



**City of Wilmington, North Carolina**

## **ANNUAL NPDES PERMIT REPORT**



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

**NPDES Permit No.:** NCS000406

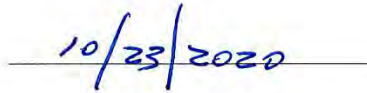
**Reporting Year:** July 1, 2019 – June 30, 2020

**REPORTING CERTIFICATION**

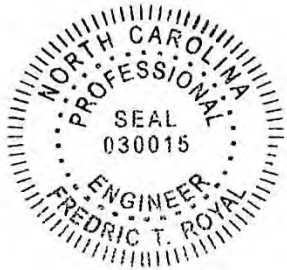
I certify, under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage 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.



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



Date



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## **INTRODUCTION**

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### **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, 2019 to June 30, 2020.

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

- Continued implementation of ordinances related to Post Construction. Revisions to the Land Development Code are occurring to provide higher water quality standards to Bradley Creek Watershed as other area SA classified watersheds.
- 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.
- Inventory of municipally owned operations with the potential to pollute reviewed.
- Hired Watershed Coordinator who began implementation of the Watershed Restoration Plans for Bradley and Hewletts Creek watersheds.

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 upcoming visits 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 ambient monitoring of water quality on creeks within the City.

## **CITY OF WILMINGTON STORMWATER SERVICES OVERVIEW**

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### **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 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 60 city-owned SCM facilities; including wet ponds, constructed wetlands, bio-retention and infiltration facilities in functioning condition.

### **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:

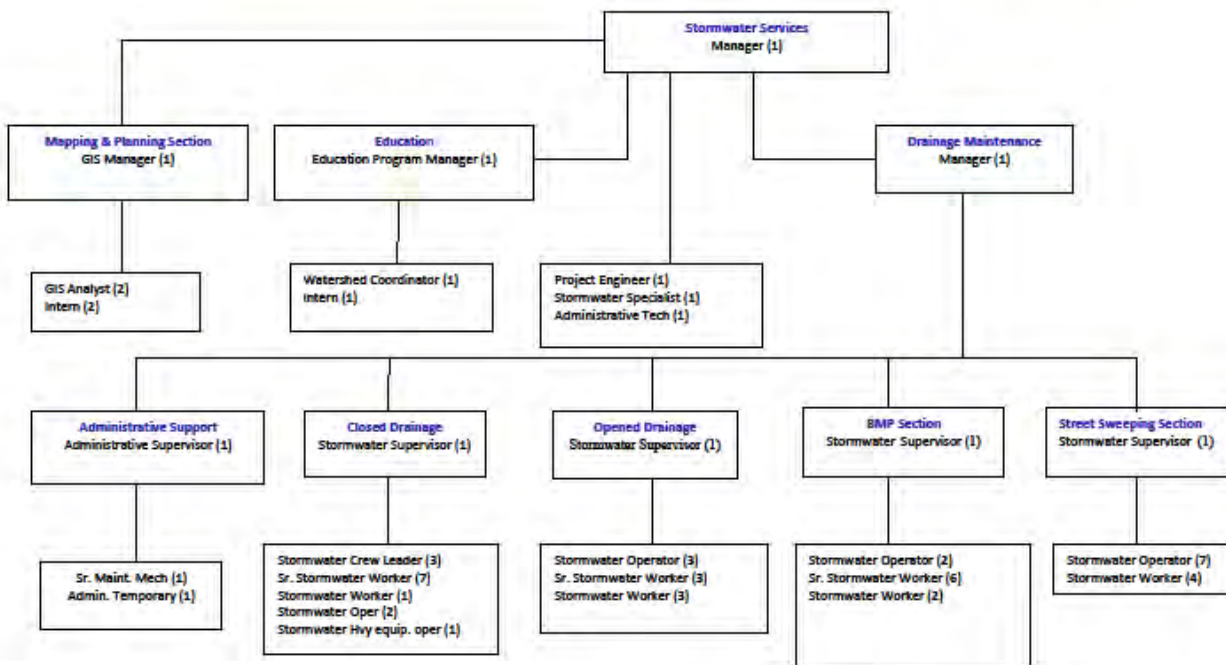
- Willard St. - stormwater wetland (Jumping Run Branch).
- University Commons wet pond – retrofit to stormwater wetland (Clear Run Branch).

