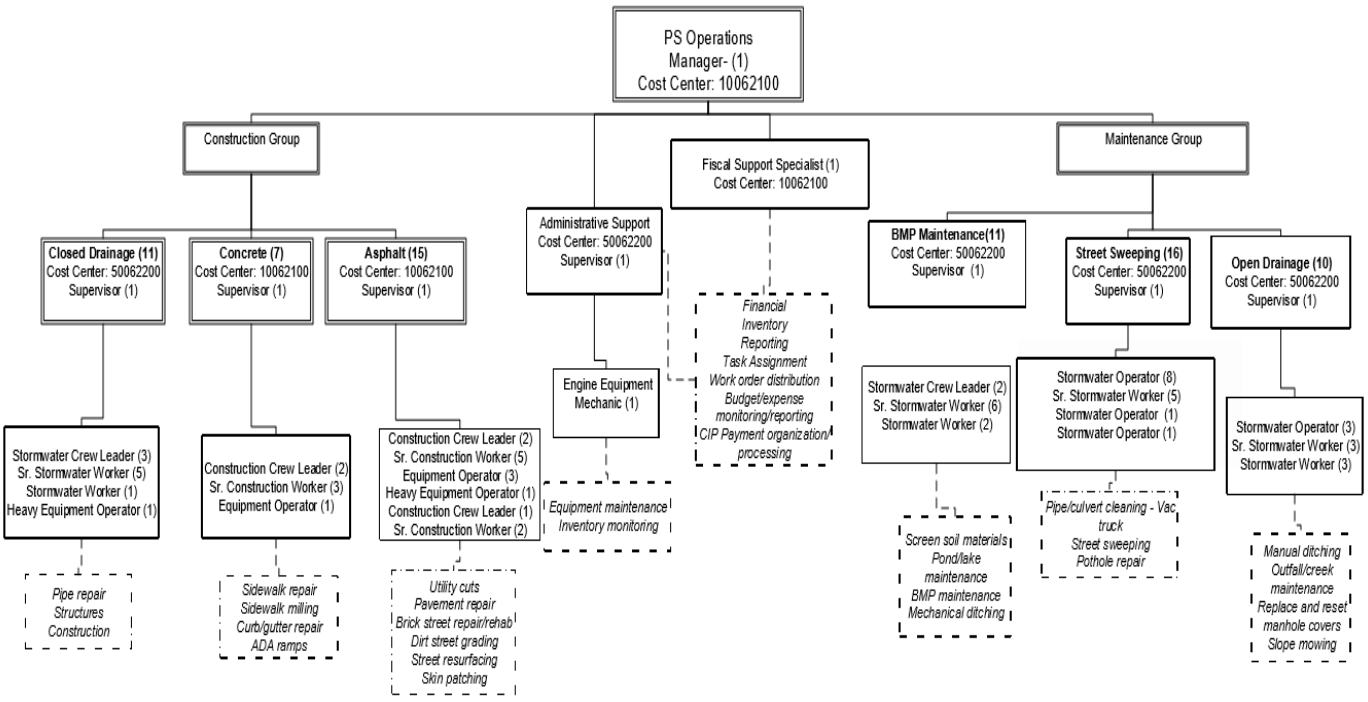
These efforts strive to improve water quality in the runoff entering waterbodies, educate and engage citizens in protecting and improving local water quality through awareness, education, behavior modification and action.

**Management and Planning**

***Organization Chart of the Stormwater Services Division***



# PS Operations Division
## Cost Centers: 50062200 and 10062100
## Total: 74 FTEs
## FY21 Final Adopted



*Estimated FY 20-21 Stormwater Management Fund Budget for NPDES*

| | FY20-21 Adopted | FY 21-22 Adopted | |
|---|---|---|---|
| REVENUES | | | |
| Storm Water Utility Fees | 9,825,988 | 9,660,407 | |
| City Streets Storm Water Fees | 2,939,139 | 3,042,744 | |
| Storm Water Discharge permits | 51,000 | 51,000 | |
| NCDOT Drainage Maintenance | 37,000 | 37,000 | |
| Interest Earnings | 56,795 | 20,000 | |
| Miscellaneous | - | - | |
| Appropriated Fund Balance | - | - | |
| TOTAL REVENUES | 12,909,922 | 12,852,468 | |
| EXPENDITURES | | | |
| Public Services | 6,064,197 | 6,564,992 | |
| Non-departmental | 1,621,495 | 1,498,901 | |
| Debt Service | 1,824,230 | 1,813,575 | |
| Contingency | - | - | |
| Transfer to Capital Project Fund | 3,400,000 | 2,975,000 | |
| TOTAL EXPENDITURES | 12,909,922 | 12,852,468 | [1] |

[1] The FY 2021 budget was adopted by the Wilmington City Council on June 15, 2021.

**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 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***

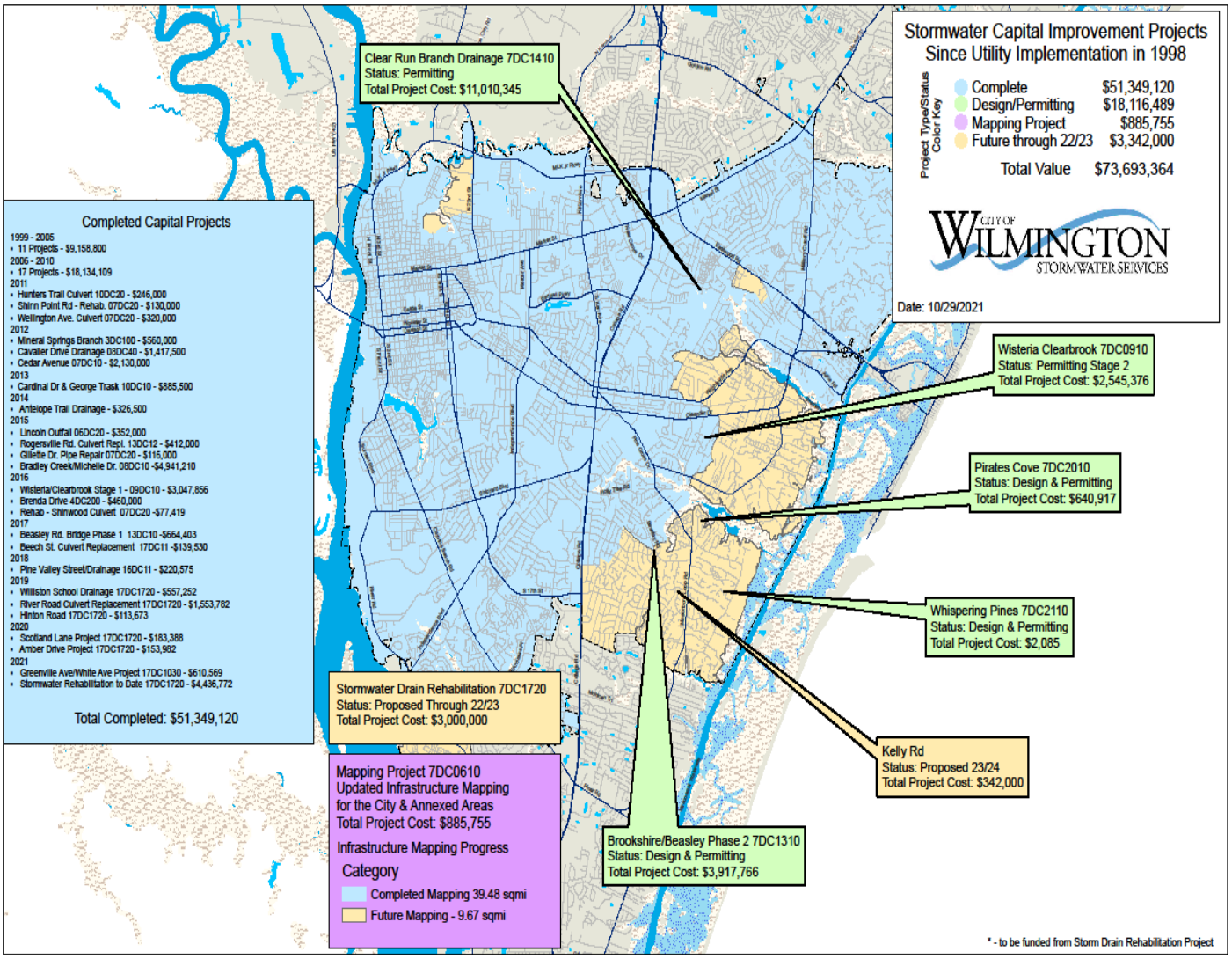
Reports of illicit discharges are addressed on a case by case basis. Informational posters and brochures for general use have been developed for distribution and others for specific common source types. These posters are distributed to specific types of businesses to display for employees in restaurants, 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*

| | | |
|---|---|---|
| 1. | **BL 300 Early Dr.**<br>Installed 20 casting, frame & grate complete | $ 3,666.60 |
| 2. | **116 Bryan Rd.**<br>Installed 64 ft. of 15" RC Pipe | $ 403.20 |
| 3. | **6209 Mallard St.**<br>1 Head wall | $ 452.00 |
| | **Total** | $ **4,521.80** |

## Operations and Maintenance

***Yearly Maintenance Activities Chart – Intelligov data (7/1/2020-2/14/2021), Munis Data (2/15/2021-6/30/2021)***

| **Intelligov** | | | | |
|---|---|---|---|---|
| | **Amount** | **Unit of Measure** | **Total Labor Hrs.** | **Total Cost** |
| **SECTION 1: CONSTRUCTION** | | | | |
| **C-1** Construction - Structure | 27.00 | each | 851.50 | $ 56,730.92 |
| **C-1** Construction - Pipe | 64.00 | ft. | 311.00 | $ 18,046.39 |
| **C-2** Construction - Flume | | each | - | $ - |
| C-0 Construction- Pipe replacement | 1.00 | ft. | 15.00 | $ 881.62 |
| **C-3** Construction - Ditch | | each | - | $ - |
| **C-3** Construction - BMP | - | each | - | $ - |
| **C-0** Construction - Stock pile material | 10.00 | load | 42.50 | $ 3,258.68 |
| **C-0** Construction - Plan work | | | 31.00 | $ 975.97 |
| | | | **1,251.00** | **$ 79,893.58** |
| **SECTION 2: INSPECTION** | | | | |
| **I-1** Inspection - Closed | | | 2,035.65 | $ 82,397.59 |
| **I-1** Inpection - Video | 27,123.00 | ft. | 951.00 | $ 33,034.14 |
| **I-1** Inspection-Video data management | | | - | $ - |
| **I-1** Inspection-new system | | | - | $ - |
| **I-1** Inspection-Survey | | | - | $ - |
| **I-2** Inspection-Open | | | 244.00 | $ 8,020.68 |
| **I-3** Inspection-BMP | 22.00 | each | 241.50 | $ 5,788.44 |
| **I-3** Inspection-Lake | 3.00 | each | 10.00 | $ 458.29 |
| **I-4** Inspection-Tide gate | | each | - | $ - |
| **I-0** Inspection-Miscellaneous | | | - | $ - |
| **I-0** Inspection-Plan work | | | 8.00 | $ 513.49 |
| | | | **3,490.15** | **$ 130,212.63** |
| **SECTION 3: MAINTENANCE** | | | | |
| **M-1** Maintenance-BMP | 236.00 | each | 2,228.00 | $ 101,789.86 |
| **M-1** Maintenance-Right of Way | | | 795.50 | $ 33,999.78 |
| **M-2** Maintenance-Ditching manual | 69,607.00 | ft. | 1,357.00 | $ 41,026.91 |
| **M-3** Maintenance-Ditching mechanical | 13,171.00 | ft. | 1,047.00 | $ 79,428.31 |
| **M-4** Maintenance-Culvert | 2.00 | each | 14.00 | $ 832.02 |
| **M-5** Maintenance-Pipe | 56,781.00 | ft. | 1,450.50 | $ 79,869.05 |
| **M-5** Maintenance-Structure | 5,327.00 | each | 2,021.00 | $ 95,993.16 |
| **M-5** Maintenance-Reset cover | 96.00 | each | 128.50 | $ 4,170.61 |
| **M-6** Maintenance-Lake | 24.00 | each | 173.00 | $ 5,727.77 |
| **M-7** Maintenance-Mowing | 128,386.00 | ft. | 930.50 | $ 49,240.96 |
| **M-7** Maintenance-Mowing right of way | 20.12 | acre | 104.00 | $ 4,856.63 |
| **M-8** Maintenance-Tide gate | | each | - | $ - |
| **M-9** Maintenance-Sweep streets | 3,977.03 | mile | 2,252.50 | $ 263,291.58 |
| **M-9** Maintenance-Sweep support | | | 820.00 | $ 60,843.70 |
| **M-10** Maintenance-Haul waste | 366.00 | load | 823.50 | $ 60,345.54 |
| **M-10** Maintenance-Screen material | | | - | $ - |
| **M-11** Maintenance-equipment | | | 933.25 | $ 41,576.72 |
| **M-0** Maintenance-Yard | | | 482.50 | $ 18,997.07 |
| **M-0**Maintenance- Ditching (creek walk thru) | 7981.00 | ft. | 394.00 | $ 10,354.15 |
| **M-0** Maintenance-Plan work | | | 89.50 | $ 6,521.12 |
| | | | **16,044.25** | **$ 958,864.94** |
| **SECTION 4: REPAIR** | | | | |
| **R-1** Repair-Pipe failure | 30.00 | each | 1,424.25 | $ 79,702.61 |
| **R-2** Repair Pipe work | 1.00 | ft. | 192.50 | $ 8,016.05 |
| R-2 Repair-Convert structure | 2.00 | each | 131.00 | $ 5,495.45 |
| **R-3** Repair Structure | 23.00 | each | 506.00 | $ 20,275.53 |
| **R-4** Repair Erosion | | ft. | | |
| **R-5** Repair Replace cover | 49.00 | each | 64.50 | $ 5,652.80 |
| **R-5** Repair Tidegate | | each | - | $ - |
| **R-0** Repair- Plan work | | | 28.00 | $ 1,015.96 |
| | | | **2,346.25** | **$ 120,158.40** |

| Munis | | | | |
|---|---|---|---|---|
| | **Amount** | **Unit of Measure** | **Total Labor Hrs.** | **Total Cost** |
| **SECTION 1: CONSTRUCTION** | | | | |
| **STM1900** Construction-Flume | 5 | each | 57 | $ 3,713.57 |
| **STM1202** Construction-Ditch | 0 | each | 0 | $ - |
| **STM0603** Construction-Pipe Replacement | 60 | ft. | 289.50 | $ 22,906.99 |
| **STM0102** Construction-SCM | 0 | each | 0 | $ - |
| **STM2700** Construction-Stock Pile Material | 12 | load | 48 | $ 3,927.62 |
| **STM0702** Construction-Structure Installation | 2 | each | 240.50 | $ 12,901.71 |
| | | | **635** | **$ 43,449.89** |
| **SECTION 2: INSPECTION** | | | | |
| **STM2000** Inspection- Closed | 1016 | each | 1614.50 | $ 57,059.52 |
| **STM2001** Inspection-Open | 4 | each | 16 | $ 532.58 |
| **STM 0100** Inspection-SCM | 8 | each | 125.50 | $ 2,967.02 |
| **STM0400** Inspection-Survey | | | 36.50 | $ 1,029.76 |
| **STM0500** Inspection-Video | 23601 | ft. | 711.50 | $ 25,710.29 |
| | | | **2504.00** | **$ 87,299.17** |
| **SECTION 3: MAINTENANCE** | | | | |
| **STM1101** Maintenance- Acreage Mowing | 59.79 | acre | 421.01 | $ 33,999.62 |
| **STM2600** Maintenance- Creek Walk Thru | 14736 | ft. | 307 | $ 10,802.53 |
| **STM0801** Maintenance- Reset Cover | 61 | each | 72.50 | $ 2,337.46 |
| **STM1400** Maintenance-Equipment Repair | | | 478 | $ 20,278.28 |
| **STM1800** Maintenance-Haul Waste | 133 | load | 309 | $ 48,951.80 |
| **STM1200** Maintenance-Manual Ditching | 76279 | ft. | 865 | $ 26,134.83 |
| **STM1201** Maintenance-Mechanical Ditching | 5214 | ft. | 1069.50 | $ 76,481.92 |
| **STM0604** Maintenance-Pipe | 21532 | ft. | 277 | $ 47,017.97 |
| **STM2400** Maintenance-Pot Hole | 1279 | each | 545 | $ 15,351.23 |
| **STM2800** Maintenance-Right of Way | | | 255.50 | $ 14,635.71 |
| **STM0101**Maintenance-SCM | 168 | each | 1667 | $ 84,390.59 |
| **STM1700** Maintenance-Screen Material | | | 0 | $ - |
| **STM1100** Maintenance-Slope Mowing | 278544 | ft. | 729.80 | $ 52,580.42 |
| **STM0703** Maintenance-Structure | 587.00 | each | 306.50 | $ 11,107.88 |
| **STM1300** Maintenance-Sweep Streets | 3603.38 | mile | 2633.50 | $ 317,752.99 |
| **STM2100** Maintenance-Yard | | | 388.00 | $ 13,619.21 |
| | | | **10324.31** | **$ 775,442.44** |
| **SECTION 4: REPAIR** | | | | |
| **STM0600** Repair-Cave In | 12 | each | 114 | $ 4,853.27 |
| **STM0701** Repair-Convert Structure | 1 | each | 43 | $ 2,065.57 |
| **STM1203** Repair-Erosion | | ft. | 0 | $ - |
| **STM0601** Repair-Pipe Rehabilitation | 9 | each | 513.75 | $ 42,898.48 |
| **STM0800** Repair-Replace Cover | 34 | each | 47.50 | $ 5,524.93 |
| **STM0700** Repair-Structure | 9 | each | 345 | $ 16,657.60 |
| **STM1204** Repair- Flume | | each | 0 | $ - |
| | | | **1063.25** | **$ 71,999.85** |
| **Other** | | | | |
| **STM0200** Assessment | | | 157.75 | $ 5,639.00 |
| **STM2500** Special Request | | | 134 | $ 6,869.50 |
| **STM1600** Pumping | | | 117 | $ 4,503.10 |
| | | | **408.75** | **$ 17,011.60** |

## 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.

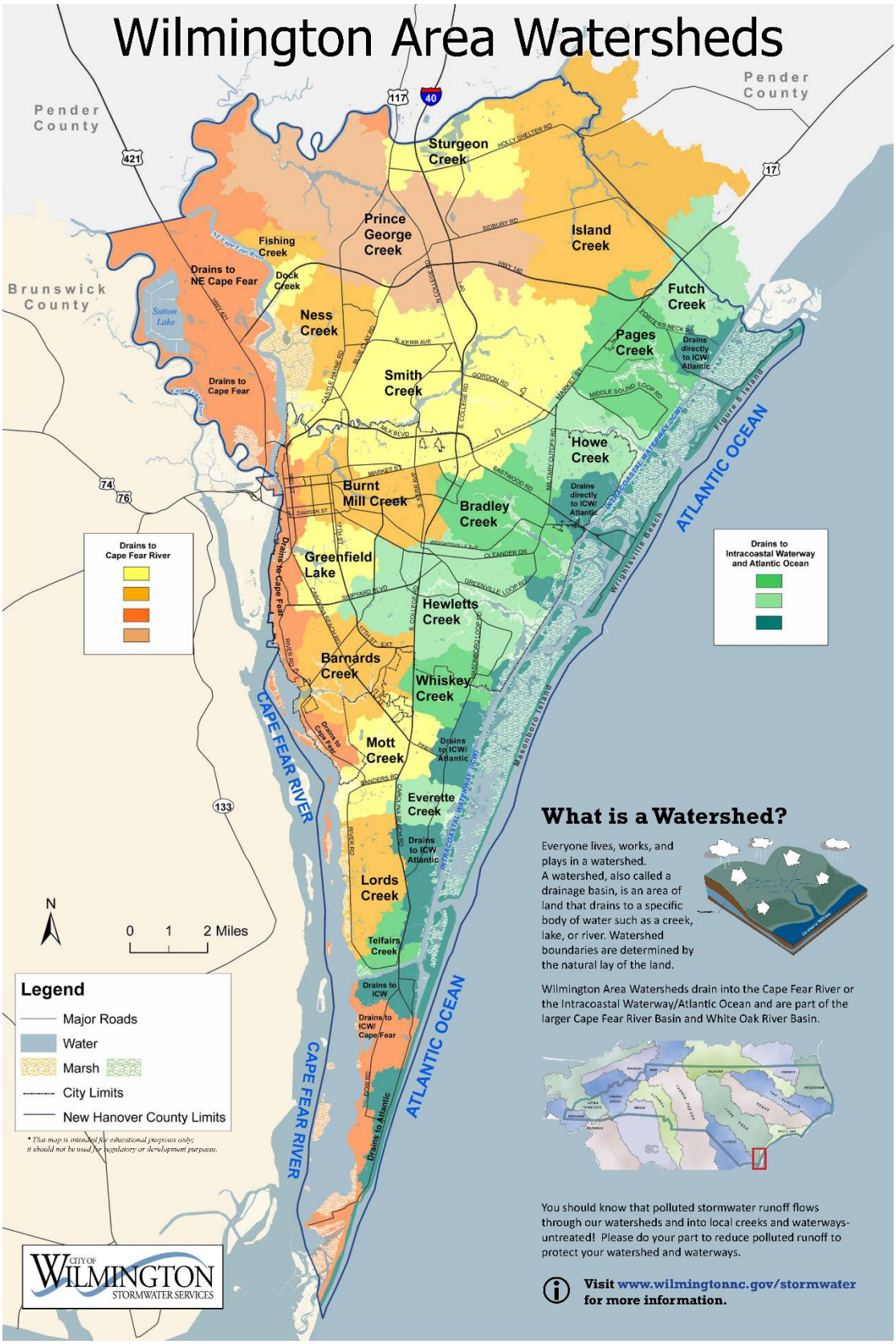
The analytical method used to measure chlorophyll *a* is described in Welschmeyer (1994) and US EPA (1997). Chlorophyll *a* concentrations were determined from the 1.0 micrometer glass fiber filters used for filtering samples for nitrate+nitrite and orthophosphate analyses. All filters were wrapped individually 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, 2020

by

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# Executive Summary

This report represents results of Year 23 of the Wilmington Watersheds Project. Waterquality data are presented from a watershed perspective, regardless of political boundaries. The 2020 program involved 5 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 2020. 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.

Barnards Creek – Barnards Creek drains into the Cape Fear River Estuary. It drains a4,173 acre watershed that consists of 22.3% impervious surface coverage, and a human population of approximately 12,200. Due to Covid-19 and resource re- allocation, sampling was suspended here in 2020.

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. A new site, BC-RD, on upper Clear Run at Racine Dr. was added to thethree previous sites (BC-CA, Clear Run at College Acres; BC-NB, Bradley Creek northbranch at Wrightsville Ave., and BC-SB, Bradley Creek south branch at Wrightsville Ave.). The new site was sampled three times and the old sites six times in 2020.

There were a few incidents of high turbidity and suspended solids in 2020. Dissolved oxygen was stressed (< 5.0 mg/L) on several occasions at the two upper sites BC-RD and BC-CA. Ammonium and nitrate concentrations were low to moderate while nitrateand orthophosphate concentrations were low on almost all sampling occasions. Our Bradley Creek stations did not host significant algal blooms during the 2020 sampling trips. Fecal coliform bacteria counts were excessive at all four sites but particularly so at BC-RD and BC-CA, which had geometric mean counts of 4,061 and 1,242 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 2020, onseven occasions. Dissolved oxygen concentrations were Good in the two upper stations and Fair in the remaining lower creek site. High fecal coliform counts occurredat two sites in 2020, especially at the uppermost site BMC-AP1 above Anne McCrary Pond, the regional wet detention pond on Randall Parkway, and at the lowermost station BMC-PP at Princess Place. We note that fecal coliform counts and nitrate-N concentrations significantly declined during passage through the detention pond. Majoralgal blooms were not seen in 2020, though a few minor ones occurred. Several water quality parameters showed an increase in pollutant levels along the creek from the exit from the detention pond to the downstream Princess Place sampling station, including fecal coliform bacteria, nitrogen and phosphorus, 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 four tributary sites and three in-lake sites on 11 occasions. Of the tributaries of Greenfield Lake, Squash Branch (near Lake Branch Drive), Jumping Run Branch at 17$^{th}$ Street, Jumping Run Branch at Lakeshore Dr., and Clay Bottom Branch (near Lakeshore Commons Apartments), three suffered from low dissolved oxygen problems, although main lake stations maintained good oxygen concentrations.

Algal blooms are chronically problematic in Greenfield Lake, and have occurred during all seasons, but are primarily a problem in spring and summer. In 2020 a massive spring-summer blue-green algal bloom of *Anabaena* occurred. 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 animportant cause of low dissolved oxygen, and high BOD occurred congruent with the blooms in 2020. In 2020 all four tributary stations exceeded the fecal coliform State standard on >35% of occasions sampled and rated Poor, but the in-lake stations were inGood to Fair condition for fecal bacteria.

Greenfield Lake is currently on the NC 303(d) list for impaired waters due to excessive algal blooms. The thesis work of UNCW graduate student Nick Iraola assessed the fivemain 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) have been awarded funds for 2020-2022 and UNCW has begun sampling in support of future nutrient reduction efforts on Jumping Run Branch. Early data show the Willard Street Wetland, between Willard St., 15$^{th}$ St. and 16$^{th}$ 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. Thus, the engineering team is currently devising strategies to restore the wetland to reduce the pollutant load. An analysis of sediment phosphorus loads found elevated concentrations in Jumping Run Branch, suggesting upstream sources.

Hewletts Creek – Hewletts Creek drains a large (7,478 acre) watershed into the AtlanticIntracoastal Waterway. This watershed has about 25.1% impervious surface coverage with a population of about 20,210. In 2020 the creek was sampled at four tidal sites on six occasions and one non-tidal freshwater site (PV-GC-9) on three occasions.

Incidents of low dissolved oxygen did not occur at Hewletts Creek in 2020. Turbidity was low and did not exceed the state standard, and no algal blooms occurred. Fecal coliform bacteria counts were elevated sufficiently at all sites for a Poor rating, but only the geometric mean at NB-GLR exceeded 200 CFU/100 mL; and the geometric mean offecal bacteria counts at HC-3 was 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% impervioussurface coverage. Due to Covid-19 and resource re-allocation, sampling was suspended here in 2020.

Motts Creek – Motts Creek drains a watershed of 3,342 acres into the Cape Fear RiverEstuary 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 of16,650 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 4.0mg/L, which was violated on only one of 12 occasions in our 2020 samples for a Goodrating. The North Carolina turbidity standard for estuarine waters (25 NTU) was not exceeded. There were no major algal blooms present in our 2020 sampling. Fecal coliform bacterial concentrations exceeded 200 CFU/100 mL on only one of 12 sampling occasions in 2020 for a Good rating.

Whiskey Creek – Whiskey Creek is the southernmost large tidal creek in New HanoverCounty 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 Covid-19 and resource re-allocation,

sampling was suspended here in 2020.

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 siteexceeds 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 2020 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 15% to be in Good condition, 10% in Fair condition but 75**%** in Poor condition, a deterioration over the previous year. Dissolved oxygen conditions (measured at the surface) system-wide(20 sites) showed 60% of the sites were in Good condition, 15% were in Fair condition, and 25% were in Poor condition. For algal bloom presence, measured as chlorophyll *a*,80% of the 20 stations sampled were rated as Good, 10% as Fair and 10% as Poor.For turbidity, 85% of sites were Good, 10% Fair, and only 5% Poor. It is important to note that the water bodies with the worst water quality in the system also have the mostdeveloped watersheds with the highest impervious surface coverage; Burnt Mill Creek –39% impervious coverage; Greenfield Lake – 37% impervious coverage; Bradley Creek– 28% impervious coverage.

## 2020-2021 NPDES PROGRAM HIGHLIGHTS & ANNUAL REPORTING

### Public Education & Outreach

- 50 presentations delivered virtually to 8th grade science classes in New Hanover County serving approximately 1650 students.
- Pet waste educational signs were posted in city parks with 400+ pet waste roll bags given away free to park visitors.
- A coordinated litter prevention campaign ran across several mass media platforms in Spring 2021 on Lamar Billboards, WECT digital/mobile/web, and Port City Daily digital newspaper.

### Public Involvement & Participation

- A new stormwater webpage was developed and deployed for the public focused on stormwater capital and in-house projects: www.wilmingtonncgov/stormwaterprojects
- 10 watershed cleanups involving 211 volunteers contributing 412 volunteer hours cleaned up 6.95 miles of creeks/watersheds within the city limits.
- 26 storm drain markers were placed in neighborhoods off SeaSpray Drive, utilizing 17 volunteers contributing 34 hours, and distributing 100 educational doorhangers.
- Public meetings, public notice and/or one-on-one property owner meetings were conducted for Clear Run Branch, Wisteria/Clearbrook, Brookshire Beasley, Greenville/White Avenue, New Orleans Place, Scotland Lane, and Red Cross Street. The Emergency Watershed Protection project for Hurricane Florence recovery repairs was also completed this year.

### 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.
- The City conducted IDDE training for City Engineering and Code Enforcement Staff.
- Dry weather flow investigations increased this year.
- The City began its program review with Moffat & Nichol consultants of its NPDES Phase II program in anticipation of our upcoming audit from the State in 2023.

### Post-Construction Site Runoff Controls

- Revisions to the City's Land Ordinance Code finalized and to be approved in August 2021.
- Continued site plan reviews of all new development and redeveloped sites.
- NC State's SCM Inspection and Maintenance re-certification completed by 2 engineering staff.

### Pollution Prevention and Good Housekeeping for Municipal Operations

- Database for all privately owned structural SCMs was updated this year.
- Implemented I&M contract for City owned facilities with oil/water separators.
- Conducted site visits of 18 City owned facilities with potential to pollute stormwater. Moffatt & Nichol consultants to provide overview of compliance of City facilities for NPDES requirements.
- Continued privately owned SCM inspections for compliance.

### Voluntary Watershed Restoration Plan for Bradley & Hewletts Creeks

- Installed two 1000-gallon cisterns at 2 fire stations, one located in the Bradley Creek Watershed and the other in the Hewletts Creek Watershed.
- The EPA 319 Grant "Reducing Stormwater Runoff Volume on the UNC-Wilmington Campus" officially ended in December 2020. The combined projects installed through the grant will reduce approximately 6,515,804 million gallons of stormwater runoff annually.

- In partnership with NC State University, an EPA 319 Grant, *"Implementing Private & Public Retrofits to Reduce Stormwater Runoff Volume & Pollutants in the Bradley Creek Watershed"* was awarded with full funding. Meetings with private property owners to discuss preliminary construction plans were conducted in late FY21.
- The final FY21 volume reduction totals for Bradley Creek and Hewletts Creek were 78,361.05 gallons and 6,616.43 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. 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 a major update in Spring 2021.

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| 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 (www.wilmingtonnc.gov/stormwaterprojects). This new webpage includes a snapshot of each current project, as well as a map and summary of completed 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.

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| 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:**

This year, the Stormwater Watch newsletter was incorporated into the city's brand new newsletter format – a multipage booklet. Stormwater content was included throughout this new format with articles about the stormwater compliance officers, large cisterns installed at city fire stations, the Bradley Creek Capital Improvement Project, 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 44,000+ city residents and businesses.

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 FY20/21 the entire program was completed by conducting live, virtual presentations for all classes. This is because New Hanover County Schools did not allow students back until later in the school year and because the schools are still not allowing guest speakers due to Covid19.

These virtual presentations actually required double the effort and staff to make them happen. It took 2 people to conduct each presentation – the Instructor to give the actual presentation and a Host to run the presentation behind the scenes and virtually interact with the students/teachers *(run the chat, deploy quiz questions, admit students into presentations, etc).* A comprehensive 20-page "Zoom Enviroscape Training Guide" was developed for the Enviroscape instructors and hosts, and multiple instructor/host trainings were held prior to delivering presentations. In all, we completed 50 live, virtual Enviroscape presentations! www.wilmingtonnc.gov/enviroscape

Education staff worked with Stormwater Code Compliance Officers to conduct pet waste education in the community including hosting outreach booths, distributing additional pet waste signage to multi-family apartment complexes, and posting the signs with free pet waste roll bags in city parks. This has proven to be extremely successful pilot project and we observe many pet owners with the roll bags attached to their dog's leash on a regular basis. Compliance Officers conducted pop-up outreach events in city parks to educate pet owners one-on-one.

Another initiative was compiling a comprehensive local Landscaper database and conducting an educational and compliance mailing. The mailing included proper yard waste disposal methods in both English and Spanish, a compliance letter with the city yard waste ordinance and fines, and posters to hang in the workplace. At least 100 packets were mailed to area landscaping companies.

Outreach staff presented to the Cape Fear Rotary Club at a virtual member meeting in Fall 2020. Topics covered included stormwater pollution, solutions, the impacts of polluted runoff on area waterways, and opportunities to get involved at the local level.

Wilmington continues to struggle with a litter problem. This fall and spring, coordinated mass media campaigns were funded to run on Lamar Billboards, Port City Daily online, and WECT digital, mobile and social media platforms. Content was also added to the city's dedicated social media and web platforms. Ads are ran across these different platforms and focused on the prevention of litter and pandemic waste (ie masks, gloves, etc), which has become a growing litter issue. Data for media campaign effectiveness is included in the appendix.

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| 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 (2) who track, investigate, and respond to each hotline report. Compliance officers routinely educate each offender, 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:
28 calls were placed to the City's Stormwater hotline, 11 online webform reports were submitted, and 641 direct emails and 54 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.

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| 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 impacted direct education events and presentations again this year but alternative measures were taken to provide community education, such as virtual presentations and outdoor tours.

Plans for the next fiscal year include:

- Fecal coliform bacteria education - expand the pilot program to install educational pet waste signage and free roll bags in more city parks.
- Conduct Enviroscape watershed education presentations for 8th grade science classes in New Hanover County Schools – either in-person, virtual, or pre-recorded, based on school requirements this coming year.
- Create stormwater content for citywide newsletter mailing reaching 44,000 recipients.
- Create new Stormwater Services website *(entirely dependent on city Communications Office timeline).*
- Perform self-assessment of public outreach/education and involvement/participation BMPs and revise PE/PI Plan as necessary

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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 services performed. The cumulative year-end progress 4$^{th}$ 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.

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| 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 public input with stormwater staff.

Public meetings, public notice and/or one-on-one property owners meetings were conducted for Clear Run Branch, Wisteria/Clearbrook, Brookshire Beasley, Greenville/White Avenue, New Orleans Place, Scotland Lane, and Red Cross Street. These activities are detailed in the Public Involvement appendix section.

The Emergency Watershed Protection project for Hurricane Florence recovery repairs, were also completed this

year. All current and completed projects can be viewed on our website at www.wilmingtonnc.gov/stormwaterprojects This webpage was developed to educate and provide a means for review and input by the public regarding stormwater projects.

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|---|---|
| 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.

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To summarize hotline/web reporting activity this past fiscal year:
28 calls were placed to the City's Stormwater hotline, 11 online webform reports were submitted, and 641 direct emails and 54 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.

**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:

- Continue contracts with outside agencies to implement PI/PP activities
- Revamp volunteer storm drain marking program materials
- Potentially develop online public input form as a mechanism for public involvement
- 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.

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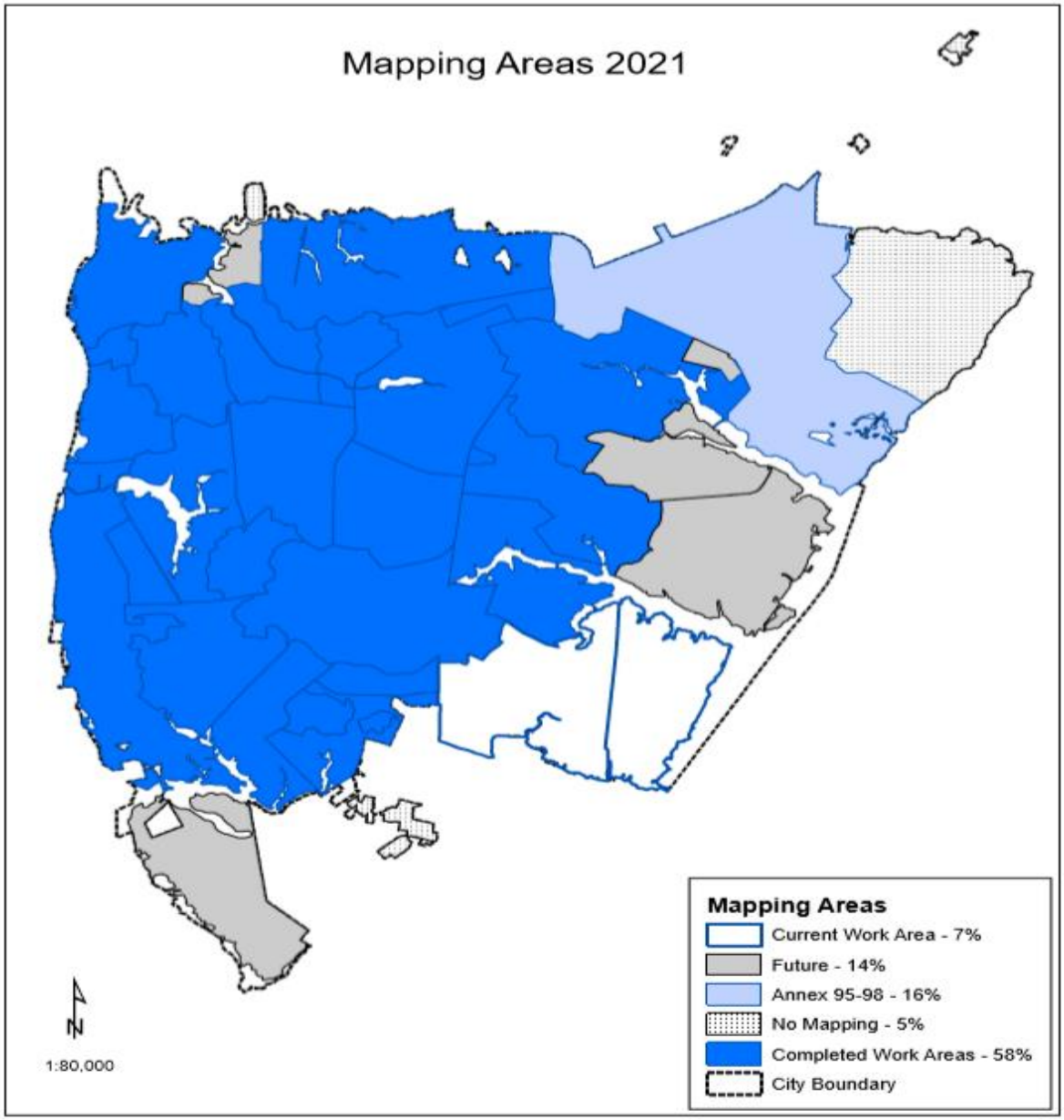
| b. Maintain a Storm Sewer System Base Map of Major Outfalls. | The permittee shall maintain a current map showing major outfalls and receiving streams |

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

During this past reporting year, our City GIS Intern re-evaluated all NPDES designated outfalls through GIS and data spreadsheet to determine accuracy and updated any new locations. Outfalls were then classified and added to the GIS dataset as mapping of the City MS4 inventory.

Additionally, the City has made 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. This year, the City began re-mapping "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 "Future" mapped area (River Lights) 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. Thus, a 100% mapping completion may not take place for several more years.

For the next reporting year, the City is scheduled to begin mapping portions of the River Lights community. This area is shown on the map below as future mapping.



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| 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. The process has streamlined time spent at each structure while providing copious information that can be exported into a spreadsheet for reviews. Several Stormwater Services staff utilize the field procedures to provide additional assistance and scheduling flexibility throughout the next year. 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 15%. of total NPDES outfalls (Appendix D). This was an increase from the previous reporting year but investigations were still hampered by Covid 19 protocols which limited staff interactions due to work from home requirements thus preventing more field visits.

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| 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 continues data input and documentation through the outgoing *Intelligov* and 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 *Intelligov/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.

The City rolled out the new *Munis* work system in February 2021 and illicit discharge data is now captured in this system. Not all Department Sections have implemented the new system, but the City has future schedules for rollouts.

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| 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 with through our data management systems. 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 *Intelligov*. (former) and *Munis* (current)

(Appendix I).

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| 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 conducted 3 virtual IDDE trainings this year in Spring 2021 for Engineering (Plan Review), Engineering (Construction Inspectors) and Code Compliance staff. A total of 19 employees attended the presentations.

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| 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, the Enviroscape Watershed Education Program www.wilmingtonnc.gov/enviroscape remain big components of the City's efforts to educate the public on illegal discharges and improper disposal of waste.

Education staff worked with Stormwater Code Compliance Officers to conduct pet waste education in the community including hosting outreach booths, distributing additional pet waste signage to multi-family apartment complexes, and posting the signs with free pet waste roll bags in city parks.

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

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| 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)

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| 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 *Intelligov/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 2020-2021 there were 2 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. Unmapped areas will be surveyed and added to our database. In addition, the City will be continuously updating previous mapped areas that may have changed due to recent drainage improvement projects 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 not fully met this past year due to Covid 19. The City is on track to meet its goal for the next reporting year.

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.

Employee training will be tentatively scheduled on a 2 year rotation between Stormwater field crews, Parks and Rec. field crews, Solid Waste field crews, Streets field crews and Engineering Inspectors. Despite Covid-19, 3 virtual trainings where conducted this reporting year. Monthly reports from the City's Compliance Officer regarding IDDE reports continue to indicate education efforts are effective. The majority of reports are from City staff, citizens and Inter-agency staff.

Enforcement of IDDE violations will continued to be tracked through the City's management system.

The City is currently 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, is currently reviewing the IDDE program. A review of the City's ordinances, mapping, staff training, reporting, procedures, and documentation occurred over the 2020-2021 reporting period. The City hopes to identify potential gaps as well as to determine needs for improvement or enhancement.

## 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 |
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| 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.<br><br>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<br><br>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.<br><br>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 has finalized draft updates to its Land Development Code. Revisions for the updated Code has been occurring during the last year with City staff meeting weekly to review sections within the Code. One major change in the Code is applying higher SA water quality standards to new development in the impaired Bradley Creek watershed. Another proposed change is process guidance om stormwater permit renewals and expirations. The finalized draft of the revised Code is expected to be adopted by City Council in August 2021.

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| 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.<br><br>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.<br><br>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. Two engineers were re-certified this past year.

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| 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.

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| 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.

Engineering and Stormwater Staff are still currently 50% complete incorporating spreadsheet data into a GIS application to improve the database of permits and help with future permit renewals. The goal was to incorporate a new software, *EnerGov*, to help with this process in order to merge County and City systems so developers only have to access one system. Our consultants and IT Department have been having compatibility issues merging the systems, thus stymieing the implementation. With the uncertainty of the software application, a "go live" date has been pushed back to December of 2021. If the application is not resolved at this date, Review Engineer's will provide another alternative to update the inventory.

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| 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.

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| 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.

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| 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.<br><br>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.<br><br>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 209 private sites were inspected for their respective SCMs with 91 sites out of compliance (see Appendix F). The inspections reported in the appendix overlapped reporting years, however, the 2020 inspection totals were not reported in the previous 2019-2020 report, so they have been included in the table. The City's GIS Intern updated the SCM database this past reporting year for owner information and any new additions that may have been left out of the database. This took several months but the information is now current.

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 went through the certification class, with 2 getting re-certified this past reporting year.

Stormwater Staff are scheduled to be trained on SCM Inspection and Maintenance in July 2021.

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| 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.

A virtual ASCE Coastal Branch training was conducted in December 2020 for local engineers and developers on the City's Development Review process. A copy of the memo for the training can be found Appendix F.

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| 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.

The City has finalized updates to its Land Development Code to apply higher water quality requirements for the Bradley Creek Watershed.

Engineering Project Review Staff remain at 50% complete updating the stormwater permit renewal process.

Engineering Staff conducted developer training on the proposed updated Land Development Code in December 2020.

SCM I&M recertification through NC State's program occurred in March 2021 for City Staff.

The City will be re-evaluating its private SCM inspection process with Moffatt & Nichol consultants to possibly update goals.

**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 provisions 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 updated its inventory of known facilities with the potential for generating polluted runoff. This past reporting year, the City identified 18 of its sites for Pollution Prevention/ Good Housekeeping (PP/GH) review with its consultants Moffatt & Nichol (M&N). City and M&N staff conducted 3 rounds of site visits, with the potential to pollute, in the Spring of 2021. Sites were inspected by staff per DEQ audit templates and checklists to determine current conditions and site managers were interviewed for processes, procedures and documentation. M&N and staff will compile existing information to understand where site improvements and recommendations will be needed. M&N will be implementing phase II of its contract with the City in Fall of 2021to develop the City's SWMP per NC DEQ in preparation of a 2023 audit..

The City currently has a Spill Prevention Control and Countermeasure plan (SPCC) for the Operations Complex and a separate Stormwater Pollution Prevention Plan (SPPP) for the Fleet Maintenance building located within the complex. A SPCC is also in place for the Police Headquarters location.

The City updated its list of all structural SCMs. These include permitted, non-permitted and grant related SCMs. Currently, there are over 90. The City has worked this past year to update all structural SCMs based on type, location and features into a GIS database. This will allow for our SCM maintenance field supervisor to access a comprehensive list for I&M.

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| 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:**
Currently, The City relies on a SPCC plan and a SPPP for the Operations Complex, Police HQ and Fleet Maintenance building. The Fleet Maintenance General Permit (NCG08000) was renewed this past year and City staff will follow up with the new requirements and schedules for monitoring. Previous analytical and qualitative monitoring of the outfall per the requirements of the SPPP and General Permit for Fleet Maintenance indicate parameter levels well below benchmark values.

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 contractor will began inspecting the city locations with the upcoming fiscal year. The contract specifies frequency of inspections and maintenance requirements.

Moffat & Nichol consultants has reviewed the City facilities with the potential to pollute and will be following up with I&M schedules in phase II of their contract with the City. This will occur in fall 2021.

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| 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.

For the remaining City facilities, Moffatt & Nichol, after reviewing City facilities this past year will prepare procedures under Phase II of their contract to begin in the fall of 2021.

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

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| 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 2020-21, street sweepers swept 7,580 curb miles while collecting sediment, vegetation and trash potentially diverted from the stormwater sewer system. The amount of debris volume collected was 500 loads. The City began to calculate approximate volume by observation in Jan./Feb. 2020.

In fiscal year 2020-21, stormwater crews conducted hand maintenance of 145, 886 feet of ditch, 18,385 linear feet of ditch by mechanical methods, cleaned 78,313 linear feet of pipe, and removed blockages and cleaned 5,914 drainage inlets and manholes thus reducing debris, sediment, vegetation and trash potentially diverted from being discharged into our receiving waters. An estimated sweeping volume and vacuum truck volume of debris collected was approximately 7,750 cubic yards. For the next reporting year, debris calculations should be more precise as the scale house will be back in service again.

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.

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| 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*. The City changed tracking and work order systems from *Intelligov* (7/1/20 – 2/14/21) to *Munis* (2/15/21- 6/30/21) this reporting year. .

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| 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.

The City has worked this past year to update all structural SCMs as needed based on type, location and features into a GIS database. This allows for our SCM maintenance field supervisor to access locations and type and then coordinate maintenance schedules to the locations. New City software has been working to integrate with the GIS database and provide documentation but is still going through trial and error processes this past year. Documentation is now being captured through the new *Munis* data management system.

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| 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.<br><br>The I&M program shall specify the frequency of inspections and routine maintenance requirements.<br><br>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 BMPs in compliance. Documentation occurs with every SCM site visit and maintenance activity.

The City has worked this past year to update all structural SCMs based on type, location and features into a GIS database. This will allow for our SCM maintenance field supervisor to access locations and type and then coordinate maintenance schedules to the locations.

Moffatt & Nichol is currently reviewing City facilities and will addressing I&M programs under Phase II of their contract to begin in the fall of 2021. SOPs to address the frequency of inspections and routine maintenance requirements for its SCMs are to be considered by M&N.

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| 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 11 certifications for Parks and Recreation staff and 2 certifications for Stormwater/Public Services staff.

The City is getting away from the use of glyphosate as an herbicide, especially in aquatic environments, to help improve with water quality. The City is in the process of purchasing a specialty piece of equipment (Conver) for invasive aquatic weed removal. With the purchase of this equipment, weed removal can be done mechanically without the need for chemicals, thus limiting the need for herbicide application certifications.

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

**Accomplishments:**
Staff training was scheduled for winter of 2020-21 but due to Covid-19and budget constraints, it was postponed until the next fiscal year. The City is planning to purchase training videos with its upcoming annual budget and begin training in the fall/winter of 2021-22. An SCM training for the City's field crews is already scheduled for July 2021and will be included in next year's report.

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| 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.

Moffatt & Nichol has begun evaluating the City's Fire Station locations and procedures that occur at each facility. During the next reporting year, M&N will be providing recommendations in phase II of their scope of work of the MS4 program review. Currently, all City Fire Stations have designated wash down areas for vehicle cleaning.

Moffat & Nichol will also be reviewing and making recommendations at all the City's operations facilities with the potential to pollute as 18 City-owned site visits occurred in the 2020-21 reporting year as mentioned in this section (2.a).

**Assessment of Program Implementation**
The City will continue to keep 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 will begin to be implemented at locations within 2 years and documented annually. Site SCMs to help reduce the potential for pollutants to the stormwater system will be evaluated and added or modified as needed.

The City is under an annual contract with a local consultant for oil/water separator inspection and maintenance at all facilities that are applicable.

The City has updated its private and public SCM inventory in this reporting year and will update as needed.

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.

The City's consultant (M&N) will help in developing SOPs to address the routine inspections of its own SCMs in the next year in phase II of their scope of work in fall/winter 2021-22.

Staff Training for City field crews will be re-evaluated (due to Covid-19 and budgetary constraints) for content in the next reporting year.

Moffatt & Nichol consultants will begin to provide with PP/GH programs, procedures, and recommendations for all City owned facilities with the potential to pollute in preparation for NC DEQs upcoming NPDES audit.

## 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:<br>• Identifies the watershed(s) subject to an approved TMDL with an approved Waste Load Allocation (WLAs) assigned to the permittee; and<br>• Includes a description of the watershed(s); and<br>• Includes a map of watershed(s) showing streams & outfalls<br>• 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<br>• 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:<br>• 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<br>• Provide an explanation as to how those measures are designed to reduce the TMDL pollutant of concern.<br>• 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:<br>• 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<br>• 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:<br>• 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<br>• 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 Watershed Restoration Plan Accomplishments:**

The Bradley and Hewletts Creeks Watershed Restoration Plan has continued to make progress over the 2020-2021 fiscal year in promoting volume-reducing stormwater control measures (SCMs), also known as best management practices (BMPs), to the public. The Heal Our Waterways (HOW) Program, which is the informal name of the restoration plan, had greater reach and engagements through social media campaigns, garnered more attention through news outlets, and continued its involvement with 319 grant partnerships and community events.

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 2020 postcard discussed the importance of 1.5 inches of rain, or the "first flush", in coastal communities and simple steps that property owners can take to keep pollutants out of stormwater runoff. The spring 2021 postcard featured the importance of wetlands and how property owners can help to protect wetlands in the Bradley and Hewletts Creeks Watersheds. The wetlands information was also used in the spring Wilmington Currents newsletter, which was distributed to all homeowners within the City limits.

The media partnership with WECT continued this year to raise more awareness about the Monthly Rain Barrel Sale (hosted by New Hanover Soil & Water Conservation District and the City of Wilmington) and the HOW Program in general. The Fall 2020 campaign was heavily focused on the Monthly Rain Barrel Sale and the benefits of rain barrels, with video pre-rolls, weather channel display banners, and targeted Facebook ads. WECT.com is viewed by an average of 1.5 million unique visitors per month and the WECT Facebook page has over 258,500 followers. The HOW Program was also featured in several "Homepage Takeovers" on WECT's website on dates close to the physical sale. The banners for the takeover featured animations for rain barrels and, if visitors clicked on them, linked to information about the local monthly rain barrel sale. The Spring 2021 campaign used some of the rain barrel materials close to sale dates but provided more general information about the HOW Program throughout the rest of the campaign. One of the new PSAs that was created during 2020 was utilized with the addition of a watershed map to target more Bradley and Hewletts Creeks residents through Facebook ads.

Two new billboard designs were created this year to educate residents on stormwater runoff and raise awareness of the HOW Program. The Fall 2020 billboard featured a stormwater outfall draining into a waterway with the phrase, "Get the Drop on Polluted Runoff!" The Spring 2021 billboard featured a closeup of plants in rain and the phrase, "Rain Showers Love Rain Gardens", as well as the HOW website. These billboards were posted next to a busy intersection in Bradley Creek to reach watershed residents/motorists. The campaigns ran for the full months of October 2020 and April 2021, respectively.

HOW also renewed its presence as an underwriting partner with local National Public Radio affiliate, WHQR. This year, the campaign highlighted rerouting downspouts and installing rain barrels as stormwater solutions residents could incorporate at home. The messaging was broken into fall and spring campaigns. The first ran through October and November 2020 and included 23 total announcements. The second campaign ran in late spring through April and May and included a total of 38 announcements. Each week, WHQR reached about 40,000 listeners in the Wilmington Designated Market Area.

With many COVID-19 restrictions still present through FY21, the Wilmington Earth Day Festival went virtual in April 2021. The festival featured events, vendors, and locations that were environmentally-friendly throughout all of April in a scavenger hunt format. For each item a resident participated in or location that

they visited, they were entered into a weekly drawing for raffle prizes. The HOW Program featured both Anne McCrary Park and Wade Park as locations to visit and hosted an in-person tour of the stormwater solutions installed at Anne McCrary Park on April 27th, 2021. Example practices included large and small rain gardens, rain barrels, and pervious pavement. Four residents attended the tour and provided feedback that it was helpful to see how the practices looked and functioned in-person.

The HOW Program's social media and website traffic continued to grow during 2021. The biggest advancement was the addition of a HOW Instagram page which grew to 291 followers in 11 months. The HOW Program now has a presence on Facebook, Instagram, and Twitter, in addition to its main webpage. During 2021, the Heal Our Waterways website home page received 2,430 unique views. News stories were posted monthly, and new videos and publications were posted to the website, including a video featuring a cistern recently installed at a local fire station.

The 319 Grant in partnership with North Carolina Coastal Federation and the University of North Carolina Wilmington wrapped in December 2020. A final rain garden was excavated by Tinga Landscaping and planted by socially-distanced volunteers during the fall semester with the help of UNCW Landscaping and UNCW Sustainability. With the new rain garden, previously installed rain gardens, and previous pervious pavement retrofits, 6,515,804 million gallons of stormwater runoff will be reduced annually or 424,655 gallons for the one year, 24-hour storm. With such a great success rate and positive response from the university, a "Phase II" EPA 319 Grant application with the same partners was submitted in May 2021 and was invited for an interview by the grant panelists.

While one grant ended, another began -- the HOW Program entered a 319 Grant Partnership with North Carolina State University (NCSU) this year. NCSU is planning to work with Stormwater Services to retrofit an existing drainage swale with wetland plants. Two private wet retention ponds will also be retrofitted to maximize pollution treatment upstream of Clear Run Branch, which drains directly into Bradley Creek. Work will begin in the summer and fall of 2021. In addition to the structural retrofits, an outreach campaign is tentatively planned for an HOA neighborhood located near the project area to inform residents about the benefits of rerouting downspouts into lawn or garden areas.

New Hanover Soil & Water Conservation District (NHSWCD) was once again granted a contract (HOWBMP) with the city to install BMPs on private properties in the watersheds. HOWBMP produced 9 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 all received rain gardens. The total volume reduction from the HOWBMP program this year was 906 cubic feet.

HOW Program staff continues to track BMP volume reduction projects that are in-design or in-the-ground using the GIS Atlas. This tracking tool allows HOW to analyze current impacts and assess stormwater volume reduction numbers from BMPs within the two target watersheds and continues to be a key factor in HOW's progress, both in scope and accuracy. All 319 grant projects, HOWBMP projects, tree plantings, private retrofits discovered through site visits, and city-wide rain barrel sale data was recorded for FY21.