These efforts strive to 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

Stormwater Services Position Chart FY 19-20





*Estimated FY 19-20 Stormwater Management Fund Budget for NPDES*

|                                  | FY 19-20<br><u>Adopted</u> | FY 20-21<br><u>Adopted</u>  |
|----------------------------------|----------------------------|-----------------------------|
| REVENUES                         |                            |                             |
| Storm Water Utility Fees         | 8,940,758                  | 9,825,988                   |
| City Streets Storm Water Fees    | 2,839,062                  | 2,939,139                   |
| Storm Water Discharge permits    | 100,100                    | 51,000                      |
| NCDOT Drainage Maintenance       | 37,000                     | 37,000                      |
| Interest Earnings                | 164,680                    | 56,795                      |
| Miscellaneous                    | -                          | -                           |
| Appropriated Fund Balance        | <u>-</u>                   | <u>-</u>                    |
| <br>TOTAL REVENUES               | <br>12,081,600             | <br>12,909,922              |
| EXPENDITURES                     |                            |                             |
| Public Services                  | 6,547,294                  | 6,064,197                   |
| Non-departmental                 | 1,554,865                  | 1,621,495                   |
| Debt Service                     | 1,841,944                  | 1,824,230                   |
| Contingency                      | -                          | -                           |
| Transfer to Capital Project Fund | <u>2,137,497</u>           | <u>3,400,000</u>            |
| <br>TOTAL EXPENDITURES           | <br>11,776,939             | <br>12,909,922 <sup>1</sup> |

<sup>1</sup> The FY 2021 budget was adopted by the Wilmington City Council on June 16, 2020.

## **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 2019-2020, a total of 2 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***

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.