Finally, while events were still largely postponed during FY21, the HOW Program did participate in several virtual and outdoor presentations with community partners. The relationship with the Wilmington Farmer's Market continued with HOW being present approximately once a month for market days. The HOW Program was also featured as a presenter in a virtual "Backyard Sustainability Series" with NCSU Cooperative Extension and a "Watershed Moment" community event with New Hanover Soil & Water Conservation District.

**Annual Assessment & Evaluation of Plan Implementation:**

The HOW Program continued its forward momentum this year with more installations, widespread social media campaigns, and greater awareness among City departments. Along with the online growth of the HOW Program, there were also substantial gains towards the volume reduction goals established by the Watershed Restoration Plan.

Along with the addition of Instagram, the HOW Program built a greater partnership with the City's Communications Department. Several collaborative "Watershed Wednesday" posts were featured on the City's main social media channels and discussed general information about the HOW Program and stormwater pollution. The HOW Program also worked with Communications to respond to several media inquiries. High bacteria levels in Bradley Creek were picked up by the media and resulted in several written and tv news interviews. One interview by WECT News specifically focused on the recently completed 319-grant funded rain garden at UNCW, particularly the benefits for water quality in Bradley Creek. Communications also developed a video for a 1000-gallon cistern that was installed at a Fire Station located within the Bradley Creek Watershed and funded by the HOW Program. This widespread news coverage and collaboration with City Communications helped to increase awareness about the existence of the HOW Program as a whole.

In addition to the successful structural projects that were installed within both watersheds, there were several internal movements to establish actions that would benefit water quality. For example, more attention was given to protecting Bradley Creek within the proposed updates for the City's Land Development Code. While the proposed changes may not make it into the final draft, there have been several meetings and presentations that discussed the state of water quality in Bradley Creek with area leaders. This process has kept Bradley Creek relevant and raised greater awareness about some of the major stressors that threaten the health of the creek.

Ultimately, the HOW Program is continuing progress towards the Bradley and Hewletts Creeks Watershed Restoration Plan's 6 Objectives and 35 Actions. The information below outlines this progress:

**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 programs | On-going | City of Wilmington - Stormwater 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 | On-going | City of Wilmington – Stormwater Services; WB |

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| | | related to human and pet wastes | | |

In support of Actions 1-1 and 1-5, the HOW Program continued its partnership with the City's Planning and Engineering Departments to provide feedback on proposed changes to the Land Development Code (LDC) and on proposed developments within the City of Wilmington through the Technical Review Committee (TRC) process. For example, the Exceptional Design Criteria, which allows projects to build greater density along SA waterways if LID practices are incorporated, was under review through the LDC updates. The HOW Program worked with the Planning Department to determine which SCMs should be included in the Exceptional Design Criteria, what the design requirements should be, and how much "credit" could be received by incorporating the various SCMs. During TRC meetings, the current Exceptional Design Criteria were also presented to developers for projects that fell within the appropriate boundaries as potential incentives for incorporating more LID practices. Whether or not developers incorporate LID, the Engineering Department continues to ensure that all State and City stormwater regulations are met for developments during the TRC process.

HOW continued the fall and spring watershed mailers again this year in support of Action 1-4, but with a greater focus on educating residents about stormwater pollution. The fall mailer briefly discussed the 1.5 inches stormwater regulation rule and featured simple solutions that can help to soak in the "first flush" during rain events, supporting Action 1-2. The spring mailer focused on the benefits of wetlands and how residents can help protect coastal wetlands along Bradley and Hewletts Creeks. Both postcards were mailed to over 20,000 residents within the target watersheds.

All media partnerships also continued this year for educational messaging. HOW partnered with WECT, WHQR, and Lamar Billboards to bring awareness to the HOWBMP funding program, the monthly rain barrel sale, and the HOW website. The HOW website and all social media channels (FB, Twitter, & IG) continued to remain active throughout the year as well. The HOW Program also continued distributing quarterly e-newsletters, covering topics from native plants to proper tree planting techniques. There are currently 382 active subscribers.

Regarding Action 1-3, CCAP is a funding program that is coordinated through the New Hanover Soil and Water Conservation District (NHSWCD). This program was promoted to a few property owners that were outside of the HOWBMP contract program with NHSWCD but was not a large area of focus in FY21 due to most of the funds already being allocated. A greater area of focus was placed on the HOWBMP Program (which is modelled after CCAP), which installed a total of 9 rain gardens between 7 properties during FY21. The total volume reduction was 906 cubic feet, exceeding the total from the FY1920. The funding was increased to $30,000 this year and was almost completely expended, with more properties on the waitlist for FY22.

The HOW Program continued its existing educational programs, such as regular tabling at the Wilmington Farmer's Market. New outreach materials were created this year to highlight common sources of pollutants and how they can be kept out of storm drains by keeping pollutants out of the environment and by implementing simple LID practices, such as rain barrels and downspout extenders. To encourage more participation from the public, rain barrels were raffled off at most market events. LID practices were also promoted through tours of the Stormwater Demonstration Site at Anne McCrary Park. Multiple residents joined the HOW Program for an Earth Day Walking Tour and several homeowners also attended one-on-one tours. Interest grew as the HOW Program, Alliance for Cape Fear Trees, Wilmington Tree Commission, and NHSWCD worked together to reach out to HOAs within the City and discuss the benefits of green infrastructure for neighborhoods.

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

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| 2. Determine Appropriate Water | Action 2-1 | Work with SS, UNCW, WB and NCCF to conduct preliminary | Year 1, establish preliminary | City of Wilmington –Stormwater Services; UNCW, SS, WB, NCCF |

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| Quality Classifications and Designated Uses Where Water Quality Impairment Exists | | evaluations of water quality to determine where more intensive state (SS) water quality investigations are needed | monitoring | |
| | 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 Aquatic Ecology Lab with the University of North Carolina at Wilmington (UNCW) continues to conduct regular surface water sampling to determine what effects the HOW Program's volume reduction efforts are having on the health of the creeks. Additional monitoring stations were added in the upper north branch of Bradley Creek to prepare for a pre/post comparison for the upcoming 319 Grant with NCSU, which will be incorporating wet pond retrofits directly upstream from the stations.

This plan objective concentrates heavily on the classification of local waters and the appropriateness of current classifications considering today's conditions. A discussion with State staff this year indicated that reclassification of a portion of Banks Channel with docks would not be likely (Action 2-5), but also that a TMDL is not likely to be pursued due to the unique circumstances in this area of the waterway. Staff also discussed the requirements needed to reclassify a waterbody such as Bradley Creek from SC to SB or SA, which would include documenting active use of the waterbody. A reclassification of this nature would require engagement and discussions with Stormwater Staff, City Council, and Bradley Creek residents if reclassification were to be pursued in the future.

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

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| 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 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 |
| | 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 through FY21. These goals were accomplished by installing volume reduction practices through grants, interdepartmental partnerships, local rain barrel sales, and the HOWBMP contract program. All projects were tracked in the HOW Program's GIS Atlas, which estimates the total volume of runoff reduced within each watershed.

The North Carolina Coastal Federation's (NCCF) grant for stormwater retrofits on UNCW's campus continued to be a major contributor to exceeding the internal performance measure of 0.15-acre feet of volume reduction within the Bradley Creek Watershed. A final rain garden was installed in fall 2020 and will treat approximately 73,847 gallons per storm. This initiative, in addition to the other projects completed within the Bradley Creek Watershed, helped achieve the volume reduction measure for the Bradley Creek Watershed by 160%.

The HOWBMP contract with New Hanover Soil and Water Conservation District installed several rain gardens in both the Bradley and Hewletts Creek Watersheds this year. There were 9 total rain gardens installed for 7 homeowners with a total volume reduction of 906 cubic feet.

Rain barrels installations also continued at a high rate in the Bradley and Hewletts Creek Watersheds. The monthly rain barrel sale and giveaways hosted by the HOW Program contributed to the large distribution of rain barrels in FY21.

Finally, the HOW Program continued its partnership with the Wilmington Fire Department to install two 1000-gallon cisterns – one in the Bradley Creek Watershed and one in the Hewletts Creek Watershed. The fire stations will use the rainwater captured in the cisterns to wash vehicles and irrigate landscaping around the buildings. This completes the cistern installation initiative for fire stations located within the Bradley and Hewletts Creeks Watersheds. There are now a total of four 1000-gallon cisterns.

**Objective 4: Promote stormwater reduction efforts:**

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| 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 |

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| | 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 FY21, action 4-1 was still supported through continued use of and updates to the GIS Atlas. The "Who's Helping?" map was updated and posted to the website with the most recent installations. The presentation at the June 8th "Watershed Moment" event also discussed the overall process of using the GIS Atlas to track projects within the watersheds. The presentation was given to the public and several community partners and served as an overview to those new to the tracking system and a reminder to those already familiar with the HOW Program to continue submitting their projects to be included in the GIS Atlas.

The HOW Program continued providing recommendations during the City's Technical Review Committee (TRC) meetings for proposed developments, including a few City-related properties, in support of Actions 4-3 and 4-7. Several developments incorporated the green infrastructure suggestions that were provided to them through the review process. Also, in support of Action 4-3, the discussion to add additional stormwater protections to Bradley Creek within the draft Land Development Code (LDC) continued. While the change may not remain in the final LDC, several presentations to City Council and Planning Commission have made it clear that retrofits and LID will be necessary to help improve water quality within the creek.

Tree plantings were also a major focus for stormwater improvements in tandem with the creation of the Wilmington Tree Initiative to support Action 4-4. Several tree plantings occurred within the Bradley and Hewletts Creeks Watersheds and were organized by multiple groups, including the HOW Program, the City's Community Services Department, the Wilmington Tree Commission, and UNCW. All tree plantings were tracked in the GIS Atlas, in accordance with Action 4-1. The tree plantings through the HOW Program took place at JEL Wade Park (City of Wilmington park/wetland), which was supportive of Action 4-7.

Finally, in support of Actions 4-3, 4-7, 4-10, and 4-11, a grant with North Carolina State University was approved for full funding to retrofit several private wet ponds and a public drainage swale in the upper reaches of Bradley Creek. These retrofits will improve the stormwater residency time, reduce a greater volume of stormwater, and add habitat within a highly urbanized area. The meetings with property owners have already concluded and construction will begin in early FY22.

**Objective 5: Form and maintain partnerships:**

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| 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 programs | Years 1 – 5 | City of Wilmington – Stormwater Services; Development Services; NCCF, WB, Cape Fear Public Utilities |
| | 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<br>City of Wilmington - Stormwater Services; UNCW, NCCF |

Satisfying several Actions (5-1, 5-2, 5-6), partnerships continue to be a vital component of the success of the HOW Program. HOW continued its partnerships with local news media outlets (WECT, WHQR, and Lamar Billboards), the New Hanover County Soil and Water Conservation District, North Carolina Coastal Federation, University of North Carolina-Wilmington, NC State University – Cooperative Extension, and members of the Wilmington Tree Commission. The Wilmington Farmer's Market at Tidal Creek Co-op, New Hanover Soil and Water Conservation District, and North Carolina State University Cooperative Extension provided opportunities to promote the HOW Program and retrofits to property owners within the Bradley and Hewletts Creeks Watersheds through virtual presentations and outdoor events.

In accordance with Action 5-1, the HOW Program continued to be a presence at the Wilmington Farmer's Market, located within the Bradley Creek Watershed, and raffled off several rain barrels to homeowners within the Bradley and Hewletts Creeks Watersheds. Events were still limited during the summer and fall, but winter and spring saw an uptick in the number of event opportunities. The HOW Program was featured in a presentation about stormwater solutions for the North Carolina State University Co-operative Extension's "Backyard Sustainability" series, which was a new event this year. HOW also presented at "A Watershed Moment" hosted by New Hanover Soil and Water Conservation District to discuss the history of the watershed restoration plan and the current initiatives to improve water quality in Bradley and Hewletts Creeks.

While the Wilmington Earth Day Festival still did not occur in its usual festival format, it was modified into a virtual event and the HOW Program was able to participate. The online scavenger hunt included locations that were relevant to the HOW Program, as well as an in-person tour of the Stormwater Demonstration Site at Anne McCrary Park. This opportunity was made possible through a continued partnership with the Wilmington Earth Day Alliance.

The ongoing partnership with the NC Coastal Federation continues to fulfil Action 5-2, securing 319 Grant funds for retrofits within the Bradley Creek Watershed. The first 319 UNCW grant contributed to tremendous success for Action 5-6 with the installation of a final rain garden, which was completed in fall 2020. To continue the forward momentum, a new grant application was submitted in May 2021 for a "Phase II" 319 Grant to again take place on UNCW's campus. To also support action 5-2, the grant application with North

Carolina State University (NCSU) was approved and officially awarded funds in February 2021. The HOW Program will tentatively play a role in two 319 grants in the Bradley Creek Watershed, depending on the acceptance of the UNCW grant application.

**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 and modify plan as needed | Yearly | City of Wilmington - Stormwater Services, Development Services; NCCF, WB, UNCW |

Water quality is still being closely monitored by UNCW, in accordance with Action 6-2. The additional stations in upper Bradley Creek consistently showed high fecal coliform levels through FY21. Cape Fear Public Utility Authority and the City's Public Services Department investigated to see if there was a sewage leak in the area, but no evidence was found. The hope is that the 319 Grant work with NCSU directly upstream of the stations will help to improve the bacteria levels in this area. Both Bradley Creek and Hewletts Creek continued to show high fecal coliform levels, while the downstream stations in Hewletts Creek only exceeded the standard in 25% of the samples. This reflects the benefits of having the constructed stormwater wetland at Wade Park in the Hewletts Creek Watershed, which has shown documented reductions in bacteria, TSS, TP, and TN levels in stormwater runoff leaving the wetland.

To highlight the program's progress through Action 6-1, the city-established performance measure for volume reduction for Bradley Creek was exceeded by 160%. Hewletts Creek did not meet the city-established performance measure for volume reduction again this year, but there were still 27 volume-reducing SCMs installed within the watershed. This has consistently been a trend that while there is a large amount of interest from homeowners, the projects installed are typically smaller rain gardens or rain barrels. The grant projects in the Bradley Creek Watershed have installed larger, commercial-scale practices, which is reflected by the success of the Bradley Creek measure. Unfortunately, the city performance measures were not able to be adjusted during FY21 despite having evidence of this trend. Staff will continue to advocate for an adjustment to the performance measures in future strategic plans. Overall, there was still progress towards reducing the hydrograph of both watersheds.

While the next 5 year assessment will not occur until September 2022, it can be seen through the annual assessment above, the increase in the number of projects installed, continued grant funding opportunities and partnerships, and the expanded media reach that the HOW Program continues to gain momentum towards achieving the volume reduction goals for Bradley Creek and Hewletts Creek.

## 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 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 plan update was Spring 2021. |

| **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 |
| 7/1/20 | Stormwater Services website | General public Website viewers | Stormwater Services | Updated Stormwater billing and rate information | www.wilmingtonnc.gov/stormwater |
| 7/14/20 | Stormwater Services website | General public Web viewers Social media followers | Communications Div. | News article - Clear Run Branch Drainage Improvement Project | www.wilmingtonnc.gov/stormwater |
| 8/1/20 | Stormwater Services website | General public Website viewers | Stormwater Services | Uploaded new Litter PSA on homepage | www.wilmingtonnc.gov/stormwater |
| 9/5/20 | Stormwater Services website | General public Website viewers | Stormwater Services | Updated images on Report Stormwater Pollution webpage | www.wilmingtonnc.gov/stormwater |
| 10/20/20 | Stormwater Services website | General public Website viewers | Stormwater Services | Updated the CIP Project Map on Projects webpage | www.wilmingtonnc.gov/stormwater |
| 9/16/20 | Stormwater Services website | General public Website viewers | Stormwater Services | Updated the Fall 2020 Schedule and other info on the Enviroscape webpage | www.wilmingtonnc.gov/stormwater |
| 11/1/20 | Stormwater Services website | General public Website viewers | Stormwater Services | Uploaded new NPDES Annual Report to Regulations webpage | www.wilmingtonnc.gov/stormwater |
| 1/28/21 | Stormwater Services website | General public Web viewers Social media followers | Communications Div. | News article - Monthly Rain Barrel Sale | www.wilmingtonnc.gov/stormwater |

| | | | | | |
|---|---|---|---|---|---|
| 3/25/21 | Stormwater Services website | General public Web viewers Social media followers | Communications Div. | News article - Turning a Lake from Green to Clean - Waterloop Podcast | www.wilmingtonnc.gov/stormwater |
| 4/1/21 | Stormwater Services website | General public Web viewers Social media followers | Communications Div. | Created brand new webpage dedicated to Stormwater CIP & Iin-House projects | www.wilmingtonnc.gov/stormwater |
| 5/7/21 | Stormwater Services website | General public Web viewers Social media followers | Communications Div. | News article - There is no Poop Fairy PSA | www.wilmingtonnc.gov/stormwater |
| 5/12/21 | Stormwater Services website | General public Website viewers | Stormwater Services | Updated Canines for Clean Water | www.wilmingtonnc.gov/stormwater |
| 5/15/20 | Stormwater Services website | General public Website viewers | Stormwater Services | Uploaded UNCW Water Quality Report to Publications webpage | www.wilmingtonnc.gov/stormwater |
| 5/31/21 | Stormwater Services website | General public Web viewers Social media followers | Communications Div. | Uploaded Stormwater Watch Newsletter | www.wilmingtonnc.gov/stormwater |
| 6/11/21 | Stormwater Services website | General public Web viewers Social media followers | Communications Div. | News article - Stormwater Watch Newsletter | www.wilmingtonnc.gov/stormwater |
| 6/10/21 | Stormwater Services website | General public Website viewers | Stormwater Services | Updated Contact Us page with new on-call info | 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 Watershed Presentations | All 8th Grade NHC Schools Science Classes | Stormwater Services CFRW NHSWCD | ZOOM virtual presentation 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. | 50 virtual presentations total: Fall - 20 classes, 520 students Spring - 30 classes, 732 students |
| 7/9/2020 | Stormwater Services General Informational Brochure | CFPUA Customers | Stormwater Services | All CFPUA customers are billed for Stormwater fees. CFPUA distributes 1500+ brochures annually. | 1500 Stormwater Brochures distributed to CFPUA customers |
| 7/23/2020 | Pet Waste Signage for Condo HOA | Wrightsville Green HOA | Stormwater Services | Provided signage to HOA to help address pet waste issue on private property | 4 pet waste signs distributed |

| | | | | | |
|---|---|---|---|---|---|
| 7/30/2020 | UNCW Good Neighbor Packets | UNCW Off Campus Students | Stormwater Services Stormwater Compliance | Pet Waste Brochure included in student welcome packets | 300 pet waste brochures distributed |
| 10/2/2020 | Pet Waste Educational Signs & Supplies | The Quad Apartment Complex | Stormwater Services | Pet Waste signage, brochures, and management packet distributed to apartment managers | 200 residents<br>105 educational items distributed |
| 10/10/2020 | LakeFest at Greenfield Lake (limited, socially-distanced event due to Covid 19) | General public | Stormwater Services | Litter Prevention Display and activity for attendees with educational stormwater giveaways provided to each participant. | 30 attendees<br>80 educational items distributed |
| 10/16/2020 | Targeted Mailing | Scotland Lane Homeowners | Stormwater Compliance | Compliance mailing to inform homeowners of proper yard waste disposal practices | 35 Yard Waste Disposal informational compliance letters mailed |
| 11/12/2020 | Landscaper Educational and Ordinance Mailing | Landscapers | Stormwater Services | Yard Waste ordinance compliance letter<br>Don't Blow It large posters in English & Spanish<br>General SWS brochure | 93 mailings<br>372 educational items distributed |
| 10/23/2020 | Stormwater Presentation for Civic Group | Cape Fear Roatary Club | Stormwater Services | Presented Stormwater 101 Powerpoint presentation/Q&A | 30 members |
| 11/12/2020 | Landscaper Educational and Ordinance Mailing | Landscapers | Stormwater Services | Yard Waste ordinance compliance letter<br>Don't Blow It large posters in English & Spanish<br>General SWS brochure | 93 mailings<br>372 educational items distributed |
| 2/24/2021 | Cape Fear Academy | 1st Grade Classes | Stormwater Services | Virtual Zoom presentation about the impacts of stormwater runoff and marine debris | 50 copies of Wendell the Duck Stormwater booklet sheets were distributed |
| 4/27/2021 | Lower Cape Fear Earth Day Celebration - virtual this year | Virtual festival attendees, general public | Stormwater Services (SWS is an annual sponsor of the Lower Cape Fear Earth Day Festival) | Information about stormwater and our major sponsorship posted on social media.<br>Tour of SWDS led by intern and HOW Staff. | Online event. |
| 6/15/2021 | Pet Waste Signage & Supplies for Condo HOA | Wrightsville Green HOA | Stormwater Services | Provided signage and supplies to HOA to help address pet waste issue on private property | 1 pet waste sign, 40 pet waste brochures, 20 yellow flags, 30 roll bags distributed |
| 6/17/2021 | Pet Waste Signage & Supplies for Condo HOA | Aspire 349 Apartment Complex, Ben Smith- Mgr. | Stormwater Services | Provided signage and supplies to apartment complex to help address pet waste issue on private property | 4 pet waste signs, 50 pet waste brochures, 5 posters, 25 yellow flags, and Pet Waste Manager's Toolkit. |

| | | | | | |
|---|---|---|---|---|---|
| 6/30/2021 | 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 | 450+ 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 | 28 calls were placed to the City's Stormwater hotline, 11 online webform reports were submitted, and 641 direct emails and 54 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. |

## BMP h. Implement Public Education & Outreach Program.

***Media Advertising Campaigns***

| | | | | | |
|---|---|---|---|---|---|
| 9/7/20-11/22/20 | WECT-TV6 website, digital, mobile and targeted ad campaign | General public Mobile, digital, and web viewers | Stormwater Services | Yard Waste & SW Animations PSA videos and ads ran on digital, mobile, and social media outlets.<br><br>Ad Content: "This Storm Season Remember…The Drain is For Rain!" | Target Audience: General public, Landscapers, Residents<br>Ads Served:<br>• 51,014 Pre-roll video ads with 78.5% View Thru Rate<br>• 249,615 Targeted display banner ads<br>• 225,000 social media posts (FB) - 556,896 Facebook Ads Served with 424 Total |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | Engagements<br>Total cost: $4750 |
| 9/14/20 - 10/11/20 | Lamar Digital Billboard Advertising | Motorists Pedestrians | Stormwater Services | "This Storm Season, Remember, the Drain is Only for Rain"<br>Yard Debris pollution digital billboards - 6100 Oleander Drive and 706 S. College Road & Fountain Drive. | Target Audience: General public<br>Reach: Motorists<br>Frequency: Rotating billboard shown for 8 seconds every minute 24/7 using rotating billboard locations<br>Ads Served: 86,400<br>Total cost: $2000 |
| 4/1/21 - 5/31/21 | Port City Daily/Local Voice Wilmington | Radio & Digital viewers | Stormwater Services | Digital Advertising Litter/Pandemic Waste/Sea Turtle Prevention Campaign<br><br>Leaderboard & Side Banner on Homepage and Local News with link thru to Stormwater Education webpage. Also free ads posted on Brews & Bites and Obits sidebars | Target Audience: General public<br>Reach: 239,575 impressions<br>Click Thrus: 192<br>Ads Served: 60<br>Unique Users Annually: 4,966,597<br><br>Total cost: $2,200 |
| 3/15/21 - 5/15/21 | WECT-TV6 website, digital, mobile and targeted ad campaign | General public Mobile, digital, and web viewers | Stormwater Services | Litter/Pandemic Waste/Sea Turtle PSA and click thru ads ran on digital, mobile, and social media outlets.<br><br>Ad Content: "Remember stormwater runoff is not treated. Don't let our litter become their problem" | Target Audience: General public, Landscapers, Residents<br>Ads Served: 755,260 Total Ads<br>• 24,995 Pre-roll video ads with 89.56% View Thru Rate<br>• 184,786 Targeted display banner ads<br>• 4,001 News App Interstitial banners<br>• 541,478 social media posts (Insta & FB)<br>Total cost: $4750 |
| 4/5/21-5/5/21 | Lamar Digital Billboard Advertising | Motorists Pedestrians | Stormwater Services | Litter/Turtle Billboard - Don't Let Our Litter Become Their Problem.<br><br>Two larger billboard locations were used for this campaign: Oleander Drive and Market St. | Target Audience: General public<br>Reach: Motorists<br>Frequency: Rotating billboard shown for 8 seconds every minute 24/7 using rotating billboard locations<br>Ads Served: 86,400<br>Total cost: $4000 |

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| 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***

| | | | | | |
|---|---|---|---|---|---|
| 1/7/20 | Port City Daily | Online newspaper readers Radio listeners | Port City Daily staff | Online newspaper article - Don't Go Near the Water: Concerning Fecal Coliform Bacteria Levels in Bradley Creek Watershed Branch | 920,000 unique website users annually |
| 8/20/20 | WWAY-TV3 | TV News Online website | WWAY Reporter | TV News, website, social media outlets - One Year After Dogs Die from Poison Pond, Owner Reacts to City-Installed Warning Signs | Stats unavailable. |
| 9/11/20 | WECT-TV6 | Online newspaper readers Radio listeners | WECT News reporter | Print and online newspaper article - Don't Go Near the Water: Concerning Fecal Coliform Levels in Bradley Creek Watershed Branch | Stats: -190, 390 households served -3.67 million monthly page views -2.92 million page views in mobile news app |
| 9/15/20 | Port City Daily | Online newspaper readers Radio listeners | Port City Daily staff | Online newspaper article - Unable to Reach Agreement with Homeowners, Wilmington Eyes Eminent Domain for Stormwater Improvements | 920,000 unique website users annually |
| 9/15/20 | Port City Daily | Online newspaper readers Radio listeners | Port City Daily staff | Online newspaper article - NC State Looking at Wilmington's Greenfield Lake for State-Funded 'Floating Wetland Islands' project | 920,000 unique website users annually |
| 9/30/20 | WECT-TV6 | Online newspaper readers Radio listeners | WECT News reporter | Print and online newspaper article - Project to Alleviate Flooding on a Busy Wilmington Road Moves Forward | Stats: -190, 390 households served -3.67 million monthly page views -2.92 million page views in mobile news app |

***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. | 35,000 Facebook Followers<br>30,100 Instagram Followers<br>36,700 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 (ie 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 |
| 7/23/2020 | Pet Waste Signage for Condo HOA | Wrightsville Green HOA | Stormwater Services | Provided signage to HOA to help address pet waste issue on private property | 4 pet waste signs distributed |
| 7/30/2020 | UNCW Good Neighbor Packets | UNCW Off Campus Students | Stormwater Services Stormwater Compliance | Pet Waste Brochure included in student welcome packets | 300 pet waste brochures distributed |
| 10/2/2020 | Pet Waste Educational Signs & Supplies | The Quad Apartment Complex | Stormwater Services | Pet Waste signage, flags, brochures, and management packet distributed to apartment managers | 200 residents<br>105 educational items distributed |
| 10/10/2020 | LakeFest at Greenfield Lake (socially-distanced event due to Covid 19) | General public | Stormwater Services | Litter Prevention Display and activity for attendees with educational stormwater giveaways provided to each participant. | 30 attendees<br>80 educational items distributed |
| 2/24/2021 | Cape Fear Academy | 1st Grade Classes | Stormwater Services | Virtual Zoom presentation about the impacts of stormwater runoff and marine debris | 50 copies of Wendell the Duck Stormwater booklet sheets were distributed |
| 6/15/2021 | Pet Waste Signage & Supplies for Condo HOA | Wrightsville Green HOA | Stormwater Services | Provided signage and supplies to HOA to help address pet waste issue on private property | 1 pet waste sign, 40 pet waste brochures, 20 yellow flags, 30 roll bags distributed |
| 6/17/2021 | Pet Waste Signage & Supplies for Condo HOA | Aspire 349 Apartment Complex, Ben Smith- Mgr. | Stormwater Services | Provided signage and supplies to apartment complex to help address pet waste issue on private property | 4 pet waste signs, 50 pet waste brochures, 5 posters, 25 yellow flags, and Pet Waste Manager's Toolkit. |

| | | | | | |
|---|---|---|---|---|---|
| 4/25/2020 | Lower Cape Fear Earth Day Celebration - virtual this year | Virtual festival attendees, general public | Stormwater Services (SWS is an annual sponsor of the Lower Cape Fear Earth Day Festival) | Information about stormwater and the Stormwater Demonstration Site. | Online participants. |
| Fall 2020 & Spring 2021 semesters | 8th Grade Enviroscape Watershed Presentations | All 8th Grade NHC Schools Science Classes | Stormwater Services CFRW NHSWCD | ZOOM virtual presentation 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. | 50 virtual presentations total: Fall - 20 classes, 520 students Spring - 30 classes, 732 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 Services GTV-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<br>Rain Barrel slides<br>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 slides<br>Rain Barrel slides<br>Stormwater Basics PSA | Employees and visitors to CFPUA offices |

***Brochures, Displays, Signs, Welcome Packets, Pamphlets***

| | | | | | |
|---|---|---|---|---|---|
| Ongoing Enforcement 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. |
| 7/1/20 | 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 2021 | 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 Clear Run Branch project, Compliance Officers, HOW cistern | 44,000+ newsletters mailed to city residents |

***Grant Projects***

| | | | | | |
|---|---|---|---|---|---|
| CWMTF Grant - Floating Wetland Treatment Islands in | 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. |

| | | | | | |
|---|---|---|---|---|---|
| GFLake (NCSU) | | | | | |
| EPA 319 CFRW Grant for Jumping Run Branch tributary of Greenfield Lake (Phase 1) | Greenfield Lake | Stormwater Services<br>CFRW<br>UNCW<br>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 slated thru 2022. |
| EPA 319 Grant for Bradley Creek | Bradley Creek | Stormwater Services<br>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. |
| Ongoing | Watershed restoration plan for Hewletts and Bradley Creeks, now being implemented by Watershed Coordinator | Hewletts & Bradley Creek watershed residents and businesses | Partners:<br>Stormwater Services<br>NC Coastal Federation<br>Town of Wrightsville Beach<br>Withers and Ravenal<br>UNCW | 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, government, NGOs | Stormwater Education Program Manager | Participation in collaborative meeting | Ongoing |

***Employee Trainings***

| | | | | | |
|---|---|---|---|---|---|
| 4/14/2021 | IDDE/Stormwater Presentation for Downtown Code Compliance | Code Compliance | Compliance Officer | Illicit Discharge Detection & Elimination Training | 7 attendees |
| 4/23/2021 | Post Construction Inspection Presentation for Engineering staff | Engineering Staff | Compliance Officer | Illicit Discharge Detection & Elimination Training | 5 attendees |
| 4/14/2021 | IDDE/Stormwater Presentation for Downtown Code Compliance | Engineering Staff | Compliance Officer | Illicit Discharge Detection & Elimination Training | 8 attendees |

***Weekly Update Articles for City Council / City Staff / Media***

| | | | | | |
|---|---|---|---|---|---|
| Weekly | Weekly Email Update | City Council<br>Employees<br>Media | Various city staff | Weekly update of city news, events, projects, etc. | Stormwater information was included in 17 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 15 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

Spring 2021

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# 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,
- 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 or to ask questions related to stormwater.

- Promote an online mechanism for public involvement for citizens to provide input on stormwater issues and the stormwater program.

**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<br>• Illicit Discharges<br>• Residential | • Public Education & Outreach<br>• Watershed Coordinator<br>• IDDE / Stormwater Compliance |

| | | |
|---|---|---|
| | • Pet Owners, Pet Businesses<br>• Schools<br>• Bradley and Hewletts Creek Private Property Owners | |
| Nutrients / Yard Waste | • Sewer Overflows<br>• Urbanization<br>• Residential Commercial - Landscapers Golf Courses Construction Schools | • Public Education & Outreach<br>• Watershed Coordinator<br>• IDDE / Stormwater Compliance<br>• Construction Site Runoff Control<br>• Post-Construction Site Runoff Control<br>• Good Housekeeping & Pollution Prevention |
| Litter | • Residential<br>• Commercial<br>• Schools | • Public Education & Outreach<br>• Watershed Coordinator<br>• Public Involvement/Participation<br>• IDDE / Stormwater Compliance |
| Sediment | • Residential<br>• Commercial – Landscapers Pressure Washers Cleaning Businesses<br>• Municipal Operations<br>• Schools | • Construction Site Runoff Control<br>• IDDE / Stormwater Compliance<br>• Pollution Prevention & Good Housekeeping<br>• Public Education & Outreach<br>• Watershed Coordinator |
| Chemicals / Improper Disposal of Waste | • Residential<br>• Commercial – Landscapers Pressure Washers Cleaning Businesses Construction<br>• Municipal Operations<br>• Schools | • IDDE / Stormwater Compliance<br>• Pollution Prevention & Good Housekeeping<br>• Construction Site Runoff Control<br>• Public Education & Outreach |
| Illicit Discharge | • Residents<br>• Businesses<br>• Industry<br>• Municipal Operations | • IDDE / Stormwater Compliance<br>• Pollution Prevention & Good Housekeeping<br>• Public Education & Outreach |
| Illegal dumping | • Residents<br>• Businesses<br>• Industry<br>• Municipal Operations | • Public Education & Outreach<br>• IDDE / Stormwater Compliance |
| General non- point source pollution | • Residential<br>• Commercial<br>• Schools<br>• Municipal Operations | • Public Education & Outreach<br>• IDDE / Stormwater Compliance<br>• 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. 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. 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.

**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.

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 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. Greenfield Lake has experienced all of these issues in the past. 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 includes 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.

**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 wash water 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 wash water 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, Stray/Feral/Wild 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 Management, 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.
- 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.
- 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:**<br><br>A pet owner has the power to reduce bacteria in runoff by cleaning up after their pet regularly.<br><br>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<br>• Schools – include pet waste/bacterial education in Enviroscape 8th Grade watershed education presentations<br>• Canines for Clean Water outreach program for pet owners to sign clean water pledge<br>• Host Super Pooper Scooper photo booth to educate pet owners in a fun and interactive way<br>• Participate in local pet-related events to provide direct education to pet owners and distribute pet waste brochures and fliers<br>• Post the City's Pet Waste Ordinance signs on the city's pet waste stations<br>• 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<br>• Implement media/social media campaigns to educate the public about the dangers of uncollected pet waste, city's ordinance, and simple solutions<br>• Include information in the citywide newsletter<br>• Post outreach messages on stormwater website and GTV<br>• Compliance Officers - utilize enforcement actions and fines when necessary for violations of the city's pet waste ordinance<br>• Compliance Officers provide educational direct contact on site with the pet owners |

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| | • Encourage community participation in storm drain marking program<br>• Outreach/education and BMP installations to reduce bacteria via the Heal Our Waterways Program<br>• Direct mail enforcement letter and pet waste brochure to neighborhoods with complaints or identified pet waste problem<br>• Promote Stormwater Pollution Prevention Hotline & Web Reporting Tool to the public |
| **Pet-Related Businesses:**<br><br>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.<br><br>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.)<br>• Encourage businesses to post the pet waste educational poster and/or materials for customers to view<br>• 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 –**<br><br>Apartment complexes often experience problems with uncollected pet waste on their property due to the large number of inhabitants on the property.<br><br>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<br>• Encourage management to be make it easy for their residents to manage pet waste by installing pet waste receptacles around the property<br>• Encourage management to post the pet waste education signage, large format poster, or brochure in common areas for their residents to view<br>• 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, pine straw) 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.
- Grass cycle! 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, grass cycling, 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.
- 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** |
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| **Residents:**<br><br>Many citizens improperly apply fertilizer and/or blow yard waste into the street or storm drain.<br><br>This target audience is primarily male residents that self-apply fertilizer and manage yard waste disposal.<br><br>Also target households that hire landscaping companies to maintain their property. | • Educate citizens about nutrient pollution and the City's yard waste ordinance using a variety of methods<br>• Distribute fertilizer and yard waste education materials during presentations and special events<br>• Schools – include nutrient education in Enviroscape 8th Grade watershed education presentations<br>• Utilize mass media/social media campaigns to inform residents about proper fertilization, proper yard waste disposal methods, grass cycling, composting, collecting yard waste for pick-up, and the improper disposal of yard waste<br>• Include information in the citywide newsletter<br>• Post outreach messages on stormwater website and GTV<br>• Encourage community participation in storm drain marking program<br>• Promote stormwater pollution prevention hotline<br>• Compliance Officers - utilize enforcement actions and fines when necessary violations of the city's pet waste ordinance<br>• Compliance Officers provide educational direct contact on site with landscapers and property owners<br>• Encourage community participation in storm drain marking program |

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| | • Promote Stormwater Pollution Prevention Hotline & Web Reporting Tool to the public |
| **Landscaping Companies:**<br><br>Landscaping and turf maintenance companies frequently use fertilizers and produce a significant amount of yard waste on a regular basis.<br><br>Employees in this field of work are often male.<br>Outreach efforts should include Spanish translation materials. | • Post outreach materials in English and Spanish on stormwater website<br>• Distribute large format education poster about yard waste disposal to landscaping companies, available in both English and Spanish, to post for employees<br>• Emphasize proper staff training on practices like fertilization application and yard waste disposal<br>• Compliance Officers - utilize enforcement actions and fines when necessary violations of the city's pet waste ordinance<br>• 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** |
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| **General Public & Youth:**<br><br>Litter habits cannot be confined to a particular demographic in most cases. Therefore, targeting the general public is advisable.<br><br>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).<br>• Distribute litter education materials during presentations and special events<br>• Schools – include litter education in Enviroscape 8th Grade watershed education presentations<br>• Utilize mass media/social media campaigns to inform residents about the litter problem and solutions<br>• Post outreach messages on stormwater website and GTV<br>• Emphasize easy solutions to littering - using trash or recycling receptacles<br>• Promote the 5 R's: Reduce, Reuse, Recycle, Refuse, Repurpose<br>• Promote North Carolina's Swat-a-Litterbug Program<br>• Include information in the citywide newsletter<br>• Encourage community participation in storm drain marking program<br>• Promote Stormwater Pollution Prevention Hotline & Web Reporting Tool to the public<br>• Compliance Officers - utilize enforcement actions and fines when necessary<br>• Compliance Officers provide educational direct contact on site with landscapers, developers, and property owners |
| **Smokers:**<br><br>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)<br>• Post outreach materials on stormwater website and GTV<br>• Distribute pocket ashtrays at public events |
| **Motorists and Pedestrians:**<br>Along roadways, motorists (52%) and pedestrians (23%) are the largest contributors of litter. Target males and females. | • Educate citizens about North Carolina's Swat-A-Litterbug Program<br>• Remind motorists about the proper disposal of trash by displaying educational signs on public transportation vehicles (i.e. Wave Transit buses)<br>• Involve authorities in holding offenders responsible |

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| | • 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** |
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| **General Public/Homeowners:**<br><br>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<br>• Distribute education materials during presentations and special events<br>• Schools – include sediment education in Enviroscape 8th Grade watershed education presentations<br>• Utilize mass media/social media campaigns to inform residents about the sedimentation issues<br>• During HOA or community presentations, encourage homeowners to plant vegetation or apply mulch to anchor soil in place and prevent erosion<br>• Post outreach messages on stormwater website and GTV<br>• Encourage waterfront property owners to plant vegetative buffers or living shorelines.<br>• The public should be made aware of the City's yard waste ordinance which also addresses sediment<br>• Include information in the citywide newsletter<br>• Encourage community participation in storm drain marking program<br>• Utilize enforcement actions when necessary for violators of yard waste ordinance (sediment) ordinance<br>• Promote the State's STOP MUD Hotline: 1-866-STOP-MUD<br>• 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<br>• Post outreach materials on stormwater website and GTV |

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

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| | • Promote Stormwater Pollution Prevention Hotline & Web Reporting Tool to the public |
| **Pressure Washers, Mobile Detailers, Equipment Cleaning Businesses:**<br><br>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<br>• Post outreach materials on stormwater website and GTV |
| **Landscape/Turf Maintenance Professionals:**<br><br>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<br>• Promote BMP & Rain Garden certification programs<br>• Promote the installation of native plants to reduce pesticide use |
| **Restaurants:**<br><br>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<br>• Make available the "Business Friendly Checklist" so businesses can see if they're utilizing stormwater-friendly practices<br>• Encourage employee training on proper wash water disposal practices, proper chemical use and disposal, grease traps, etc.<br>• Mark storm drains near restaurants<br>• Give presentation to restaurant association |
| **Assessment & Evaluation** | |
| • Conduct a survey of restaurants to gauge compliance with local stormwater ordinances and stormwater-friendly practices<br>• Assess and evaluate local water quality utilizing UNCW Center for Marine Science annual water quality reporting, specifically focusing on illicit discharge tested locations<br>• Periodically assess the pesticide application habits of homeowners and landscape professionals by:<br>- Direct observation of pesticide application habits of homeowners and landscape professionals<br>- 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 wash water. 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 wash water, or set up a self-containment and capture system for the wash water.
- 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 car washing 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**<br><br>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.<br><br>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.<br><br>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<br>• Distribute education materials during presentations and special events<br>• 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<br>• Schools – include vehicle pollution education in Enviroscape 8th Grade watershed education presentations<br>• Utilize mass media/social media campaigns to inform residents about the vehicle pollution issues<br>• Post outreach messages on stormwater website and GTV<br>• Include information in the citywide newsletter<br>• Encourage community participation in storm drain marking program<br>• Utilize enforcement actions when necessary for violators of illicit discharge ordinance<br>• 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.

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## 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 |
|---|---|---|---|---|---|
| Many Public Involvement & Participation events/activities were cancelled in Summer & Fall 2020 due to Covid-19 stay at home orders, including school being cancelled for the remainder of the year. Virtual events and activities were scheduled where appropriate and safe. | | | | | |

### 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.<br><br>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.<br><br>211 volunteers contributed a total of 412 volunteer hours<br><br>Collected:<br>-24 (96-gallon) bins of trash<br>-17.25 (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:<br>CFRW<br>NHSWCD<br>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:<br>26 storm drains marked, utilizing 17 volunteers and placing 100 educational doorhangers in the SeaSpray Drive neighborhood.<br>NHSWCD: 0 drains marked (new staff) |

***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.<br>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.<br><br>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<br>NHSWCD<br>RainBarrelUSA | Stormwater runoff reduction, watershed and water conservation education to rain barrel sale attendees. | 130 total rain barrel sales this fiscal year |

***Community Events / Educational Programs for the Public***

| | | | | | |
|---|---|---|---|---|---|
| Fall 2020 & Spring 2021 semesters | 8th Grade Enviroscape Watershed Presentations | All 8th Grade NHC Schools Science Classes | Stormwater Services<br>CFRW<br>NHSWCD | ZOOM virtual presentation 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. | 50 virtual presentations total:<br>Fall - 20 classes, 520 students<br>Spring - 30 classes, 732 students |
| 7/23/2020 | Pet Waste Signage for Condo HOA | Wrightsville Green HOA | Stormwater Services | Provided signage to HOA to help address pet waste issue on private property | 4 pet waste signs distributed |
| 7/30/2020 | UNCW Good Neighbor Packets | UNCW Off Campus Students | Stormwater Services<br>Stormwater Compliance | Pet Waste Brochure included in student welcome packets | 300 pet waste brochures distributed |

| | | | | | |
|---|---|---|---|---|---|
| 10/2/2020 | Pet Waste Educational Signs & Supplies | The Quad Apartment Complex | Stormwater Services | Pet Waste signage, flags, brochures, and management packet distributed to apartment managers | 200 residents 105 educational items distributed |
| 10/10/2020 | LakeFest at Greenfield Lake (socially-distanced event due to Covid 19) | General public | Stormwater Services | Litter Prevention Display and activity for attendees with educational stormwater giveaways provided to each participant. | 30 attendees 80 educational items distributed |
| 6/15/2021 | Pet Waste Signage & Supplies for Condo HOA | Wrightsville Green HOA | Stormwater Services | Provided signage and supplies to HOA to help address pet waste issue on private property | 1 pet waste sign, 40 pet waste brochures, 20 yellow flags, 30 roll bags distributed |
| 6/17/2021 | Pet Waste Signage & Supplies for Condo HOA | Aspire 349 Apartment Complex, Ben Smith- Mgr. | Stormwater Services | Provided signage and supplies to apartment complex to help address pet waste issue on private property | 4 pet waste signs, 50 pet waste brochures, 5 posters, 25 yellow flags, and Pet Waste Manager's Toolkit. |
| 3/20/2021 | WaterLoop Podcast Interview | General public | Stormwater Services CFRW UNCW | Topic: Turning a Lake from Green to Clean | Audience numbers unknown |
| Ongoing | Pet Waste Tidy Bag Pet Dispensers & Educational Signage | Pet owners | Stormwater Services | Supplement to signage program. Compliance officer distributes bag dispensers to pet owners to encourage pick up and proper disposal | 351 tidy bag pet waste dispensers purchased |

***Citizen Contacts***

| | | | | | |
|---|---|---|---|---|---|
| Ongoing/ regularly | Stormwater office via phone, email or walk-in | Citizens/ Businesses | Stormwater Services | Responses to requests for information, literature, etc. | 14 contacts. Information provided regarding specific nature of contact |

## BMP b. Mechanism for Public involvement

***Public Notices, Public Meetings & Community Input***

| | | | | | |
|---|---|---|---|---|---|
| 7/31/2020 | Targeted Doorhanger notice | Residents and businesses affected by the Scotland Lane project | Stormwater Services | Project info notice distributed to local residents in advance of project work | 34 doorhangers |

| | | | | | |
|---|---|---|---|---|---|
| Sept. 2020 | Face-to-face meeting with property owners. | Residents and businesses impacted by New Orleans Place project | Stormwater Services | Meeting with property owners in the project area. | 3 meetings |
| 12/1/2020 | Face-to-face meetings with property owners. | Residents and businesses impacted by Greenville White project | Stormwater Services | Meetings with property owners in the project area. | 6 meetings |
| August - November 2020 | Targeted Mailings | Residents and businesses impacted by Emergency Watershed Protection (EWP) projects | Stormwater Services | Targeted mailings to property owners the 7 different project areas. | 345 mailings |
| 1/2/2021 | Targeted Mailings | Residents and businesses impacted by the Red Cross St. Project | Stormwater Services | Meetings with property owners in the project area. | 35 mailings |
| 4/5/2021 | Face-to-face meetings with property owners. | Residents and businesses impacted by Brookshire/Beasley project | Stormwater Services | Meetings with property owners in the project area. | 5 meetings |
| 5/1/2021 | Face-to-face meetings with property owners. | Residents and businesses impacted by Wisteria/Clearbrook project | Stormwater Services | Meetings with property owners in the project area. | 2 meetings |
| 6/2/2021 | Face-to-face meetings with property owners. | Residents impacted by Clear Run Branch Project | Stormwater Services | Meeting with property owners in the project area. | 20 meetings |
| Posted online until projects were completed | Florence Recovery Project Tracking Map | All city residents | Stormwater Services | Interactive public map posted for citizens to view sidewalk, stormwater, and street repair projects post-Hurricane Florence. | Online map in the city's GIS Website Gallery |

## 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.

| | | | | | |
|---|---|---|---|---|---|
| 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 | 28 calls were placed to the City's Stormwater hotline, 11 online webform reports were submitted, and 641 direct emails and 54 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. |

# Cumulative Year End Contract Agency Reports

FY 20-21

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

## Quarterly Progress Report #4: April 1 – June 30, 2021

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, 2020** through **June 30, 2021** 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)**

### October 1 – December 31, 2020

| **8th Grade Enviroscape Presentations** | | | | |
|---|---|---|---|---|
| **Date** | **School / Teacher** | **Grade** | **# of presentations** | **# of students** |
| 10/13/20 | Murray Middle / Chris Courie | 8th | 1 | Mock Presentation |
| 11/30/20 | Trask Middle / Lauren Bennett | 8th | 4 | 106 |
| 12/1/20 | Trask Middle / Kristin Connell | 8th | 2 | 59 |

| 8th Grade Enviroscape Presentations – ZOOM Enviroscape Supervisor / Hosting | | | |
|---|---|---|---|
| **Date of Hosting** | **Name of Host / Agency** | **Teacher / School Name** | **Class Timespan Hosted** |
| 11/30/20 | Kay Lynn Hernandez / CFRW | Lauren Bennett / Trask Middle | 8:45 – 9:40am |
| 11/30/20 | Kay Lynn Hernandez / CFRW | Lauren Bennett / Trask Middle | 9:50 – 10:45am |
| 12/1/20 | Kay Lynn Hernandez / CFRW | Kristin Connell / Trask Middle | 8:45 – 9:40am |
| 12/1/20 | Kay Lynn Hernandez / CFRW | Kristin Connell / Trask Middle | 9:50 – 10:45am |
| 12/1/20 | Kay Lynn Hernandez / CFRW | Kristin Connell / Trask Middle | 10:55 – 11:50am |
| 12/1/20 | Kay Lynn Hernandez / CFRW | Kristin Connell / Trask Middle | 12:00 – 12:55pm |

Enviroscape Host Training – October 5th and 7th, 2020 and November 16th, 2020

## January 1 – March 31, 2021

| 8th Grade Enviroscape Presentations | | | | |
|---|---|---|---|---|
| **Date** | **School / Teacher** | **Grade** | **# of presentations** | **# of students** |
| 2/11/2021 | International School at Gregory / Jennifer Booth | 8th | 2 | 41 |
| 3/30/2021 | Myrtle Grove MS / Kate Supak & Chanda Wynne | 8th | 2 | 85 |

| 8th Grade Enviroscape Presentations – ZOOM Enviroscape Supervisor / Hosting | | | |
|---|---|---|---|
| **Date of Hosting** | **Name of Host / Agency** | **Teacher / School Name** | **Class Timespan Hosted** |
| 3/29/2021 | Kay Lynn Hernandez/CFRW | Patrick Holder/Myrtle Grove | 11:15am – 12:50pm |
| 3/29/2021 | Kay Lynn Hernandez/CFRW | Patrick Holder/Myrtle Grove | 2:40 – 3:40pm |

Virtual Enviroscape scheduling and update meeting – 2/18/21

## April 1 – June 30, 2021

| 8th Grade Enviroscape Presentations | | | | |
|---|---|---|---|---|
| **Date** | **School / Teacher** | **Grade** | **# of presentations** | **# of students** |
| 4/22/2021 | Roland Grise Middle School / Stephanie Titzel & Will McKibben | 8th | 2 | 117 |
| **Other Enviroscape Presentations** | | | | |
| **Date** | **School / Group / Event** | **Grade** | **# of presentations** | **# of attendees** |
| 6/22/2021 | Sea Turtle Camp | 9th - 12th | 1 | 15 |

| 8th Grade Enviroscape Presentations – ZOOM Enviroscape Supervisor / Hosting | | | |
|---|---|---|---|
| **Date of Hosting** | **Name of Host / Agency** | **Teacher / School Name** | **Class Timespan Hosted** |
| 4/21/2021 | Kay Lynn Hernandez / CFRW | Molly Philippbar / Roland Grise Middle School | 11:00am – 11:55am |
| 4/21/2021 | Kay Lynn Hernandez / CFRW | Molly Philppbar / Roland Grise Middle School | 12:45pm – 1:35pm |
| 4/22/2021 | Kay Lynn Hernandez / CFRW | Stephanie Titzel & Will McKibben / Roland Grise Middle School | 11:00am – 11:55am |
| 4/22/2021 | Kay Lynn Hernandez / CFRW | Stephanie Titzel & Will McKibben / Roland Grise Middle School | 12:45pm – 1:35pm |

**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, 2020

| **First Saturday Seminars** | | | |
|---|---|---|---|
| **Date** | **Topic** | **Speaker** | **Attendance** |
| 8/1/2020 | Stormwater Mitigation (Virtual due to COVID-19) | Bill Hunt | 47 |
| 9/5/2020 | Environmental Justice (Virtual due to COVID-19) | Sherri White Williams | 31 |
| **Other Presentations by CFRW Staff** | | | |
| **Date** | **Organization/Audience** | **Topic / Speaker** | **Attendance** |
| 8/1/2020 | UNCW Island Ecology Class (Virtual due to COVID-19) | CFRW/Kay Lynn Hernandez | 55 |
| 8/27/2020 | NAACP (Virtual due to COVID-19) | Civic Engagement Program/Audrey Dunn | 40 |
| 8/28/2020 | Dark Waters Film Screening (Virtual due to COVID-19) | PFAS/Dana Sargent | 28 |
| 8/30/2020 | UNCW Environmental Conservation Class (Virtual due to COVID-19) | CFRW/Kay Lynn Hernandez | 45 |
| 9/3/2020 | Revisioning Recovery and Film screening (Virtual due to COVID-19) | Environmental Justice/Audrey Dunn | 40 |
| **Greenfield Lake Eco-Tours & Paddle Tours on Creeks** | | | |
| **Date** | **Group Served/Audience** | **Type of Tour /Topic / Location / Speaker** | **Attendance** |
| 7/9/2020 | Giggles Day Care | Walking Eco Tour/Stormwater, plants and animals/Greenfield Lake/Kay Lynn Hernandez | 8 |
| 7/15/2020 | Noah's Ark Day Care | Walking Eco Tour/Stormwater, plants and animals/Greenfield Lake/Kay Lynn Hernandez | 10 |
| 7/27/2020 | Private Citizens | Paddling Eco Tour/Stormwater, history, flora and fauna/Greenfield Lake/Kay Lynn Hernandez | 3 |
| 9/20/2020 | Homeschool Group/Students | Walking Eco Tour/Stormwater, plants and animals/Greenfield Lake/Kay Lynn Hernandez | 8 |
| 9/28/2020 | Private Citizens | Paddling Eco Tour/Stormwater, history, flora and fauna/Greenfield Lake/Kay Lynn Hernandez | 2 |
| 9/30/2020 | Private Citizens | Paddling Eco Tour/Stormwater, history, flora and fauna/Greenfield Lake/Kay Lynn Hernandez | 2 |
| 9/30/2020 | Private Citizens (Virtual due to COVID-19) | Virtual Eco Tour/ Stormwater, history, flora and fauna/Greenfield Lake/Kay Lynn Hernandez | 16 |

## October 1 - December 31, 2020

| **First Saturday Seminars (Virtual due to COVID-19)** | | | |
|---|---|---|---|
| **Date** | **Topic** | **Speaker** | **Attendance** |
| 10/5/2020 | History of Masonboro Island | Lloyd Singleton | 17 |
| 11/7/2020 | Story of an Urban Stream | Amy McClane | 36 |
| 12/8/2020 | Designing home garden | Kate Cardemone | 28 |

| Other Presentations by CFRW Staff (Virtual due to COVID-19) | | | |
|---|---|---|---|
| **Date** | **Organization/Audience** | **Topic / Speaker** | **Attendance** |
| 10/1/2020 | OLLI/Students | Water Quality in CF Basin/Kemp Burdette | 50 |
| 11/15/2020 | CFRW/Members | Water Quality in CF Basin/Kemp Burdette | 30 |
| **Greenfield Lake Eco-Tours & Paddle Tours on Creeks** | | | |
| **Date** | **Group Served/Audience** | **Type of Tour /Topic / Location / Speaker** | **Attendance** |
| 10/12/2020 | Private Citizens | Paddling Eco Tour/Stormwater, history, flora and fauna/Greenfield Lake/Kay Lynn Hernandez | 5 |
| 10/13/2020 | Men's Club | Paddling Eco Tour/Stormwater, history, flora and fauna/Greenfield Lake/Kay Lynn Hernandez | 12 |
| 10/14/2020 | Private Citizens | Paddling Eco Tour/Stormwater, history, flora and fauna/Greenfield Lake/Kay Lynn Hernandez | 2 |
| 10/24/2020 | LakeFest/Community members | Walking Eco Tour of Greenfield Lake/Kay Lynn Hernandez | 7 |
| 10/27/2020 | Men's Club | Paddling Eco Tour/Stormwater, history, flora and fauna/Greenfield Lake/Kay Lynn Hernandez | 14 |
| 11/7/2020 | Archie Blue EJ event/Citizens | Smith Creek/Kemp Burdette | 12 |
| 12/31/2020 | Private Citizens (Virtual due to COVID-19) | Virtual Eco Tour/ Stormwater, history, flora and fauna/Greenfield Lake/Kay Lynn Hernandez | 78 |