### ***Illicit Discharges***

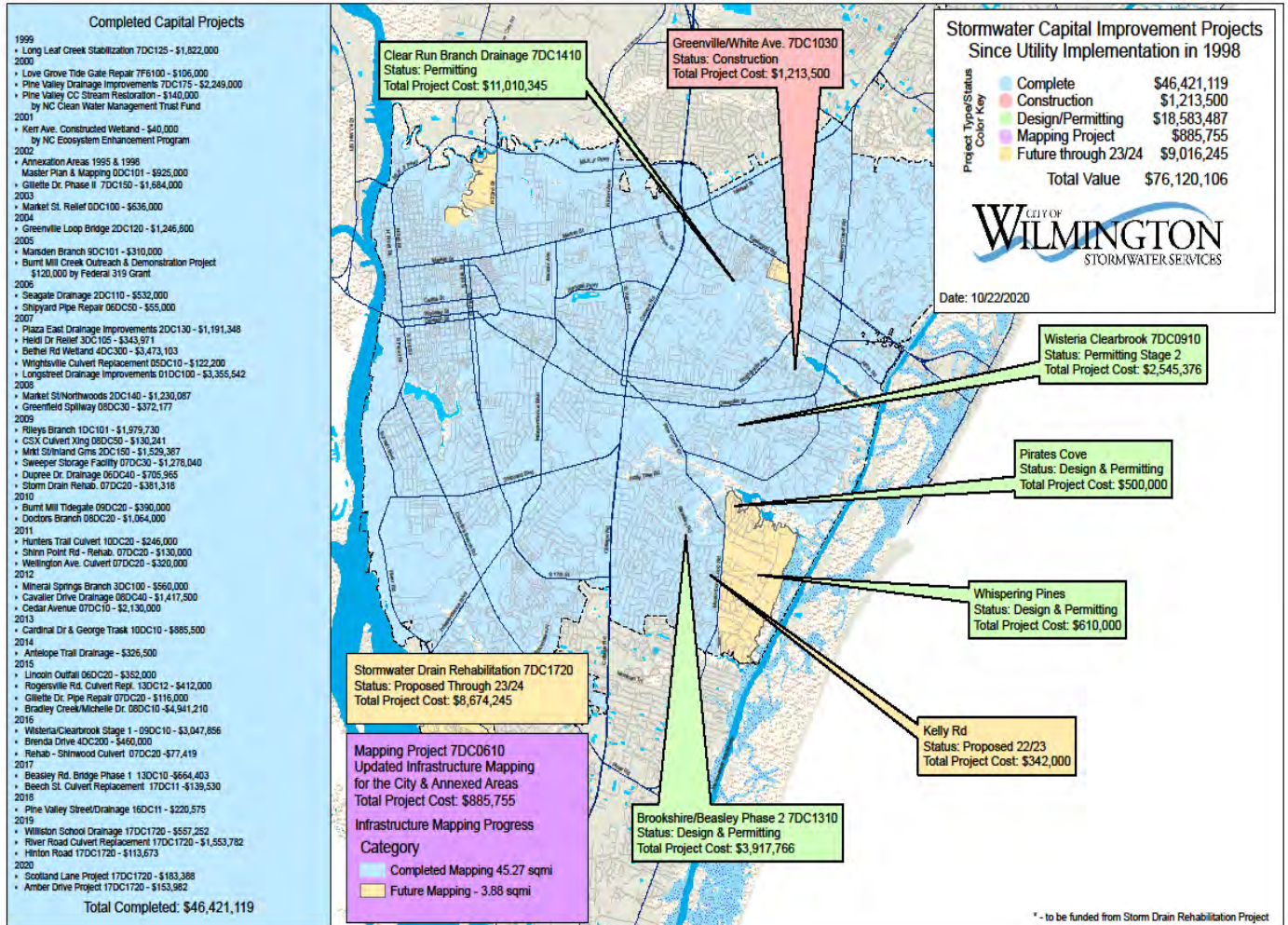
Reports of illicit discharges are addressed on a case by case basis. Informational posters and brochures for general use have been developed for distribution and others for specific common source types. These posters are distributed to specific types of businesses to display for employees in restaurants, 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 four Environmental Compliance Officers, one Environmental Compliance Supervisor, and one Environmental Compliance Manager that implement and enforce elements of the City's NPDES Wastewater Discharge Permit to include the City's Collection System Permit. As part of those requirements the group regulates sanitary sewer overflows (SSOs) and eliminates any wastewater or other polluted waters from leaving their system. They respond to reports and investigate leads generated by the public or monitoring results as part of their permit requirement and respond using public education, enforcement and maintenance. The CFPUA copies the City on all SSOs and follows up with monitoring results and clean up measures. The CFPUA has maintained right of entry on the properties that it services. The city and CFPUA are working together to keep open lines of communication, continue to build relationships and combine resources in a continued effort to locate chronic leaks and minimize release to MS4.

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

# Capital Improvements



***In-House Projects***

| Location         | Pipe              |            |                        |                    | Structures  |  |                    | BMP  |      |            | Total Cost          |
|------------------|-------------------|------------|------------------------|--------------------|-------------|--|--------------------|------|------|------------|---------------------|
|                  | Amt.              | Size       | Type                   | Cost               | Amt.        | Type   | Cost               | Amt. | Type | Cost       |                     |
| 4606 Bently Dr   | 102 Ft.           | 18"        | RCP                    | \$ 2,292.74        | 1           | Casting, frame & grate, 24" x 36"  | \$ 3,654.08        |      |      |            | \$ 5,946.82         |
| 414 Buccaneer Rd | 22 Ft.<br>237 Ft. | 24"<br>18" | ADS Double<br>wall RCP | \$ 4,168.35        | 1<br>2<br>1 | Built Headwall<br>Speciality made structures, 2' x 3'<br>Installed casting, frame & grate, 24" x 36" | \$ 990.87          |      |      |            | \$ 5,159.22         |
| <b>Total</b>     |                   |            |                        | <b>\$ 6,461.09</b> |             |  | <b>\$ 4,644.95</b> |      |      | <b>\$-</b> | <b>\$ 11,106.04</b> |