***Kerr Ave. Outreach, 11/11/2020***

Brochures distributed to:

Kure CBD + Vape, Harris Teeter, McDonalds, 2.50 cleaners, Rochelle's Hair Studio, Apple Annie's, Long Island Deli, Asian Healing Massage, Asian Market, Wilmington Furniture Co., Ethan Allen, Mani Q Spa, Chili's, A Good Night Sleep Store, Buffalos, A Helping Hand of Wilmington, K&K Pet Grooming, S&S Tobacco &Vape Discount Cigarettes, Rhythm & Blues Tattoo, Exotic Hemp Co, Jae's Alterations

## January 1 - March 31, 2021

| First Saturday Seminars (Virtual due to COVID-19) | | | |
|---|---|---|---|
| **Date** | **Topic** | **Speaker** | **Attendance** |
| 2/7/2021 | Eagles Island | Roger Shew | 229 |
| 3/8/2021 | Growing Organically | Kyle Stenerson | 45 |
| **Other Presentations by CFRW Staff (Virtual due to COVID-19)** | | | |
| **Date** | **Organization/Audience** | **Topic / Speaker** | **Attendance** |
| 1/26/2021 | Island Wildlife Group / Community Members | Env. Issues of the CFR / Kemp Burdette | 100 |
| 2/12/2021 | Coastal Land Trust Little Lunch Lecture Series/Community Members | Greenfield Lake / Kay Lynn Hernandez | 105 |
| 3/23/2021 | Waterloop Podcast / Community Members | Greenfield Lake / Dana Sargent | 26 |
| **Greenfield Lake Eco-Tours & Paddle Tours on Creeks** | | | |
| **Date** | **Group Served/Audience** | **Type of Tour /Topic / Location / Speaker** | **Attendance** |
| 12/31/2020 | Private Citizens (Virtual due to Covid-19) | Virtual Eco Tour/ Stormwater, history, flora and fauna/Greenfield Lake/Kay Lynn Hernandez | 26 |

## April 1 – June 30, 2021

| First Saturday Seminars (Virtual due to COVID-19) | | | |
|---|---|---|---|
| **Date** | **Topic** | **Speaker** | **Attendance** |
| 4/3/2021 | Climate Change | Warren Darryl | 44 |

| | | | |
|---|---|---|---|
| 5/1/2021 | Emily Sutton, Emily Donovan, Le'Meshia Whittington, Jamie DeWitt, Elijah Yetter-Bowman | PFAS | 98 |
| 6/5/2021 | Bonnie Monteleone | Plastics | 41 |
| **Other Presentations by CFRW Staff (Virtual due to COVID-19)** | | | |
| **Date** | **Organization/Audience** | **Topic / Speaker** | **Attendance** |
| 4/15/2021 | NC Sorosis | Water quality threats and protection work / Audrey Dunn | 26 |
| 5/6/2021 | Cape Fear Museum | Science Chat | 6 |
| 6/8/2021 | NC Cooperative Extension and Arboretum | Creekwatchers | 60 (approx..) |

| **Greenfield Lake Eco-Tours & Paddle Tours on Creeks** | | | |
|---|---|---|---|
| **Date** | **Group Served/Audience** | **Type of Tour /Topic / Location / Speaker** | **Attendance** |
| 4/13/2021 | Eagles Island Paddle | On the water Eco-tour/ history, flora and fauna/Eagles Island/Kay Lynn Hernandez | 1 |
| 4/16/2021 | Cypress Cove Paddle | On the water Eco-tour/ history, flora and fauna/Cypress Cove/Kay Lynn Hernandez | 2 |
| 4/19/2021 | Downtown Riverfront Walking Tour | Guided Downtown walking tour/river history, impacts and protective measures/Riverwalk/CFRW Intern | 5 |
| 4/20/2021 | Downtown Riverfront Walking Tour | Guided Downtown walking tour/river history, impacts and protective measures/Riverwalk/CFRW Intern | 1 |
| 4/23/2021 | Greenfield Lake Paddle | On the water Eco-tour/ Stormwater, history, flora and fauna/Greenfield Lake/Kay Lynn Hernandez | 2 |
| 4/27/2021 | Eagles Island Paddle | On the water Eco-tour/ history, flora and fauna/Eagles Island/Kay Lynn Hernandez | 1 |
| 4/28/2021 | Eagles Island Paddle | On the water Eco-tour/ history, flora and fauna/Eagles Island/Kay Lynn Hernandez | 1 |
| 4/30/2021 | Greenfield Lake Paddle | On the water Eco-tour/ Stormwater, history, flora and fauna/Greenfield Lake/Kay Lynn Hernandez | 4 |
| 5/22/2021 | NC Environmental Educators Association | On the water Eco-tour/ Stormwater, history, flora and fauna/Greenfield Lake/Kemp Burdette | 7 |
| 6/22/2021 | Sea Turtle Camp | Walking eco-tour / Stormwater, history, flora and fauna/Greenfield Lake/CFRW Intern Sara Marston | 15 |

## Kerr Avenue Cleanup:

| **Date of Cleanup** | **Watershed Name & Specific Area Cleaned (Include map # and specific location cleaned)** | **# of Creek or Ditch Ft/Miles Cleaned** | **Amount of Trash Collected ie. # of 96 gallon bins of recycling # of 30 gallon trash bags of trash Type of trash collected, etc.** | **# of Volunteers/ Total Volunteer Hours Contributed** |
|---|---|---|---|---|
| 6/12/21 | Burnt Mill Creek / BMC #3 Kerr Avenue Wetland | .15 miles | Trash: 1.75 96-gallon bins<br>Recycling: 1 96-gallon bins | 28 volunteers/ 56 volunteer hours |

## 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, 2021**

| **Storm Drain Marking** | | | | | |
|---|---|---|---|---|---|
| **Date** | **Name of Volunteer Organization/Business/Etc** | **Specific Area Marked** | **# of Volunteers** | **# of Drains Marked** | **# of door hangers distributed** |
| 5/1/2021 | Girl Scout Troop 4785/April Hanysk – Troop Leader | Seaspray Drive/Sandcastle Court | 8 | 12 | 50 |
| 5/2/2021 | Girl Scout Troop 4785/April Hanysk – Troop Leader | Seaspray Drive/ Royal Bonnet Drive | 9 | 14 | 50 |

**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, 2020

| **Watershed Clean-ups** | | | | |
|---|---|---|---|---|
| **Date of Cleanup** | **Watershed Name & Specific Area Cleaned** *(Include map # and specific location cleaned)* | **# of Creek or Ditch Ft/Miles Cleaned** | **Amount of Trash Collected** *ie. # of 96 gallon bins of recycling # of 30 gallon trash bags of trash Type of trash collected, etc.* | **# of Volunteers/ Total Volunteer Hours Contributed** |
| 8/8/2020 | Greenfield Lake/GFL#3 Lower Willard Pond | .1 miles | Trash: 1 96-gallon bin of residential trash<br>Recycling: 1 96-gallon bin of recycling<br>Miscellaneous: Camp material, veterinary medical waste | 4 volunteers/<br>8 volunteer hours |
| 9/14/2020 | Greenfield Lake/GFL#2 11th St between Greenfield St & Lakeshore Dr | .2 miles | Trash: 1.5 96-gallon bins of residential trash<br>Recycling: 2 96-gallon bins of recycling<br>Miscellaneous: 1 large backpack attached to hard hat & gloves, another hard hat & gloves with rubber boots | 8 volunteers/<br>16 volunteer hours |

## October 1 - December 31, 2020

| **Watershed Clean-ups** | | | | |
|---|---|---|---|---|
| **Date of Cleanup** | **Watershed Name & Specific Area Cleaned** *(Include map # and specific location cleaned)* | **# of Creek or Ditch Ft/Miles Cleaned** | **Amount of Trash Collected** *ie. # of 96 gallon bins of recycling # of 30 gallon trash bags of trash Type of trash collected, etc.* | **# of Volunteers/ Total Volunteer Hours Contributed** |
| 10/10/2020 | Greenfield Lake / GFL #4 – 13th St to Lakeshore Dr<br><br>Burnt Mill Creek / BMC #2 – Emerson St., ditch runs from Kerr to Marlboro St. | 3 miles | Trash: 1 96-gallon bins of residential trash<br>Recycling: 1 96-gallon bins of recycling<br>Miscellaneous**:** Two chairs and a table | 26 volunteers/<br>59 volunteer hours |
| 11/14/2020 | Smith Creek / SC #2 – Evans St. & Princess Place | .5 miles | Trash: 4 96-gallon bins of residential trash<br>Recycling: 2 96-gallon bins of recycling<br>Miscellaneous**:** Crutches, child's bicycle, toy guitar, computer monitor, bullets, cell phones, baby's bassinet, plastic Christmas tree, miscellaneous metal, needles | 17 volunteers/<br>34 volunteer hours |

## January 1 - March 31, 2021

| Watershed Clean-ups | | | | |
|---|---|---|---|---|
| **Date of Cleanup** | **Watershed Name & Specific Area Cleaned** *(Include map # and specific location cleaned)* | **# of Creek or Ditch Ft/Miles Cleaned** | **Amount of Trash Collected** *ie. # of 96 gallon bins of recycling # of 30 gallon trash bags of trash Type of trash collected, etc.* | **# of Volunteers/ Total Volunteer Hours Contributed** |
| 1/23/2021 | Drains directly to the Cape Fear / DDCFR #1 – Front St/Greenfield St. (across from S. Front Apts) | .50 miles | Trash: 3 96-gallon bins of residential trash + 1 more full trash bag<br>Recycling: 3 96-gallon bins of recycling<br>Miscellaneous*:* 1 entire truck bed of large debris – two partial semi-truck wheels, one semi-truck wheel mud guard, couch cushion, wooden pallet, large pieces of Styrofoam, a bucket, scrap metal, & wooden planks | 30 volunteers/ 60 volunteer hours |
| 2/20/2021 | Greenfield Lake / GFL #1 – Railroad right-of-way from 3rd to 17th St. | .65 miles | Trash: 4 96-gallon bins of residential trash + 12 more full trash bags<br>Recycling: 3 96-gallon bins of recycling<br>Miscellaneous*:* 1 piano, a couple of tires, a shopping cart (returned to Mother Hubbard's Cupboard), clothing, and a Honda bumper, railroad ties | 22 volunteers / 44 volunteer hours |
| 3/13/2021 | Burnt Mill Creek / BMC #1 – Randall Pond | .5 miles | Trash: 1.5 96-gallon bins<br>Recycling: 1 96-gallon bin<br>Miscellaneous*:* N/A | 15 volunteer / 30 volunteer hours |

## April 1 – June 30, 2021

| Watershed Clean-ups | | | | |
|---|---|---|---|---|
| **Date of Cleanup** | **Watershed Name & Specific Area Cleaned** *(Include map # and specific location cleaned)* | **# of Creek or Ditch Ft/Miles Cleaned** | **Amount of Trash Collected** *ie. # of 96 gallon bins of recycling # of 30 gallon trash bags of trash Type of trash collected, etc.* | **# of Volunteers/ Total Volunteer Hours Contributed** |
| 4/10/2021 | Greenfield Lake / GFL #5 – Medical Center Dr (creek runs on both sides behind Bojangles and Hess Gas Station) | .50 miles | Trash: 2 96-gallon bins<br>Recycling: .75 96-gallon bin | 17 volunteers/ 17 volunteer hours |
| 5/08/2021 | Burnt Mill Creek / BMC #8 – Shirley Rd dead end | .50 miles | Trash: 3 96-gallon bins + 10 bags<br>Recycling: 2 96-gallon bins<br>Misc: Many balls and dog toys | 36 volunteers/ 72 volunteer hours |
| 6/12/21 | Greenfield Lake / GFL #5 | .50 miles | Trash: 3 96-gallon bins<br>Recycling: 1.5 96-gallon bins | 36 volunteers/ 72 volunteer hours |

| | | | | |
|---|---|---|---|---|
| | – Medical Center Dr (creek runs on both sides behind Bojangles and Hess Gas Station) | | | |

**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, 2020

| **CreekWatchers Reports** | | | |
|---|---|---|---|
| **Date of Report** | **CreekWatcher Volunteer Name(s)** | **Watershed** | **Specific Creek Location Monitored** *(reference the list of locations provided)* |
| 8/17/2020 | Jim Depree & Deanna Bertino | Barnards Creek | Appleton Way |
| 8/22/2020 | Mary Martha Vaught | Smith Creek | Maides Park/Hurst Branch |

## October 1 - December 31, 2020

| **CreekWatchers Reports** | | | |
|---|---|---|---|
| **Date of Report** | **CreekWatcher Volunteer Name(s)** | **Watershed** | **Specific Creek Location Monitoried** *(reference the list of locations provided)* |
| 10/17/2020 | Lauren Cromey | Bradley Creek | End of Circular Drive |
| 10/23/2020 | S. Clancy | Burnt Mill Creek | Wilshire at Downey |
| 12/5/2020 | Murray Whitehill | Hewletts Creek | Creekside at Hewletts |
| 12/8/2020 | Lauren Cromey | Bradley Creek | End of Circular Drive |

## January 1 - March 31, 2021

| **CreekWatchers Reports** | | | |
|---|---|---|---|
| **Date of Report** | **CreekWatcher Volunteer Name(s)** | **Watershed** | **Specific Creek Location Monitoried** *(reference the list of locations provided)* |
| 2/24/2021 | Gloria Shirley | Burnt Mill Creek | BMC from bridge at Grady to Metts Ave. |
| 2/24/2021 | Bhairavi Jeganathan | Burnt Mill Creek | Mary Bridgers Park |

## April 1 – June 30, 2021

| **CreekWatchers Reports** | | | |
|---|---|---|---|
| **Date of Report** | **CreekWatcher Volunteer Name(s)** | **Watershed** | **Specific Creek Location Monitored** *(reference the list of locations provided)* |
| 4/17/21 | Jim DePree | Barnards | Barnards Creek at Appleton Way |
| 4/24/21 | Michelle Beasley | Hewletts | Hewletts Creek at Lincoln Outfall |
| 6/26/21 | Gloria Shirley | Burnt Mill Creek | Wallace Park |
| 6/19/21 | Murray Whitehill | Hewletts | Hewletts at "Creekside at Hewletts" |

## 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: **Kay Lynn Hernandez ($1342)**

Comment [CFRW]: Kay Lynn Hernandez's last date of employment with Cape Fear River Watch was May 14, 2021. As of that date, she was no longer the designated contact person with the City of Wilmington Stormwater Services.

## 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:** Dana Sargent **Date:** 6/30/2021

FY 20-21

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

## Quarterly Progress Report #4: April 1 – June 30, 2021

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, 2020** through **June 30, 2021** 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, 2020

Assisted with training and testing of online set-up for 20/21 school year due to Covid-19 restrictions.

### October 1 – December 31, 2020

| **8th Grade Enviroscape Presentations** | | | | |
|---|---|---|---|---|
| **Date** | **School** | **Grade** | **# of presentations** | **# of students** |
| 10/13/20 | Murray Middle / Chris Courie | 8 | 1 | Mock Presentation |
| 11/23/20 | Murray Middle / Robert Roth | 8 | 2 | 56 |
| 11/24/20 | Murray Middle / Kara Krisanda & Chris Courie | 8 | 2 | 66 |

| 8th Grade Enviroscape Presentations – ZOOM Enviroscape Supervisor / Hosting | | | |
|---|---|---|---|
| **Date of Hosting** | **Name of Host / Agency** | **Teacher / School Name** | **Class Timespan Hosted** |
| 11/23/20 | Dru Harrison / NHSWCD | Robert Roth / Murray Middle | 2:30 – 3:20pm |
| 11/24/20 | Dru Harrison / NHSWCD | Kara Krisanda & Chris Courie / Murray Middle | 9:10 – 10:00am |
| 11/24/20 | Dru Harrison / NHSWCD | Kara Krisanda & Chris Courie / Murray Middle | 10:10 – 11:00am |
| 11/24/20 | Dru Harrison / NHSWCD | Kara Krisanda & Chris Courie / Murray Middle | 1:30 – 2:10pm |
| 11/24/20 | Dru Harrison / NHSWCD | Kara Krisanda & Chris Courie / Murray Middle | 2:30 – 3:20pm |
| 11/30/20 | Dru Harrison / NHSWCD | Lauren Bennett / Trask Middle | 10:55 – 11:50am |
| 11/30/20 | Dru Harrison / NHSWCD | Lauren Bennett / Trask Middle | 12:00 – 12:55pm |

Trainings Attended:

- 10/13/20 One staff observed Enviroscape Supervisor, Dru Harrison, present the Enviroscape.
- 10/13/20 Two staff observed veteran instructors, Anna Reh-Gingerich and Audrey Dunn, present the Enviroscape.
- 11/23/20 One staff observed Enviroscape Supervisor, Dru Harrison, present the Enviroscape.

## January 1 – March 31, 2021

| 8th Grade Enviroscape Presentations | | | | |
|---|---|---|---|---|
| **Date** | **School / Teacher** | **Grade** | **# of presentations** | **# of students** |
| 3/2/21 | Williston Middle School / Stephen Foster & Bobby Garcia | 8 | 2 | 69 |
| 3/29/21 | Myrtle Grove Middle School / Patrick Holder | 8 | 2 | 45 |
| 3/30/21 | Myrtle Grove Middle School / Kate Supak & Chanda Wynne | 8 | 1 | 50 |

| 8th Grade Enviroscape Presentations – ZOOM Enviroscape Supervisor / Hosting | | | |
|---|---|---|---|
| **Date of Hosting** | **Name of Host / Agency** | **School Name / Teacher** | **Class Timespan Hosted** |
| 3/2/21 | Dru Harrison / NHSWCD | Williston Middle School / Stephen Foster & Bobby Garcia | 1:30-2:25pm |
| 3/30/21 | Dru Harrison / NHSWCD | Myrtle Grove Middle School / Kate Supak & Chanda Wynne | 10:55-11:50am<br>11:55am-12:50pm<br>2:40-3:40pm |

Trainings Attended:

- 1/15/2021 Three staff members attended the New Instructor Training for Enviroscape from 9:00 a.m. to 12:00 p.m.
- 2/18/21 Three staff members attended scheduling and program update meeting.
- 3/2/2021 One staff member observed veteran instructor, Anna Reh-Gingerich, present the Enviroscape.
- 3/29/2021 One staff member observed veteran instructor, Amy Renfranz, present the Enviroscape.

## April 1- June 30, 2021

| 8th Grade Enviroscape Presentations | | | | |
|---|---|---|---|---|
| **Date** | **School / Teacher** | **Grade** | **# of presentations** | **# of students** |
| 4/22/21 | Roland Grise Middle School / Stephanie Titzel & Will McKibbin | 8 | 1 | 62 |
| **Other Enviroscape Presentations** | | | | |
| **Date** | **School / Group / Event** | **Grade** | **# of presentations** | **# of attendees** |

| | | | | |
|---|---|---|---|---|
| 6/21/21 | Turtle Camp at Cape Fear River Watch | HS | 1 | 15 |

| 8th Grade Enviroscape Presentations – ZOOM Enviroscape Supervisor / Hosting | | | |
|---|---|---|---|
| **Date of Hosting** | **Name of Host / Agency** | **School Name / Teacher** | **Class Timespan Hosted** |
| 4/22/21 | Dru Harrison / NHSWCD | Roland Grise Middle School / Stephanie Titzel & Will McKibbin | 1:45-2:35pm<br>2:45-3:40pm |

**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, 2020

Scheduled event for 10/31/20 at Quad Apartments during Pet Day at complex. Event was cancelled due to Covid-19.

## October 1 – December 31, 2020

| Pet Events / Pet Waste Ordinance Education | | | | | |
|---|---|---|---|---|---|
| **Date** | **Event** | **Location** | **Method of Delivery** | **# and Name of Education Materials Distributed** | **# of signed Pet Waste Pledges** |
| 10/27/20 | Social Media Outreach for C4CW | Facebook | Social Media Post | 258 - people viewed the post<br>16 - people clicked on link to COW C4CW website https://www.wilmingtonnc.gov/departments/public-services/stormwater/education-outreach/programs/canines-for-clean-water | N/A |
| 11/16/20 | Social Media Outreach for C4CW Event at Aunt Kerry's | Facebook | Social Media Event | 317 – people viewed the event page https://www.facebook.com/events/398812911259500/?active_tab=discussion<br>25 – people responded to event | N/A |
| 11/21/20 | Social Media Outreach for C4CW Event at Aunt Kerry's | Facebook | Social Media Posts | 91 – people viewed the posts | N/A |
| 11/21/20 | C4CW Outreach Event | Aunt Kerry's Pet Stop | C4CW Display Table | 26 - C4CW goodie bags<br>26 – COW Stormwater is a Dirty Word brochure<br>26 - COW Pet Waste brochures<br>26 - COW C4CW brochures<br>26 - C4CW magnets<br>26 - C4CW pens<br>26 - C4CW pet waste bags and dispensers | 16 |

## January 1 – March 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** |
| 2/16/21 | February E-Newsletter | Online | Email | 508 – people who read February's Soil & Water E-Newsletter, which featured pet waste removal as the BMP of the month | N/A |

| | | | | | |
|---|---|---|---|---|---|
| | | | | • External link shared: https://www.wilmingtonnc.gov/departments/public-services/stormwater/education-outreach/programs/canines-for-clean-water | |

Other:

- Scheduled event for 1/9/21 at Long Leaf Park for the Paws 4 People Annual 5K. Event was rescheduled due to Covid-19.
- Scheduled event for 3/20/21 at Animal House of Wilmington during their Open House. Event was rescheduled due to weather.
- Link to the February E-Newsletter: https://soilwater.nhcgov.com/wp-content/uploads/2021/02/ENewsletter_February2021.pdf .

## April 1 – June 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** |
| 4/10/21 | Open House Event | Animal House of Wilmington | C4CW Display Table | 8 C4CW goodie bags containing "Stormwater is a Dirty Word", "COW Pet Waste", and "COW C4CW" brochures, C4CW magnets, C4CW pen, C4CW pet waste bag dispensers | 8 |
| 5/15/21 | C4CW Outreach Event | Long Leaf Park Dog Park | C4CW Display Table | 18 C4CW goodie bags containing "Stormwater is a Dirty Word", "COW Pet Waste", and "COW C4CW" brochures, C4CW magnets, C4CW pen, C4CW pet waste bag dispensers | 18 |

**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)**

## July 1 - September 30, 2020

| **Stormwater 101 Presentations** | | | | |
|---|---|---|---|---|
| **Date** | **Organization / Audience** | **Method of Delivery** | **# and Name of Education Materials Distributed** | **# of attendees** |
| 8/8/20 | Friends of Greenfield Lake | Zoom/ Power Point presentation (Virtual meeting due to Covid-19) | 7 – electronic Stormwater Solutions brochures https://soilwater.nhcgov.com/programs/stormwater-solutions/ | 7 |

## January 1 – March 31, 2021

| **Stormwater 101 Presentations** | | | | |
|---|---|---|---|---|
| **Date** | **Organization / Audience** | **Method of Delivery** | **# and Name of Education Materials Distributed** | **# of attendees** |
| 3/23/21 | Island Wildlife Chapter | Zoom/ Power Point presentation (Virtual meeting due to Covid-19) | 19 – electronic Stormwater Solutions link https://soilwater.nhcgov.com/programs/stormwater-solutions/ | 3 CoW Residents, 16 Other |

## April 1 – June 30, 2021

| Stormwater 101 Presentations | | | | |
|---|---|---|---|---|
| **Date** | **Organization / Audience** | **Method of Delivery** | **# and Name of Education Materials Distributed** | **# of attendees** |
| 6/8/21 | Hewletts & Bradley Creek Watershed Residents at the NHC Arboretum | Power Point presentation | 12 – electronic Stormwater Solutions link emailed after the program https://soilwater.nhcgov.com/programs/stormwater-solutions/ | 7 |

**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)**

## October 1 – December 31, 2020

11/20 Worked with NHC GIS staff to identify area and mailing addresses to include in annual newsletter mailing.

## April 1 – June 30, 2021

| Hewletts Creek Educational Contact | | | | | |
|---|---|---|---|---|---|
| **Date** | **Audience Name or School/Grade** | **Topic(s) and/or Activity** | **# and Name of Education Materials Distributed** | **# presentations** | **# of attendees** |
| 6/8/21 | Hewletts & Bradley Creek Watershed Residents at the NHC Arboretum | A Watershed Moment Community Event | Various materials distributed at participating partners' outreach tables | 3 | 74 |
| 6/8/21 | Hewletts & Bradley Creek Watershed Residents at J.E.L. Wade Park | Wetlands at Work: A Tour of Wade Park | N/A | 1 | 22 |
| 6/10/21 | Hewletts Creek Watershed Residents | Changing Tides Newsletter | 501 – Changing Tides Newsletters https://soilwater.nhcgov.com/wp-content/uploads/2021/06/CropandBleed_Volume13Summer2021ChangingTidesNewsletter.pdf | N/A | 501 |

**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)**

## January 1 – March 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** |
| 1/27/21 | Midtown YMCA Youth Services | We All Live in a Watershed | N/A | 5 | 62 |
| 2/3/21 | Midtown YMCA Youth Services | Composting | N/A | 2 | 37 |

| | | | | | |
|---|---|---|---|---|---|
| 2/5/21 | NHC Arboretum, Teachers | Methods of Teaching Environmental Education | 6 – Methods of Teaching EE Workbooks | 2 | 6 |
| 3/16/21 | Murray Middle School | Coastal Envirothon Competition | N/A | 1 | 5 |

## April 1 – June 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** |
| 4/17/21 | Adult Participants at the NHC Arboretum | Vermicompost and Backyard Composting | N/A | 1 | 33 |
| 4/27/21 | General Adult Audience via Pre-Registration | Nature-Based Stormwater Solutions with Experts via Zoom | 103 – Link to the presentation recording https://zoom.us/rec/share/tR6WprYQCTMHg-ziYIdTqGLJ12YdPWFyXkhE86-AC9CLL0_FH8u6x8OeWgTOPJb3.9EHLIkVj6NGKM1MR | 1 | 72 |
| 5/14/21 | Roland Grise Middle School / 6th Grade | Soil Science Virtual Program | N/A | 1 | 98 |
| 5/27/21 | General Adult Audience via Pre-Registration | Green Infrastructure and Stormwater with Experts via Zoom | 27 – Link to the presentation recording https://zoom.us/rec/share/vrcGXxuEhou7cYUg7yFebTDmATp1jCvBZE7ZsE5bN4muwlhkBT4_ZwQ3bygyw-Nm.PZ482lpVowxgTA7W | 1 | 27 |
| 6/28/21 | Davis Recreation Center Summer Camp Kids' Program | Backyard Birding Fun | N/A | 2 | 18 |

Other:

- On 6/22/21 Amy Renfranz completed her Project WET Facilitator Certification and will be offering that adult workshop in the future.