## Operations and Maintenance

### *Yearly Maintenance Activities Chart*

|   | Amount     | Unit of Measure | Total Labor Hrs. | Total Cost             |
|---|------------|-----------------|------------------|------------------------|
| <b>SECTION 1: CONSTRUCTION</b>              |            |                 |                  |                        |
| C-1 Construction - Structure                | 13.00      | each            | 846.50           | \$ 42,892.69           |
| C-1 Construction - Pipe                     | 167.00     | ft.             | 282.50           | \$ 18,256.98           |
| C-2 Construction - Flume                    | 10.00      | each            | 36.00            | \$ 4,472.23            |
| C-0 Construction- Pipe replacement (new)    | 354.00     | ft.             | 1,398.50         | \$ 82,090.64           |
| C-3 Construction - Ditch                    | -          | each            | -                | \$ -                   |
| C-3 Construction - BMP                      | -          | each            | -                | \$ -                   |
| C-0 Construction - Stock pile material      | 139.00     | load            | 225.00           | \$ 14,573.30           |
| C-0 Construction - Plan work                |            |                 | 119.50           | \$ 4,837.41            |
|   |            |                 | <b>2,908.00</b>  | <b>\$ 167,123.25</b>   |
| <b>SECTION 2: INSPECTION</b>                |            |                 |                  |                        |
| I-1 Inspection - Closed                     |            |                 | 5,371.75         | \$ 195,123.00          |
| I-1 Inspection - Video                      | 26,611.00  | ft.             | 768.00           | \$ 24,120.11           |
| I-1 Inspection-Video data management        |            |                 | -                | \$ -                   |
| I-1 Inspection-new system                   |            |                 | -                | \$ -                   |
| I-1 Inspection-Survey                       |            |                 | -                | \$ -                   |
| I-2 Inspection-Open                         |            |                 | 615.00           | \$ 17,593.44           |
| I-3 Inspection-BMP                          | 9.00       | each            | 573.50           | \$ 14,728.76           |
| I-3 Inspection-Lake                         | 1.00       | each            | 7.00             | \$ 332.47              |
| I-4 Inspection-Tide gate                    | 3.00       | each            | 10.00            | \$ 227.52              |
| I-0 Inspection-Miscellaneous                |            |                 | -                | \$ -                   |
| I-0 Inspection-Plan work                    |            |                 | 38.00            | \$ 2,140.32            |
|   |            |                 | <b>7,383.25</b>  | <b>\$ 254,265.62</b>   |
| <b>SECTION 3: MAINTENANCE</b>               |            |                 |                  |                        |
| M-1 Maintenance-BMP                         | 254.00     | each            | 4,139.00         | \$ 188,503.66          |
| M-1 Maintenance-Right of Way                |            |                 | 3,112.25         | \$ 152,196.81          |
| M-2 Maintenance-Ditching manual             | 136,326.80 | ft.             | 2,218.50         | \$ 74,838.41           |
| M-3 Maintenance-Ditching mechanical         | 20,566.00  | ft.             | 2,088.50         | \$ 149,618.97          |
| M-4 Maintenance-Culvert                     | 395.00     | each            | 245.00           | \$ 7,875.23            |
| M-5 Maintenance-Pipe                        | 104,619.00 | ft.             | 2,518.50         | \$ 125,543.12          |
| M-5 Maintenance-Structure                   | 13,503.50  | each            | 4,153.00         | \$ 176,933.61          |
| M-5 Maintenance-Reset cover                 | 187.00     | each            | 259.75           | \$ 7,639.23            |
| M-6 Maintenance-Lake                        | 38.00      | each            | 538.00           | \$ 18,966.88           |
| M-7 Maintenance-Mowing                      | 409,187.45 | ft.             | 2,073.50         | \$ 174,341.89          |
| M-7 Maintenance-Mowing right of way         | 6,935.96   | acre            | 250.50           | \$ 33,034.82           |
| M-8 Maintenance-Tide gate                   | 4.00       | each            | 29.00            | \$ 722.03              |
| M-9 Maintenance-Sweep streets               | 9,946.28   | mile            | 4,806.55         | \$ 550,780.86          |
| M-9 Maintenance-Sweep support               |            |                 | 2,126.50         | \$ 175,166.89          |
| M-10 Maintenance-Haul waste                 | 160.00     | load            | 628.00           | \$ 44,152.61           |
| M-10 Maintenance-Screen material            |            |                 | -                | \$ -                   |
| M-11 Maintenance-equipment                  |            |                 | 2,319.00         | \$ 121,304.88          |
| M-0 Maintenance-Yard                        |            |                 | 1,604.25         | \$ 223,015.75          |
| M-0 Maintenance- Ditching (creek walk thru) | 41571.00   | ft.             | 2,370.75         | \$ 65,482.35           |
| M-0 Maintenance-Plan work                   |            |                 | 124.50           | \$ 6,201.03            |
|   |            |                 | <b>35,605.05</b> | <b>\$ 2,296,319.03</b> |
| <b>SECTION 4: REPAIR</b>                    |            |                 |                  |                        |
| R-1 Repair-Pipe failure                     | 95.00      | each            | 3,315.00         | \$ 160,428.63          |
| R-2 Repair Pipe work                        | 1,151.00   | ft.             | 1,689.00         | \$ 96,399.38           |
| R-2 Repair-Convert structure                | 2.00       | each            | 105.00           | \$ 4,260.15            |
| R-3 Repair Structure                        | 89.00      | each            | 2,137.00         | \$ 97,893.65           |
| R-4 Repair Erosion                          | 2,928.00   | ft.             | 722.50           | \$ 56,445.55           |
| R-5 Repair Replace cover                    | 113.00     | each            | 144.00           | \$ 12,995.14           |
| R-5 Repair Tidegate                         |            | each            | -                | \$ -                   |
| R-0 Repair- Plan work                       |            |                 | 96.00            | \$ 5,152.28            |
|   |            |                 | <b>8,208.50</b>  | <b>\$ 433,574.78</b>   |