**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, 2020

| **Community Outreach Events** | | | | | |
|---|---|---|---|---|---|
| **Date** | **Event** | **Location** | **Method of Delivery** | **# and Name of Education Materials Distributed** | **# of attendees** |
| 7/14/20 | LID Workshop through NC Coastal Reserve | Online | Power Point through WebEx. (virtual due to Covid-19) | 48 - electronic Local Cost Share Program brochures https://soilwater.nhcgov.com/<br>48 – electronic What is a Rain Garden brochure https://soilwater.nhcgov.com/<br>48 – links to NHSWCD website https://soilwater.nhcgov.com/<br>48 – links to LID Workshop PPT presentation https://deq.nc.gov/about/divisions/coastal- | 48 |

| | | | | | |
|---|---|---|---|---|---|
| | | | | management/nc-coastal-reserve/coastal-training-program/past-workshop#low-impact-development-for-water-quality-protection---virtual-workshop,-september-1 (click Low Impact Development for Water Quality Protection - Virtual Workshop, September 1 | |
| 9/1/20 | LID Workshop through NC Coastal Reserve | Online | Power Point through WebEx. (virtual due to Covid-19) | 101 - electronic Local Cost Share Program brochures https://soilwater.nhcgov.com/<br>101– electronic What is a Rain Garden brochures https://soilwater.nhcgov.com/<br>101 – links to NHSWCD website https://soilwater.nhcgov.com/<br>101 – links to LID Workshop PPT presentation https://deq.nc.gov/about/divisions/coastal-management/nc-coastal-reserve/coastal-training-program/past-workshop#low-impact-development-for-water-quality-protection---virtual-workshop,-september-1 (click Low Impact Development for Water Quality Protection - Virtual Workshop, September 1 | 101 |

## October 1 – December 31, 2020

| **Community Outreach Events** | | | | | |
|---|---|---|---|---|---|
| **Date** | **Event** | **Location** | **Method of Delivery** | **# and Name of Education Materials Distributed** | **# of attendees** |
| 10/24/20 | Lakefest | Greenfield Lake | Education and Activity Booth | 10 – NHSWCD Rain Garden Information Guides<br>10 – NHSWCD Grant Programs for Water Quality Improvements brochures<br>5 – COW Wilmington's Waterways Depend on You brochures<br>4 – NCDENR Buffers for Clean Water brochures<br>4 – NCDA CCAP brochures<br>4 – NRCS What is a Watershed? brochures | 25 |

## January 1 – March 31, 2021

| **Community Outreach Events** | | | | | |
|---|---|---|---|---|---|
| **Date** | **Event** | **Location** | **Method of Delivery** | **# and Name of Education Materials Distributed** | **# of attendees** |
| 2/27/21 | Tidal Creek Farmers Market | Tidal Creek Co-Op | Education, Retail, and Activity Booth | 10- NHSWCD Rain Garden Information Guide<br>10- NHSWCD Grant Programs for Water Quality Improvements Trifold<br>10- CoW Wilmington's Waterways Depend on You: Clean Water Starts at Home Trifold<br>5 - NC Coastal Federation - "Smart Yards"<br>1- CoW Citizen's Guide to Protecting Wilmington's Waterways | 56 |
| 3/27/21 | Tidal Creek Farmers Market | Tidal Creek Co-Op | Education, Retail, and Activity Booth | 3- NHSWCD Rain Garden Information Guide | 41 |

| | | | | | |
|---|---|---|---|---|---|
| | | | | 3- NHSWCD Grant Programs for Water Quality Improvements Trifold<br>1- CoW Wilmington's Waterways Depend on You: Clean Water Starts at Home Trifold<br>5 - NC Coastal Federation - "Smart Yards"<br>2- CoW Citizen's Guide to Protecting Wilmington's Waterways | |

## April 1 – June 30, 2021

| **Community Outreach Events** | | | | | |
|---|---|---|---|---|---|
| **Date** | **Event** | **Location** | **Method of Delivery** | **# and Name of Education Materials Distributed** | **# of attendees** |
| 4/1/21 | Wilmington Earth Day Alliance: Choose Your Own Adventure 2021 | Website | Online Interactive Map and Calendar of Earth Friendly Activities Throughout the Month of April | 355 – Website interactions during the month of April | 355 |
| 4/14/21 | Cape Fear Museum Earth Day Activities | NourishNC Food Bank Distribution | Deliver Earth Day Kits to Families with Children | 150 – Earth Day Education Kits, Tree & Wildlife Theme | 150 |
| 4/22/21 | Earth Day Employee Celebration | Live Oak Bank Headquarters | Stormwater Education and Activity Booth | 10- NHSWCD Rain Garden Information Guide<br>10- NHSWCD Grant Programs for Water Quality Improvements Trifold<br>10- CoW Wilmington's Waterways Depend on You: Clean Water Starts at Home Trifold<br>5 - NC Coastal Federation - "Smart Yards"<br>1- CoW Citizen's Guide to Protecting Wilmington's Waterways | 198 |
| 4/23/21 | Plastic Ocean Project's Earth Day Celebration | Tidal Creek Co-Op | Stormwater Education and Activity Booth | 5- NHSWCD Rain Garden Information Guide<br>5- NHSWCD Grant Programs for Water Quality Improvements Trifold<br>4 - NC Coastal Federation - "Smart Yards"<br>4- CoW Citizen's Guide to Protecting Wilmington's Waterways | 60 |
| 4/24/21 | Tidal Creek Farmers Market | Tidal Creek Co-Op | Stormwater Education, Retail, and Activity Booth | 1- NHSWCD Rain Garden Information Guide<br>1- NHSWCD Grant Programs for Water Quality Improvements Trifold<br>1 - NC Coastal Federation - "Smart Yards" | 42 |
| 5/29/21 | Tidal Creek Farmers Market | Tidal Creek Co-Op | Stormwater Education, Retail, and Activity Booth | 2 - NC Coastal Federation - "Smart Yards"<br>2- CoW Citizen's Guide to Protecting Wilmington's Waterways | 26 |
| 6/5/21 | Cape Fear River Watch "Hello Summer" Event | Waterline Brewing Co. | Stormwater Education Booth | 5- NHSWCD Rain Garden Information Guide<br>5- NHSWCD Grant Programs for Water Quality Improvements Trifold<br>4 - NC Coastal Federation - "Smart Yards"<br>4- CoW Citizen's Guide to Protecting Wilmington's Waterways | 65 |
| 6/25/21 | Mud Day | Wilmington Children's Museum | Touch and Play: Regional Soils Activity Table | N/A | 27 |

| | | | | | |
|---|---|---|---|---|---|
| 6/26/21 | Mud Day | Wilmington Children's Museum | Touch and Play: Regional Soils Activity Table | N/A | 34 |
| 6/26/21 | Tidal Creek Farmers Market | Tidal Creek Co-Op | Education, Retail, and Activity Booth | N/A | 13 |

**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, 2020**
Completed 3 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. Supervisors are also working on gathering information regarding local LID manual to encourage development of new NHC Government Complex in LID form.

**October 1 – December 31, 2020**
Completed 2 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. Supervisors are also working on gathering information regarding local LID manual to encourage development of new NHC Government Complex in LID form.

**January 1 – March 31, 2021**
Completed 4 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, 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.

**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)**

***Service not completed this fiscal year.***

**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)**

## October 1 – December 31, 2020

| Social Media Video Presentations | | | | |
|---|---|---|---|---|
| **Date** | **Platform** | **Topic(s) and/or Activity** | **Shared External Links** | **# of Engagements** |
| 10/28/20 | Facebook | Watershed Wednesday Video Post on Smith Creek / Bradley Creek Watershed Ridge | •Viewable online: https://fb.watch/6sffOby6-K/<br>•Link to COW "Get Educated" website https://www.wilmingtonnc.gov/.../education.../get-educated | •604 people viewed the post<br>•283 people clicked on the video and /or link |
| 11/4/20 | Facebook | Watershed Wednesday Video Post on marshes, estuaries, and BMPs | • Viewable online: https://fb.watch/6sfiDz2FwA/<br>•Link to NC Division of Coastal Management Report on Marsh Sills https://files.nc.gov/.../publications/DCM-marshsilleval.pdf | •1434 people viewed the post<br>•279 people clicked on the video and / or link |
| 12/2/20 | Facebook | Watershed Wednesday Video Post on tidal creeks, filter feeders, and pet waste pollution | • Viewable online: https://fb.watch/6sfOzK_UVr/ | •556 people viewed the post<br>•90 people clicked on the video |
| 12/9/20 | Facebook | Watershed Wednesday Video Post on rain barrels and BMPs at COW Anne McCrary Park | • Viewable online: https://fb.watch/6sfSnrDFLo/<br>•Link to NHSWCD "Rain Barrel Sales" website https://soilwater.nhcgov.com/programs/rain-barrels/ | •959 people viewed the post<br>•149 people clicked on the video and / or link |
| 12/16/20 | Facebook | Watershed Wednesday Video Post on stormwater BMPs in the COW | • Viewable online: https://fb.watch/6sfVmYjE-o/ | •1280 people viewed the post<br>•173 people clicked on the video and / or link |
| 12/23/20 | Facebook | Watershed Wednesday Video Post on Watersheds and USGS StreamStats's Rain Drop Path tool | •Viewable online: https://fb.watch/6sfXZOl2Rd/<br>•Link to USGS StreamStats https://streamstats.usgs.gov/ss/ | •25 people viewed the post<br>•8 people clicked on the video and / or link |
| 12/30/20 | Facebook | Watershed Wednesday Video Post on Dissolved Oxygen Part I | • Viewable online: https://fb.watch/6sfZC3GWHZ/ | •857 people viewed the post<br>•76 people clicked on the video and / or link |

Other:

- Updated website to include a "Resources" page on City of Wilmington's Stormwater Services and Stormwater Pollution Hotline. Viewable online https://soilwater.nhcgov.com/resources/city-of-wilmington-stormwater-services/.

## January 1 – March 31, 2021

| Social Media & Website Presentations | | | | |
|---|---|---|---|---|
| **Date** | **Platform** | **Topic(s) and/or Activity** | **Shared External Links** | **# of Engagements** |
| 1/7/21 | Facebook | Watershed Wednesday Video Post on Dissolved Oxygen | •Viewable online: https://fb.watch/6sf-qqfO2M/ | •998 people viewed the post<br>•86 people clicked on the video |
| 1/9/21 | Email | January Monthly E-Newsletter featuring Urban Agriculture and Cost Share Programs | •Viewable online: https://soilwater.nhcgov.com/wp-content/uploads/2021/01/ENewsletter_January2021.pdf | • 573 people opened the email<br>•57 people clicked on the link to read the full articles |
| 1/13/21 | Facebook | Watershed Wednesday Video Post on Dissolved Oxygen at Greenfield Lake | •Viewable online: https://fb.watch/6sg283dYqZ/ | • 929 people viewed the post<br>•78 people clicked on the video and/or link |

| | | | | |
|---|---|---|---|---|
| | | with Cape Fear River Watch | •Link to Cape Fear River Watch CreekWatchers Program: https://capefearriverwatch.org/creekwatchers/ | |
| 1/21/21 | Facebook | Watershed Wednesday Video Post on BMPs at Greenfield Lake with NCSU | •Viewable online: https://fb.watch/6sg67kxYLN/ | •584 people viewed the post<br>•56 people clicked on the video and/or link |
| 1/27/21 | Facebook | Watershed Wednesday Video Post, Summary of Dissolved Oxygen Presentations | • Viewable online: https://fb.watch/6sg8qfagQ0/<br>• Link to Canines for Clean Water: https://www.wilmingtonnc.gov/.../canines-for-clean-water... | •99 people viewed the post<br>•20 people clicked on the video and/or link |
| 2/3/21 | Facebook | Watershed Wednesday Post on Hewletts and Bradley Creek Watersheds | • Link to NC Coastal Federation: https://www.nccoast.org/.../bradley-hewletts-watershed.../ | •307 people viewed the post<br>•26 people clicked on the link |
| 2/10/21 | Facebook | Watershed Wednesday Post on Cape Fear & White Oak River Basins | • Link to NCDENR River Basin Map: https://ncdenr.maps.arcgis.com/.../PublicIn.../index.html... | •54 people viewed the post<br>•10 people clicked on the link |
| 3/3/21 | Facebook | Watershed Wednesday Video Post on Bradley Creek | •Viewable online: https://fb.watch/6sgbsFXTCa/ | •823 people viewed the post<br>•98 people clicked on the video |
| 3/10/21 | Facebook | Watershed Wednesday Video Post on Burnt Mill Creek | •Viewable online: https://fb.watch/6sgd74TXOO/ | •1,161 people viewed the post<br>•233 people clicked on the video |
| 3/17/21 | Facebook | Watershed Wednesday Video Post on Hewletts Creek | • Viewable online: https://fb.watch/6sghYGV6ao/ | •130 people viewed the post<br>•17 people clicked on the video and/or link |
| 3/24/21 | Facebook | Watershed Wednesday Video Post on Greenfield Lake Watershed | •Viewable online: https://fb.watch/6sgpNFOaAv/ | •375 people viewed the post<br>•43 people clicked on the video and/or link |
| 3/30/21 | Email | March Monthly E-Newsletter featuring Grasscycling | •Viewable online: https://soilwater.nhcgov.com/wp-content/uploads/2021/03/ENewsletter_March2021.pdf | •547 people opened the email<br>•103 people clicked on the link to read the full articles |

## April 1 – June 30, 2021

| **Social Media & Website Presentations** | | | | |
|---|---|---|---|---|
| **Date** | **Platform** | **Topic(s) and/or Activity** | **Shared External Links** | **# of Engagements** |
| 4/29/21 | Email | April Monthly E-Newsletter featuring Nature-Based Solutions Overview and Rain Gardens | •Viewable online: https://soilwater.nhcgov.com/wp-content/uploads/2021/04/E-Newsletter-April-2021-1.pdf | • 481 people opened the email<br>•70 people clicked on the link to read the full articles |
| 5/25/21 | Facebook & YouTube | "The Dustbusters: Soil Science" Video with the N.C. Arboretum and ecoEXPORE | •Viewable online: https://www.youtube.com/watch?v=ISmubXS96WA | • 139 Views on YouTube |
| 5/28/21 | Star News Newspaper | Article Entitled Addressing the Condition of Watersheds in New Hanover County | •Viewable online: https://www.youtube.com/watch?v=ISmubXS96WA | • |
| 5/29/21 | Email | May Monthly E-Newsletter featuring Green Infrastructure | •Viewable online: https://soilwater.nhcgov.com/wp-content/uploads/2021/05/May2021ENewsletter.pdf | • 541 people opened the email<br>•90 people clicked on the link to read the full articles |

| | | | | |
|---|---|---|---|---|
| 6/15/21 | Facebook | Watershed & River Basin Education and Resource Sharing Post | • Link to River Runner Rain Drop Path from Greensboro, NC to Wilmington, NC: https://river-runner.samlearner.com/?lng=-79.93764462797107&lat=36.04605315835032&fbclid=IwAR2ci_jfHtnKZWzVkBlT5sYZibq9uGpZWkFKKQlN_oK6PkVufHJ_8t-zFIk | • 120 people viewed the post<br>• 17 people clicked on the video and/or link |
| 6/25/21 | Email | June Monthly E-Newsletter featuring Vehicle & Pressure Washing | • Viewable online: https://soilwater.nhcgov.com/wp-content/uploads/2021/06/June2021ENewsletter.pdf | • 506 people opened the email<br>• 61 people clicked on the link to read the full articles |

## 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)**

***Full service not completed this fiscal year.***

- Promoted Storm Drain Marking program on Facebook on 3/4/21. Promotional ad reached 237 people and had 16 engagements. https://www.facebook.com/NHSWCD/photos/a.524284947597685/5842004919158968/
- Amy Renfranz was trained on storm drain marking policies and procedures on 5/13/21.
- Scheduled a storm drain marking event on 6/2/21 with a volunteer group from Altr'd State Clothing and UNCW Environmental Sciences groups. Postponed due to weather. Rescheduled for 6/22/21; canceled due to weather. Rescheduled for 6/29/21; canceled due to weather.

## 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, 2020**

| **Public Rain Barrel Sale** | | | |
|---|---|---|---|
| **Date of Sale** | **Sale Location** | **# of 60 gallon barrels sold** | **# of 80 gallon barrels sold** |
| 7/9/20 | NHC Government Center | 5 | 10 |

| | | | |
|---|---|---|---|
| 8/13/20 | NHC Government Center | 5 | 9 |
| 9/10/20 | NHC Government Center | 2 | 5 |

## October 1 – December 31, 2020

| **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** |
| 10/8/20 | NHC Government Center | 5 / 0 | 5 / 1 |
| 11/12/20 | NHC Government Center | 0 / 0 | 4 / 3 |
| 12/10/20 | NHC Government Center | 0 / 2 | 2 / 3 |

Other:

- Developed an updated Monthly Rain Barrel Sale brochure. Viewable online https://soilwater.nhcgov.com/programs/rain-barrels/.
- Developed a document on "Installing Your Rain Barrel" to use as a handout when a purchase is made. Viewable online https://soilwater.nhcgov.com/wp-content/uploads/2021/01/Installing-Your-Rain-Barrel-1.pdf .

## January 1 – March 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** |
| 1/14/21 | NHC Government Center | 0 / 4 | 1 / 3 |
| 2/11/21 | NHC Government Center | 0 / 0 | 0 / 1 |
| 3/11/21 | NHC Government Center | 1 / 4 | 3 / 13 |

Other:

- Updated the department's website to communicate the relocation of the monthly sale (from the West Entrance to the South Entrance) due to construction. https://soilwater.nhcgov.com/programs/rain-barrels/
- Promoted rain barrel sales through social media, including eight separate posts about the rain barrel sales during the quarter. As an example: https://www.facebook.com/NHSWCD/posts/5605495359476593 .

## April 1 – June 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** |
| 4/8/21 | NHC Government Center | 1 / 5 | 2 / 4 |
| 5/13/21 | NHC Government Center | 2 / 4 | 7 / 3 |
| 6/10/21 | NHC Government Center | 1 /0 | 6 / 4 |

**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, 2020

Lower Cape Fear Stewardship Development Coalition: Attended meetings 7/8/2020, 8/5/2020, and 9/9/2020. Completed audit and election of officers. Staff will continue to serve as co-chair to the education committee and scholarship committee. Discussed ways to make the scholarship program more successful, as well as who to encourage to apply for the 20/21 program year. Have the potential for 3-5 projects in the region. Event space has been reserved, but committee is proceeding with caution due to covid-19 and may have to make it a virtual event depending on the circumstances in February 2021. Staff is also providing hosting for online meetings through zoom due to covid-19 conditions.

Emergency Watershed Protection Program: Provided updates for City staff to attend online training 8/12/2020 and field training 9/24/2020. This training was designed to help sponsors learn how to complete initial work or a DSR, so that the process could be more efficient in the future, and get creeks cleaner quicker, as well as provide more money for the sponsor.

**October 1 – December 31, 2020**

The LCFSDC monthly meeting occurred on October 14th, 2020. Haley Moccia attended the meeting in Dru Harrison's place due to a meeting conflict with the NHSWCD monthly meeting. The Annual 2021 meeting was in its planning stages and members discussed possible outcomes and solutions since COVID-19 was likely to still be impacting large group gatherings at the time of the awards ceremony. One idea that was discussed was having the awards broadcast online for people that were unable or did not feel comfortable attending the event. A second idea was to have the event fully online, but after much deliberation and discussion, it was determined that the event would be better off being canceled until next year. The deciding factor in this decision was the fact that many of the groups that were applying to be considered for an award had not turned in their application. Therefore, even if the event was held this year, there might not be any complete applications to choose from. It was also decided that the members of the SDC would reach out to the prospective groups trying to apply for an award and let them know the event is canceled this year and that they are welcome to complete an application for consideration next year.

Participated with UNCW grant program. Provided 22 hours of in-kind support during meetings by giving expertise and advised on retrofit projects.

**January 1 – March 31, 2021**

Participated in the NHC Watershed Round table meeting 1/25/2021. Provided update to group regarding installation of BMPs through cost share programs as well as progress on Pages Creek Watershed Restoration Plan. Currently working with Moffitt & Nichol and Cape Fear Resource Conservation & Development to find funding to complete the current draft plan. Currently an application to NC Land & Water Trust has been submitted to complete the plan.

**April 1 – June 30, 2021**

Lower Cape Fear SDC met 5/12/21 and 6/9/21. Staff oversees nominating committee for next year's awards year. A potential of 7 projects may apply for the upcoming FY21-22. The committee discussed distributing extra scholarships as well since the funds are available to do so. Applications for next year are due at the end of August.

## 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 <u>within 12 calendar days</u> 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 & Amy Renfranz **Date:** June 30, 2021

## APPENDIX D: ILLICIT DISCHARGE DETECTION AND ELIMINATION (IDDE)

### Dry Weather Flow Monitoring Locations

- Upper Cape Fear River Watershed. – 8 outfalls investigated.
- Greenfield Lake Watershed – 2 outfalls investigated
- Lower Cape Fear River Watershed - 5 outfalls investigated.
- Barnards Creek Watershed – 6 outfalls investigated

### IDDE Staff Training (Virtual)

April 14, 2021 – 6 Code Compliance Officers
April 23, 2021 – 5 Engineering Construction Inspectors
April 30, 2021 – 8 Engineering Staff

**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 on line 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** | **June/July 2020** | **June/July 2021** |
|---|---|---|
| **Total # Sites Inspected** | 89 | 119 |
| ***Response Letter Severity*** | | |
| Level 1 (first letter) | 39 | 52 |
| Level 2 (second letter)* | 0 | 0 |
| Level 3 (third letter)** | 0 | 0 |
| # of Sites Requiring Maintenance | 39 | 52 |

*If no response from first letter after 60 days, second letter is sent
**If no response from second letter after 60 days, third letter is sent imposing civil fines

TBD = To Be Determined

# Stormwater Detention Facility

**Compliance Inspection Report**

**SITE:**

**DATE:**

**LOCATION:**

**The Stormwater Management for Post-Construction Ordinance requires a bi-annual inspection of all structural water quality detention facilities to ensure that they are being properly maintained and are functioning as originally designed.**

**The results of this inspection are as follows:**

☐ **Visual inspection found no apparent problems with the facility.**

☐ **Please complete the following repairs and/or maintenance items within 60 days of this report**

***Slopes***
- ☐ Repair eroded pond slopes
- ☐ Repair erosion at pond inlet
- ☐ Repair erosion at outlet structure
- ☐ Re-seed and/or repair bare areas
- ☐ Mow and regularly maintain vegetation
- ☐ Regrade slopes and/or aquatic shelf

***Inlets***
- ☐ Remove vegetative obstruction
- ☐ Remove sediment accumulation within pipes

***Emergency Spillway***
- ☐ Remove debris located in spillway
- ☐ Remove trees and woody vegetation
- ☐ Repair eroded areas and/or rip-rap

***Outlet Structure***
- ☐ Remove debris obstructing outlet structure
- ☐ Remove obstruction to orifice
- ☐ Repair and/or replace trash rack
- ☐ Repair trash screen for lower orifice
- ☐ Remove vegetation around outlet structure

***Pond Main Body***
- ☐ Repair vegetative shelf
- ☐ Remove sediment accumulation
- ☐ Remove floating debris and/or debris on slopes
- ☐ Remove vegetation in pond that has reduced surface area

***Other***
- ☐ _____
- ☐ _____

Additional comments and maintenance concerns:

_____
_____
_____
_____
_____
_____
_____

Proper operation and maintenance are the sole responsibility of the property owner, and a vital part of ensuring the effectiveness of your detention facility. If you fail to complete the above maintenance in a timely manner, please be advised that the City of Wilmington reserves the right to complete the maintenance, and assess the owner for any costs or damages incurred. You will be

notified if the City chooses to pursue this action.

Please inform this office of the date when work is completed, and if you should have any questions or comments concerning these items or future maintenance issues, please feel free to contact me at (910) 341-4694.

Inspected by: ____ Title:

**Training**

ASCE NORTH CAROLINA SECTION

Coastal Branch

## December 8, 2020 VIRTUAL ASCE Coastal Branch Meeting

**When**
Tuesday, December 8, 2020 from 4:00 PM to 5:00 PM EST
Add to Calendar

**Where**
**This is an online event.**

***Click Here for:***

**Zoom Webinar Registration**

**Please join us for the upcoming December ASCE Coastal Branch VIRTUAL monthly meeting. Meeting is $10 with PDH available.**

CITY OF WILMINGTON ENGINEERING

**Program:**

City of Wilmington Engineering/Stormwater Review Process

**Description:**

This presentation will cover the City of Wilmington Development Review process with special emphasis on the Engineering/Stormwater review, including the following topics:

- TRC Process Overview
- Engineering/Stormwater Permit Requirements
- Common issues faced during review
- Common Issues that impact project close out/Certificate of Occupancy
- Summary of proposed changes to the Land Development Code

**Speakers:**

Robert Gordon, PE, Plan Review Engineer

**Bios:**

Robert has worked with the City of Wilmington since 2010 and have managed the Engineering/Plan Review section since 2015. Overall, Robert has over 20 years of experience in Civil

# Summary of Plan Review Activities 2020-2021

| Type of Permit | Type of New SCM | Permit Number | Permit Issue Date | Pervious (Y or N) | # of new SCM's Onsite | Notes |
|---|---|---|---|---|---|---|
| Permit Revision | None | 2017018R2 | 7/15/2020 | N | 0 | No new SCM's |
| New Permit | None | 2020023 | 7/17/2020 | N | 0 | Offsite Permit (Wet Pond) |
| Permit Revision | None | 2019031R2 | 7/20/2020 | N | 0 | No new SCM's |
| New Permit | Infiltration Trench | 2020021 | 7/21/2020 | N | 3 | 3 Infiltration Trenches |
| New Permit | None | 2020025 | 7/23/2020 | N | 0 | No SCM's Required, washed stone gravel parking lot |
| Permit Revision | None | 2017052R1 | 7/29/2020 | Y | 0 | No new SCM's |
| Permit Revision | None | 2017001R3 | 8/6/2020 | N | 0 | No new SCM's |
| Permit Revision | None | 2003029R4 | 8/14/2020 | N | 0 | No new SCM's |
| Permit Revision | None | 2019045R3 | 8/21/2020 | N | 0 | No new SCM's |
| Permit Revision | None | 2014027R5 | 9/1/2020 | N | 0 | No new SCM's |
| New Permit | Underground Infiltration Trench, Permeable Pavement | 2020026 | 9/8/2020 | Y | 2 | 1 Permeable Pavement Area (8,785sf) |
| New Permit | Wet Pond | 2020027 | 9/18/2020 | N | 2 | |
| New Permit | | 2020022 | 9/18/2020 | | | |
| Permit Revision | | 2017045R4 | 9/29/2020 | | | |
| Permit Revision | None | 2016039R2 | 10/12/2020 | N | 0 | No new SCM's |
| New Permit | | 2020031 | 10/20/2020 | | | |
| New Permit | | 2020030 | 10/20/2020 | | | |
| Permit Revision | | 2005018R56 | 10/27/2020 | | | |
| Permit Revision | None | 2019052R1 | 11/4/2020 | N | 0 | No SCM's Required |
| Permit Revision | | 2019023R1 | 11/6/2020 | | | |
| New Permit | None | 2020034 | 11/10/2020 | N | 0 | No SCM's Required |
| New Permit | Infiltration Basin | 2018041R1 | 11/10/2020 | N | 1 | |
| New Permit | 2 Underground Infiltration Trenches, Permeable Pavement | 2019051 | 11/12/2020 | Y | 7 | 5 Permeable Areas (10,175/8,186/7,872/11,988/6614) |
| Permit Revision | | 2015034R4 | 11/17/2020 | | | |
| Permit Revision | | 2017003R2 | 11/17/2020 | | | |
| New Permit | | 2020043 | 12/1/2020 | | | |
| New Permit | Permeable Pavers | 2020029 | 12/3/2020 | Y | 1 | 1 Permeable Paver Area (12,066sf) |
| New Permit | None | 2020035 | 12/3/2020 | N | 0 | |
| New Permit | Pervious Concrete | 2020033 | 12/4/2020 | Y | 1 | 1 Pervious Concrete Area (3,834sf) |
| New Permit | Stormwater Wetland, Permeable Pavement | 2020036 | 12/4/2020 | Y | 2 | 1 Permeable Paver Area (20,800sf) |
| Permit Revision | | 2010018R3 | 12/8/2020 | | | |
| New Permit | Permeable Pavement | 2020042 | 12/11/2020 | Y | 1 | 1 Permeable Paver Area (2,524sf) |
| New Permit | None | 2020037 | 12/16/2020 | N | 0 | |
| New Permit | None | 2020037 | 12/16/2020 | N | 0 | |
| Permit Revision | None | 2006004R2 | 12/21/2020 | N | 0 | |
| New Permit | | 2020044 | 12/29/2020 | | | |
| New Permit | Permeable Pavement | 2020039 | 12/29/2020 | Y | 1 | 1 Permeable Paver Area (5,200sf) |
| Permit Revision | | 97033R1 | 1/6/2021 | | | |
| New Permit | None | 2020038 | 1/21/2021 | N | 0 | Offsite Permit |
| New Permit | | 2021001 | 1/21/2021 | | | |
| Permit Revision | None | 2019027R1 | 2/1/2021 | N | 0 | No new SCM's |
| New Permit | None | 2021002 | 2/3/2021 | N | 0 | No SCM's Required |
| New Permit | Wet Detention Basin | 2020032 | 2/9/2021 | N | 1 | |
| New Permit | | 2020041 | 2/12/2021 | | | |
| New Permit | None | 2021005 | 2/17/2021 | N | 0 | No SCM's Required |
| New Permit | None | 2021008 | 2/23/2021 | N | 0 | No SCM's Required |
| New Permit | | 2020040 | 3/9/2021 | | | |
| New Permit | None | 2021003 | 3/11/2021 | N | 0 | |
| New Permit | | 2021012 | 3/16/2021 | | | |
| New Permit | None | 2021006 | 3/23/2021 | N | 0 | |
| Permit Revision | Wet Detention Basins | 2018029R1 | 3/26/2021 | N | 2 | |
| New Permit | None | 2021013 | 3/29/2021 | N | 0 | |
| New Permit | Permeable Pavement | 2021015 | 4/1/2021 | Y | 3 | 3 Pervious Concrete Areas (2,353/1,892/3,230) |
| New Permit | | 2021014 | 4/6/2021 | | | |
| Permit Revision | | 2005018R7 | 4/6/2021 | | | |
| New Permit | Pervious Concrete | 2021017 | 4/12/2021 | Y | 1 | 1 Pervious Concrete Area (4,410sf) |
| New Permit | Permeable Pavement | 2021004 | 4/26/2021 | Y | 2 | 2 Pervious Concrete Areas (2,124/1,051) |
| New Permit | Wet Detention Basin, Underground Infiltration Trench | 2021009 | 4/27/2021 | N | 2 | |
| New Permit | | 2021020 | 4/30/2021 | | | |
| New Permit | 5 Infiltration Basins, 1 Permeable Pavement | 2021011 | 4/30/2021 | Y | 6 | 1 Pervious Concrete Area (3,783sf) |
| New Permit | | 2021019 | 4/30/2021 | | | |
| Permit Revision | | 99064R1 | 4/30/2021 | | | |
| New Permit | None | 2021022 | 5/6/2021 | N | 0 | |
| New Permit | | 2021021 | 5/11/2021 | | | |
| New Permit | | 2021023 | 5/11/2021 | | | |
| Permit Revision | | 2013018R5 | 5/11/2021 | | | |
| New Permit | None | 2021018 | 5/14/2021 | N | 0 | No SCM's Required |
| New Permit | Wet Detention Basin | 2021024 | 5/17/2021 | N | 1 | |
| New Permit | | 2021025 | 5/18/2021 | | | |
| New Permit | None | 2021007 | 5/27/2021 | N | 0 | |
| Permit Revision | None | 2020035R1 | 5/27/2021 | N | 0 | |
| New Permit | | 2021016 | 6/4/2021 | | | |
| Permit Revision | Permeable Sidewalk | 2018033R2 | 6/21/2021 | Y | 1 | 1 Pervious Concrete Area (1,163sf) |
| Permit Revision | | 2019008R1 | 6/28/2021 | | | |
| New Permit | Infiltration Basins | 2021029 | 6/29/2021 | N | 2 | 2 Infiltration Basins |

## APPENDIX G: POLLUTION PREVENTION & GOOD HOUSEKEEPING FOR MUNICIPAL OPERATIONS

No Employee training was conducted this reporting year due to the Covid-19 safety restrictions. Training is scheduled for July 2021 and Winter 2022..

## APPENDIX H: TOTAL MAXIMUM DAILY LOADS (TMDL)

**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*** | | | | | |
| 8/22/2020 | HOW Booth @ Wilmington Farmer's Market | Homeowners within the Bradley & Hewletts Creek Watersheds | HOW | Educational booth with giveaways, handouts, and a raffle prize. | 35 Visitors |
| 10/17/2020 | HOW Booth @ Wilmington Farmer's Market | Homeowners within the Bradley & Hewletts Creek Watersheds | HOW | Educational booth with giveaways, handouts, and a raffle prize. | 25 Visitors |
| 11/14/2020 | HOW Booth @ Wilmington Farmer's Market | Homeowners within the Bradley & Hewletts Creek Watersheds | HOW | Educational booth with giveaways, handouts, and a raffle prize. | 30 Visitors |
| 11/20/2020 | Volunteer Rain Garden Planting Event @ Suite Services Loop, UNCW | UNCW students, staff, community members | HOW; UNCW; NCCF | Socially distanced event where UNCW students, staff, and community members planted a recently installed rain garden at Suite Services Loop | 15 volunteers |
| 3/13/2021 | HOW Booth @ Wilmington Farmer's Market | Homeowners within the Bradley & Hewletts Creek Watersheds | HOW | Educational booth with giveaways, handouts, and a raffle prize. | 10 Raffle participants; 20 Visitors |
| 4/10/2021 | HOW Booth @ Wilmington Farmer's Market | Homeowners within the Bradley & Hewletts Creek Watersheds | HOW | Educational booth with giveaways, handouts, and a raffle prize. | 12 Raffle Participants; 25 Visitors |
| 4/27/2021 | Tour of SWDS @ Anne McCrary Park | Homeowners within the Bradley & Hewletts Creek Watersheds | HOW | Provided a tour of stormwater solutions found at Anne McCrary Park to attendees | 4 Registered Attendees |
| ***Presentations*** | | | | | |
| 7/24/2020 | Interview with UNCW professor regarding position within Stormwater Services & local government | UNCW Engineering class | HOW | Zoom interview with professor | Online course of 35 students |
| 11/23/2020 | Enviroscape Presentations | New Hanover County 8th grade students | COW | 1-hour long presentation via Zoom featuring the Enviroscape model | 35 students |

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|---|---|---|---|---|---|
| 11/24/2020 | Enviroscape Presentations | New Hanover County 8th grade students | COW | 1-hour long presentation via Zoom featuring the Enviroscape model | 30 students |
| 12/1/2020 | Enviroscape Presentations | New Hanover County 8th grade students | COW | 1-hour long presentation via Zoom featuring the Enviroscape model | 50 students |
| 3/17/2021 | "Stormwater Solutions" presentation for NCSU Co-operative Extension's Backyard Sustainability Series | Homeowners within New Hanover County | HOW | 1-hour long presentation discussing the HOW Program and various stormwater solutions that can be incorporated around homes. | 35 Attendees |
| 4/22/2021 | Interview for UNCW "Sustainabili-tea" Series | UNCW Students, UNCW Sustainability peers | COW | 1-hour long interview discussing what it's like to work in a sustainability position for a municipality and some of the major skills/lessons learned | 15 students |
| 6/8/2021 | "Bradley & Hewletts Creeks Watershed Restoration Plan" | Homeowners within New Hanover County | HOW | 1-hour long presentation discussing the history of the watershed restoration plan, the HOW Program, and future initiatives. | 74 attendees |

***Informational Website***

| | | | | | |
|---|---|---|---|---|---|
| Ongoing | Heal Our Waterways informational website healourwaterways.org | Watershed residents General public | HOW | Continuously updated, dedicated Heal Our Waterways website | 2501 unique page views as of 3091 total page views. Data as of 6/30/2020 |

***Media Advertising Campaigns***

| | | | | | |
|---|---|---|---|---|---|
| 10/19/20 - 11/18/20 | WHQR PSA Fall Campaign | WHQR listeners | WHQR; HOW | Two rotating PSAs during drivetime announcing availability for HOA presentations and re-routing downspouts. | 23 Spots during drivetime, once per weekday |
| 9/14/20 - 11/15/20 | WECT Fall Rain Barrel Campaign | Residents within the Bradley & Hewletts Creek Watersheds | WECT; HOW | Video pre-roll, weather channel display banners, and targeted Facebook posts featuring the monthly NHC rain barrel sale. | Ads Booked: 212,000 Ads Served: 323,539 Engagements: 1,495 Engagement Rate: 0.46% |

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|---|---|---|---|---|---|
| 3/15/21 - 5/15/21 | WECT Spring Campaign | Residents within the Bradley & Hewletts Creek Watersheds | WECT; HOW | Video pre-roll, weather channel display banners, and targeted Facebook posts featuring the monthly NHC rain barrel sale and the general video created about the HOW Program. | Ads Booked: 176,750<br>Ads Served: 297,829<br>Engagements: 735<br>Engagement Rate: 0.25% |
| 10/19/20 - 11/18/20 | WHQR PSA Fall Campaign | WHQR listeners | WHQR; HOW | Two rotating PSAs during drivetime announcing availability for HOA presentations and re-routing downspouts. | 23 Spots during drivetime, once per weekday |
| 4/1/21 - 5/31/21 | WHQR PSA Spring Campaign | WHQR listeners | WHQR; HOW | PSAs during drivetime announcing the HOW Program and the benefits of rain barrels. | 38 spots during drivetime, once per weekday |
| 10/12/20 - 11/08/20 | Lamar Spring Billboard | All drivers at the corner of Oleander Drive and Greenville Loop Drive, within the Bradley Creek Watershed | Lamar Billboards; HOW | Billboard featuring "Everything Goes Somewhere - Get the Drop on Polluted Runoff" and the HOW Program web address. | 1 month, 1 billboard Total cost: $1000 |
| 04/05/21 - 05/02/21 | Lamar Spring Billboard | All drivers at the corner of Oleander Drive and Greenville Loop Drive, within the Bradley Creek Watershed | Lamar Billboards; HOW | Billboard featuring "Rain Showers Love Rain Gardens!" and the HOW Program web address. | 1 month, 1 billboard Total cost: $1000 |

***News Coverage***

| | | | | | |
|---|---|---|---|---|---|
| 12/7/2020 interview; aired 12/21/20 | Interviewed by WECT about Bradley Creek water quality and Suite Services Loop Rain Garden | All WECT viewers | HOW; NCCF; UNCW; Flora Landscaping | WECT TV story & posted online | 219,160 television households; 1.5 Million unique monthly website users |
| 1/25/2020 | Interviewed by WWAY about cistern recently installed at Fire Station along Oleander Drive | All WWAY Viewers | HOW | WWAY TV Story & posted online: https://www.wwaytv3.com/2021/01/25/oleander-drive-fire-station-10-adds-cistern-to-collect-rain-water-for-multiple-uses/ | 190,000 television households; |

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|---|---|---|---|---|---|
| 9/3/2020 | "Don't Go Near the Water": Concern fecal coliform bacteria levels in Bradley Creek Watershed Branch news article; provided information for questions from reporter | Port City Daily Online Readers | Port City Daily; COW; HOW | News story posted online: https://portcitydaily.com/local-news/2020/09/03/dont-go-near-the-water-concerning-fecal-coliform-bacteria-levels-in-bradley-creek-watershed-branch/ | All Port City Daily subscribers; 20,603 FB Followers |

***Social Media Campaigns***

| | | | | | |
|---|---|---|---|---|---|
| Ongoing | Twitter site campaign | Twitter followers Interested public | HOW | Dedicated Heal Our Waterways account handle | Currently have 250 followers |
| Ongoing | Facebook site campaign | Facebook followers Interested public | HOW | Dedicated Heal Our Waterways page | Currently have 231 page "likes", 246 followers |
| Ongoing | Instagram site campaign | Instagram followers Interested public | HOW | Dedicated Heal Our Waterways account handle | Currently have 291 followers |

***Distributing promos/giveaways***

| | | | | | |
|---|---|---|---|---|---|
| Ongoing | Introductory application swag packets to HOWBMP site visits/applicants | Applicants to the HOWBMP Program | HOW; NHSWCD | Application "Swag Bag" with HOW giveaways, including grocery tote, pens, notepads, stickers, dry bag, and informational papers | 21 Total Site Visits for the HOWBMP Program |
| 8/22/2020 | Rain Barrel Raffle from HOW Booth @ Wilmington Farmer's Market | Attendees that participated at the HOW booth | HOW | 1 80-gallon rain barrel raffled to participant at HOW booth | 1 Winner |
| 10/3/2020 | Virtual Fire in the Pines Festival raffle prizes | New Hanover County residents that participated in the virtual scavenger hunt; families | COW; HOW; The Nature Conservancy; Coastal Land Conservancy | Facebook live presentations and a scavenger hunt. All scavenger hunt participants were eligible to win HOW-sponsored dry bags and an 80-gallon rain barrel. | 60 participants; 1 80-gallon rain barrel raffled off; 25 HOW dry bags; 25 HOW Reusable straws |
| 10/17/2020 | Rain Barrel Raffle from HOW Booth @ Wilmington Farmer's Market | Attendees that participated at the HOW booth | HOW | 1 80-gallon rain barrel raffled to participant at HOW booth | 1 Winner |
| 11/14/2020 | Rain Barrel Raffle from HOW Booth @ Wilmington Farmer's Market | Attendees that participated at the HOW booth | HOW | 1 80-gallon rain barrel raffled to participant at HOW booth | 1 Winner |
| 11/14/2020 | Downspout rerouter from HOW Booth @ Wilmington Farmer's Market | Attendees that participated at the HOW booth | HOW | 2 downspout reroutes raffled to participant at HOW booth | 1 Winner |

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|---|---|---|---|---|---|
| 3/13/2021 | Rain Barrel Raffle from HOW Booth @ Wilmington Farmer's Market | Attendees that participated at the HOW booth | HOW | 1 80-gallon rain barrel raffled to participant at HOW booth | 1 Winner |
| 4/10/2021 | Rain Barrel Raffle from HOW Booth @ Wilmington Farmer's Market | Attendees that participated at the HOW booth | HOW | 1 80-gallon rain barrel raffled to participant at HOW booth | 1 Winner |
| 6/8/2021 | A Watershed Moment Community Event | Homeowners within New Hanover County | HOW | 1 80-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<br>WECT staff<br>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 2020 | Fall watershed mailer | All Bradley Creek and Hewletts Creek residents. | HOW | Postcard mailer describing how most pollution is picked up in the first 1.5" of rain and strategies to reducing polluted stormwater runoff. | Mailed to 20,826 addresses |
| Spring 2021 | Spring Watershed Mailer | All Bradley Creek and Hewletts Creek residents. | HOW | Postcard mailer describing what wetlands are and the ecosystem services they provide. | Mailed to 21,166 addresses |

***Newsletters and E-newsletters***

| | | | | | |
|---|---|---|---|---|---|
| 7/31/2020 | Summer Stormwater Solutions | HOW Newsletter Subscribers | HOW | E-newsletter describing stormwater solutions that have been installed throughout the Bradley and Hewletts Creeks Watersheds. | 341 Sends<br>34% Open Rate<br>2% Click Rate |
| 11/13/2020 | Suite Services Loop Rain Garden Volunteer Event | HOW Newsletter Subscribers | HOW | E-newsletter requesting volunteers for a planting event for the Suite Services Loop rain garden at UNCW. | 354 Sends<br>32% Open Rate<br>4% Click Rate |
| 12/16/2020 | Holiday Trees | HOW Newsletter Subscribers | HOW | E-newsletter discussing recommended methods for planting trees and miscellaneous events. | 354 Sends<br>25% Open Rate<br>6% Click Rate |

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|---|---|---|---|---|---|
| 3/29/2021 | Creek Friendly Yards | HOW Newsletter Subscribers | HOW | E-newsletter discussing Earth Day events, stormwater solutions for homes, and native plants. | 362 Sends<br>25% Open Rate<br>22% Click Rate |
| 4/20/2021 | Anne McCrary Demonstration Site Tour | HOW Newsletter Subscribers | HOW | E-newsletter announcing a tour of stormwater solutions installed at Anne McCrary Park. | 372 Sends<br>23% Open Rate<br>0% 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 2019 -- Ended December 31st, 2020 | EPA 319 Grant UNCW NCCF | 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***

| | | | | | |
|---|---|---|---|---|---|
| 11/16/20 - 11/18/20 | NCSU SCM Inspection & Maintenance Certification | Stormwater professionals | North Carolina State University | Presentations via Zoom and a certification exam | Interim Watershed Coordinator |
| 7/30/2021 | Instagram Marketing - Create a Growth and Lead Generation System | Social media users | Stack Skills | Pre-recorded presentations hosted on Stack Skills | Interim Watershed Coordinator |
| 7/8/2020 | GoToWebinar - Redefining Urban Space: Site Remediation and Green Infrastructure Practices on Contaminated Properties in Lawrence, MA | Stormwater professionals | EPA | Webinar presentation about examples of site remediation in Lawrence, MA | Interim Watershed Coordinator |
| 7/28/2020 | GoToWebinar - Porous in Provincetown: How Green Infrastructure Revitalized Commercial Street | Stormwater professionals | EPA | Webinar presentation about examples of site street retrofits in Provincetown, MA | Interim Watershed Coordinator |

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|---|---|---|---|---|---|
| 8/6/2020 | PFAS Removal in Drinking Water Treatment Systems | Water quality professionals | EPA | Webinar presentation discussing methods of removing PFAS from drinking water | Interim Watershed Coordinator |
| 8/11/2020 | GoToWebinar - Clean Water on the Cape: Green Infrastructure in Sandwich and Yarmouth, MA | Stormwater professionals | EPA | Webinar presentation about examples of green infrastructure in MA | Interim Watershed Coordinator |
| 8/12/2020 | CWP Water Quality Issues: stormwater impacts to groundwater and endocrine disruptors | Stormwater professionals | Center for Watershed Protection | Webinar presentation discussing effects of stormwater pollution on groundwater | Interim Watershed Coordinator |
| 9/15/2020 | GoToWebinar - National Municipal Stormwater Alliance Stormwater Pond Webcast Series Part 1 - The Problems with Ponds | Stormwater professionals | National Municipal Stormwater Alliance | Webinar presentation discussing common problems found with stormwater retention ponds | Interim Watershed Coordinator |
| 9/24/2020 | GoToWebinar - National Municipal Stormwater Alliance Stormwater Pond Webcast Series Part 2 - Stormwater Ponds as Assets | Stormwater professionals | National Municipal Stormwater Alliance | Webinar presentation discussing ways to manage and track retention ponds within municipalities | Interim Watershed Coordinator |
| 10/13/2020 | GoToWebinar - How's My Waterway: A Tool for Exploring Your Water Quality | Stormwater professionals | EPA | Webinar presentation going through a recently completed tool by EPA, the "How's My Waterway?" tool | Interim Watershed Coordinator |
| 10/14/2020 | Soak Up the Rain Webinar: The Green Connector: Building Resiliency through Nature-based Approaches | Stormwater professionals | EPA | Webinar presentation about examples of green infrastructure for stormwater management | Interim Watershed Coordinator |
| 10/14/2020 | APWA North Carolina Event featuring stormwater control measure updates and research | Stormwater professionals in NC | APWA | Webinar presentation providing research updates regarding SCM efficacy | Interim Watershed Coordinator |

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|---|---|---|---|---|---|
| 10/21/2020 | GoToWebinar - National Municipal Stormwater Alliance Stormwater Pond Webcast Series Part 4 - Municipal Perspectives on Stormwater Ponds | Stormwater professionals | National Municipal Stormwater Alliance | Webinar presentation discussing perspectives from various municipalities on the efficacy of retention ponds | Interim Watershed Coordinator |
| 10/28/2020 | GoToWebinar - Health Effects Associated with Harmful Algal Blooms and Algal Toxins | Stormwater professionals | EPA | Webinar presentation highlighting potential health hazards from toxic algal blooms | Interim Watershed Coordinator |
| 12/3/2020 | Soak Up the Rain EPA Webinar: “The Green Connector: Building Municipal Resiliency through Nature-based Approaches” | Stormwater professionals | EPA | Webinar presentation about examples of green infrastructure for stormwater management | Interim Watershed Coordinator |
| 12/9/2020 | Urban Forest Connections Webinar: “Biocultural Stewardship: Transforming our Urban and Community Forestry Practices” | Stormwater & urban forestry professionals | USDA Forest Service | Webinar presentation discussing the cultural significance of trees and how to engage communities in tree stewardship and education | Interim Watershed Coordinator |
| 12/16/2020 | NCDEQ Webinar: “Nature-Based Solutions in Urban Areas” | Stormwater professionals | NCDEQ | Webinar presentation about examples of green infrastructure for stormwater management, specifically in urban areas | Interim Watershed Coordinator |
| 12/21/2020 | Completed online Canva and graphic design tips trainings (hosted on Canva website) | Social media users | Canva | Presentations and exercises showing design tools in Canva and tips for better appearances | Interim Watershed Coordinator |
| 12/21/2020 | Educating & Engaging Communities w/ the Coastal Version of the Watershed Game | Stormwater professionals | Center for Watershed Protection | Recorded presentation discussing updates to the watershed game and how to engage coastal communities | Interim Watershed Coordinator |

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|---|---|---|---|---|---|
| 12/21/2020 | Seeing Green Infrastructure Tools Differently" & "Managing Stormwater at Marinas in the Great Lakes through Green Infrastructure | Stormwater professionals | Center for Watershed Protection | Recorded webinar presentations about examples of green infrastructure for stormwater management and tools for managing them | Interim Watershed Coordinator |
| 1/13/2021 | "Seeing the Landscape from the Trees: An Ecosystemic Approach to Urban Forestry" | Stormwater professionals | USDA Forest Service | Webinar presentation discussing ways to pick the right tree for the right place and promote ecosystem benefits. | Interim Watershed Coordinator |
| 1/14/2021 | Bees, Pesticides & Politics: Challenges & Opportunities for Sustainable Urban Landscapes" webinar | Stormwater & Landscaping professionals | Horticultural Research Institute | Webinar discussing methods to promote pollinator habitat in urban environments. | Interim Watershed Coordinator |
| 12/29/2021 | Alan Alda Webinar: A.R.T of Communicating Science | Scientists & science communicators | Alan Alda Center for Communicating Science | Recorded webinar walking through the steps for creating effective science communication campaigns | Interim Watershed Coordinator |
| 1/27/2021 | Building Greener Futures: Green Jobs Training & Bioswales in New Haven, CT | Stormwater professionals | EPA | Webinar discussing strategies in Burlington, Vermont, to promote green jobs and green infrastructure. | Interim Watershed Coordinator |
| 2/16/2021 | Rainwater Harvesting & Introducing the Rainwater Harvester Model Training | Stormwater professionals | NCSU-BSE | Virtual walk-through of the recently created Rainwater Harvester Model by NCSU. | Interim Watershed Coordinator |
| 3/10/2021 | Tree Equity for Climate and Health: State and Local Applications | Stormwater & urban forestry professionals | USDA Forest Service | Webinar walking through community engagement and inclusion regarding tree plantings for resiliency | Interim Watershed Coordinator |
| 3/19/2021 | Cultivating Success: Using Vegetation to Manage Stormwater and Protect Water Quality | Stormwater professionals | Water World Webcasts | Webinar featuring proper planting techniques and examples of using vegetation to manage stormwater | Interim Watershed Coordinator |
| 4/14/2021 | Trees, Woodlands, Lawns and Right-of-Ways: Best Practices for Biodiversity | Stormwater & urban forestry professionals | USDA Forest Service | Webinar showing opportunities to incorporate more biodiversity in urbanized areas. | Interim Watershed Coordinator |

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| 4/29/2021 | WMOST Webinar | Stormwater professionals | EPA | Webinar walking through EPA's Watershed Management Optimization Support Tool | Interim Watershed Coordinator |
| 5/18/2021 | Investing in Resiliency: Intersectional Perspectives of Wetlands, Infrastructure, and Healthy Communities | Environmental policy professionals | Association of State Wetland Managers | Webinar discussing how wetlands and wetlands data are important for promoting resilient communities through infrastructure development. | Interim Watershed Coordinator |
| 5/20/2021 | Permeable Pavement Maintenance: Designing to Reduce Maintenance, Planning for Maintenance Frequency, and Effective Techniques to Restore Pavement Hydraulics." | Stormwater professionals | Minnesota Stormwater Seminar Series | Webinar walking through tips and strategies for best maintenance practices for permeable pavement | Interim Watershed Coordinator |
| 5/25/2021 | NC Watershed Stewardship Network Spring Meeting | Stormwater professionals & environmental educators | NC Watershed Stewardship Network | Virtual meeting & break-out groups to discuss data needs and current initiatives across the state | Interim Watershed Coordinator |
| 5/25/2021 | Harmful Algal Blooms and Algal Toxins | Stormwater professionals | EPA | Latest research discussing methods of how to track algal blooms and potential stressors | Interim Watershed Coordinator |
| 6/8/2021 | Managing Phosphorus Pollution with Stormwater Bioretention: A Soil Study | Stormwater professionals | EPA | Analysis of stormwater bioretention study in a developing watershed and how downstream water quality was influenced | Interim Watershed Coordinator |
| 6/9/2021 | i-Tree: Using Urban Forest Data to Improve Forest Management | Stormwater & urban forestry professionals | USDA Forest Service | Webinar walking through the i-Tree suite and available data management tools | Interim Watershed Coordinator |
| 6/18/2021 | Getting Smart about Stormwater | Stormwater professionals | Stormwater Journal for Surface Water and Erosion Control Professionals | Webinar discussing strategies for moving from grey to green stormwater infrastructure and how to bring communities on board | Interim Watershed Coordinator |

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|---|---|---|---|---|---|
| 6/22/2021 - 6/23/2021 | Virtual Stormwater Summit | Stormwater professionals | APWA | Two days of virtual presentations covering green stormwater infrastructure and data management tools. | Interim Watershed Coordinator |

***Citizen Contacts- Site Visits***

| | | | | | |
|---|---|---|---|---|---|
| 7/6/2020 | Greenville Loop Road Site visit | Property owner within a target watershed | HOW | Site visit | 1 Property owner; 1 COW staff |
| 7/13/2020 | 4121 Park Avenue Site Visit | Property owner | NHSWCD; HOW; Rainstorm Solutions | HOWBMP Contract Site Visit | 1 property owner; COW Staff; NHSWCD Staff; Rainstorm Solutions |
| 7/13/2020 | 151 Wintergreen Rd Site Visit | Property owner within a target watershed | NHSWCD; HOW; Rainstorm Solutions | HOWBMP Contract Site Visit | 1 property owner; COW Staff; NHSWCD Staff; Rainstorm Solutions |
| 7/13/2020 | 314 N. Colony Circle | Property owner within a target watershed | NHSWCD; HOW; Rainstorm Solutions | HOWBMP Contract Site Visit | 1 property owner; COW Staff; NHSWCD Staff; Rainstorm Solutions |
| 8/14/2020 | 111 Formosa Dr | Property owner within a target watershed | NHSWCD; HOW; Rainstorm Solutions | HOWBMP Contract Site Visit | 2 property owners; COW Staff; NHSWCD Staff; Rainstorm Solutions |
| 9/3/2020 | 408 Stradleigh Drive | Property owner & local landscaping company | HOW | Site visit at property to discuss drainage concerns | 1 property owner; 2 landscaping crew members; 2 COW staff |
| 9/28/2020 | UNCW Student outreach @ property | UNCW student/renter | HOW | Site visit at rental property to discuss stormwater solutions & potential modifications | 1 student/renter; COW staff |
| 1/12/2021 | 211 Myrtle Avenue | Property owner within a target watershed | NHSWCD; HOW; Rainstorm Solutions | HOWBMP Contract Site Visit | 1 property owner; COW Staff; NHSWCD Staff; Rainstorm Solutions |
| 1/12/2021 | 5475 Eastwind Road | Property owner within a target watershed | NHSWCD; HOW; Rainstorm Solutions | HOWBMP Contract Site Visit | 1 property owner; COW Staff; NHSWCD Staff; Rainstorm Solutions |
| 1/12/2021 | 3301 Aster Court | Property owner within a target watershed | NHSWCD; HOW; Rainstorm Solutions | HOWBMP Contract Site Visit | 1 property owner; COW Staff; NHSWCD Staff; Rainstorm Solutions |

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|---|---|---|---|---|---|
| 1/19/2021 | 5202 Clear Run Drive | Property owner within a target watershed | NHSWCD; HOW; Rainstorm Solutions | HOWBMP Contract Site Visit | 1 property owner; COW Staff; NHSWCD Staff; Rainstorm Solutions |
| 1/19/2021 | 418 Clearbrook Drive | Property owner within a target watershed | NHSWCD; HOW; Rainstorm Solutions | HOWBMP Contract Site Visit | 1 property owner; COW Staff; NHSWCD Staff; Rainstorm Solutions |
| 1/19/2021 | 6452 Quail Run Road | Property owner within a target watershed | NHSWCD; HOW; Rainstorm Solutions | HOWBMP Contract Site Visit | 1 property owner; COW Staff; NHSWCD Staff; Rainstorm Solutions |
| 1/27/2021 | Land's End HOA | HOA within a target watershed | NHSWCD; HOW; Alliance for Cape Fear Trees; Wilmington Tree Commission | Visit with HOA to discuss practices that would be environmentally friendly | 1 HOA Representative; NHSWCD Staff; COW Staff; Alliance for Cape Fear Trees Staff; Wilmington Tree Commission Staff |
| 2/19/2021 | Andrews Reach HOA | HOA within a target watershed | NHSWCD; HOW; Alliance for Cape Fear Trees; Wilmington Tree Commission | Visit with HOA to discuss practices that would be environmentally friendly | 1 HOA Representative; NHSWCD Staff; COW Staff; Alliance for Cape Fear Trees Staff; Wilmington Tree Commission Staff |
| 2/25/2021 | 5612 Maxweell Place | Property owner within a target watershed | NHSWCD; HOW; Rainstorm Solutions | HOWBMP Contract Site Visit | 1 property owner; COW Staff; NHSWCD Staff; Rainstorm Solutions |
| 2/25/2021 | 202 North Hampton Road | Property owner within a target watershed | NHSWCD; HOW; Rainstorm Solutions | HOWBMP Contract Site Visit | 1 property owner; COW Staff; NHSWCD Staff; Rainstorm Solutions |
| 3/22/2021 | 2025 Delgado Avenue | Property owner | HOW | Property owner looking for information on how to design a rain garden | 1 Property owner; COW Staff |
| 3/22/2021 | Anne McCrary Park | Property Owner & Alliance for Cape Fear Trees | HOW | Property owner looking for information on types of stormwater solutions and how a complete rain garden looks | 1 Property owner; COW Staff; Alliance for Cape Fear Trees staff |

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|---|---|---|---|---|---|
| 3/24/2021 | Kentwood Estates HOA | Property owner | HOW | Property owner looking for information on how to improve drainage within the neighborhood | 1 Property owner; COW/HOW Staff |
| 4/6/2021 | 117 Braxlo Lane | Property owner within a target watershed | NHSWCD; COW; Rainstorm Solutions | HOWBMP Contract Site Visit | 1 property owner; COW Staff; NHSWCD Staff; Rainstorm Solutions |
| 4/14/2021 | 202 Hooker Road | Property owner within a target watershed | NHSWCD; Rainstorm Solutions | HOWBMP Contract Site Visit | 1 property owner; NHSWCD Staff; Rainstorm Solutions |
| 4/14/2021 | 3505 Saint Francis Drive | Property owner within a target watershed | NHSWCD; Rainstorm Solutions | HOWBMP Contract Site Visit | 1 property owner; NHSWCD Staff; Rainstorm Solutions |
| 5/12/2021 | HOWBMP Annual Inspections | Residents that had HOWBMP Projects installed | NHSWCD; HOW | HOWBMP Contract Maintenance Inspection | 15 HOWBMP Participants |
| ***BMP Projects Installed*** | | | | | |
| 7/9/2020 | 5412 Whaler Way Rain Barrel | 1 property owner | COW; NHSWCD | Rain Barrel sold through monthly rain barrel sale | Total Volume Reduction: 8.021 cubic feet; 60 gallons |
| 9/10/2020 | 5763 Gardenia Lane Rain Barrel | 1 property owner | COW; NHSWCD | Rain Barrel sold through monthly rain barrel sale | Total Volume Reduction: 10.694 cubic feet; 80 gallons |
| 10/8/2020 | 132 Stonewall Jackson Drive Rain Barrel | 1 property owner | COW; NHSWCD | Rain Barrel sold through monthly rain barrel sale | Total Volume Reduction: 10.694 cubic feet; 80 gallons |
| 7/9/2020 | Rain barrel sold within Bradley Creek Watershed | 1 property owner | COW; NHSWCD | Rain Barrel sold through monthly rain barrel sale | Total Volume Reduction: 10.694 cubic feet; 80 gallons |
| 7/9/2020 | Rain barrel sold within Bradley Creek Watershed | 1 property owner | COW; NHSWCD | Rain Barrel sold through monthly rain barrel sale | Total Volume Reduction: 8.021 cubic feet; 60 gallons |
| 7/9/2020 | Rain barrel sold within Hewletts Creek Watershed | 1 property owner | COW; NHSWCD | Rain Barrel sold through monthly rain barrel sale | Total Volume Reduction: 10.694 cubic feet; 80 gallons |
| 7/9/2020 | Rain barrel sold within Hewletts Creek Watershed | 1 property owner | COW; NHSWCD | Rain Barrel sold through monthly rain barrel sale | Total Volume Reduction: 10.694 cubic feet; 80 gallons |
| 9/10/2020 | 3823 Sylvan Drive Rain Barrel 1 | 1 property owner | COW; NHSWCD | Rain Barrel sold through monthly rain barrel sale | Total Volume Reduction: 10.694 cubic feet; 80 gallons |

| | | | | | |
|---|---|---|---|---|---|
| 9/10/2020 | 3823 Sylvan Drive Rain Barrel 2 | 1 property owner | COW; NHSWCD | Rain Barrel sold through monthly rain barrel sale | Total Volume Reduction: 10.694 cubic feet; 80 gallons |
| 7/1/2020 | 325 Pemberton Drive Rain Barrel | 1 property owner | COW; NHSWCD | Rain Barrel raffle winner | Total Volume Reduction: 10.694 cubic feet; 80 gallons |
| 4/24/2021 | 1227 Kenningston Street Rain Barrel | 1 property owner | COW; NHSWCD | Rain Barrel sold through monthly rain barrel sale | Total Volume Reduction: 10.694 cubic feet; 80 gallons |
| 4/24/2021 | 5313 Greenleaf Drive Rain Barrel | 1 property owner | COW; NHSWCD | Rain Barrel sold through monthly rain barrel sale | Total Volume Reduction: 8.021 cubic feet; 60 gallons |
| 4/24/2021 | 409 Camway Drive Rain Barrel | 1 property owner | COW; NHSWCD | Rain Barrel sold through monthly rain barrel sale | Total Volume Reduction: 10.694 cubic feet; 80 gallons |
| 4/1/2021 | 3102 Scarborough Drive Rain Barrel | 1 property owner | COW; NHSWCD | Rain Barrel sold through monthly rain barrel sale | Total Volume Reduction: 8.021 cubic feet; 60 gallons |
| 5/8/2021 | 216 Jeb Stuart Drive Rain Barrel | 1 property owner | HOW | Rain Barrel raffle winner | Total Volume Reduction: 10.694 cubic feet; 80 gallons |
| 2/25/2021 | 5612 Maxwell Place Rain Barrel | 1 property owner | COW; NHSWCD | Rain Barrel discovered during a HOWBMP site visit | Total Volume Reduction: 10.694 cubic feet; 80 gallons |
| 2/27/2021 | 4954 Park Avenue Rain Barrel | 1 property owner | COW; NHSWCD | Rain Barrel sold through monthly rain barrel sale | Total Volume Reduction: 8.021 cubic feet; 60 gallons |
| 12/15/2020 | 348 Brenda Drive Rain Barrel | 1 property owner | COW; NHSWCD | Rain Barrel sold through monthly rain barrel sale | Total Volume Reduction: 10.694 cubic feet; 80 gallons |
| 12/15/2020 | 10 Jeb Stuart Drive Rain Barrel | 1 property owner | COW; NHSWCD | Rain Barrel sold through monthly rain barrel sale | Total Volume Reduction: 10.694 cubic feet; 80 gallons |
| 12/15/2020 | 5009 Weybridge Lane Rain Barrel | 1 property owner | COW; NHSWCD | Rain Barrel sold through monthly rain barrel sale | Total Volume Reduction: 8.021 cubic feet; 60 gallons |
| 12/31/2020 | 1205 2 Mile Circle Rain Barrel | 1 property owner | COW; NHSWCD | Rain Barrel sold through monthly rain barrel sale | Total Volume Reduction: 8.021 cubic feet; 60 gallons |
| 4/30/2021 | 117 Pine Valley Drive Rain Barrel | 1 property owner | HOW | Rain Barrel raffle winner | Total Volume Reduction: 10.694 cubic feet; 80 gallons |

| | | | | | |
|---|---|---|---|---|---|
| 8/31/2020 | 135 Cavalier Drive Rain Barrel | 1 property owner | HOW | Rain Barrel raffle winner | Total Volume Reduction: 10.694 cubic feet; 80 gallons |
| 3/1/2021 | Racine Drive Japanese Zelkova Plantings | City of Wilmington ROW along Racine Drive | COW; | Japanese zelkova trees planted by volunteers along Racine Drive. | Total Volume Reduction: 8.85 cubic feet; 66.20 gallons |
| 3/1/2021 | Racine Drive Trident Maple Plantings | City of Wilmington ROW along Racine Drive | COW; | Trident maple trees planted by volunteers along Racine Drive. | Total Volume Reduction: 3.54 cubic feet; 26.48 gallons |
| 2/3/2021 | Wade Park Tree Planting | City of Wilmington JEL Wade Park | HOW | Variety of Dogwoods, Maples, Magnolias, and Live oak planted within Wade Park | Total Volume Reduction: 133.68 cubic feet; 67.03 gallons |
| 3/1/2021 | UNCW Long Leaf Pine Tree Plantings | University of North Carolina Wilmington | UNCW | 125 long leaf pine planted on campus | Total Volume Reduction: 36.46 cubic feet; 273 gallons |
| 1/20/2021 | Fire Station 10 Cistern | Fire Station 10; Oleander Drive | HOW | 1000 gallon cistern at fire station | Total Volume Reduction: 133.68 cubic feet; 1000 gallons |
| 6/9/2021 | 314 N Colony Circle Rain Garden | 1 property owner | NHSWCD; HOW; Rainstorm Solutions | One rain garden installed through the HOWBMP funding program. | Total Volume Reduction: 87 cubic feet; 651 gallons |
| 6/9/2021 | 100 Hooker Road Rain Garden 1 | 1 property owner | NHSWCD; HOW; Rainstorm Solutions | One rain garden installed through the HOWBMP funding program. | Total Volume Reduction: 107 cubic feet; 800 gallons |
| 6/9/2021 | 100 Hooker Road Rain Garden 2 | 1 property owner | NHSWCD; HOW; Rainstorm Solutions | One rain garden installed through the HOWBMP funding program. | Total Volume Reduction: 236 cubic feet; 1765 gallons |
| 6/9/2021 | 151 Wintergreen Road Rain Garden | 1 property owner | NHSWCD; HOW; Rainstorm Solutions | One rain garden installed through the HOWBMP funding program. | Total Volume Reduction: 62 cubic feet; 463 gallons |
| 6/9/2021 | 3301 Aster Court Rain Garden 1 | 1 property owner | NHSWCD; HOW; Rainstorm Solutions | One rain garden installed through the HOWBMP funding program. | Total Volume Reduction: 110 cubic feet; 823 gallons |
| 6/9/2021 | 3301 Aster Court Rain Garden 2 | 1 property owner | NHSWCD; HOW; Rainstorm Solutions | One rain garden installed through the HOWBMP funding program. | Total Volume Reduction: 116 cubic feet; 868 gallons |
| 6/9/2021 | 211 Myrtle Avenue Rain Garden | 1 property owner | NHSWCD; HOW; Rainstorm Solutions | One rain garden installed through the HOWBMP funding program. | Total Volume Reduction: 19 cubic feet; 142 gallons |
| 6/9/2021 | 6252 Turtle Hall Drive Rain Garden | 1 property owner | NHSWCD; HOW; Rainstorm Solutions | One rain garden installed through the HOWBMP funding program. | Total Volume Reduction: 35 cubic feet; 262 gallons |

| | | | | | |
|---|---|---|---|---|---|
| 6/9/2021 | 3529 Iris Street Rain Garden | 1 property owner | NHSWCD; HOW; Rainstorm Solutions | One rain garden installed through the HOWBMP funding program. | Total Volume Reduction: 134 cubic feet; 1002 gallons |
| 12/31/2021 | UNCW Suite Services Loop Rain Garden | University of North Carolina Wilmington | HOW; UNCW; NCCF; Coastal Stormwater Services Inc.; Tinga Landscaping | One rain garden installed through the 319 Grant "Reducing Stormwater Runoff Volume on the UNC Wilmington Campus". | Total Volume Reduction: 9872 cubic feet; 73847 gallons |
| 6/11/2021 | 3505 Saint Francis Drive Rain Barrel | 1 property owner | HOW | Rain Barrel raffle winner | Total Volume Reduction: 8.021 cubic feet; 60 gallons |
| 5/13/2021 | 3522 Bethel Road Rain Barrel | 1 property owner | COW; NHSWCD | Rain Barrel sold through monthly rain barrel sale | Total Volume Reduction: 10.694 cubic feet; 80 gallons |
| 5/21/2021 | 209 East Blackbeard Road Rain Barrel | 1 property owner | COW; NHSWCD | Rain Barrel sold through monthly rain barrel sale | Total Volume Reduction: 10.694 cubic feet; 80 gallons |
| 6/1/2021 | 3124 Kirby Smith Drive Rain Barrel 1 | 1 property owner | COW; NHSWCD | Rain Barrel sold through monthly rain barrel sale | Total Volume Reduction: 10.694 cubic feet; 80 gallons |
| 6/1/2021 | 3124 Kirby Smith Drive Rain Barrel 2 | 1 property owner | COW; NHSWCD | Rain Barrel sold through monthly rain barrel sale | Total Volume Reduction: 10.694 cubic feet; 80 gallons |
| 6/10/2021 | 3204 Aster Court Rain Barrel 1 | 1 property owner | COW; NHSWCD | Rain Barrel sold through monthly rain barrel sale | Total Volume Reduction: 10.694 cubic feet; 80 gallons |
| 6/10/2021 | 3204 Aster Court Rain Barrel 2 | 1 property owner | COW; NHSWCD | Rain Barrel sold through monthly rain barrel sale | Total Volume Reduction: 8.021 cubic feet; 60 gallons |
| 6/10/2021 | 302 Honeycutt Rain Barrel | 1 property owner | COW; NHSWCD | Rain Barrel sold through monthly rain barrel sale | Total Volume Reduction: 10.694 cubic feet; 80 gallons |
| 6/29/2021 | Fire Station 15 Cistern | Fire Station 15; Masonboro Loop Road | HOW | 1000 gallon cistern at fire station | Total Volume Reduction: 133.68 cubic feet; 1000 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

# FY21 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** | | | | |
| Link Rain Barrel 1 | Rain Barrel | 80.00 | 10.69 | 0.000246 |
| Link Rain Barrel 2 | Rain Barrel | 60.00 | 8.02 | 0.000184 |
| Hanna Rain Barrel 1 | Rain Barrel | 80.00 | 10.69 | 0.000246 |
| Hanna Rain Barrel 2 | Rain Barrel | 80.00 | 10.69 | 0.000246 |
| Fire Station 10 Cistern | Cistern | 1000.00 | 133.68 | 0.003069 |
| UNCW Suite Services Loop Rain Garden | Rain Garden/Infiltration Basin | 73847.69 | 9872 | 0.226630 |
| Racine Drive Trident Maple Plantings | Tree Planting | 26.48 | 3.54 | 0.000081 |
| Racine Drive Japanese Zelkova Plantings | Tree Planting | 66.20 | 8.85 | 0.000203 |
| UNCW Long Leaf Pine Plantings | Tree Planting | 272.74 | 36.46 | 0.000837 |
| 1205 2 Mile Circle W. Rain Barrel | Rain Barrel | 60.00 | 8.02 | 0.000184 |
| 135 Cavalier Drive Rain Barrel | Rain Barrel | 80.00 | 10.69 | 0.000246 |
| 100 Hooker Road Rain Garden 1 | Rain Garden | 800.42 | 107.00 | 0.002456 |
| 100 Hooker Road Rain Garden 2 | Rain Garden | 1765.40 | 236.00 | 0.005418 |
| 211 Myrtle Avenue Rain Garden | Rain Garden | 142.13 | 19.00 | 0.000436 |
| **TOTAL BRADLEY CREEK WATERSHED VOLUME REDUCTION:** | | **78361.05** | **10475.35** | **0.240481** |
| **TOTAL NUMBER OF PROJECTS BRADLEY CREEK WATERSHED** | | | | **14** |
| **Drains To ICW2 Volume Reduction Data** | | | | |
| **TOTAL DRAINS TO ICW2 VOLUME REDUCTION:** | | **0** | **0** | **0** |
| **TOTAL NUMBER OF PROJECTS DRAINS TO ICW2** | | | | **0** |
| **Hewletts Creek Watershed Volume Reduction Data** | | | | |
| 5412 Whaler Way Rain Barrel | Rain Barrel | 60.00 | 8.02 | 0.000184 |
| 5763 Gardenia Lane Rain Barrel | Rain Barrel | 80.00 | 10.69 | 0.000246 |
| 132 Stonewall Jackson Drive Rain Barrel | Rain Barrel | 80.00 | 10.69 | 0.000246 |
| Fire Station 15 Cistern | Cistern | 1000.00 | 133.68 | 0.003069 |
| Wade Park Tree Plantings | Tree Planting | 67.03 | 8.96 | 0.000206 |
| 5009 Weybridge Lane Rain Barrel | Rain Barrel | 60.00 | 8.02 | 0.000184 |
| 10 Jeb Stuart Drive Rain Barrel | Rain Barrel | 80.00 | 10.69 | 0.000246 |
| 348 Brenda Drive Rain Barrel | Rain Barrel | 80.00 | 10.69 | 0.000246 |
| 4954 Park Avenue Rain Barrel | Rain Barrel | 60.00 | 8.02 | 0.000184 |
| 325 Pemberton Drive Rain Barrel | Rain Barrel | 60.00 | 8.02 | 0.000184 |
| 314 N Colony Circle Rain Garden | Rain Garden | 650.81 | 87.00 | 0.001997 |
| 3301 Aster Court Rain Garden 1 | Rain Garden | 822.86 | 110.00 | 0.002525 |

| | | | | |
|---|---|---|---|---|
| 3301 Aster Court Rain Garden 2 | Rain Garden | 867.74 | 116.00 | 0.002663 |
| 151 Wintergreen Drive Rain Garden | Rain Garden | 463.79 | 62.00 | 0.001423 |
| 3823 Sylvan Drive Rain Barrel 1 | Rain Barrel | 80.00 | 10.69 | 0.000246 |
| 3823 Sylvan Drive Rain Barrel 2 | Rain Barrel | 80.00 | 10.69 | 0.000246 |
| 117 Pine Valley Drive Rain Barrel | Rain Barrel | 80.00 | 10.69 | 0.000246 |
| 5612 Maxwell Place Rain Barrel | Rain Barrel | 80.00 | 10.69 | 0.000246 |
| 3529 Iris Street Rain Garden | Rain Garden | 1002.39 | 134.00 | 0.003076 |
| 3505 Saint Francis Drive Rain Barrel | Rain Barrel | 60.00 | 8.02 | 0.000184 |
| 3522 Bethel Road Rain Barrel | Rain Barrel | 80.00 | 10.69 | 0.000246 |
| 209 East Blackbeard Road Rain Barrel | Rain Barrel | 80.00 | 10.69 | 0.000246 |
| 3124 Kirby Smith Drive Rain Barrel 1 | Rain Barrel | 80.00 | 10.69 | 0.000246 |
| 3124 Kirby Smith Drive Rain Barrel 2 | Rain Barrel | 80.00 | 10.69 | 0.000246 |
| 3204 Aster Court Rain Barrel 1 | Rain Barrel | 80.00 | 10.69 | 0.000246 |
| 3204 Aster Court Rain Barrel 2 | Rain Barrel | 60.00 | 8.02 | 0.000184 |
| 302 Honeycutt Rain Barrel | Rain Barrel | 80.00 | 10.69 | 0.000246 |
| **TOTAL HEWLETTS CREEK WATERSHED VOLUME REDUCTION:** | | **6354.61** | **849.49** | **0.019502** |
| **TOTAL NUMBER OF PROJECTS HEWLETTS CREEK WATERSHED** | | | | **27** |
| **Drains To ICW3 Volume Reduction Data** | | | | |
| 6252 Turtle Hall Drive Rain Garden | Rain Garden | 261.82 | 35 | 0.000803 |
| **TOTAL DRAINS TO ICW3 VOLUME REDUCTION:** | | **261.82** | **35** | **0.000803** |
| **TOTAL NUMBER OF PROJECTS DRAINS TO ICW3** | | | | **1** |
| **TOTAL COMBINED VOLUME REDUCTION (All Watersheds):** | | | | |
| **TOTAL COMBINED VOLUME REDUCTION (All Watersheds):** | | **84977.48** | **11359.84** | **0.260786** |
| **TOTAL NUMBER OF PROJECTS (All Watersheds)** | | | | |
| **Volume Reduction Goals** | **Goal (ac.ft)** | **Gallons** | **Actual (ac.ft.)** | **% Achieved** |
| **Bradley Creek FY21** | **0.15** | **78361.05** | **0.240481** | **160.32** |
| **Hewletts Creek FY21** | **1** | **6616.43** | **0.020305** | **2.03** |

FY 20-21

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

## HOWBMP Quarterly Progress Report #4: April 1st – June 30th, 2021

### 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 – September 30, 2020

Site Visits at the following Locations:

- 4121 Park Ave (Could not suggest BMP because they are located in Burnt Mill Creek)
- 151 Winter Green Rd (Suggested a backyard rain garden)
- 314 North Colony Circle (Suggested swale)
- 113 Formosa Dr. and 111 Formosa Dr. (Suggested possible backyard rain gardens in each yard, but told homeowners they would rank low since a vegetated area is already capturing and infiltrating stormwater. Gave them native plant list to enhance their yard on their own)

No BMP devices were installed in this quarter.

## October 1 – December 31, 2020

Technician has been in collaboration with Heal Our Waterways staff and has solidified a document outlining the requirements and qualifications for all contractors that would like to participate in the HOWBMP program. This document will ensure only qualified contractors are allowed to install BMPs for the HOWBMP program. A legal document outlining the contractor legal obligations to the program has also been produced by NHC Legal Department and approved by City of Wilmington and HOW staff. The contractor agreement legal documentation and the contractor requirements and qualifications document has been included in an email to potential contractors to inform them of the opportunity to partner with the HOWBMP program by installing approved BMPs. As stated on the contractor qualifications and requirements document, qualified contractors are required to have obtained the NC State Residential Rain Garden Certification. Therefore, the invitation email was sent out to the 469 people who have registered contact emails on the compiled certification list located on the NC State website, located here: https://www.bae.ncsu.edu/workshops-conferences/rg-201/. The email stated that interested parties will contact the S&WCD Technician about their interest by January 6th if they would like to be invited to site visits starting January 11th, 2021. There is at least one confirmed qualified contractor, therefore site visits will officially resume beginning January 11th.

Obtaining tree planter vendors has proved to be challenging this quarter. The S&WCD Intern and Technician researched types of appropriate native trees, prices of native trees, and local vendors to invite to participate in the HOWBMP program. These vendors include local nurseries and contractors. County and City staff discussed requirements and determined the vendors needed to meet some established requirements to be considered by the program for tree planting. These requirements included the ability to deliver and install the tree, as well as offer a 6 month or yearlong warranty on the planted tree. S&WCD staff whittled down the initial research list to 5 nurseries and made multiple points of contact, including by email, phone call, and even visited one nursery. One of the five declined participation in the program, and only one other has taken the steps to complete the paperwork required to be a vendor with the county. To entice more qualified installers for tree installations, S&WCD emailed 46 business owners. These businesses were derived from the County's Minority and Women Business Enterprise Database and other contacts were forwarded to me by City of Wilmington staff.

No BMP devices were installed in this quarter.

No site visits occurred this quarter.

## January 1st – March 31st

Site visits were conducted at the following 11 locations:

- 211 Myrtle Ave (Suggested a cistern)
- 5475 Eastwind Road (Suggested a cistern)
- 3301 Aster Court (Suggested a rain garden and cistern)
- 5202 Clear Run Drive (Suggested a rain garden)

- 418 Clearbrook Drive (Suggested a constructed wetland)
- 6452 Quail Run Drive (Suggested tree plantings)
- 1928 Vera Court (Suggested a rain garden)
- 112 Edgewater Drive (Suggested a possible rain garden and tree plantings)
- 3241 Red Berry Drive (Suggested a rain garden in front or back yard as well as a cistern)
- 202 N Hampton Road (Suggested a constructed wetland once gutters were installed on house)
- 5612 Maxwell Place (Suggested a cistern)

The following addresses and BMPs were preliminarily approved this quarter for HOWBMP funding, contingent on perc test confirmation from contractor:

- 100 Hooker Rd (2 rain gardens)
- 314 N Colony Cir. (1 rain garden)
- 3529 Iris St (1 rain garden)

No BMP devices were installed in this quarter.

### April 1 – June 30, 2021

Site visits were conducted at the following 5 locations:

- 117 Braxlo Lane (Suggested a rain garden)
- 202 Hooker Rd (Suggested a rain garden)
- 3505 Saint Francis Dr (Suggested two rain gardens)
- 5011 Pine Street (She was interested in pervious pavement but decided not to participate in the program due to her selling the house this year and needing the pavers installed sooner than what the program could deliver)
- 5505 Andrews Reach Loop (Suggested a cistern)

Annual compliance checks were performed on 17 previously installed BMPs on 5/12/2021 and on 6/12/2021. After the first compliance checks, five rain gardens were deemed to be out of compliance and paper copies were left at their residence and emails were sent to participants outlining the remedial changes each participant needed to perform to bring their BMP back into compliance. Upon the second compliance check, only one rain garden was out of compliance at 3422 Tansey Close Dr. This participant's rain garden has been out of compliance previously. A letter of non-compliance was mailed to 3422 Tansey Close Dr. on 06/24/2021.

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 |
|---|---|---|---|
| 100 Hooker Rd. | Backyard Rain Garden | 266 | $3,428.96 |
| 100 Hooker Rd. | Roadside Rain Garden | 107 | $4,093.00 |
| 6252 Turtle Hall Dr. | Rain Garden | 35 | $3,988.60 |
| 151 Wintergreen Rd. | Rain Garden | 62 | $2,740.35 |
| 3529 Iris St. | Rain Garden | 134 | $3,560.68 |

| | | | |
|---|---|---|---|
| 314 N Colony Cir. | Rain Garden | 87 | $3,175.46 |
| 3301 Aster Ct. | Front Yard Rain Garden | 116 | $3,081.11 |
| 3301 Aster Ct. | Back Yard Rain Garden | 110 | $3519.17 |
| 211 Myrtle Ave. | Rain Garden | 19 | $2,268. 33 |
| **Total:** | | **936** | **$29,855.66** |

The City of Wilmington will receive a $144.34 refund in unspent funds.
Follow up checks were performed on all 9 installed rain gardens and all passed the installation requirements and functioned properly.

Additionally, S&WCD staff participated in "A Watershed Moment" event held at 5:30pm on 06/08/2021. S&WCD staff spoke to the 20 people that participated in the walking tour of Wade Park about the HOWBMP program.

**Report Compiled by:** Dru Harrison & Haley Moccia **Date:** 6/25/2021

## APPENDIX I: REGULATORY ENFORCEMENT ACTIONS

In 20-21 the Public Services Department Compliance Officer provided stormwater education and investigated approximately 120 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 2020-2021

**Reporting period (FY21) July 1, 2020- June 30, 2021**

| Nature of Complaint | Number of Reports | Resolved thru Public Education | NOVs Incidents | Referred to DWQ | # Civil Penalties |
|---|---|---|---|---|---|
| Pet Waste | 6 | 100% | 0 | N/A | 0 |
| Outreach | 6 | N/A | N/A | N/A | N/A |
| Illicit Discharge/Sediment | 109 | 87.2% | 14 | 2 | 2 |
| *Illicit Connection* | 6 | 83.3% | 1 | 0 | 0 |
| *Dry Weather Flow* | 0 | 100.0% | 0 | 0 | 0 |
| *SSO* | 9 | 77.8% | 2 | 2 | 0 |
| Totals for 1,2 and 3 | 121 | 86% | 17 | 4 | 2 |

### CIVIL PENALTIES 2020-2021

| Nature of Compliant | Responsible Party | Address of violation | Date of Violation | Total Penalty |
|---|---|---|---|---|
| Illicit Discharge | ARRIS WILMINGTON LLC | 4544 FAIRVIEW DR. | 1/14/21 | $650.00 |
| Illicit Discharge | TARA MANAGEMENT | 2251 BURNETT BLVD. | 7/8/20 | $600.00 |

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.