## 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.

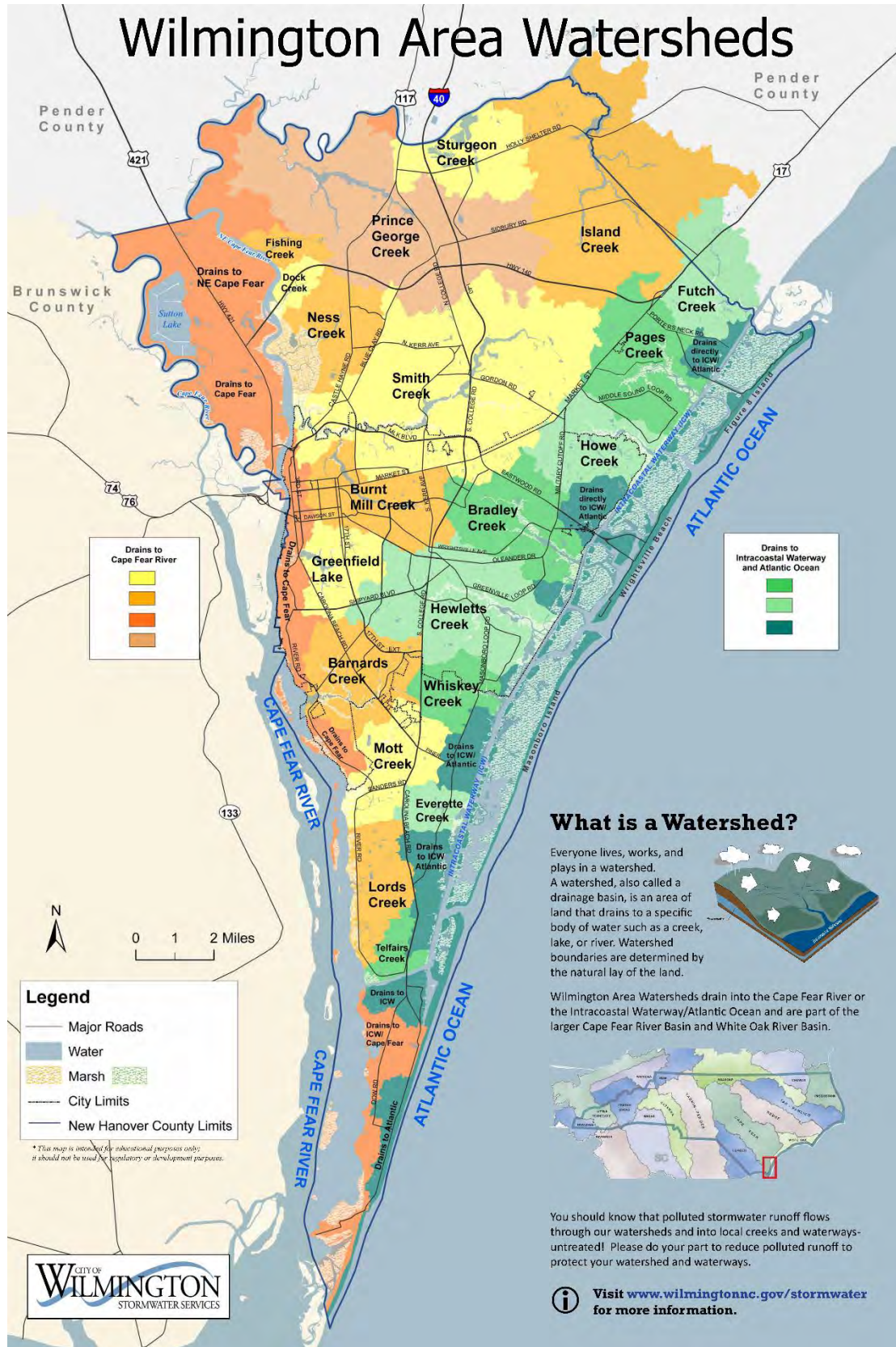
Nutrients (nitrate, ammonium, total Kjeldahl nitrogen, total nitrogen, orthophosphate, and total phosphorus) and total suspended solids (TSS) were analyzed by a state-certified contract laboratory using EPA and APHA techniques. We also computed inorganic nitrogen to phosphorus molar ratios for relevant 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



**What is a Watershed?**

Everyone lives, works, and plays in a watershed. A watershed, also called a drainage basin, is an area of land that drains to a specific body of water such as a creek, lake, or river. Watershed boundaries are determined by the natural lay of the land.



Wilmington Area Watersheds drain into the Cape Fear River or the Intracoastal Waterway/Atlantic Ocean and are part of the larger Cape Fear River Basin and White Oak River Basin.



You should know that polluted stormwater runoff flows through our watersheds and into local creeks and waterways-untreated! Please do your part to reduce polluted runoff to protect your watershed and waterways.

**i** Visit [www.wilmingtonnc.gov/stormwater](http://www.wilmingtonnc.gov/stormwater) for more information.

**ENVIRONMENTAL QUALITY OF WILMINGTON AND  
NEW HANOVER COUNTY WATERSHEDS, 2019**

by

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## Executive Summary

This report represents results of Year 22 of the Wilmington Watersheds Project. Water quality data are presented from a watershed perspective, regardless of political boundaries. The 2019 program involved 9 watersheds and 24 sampling stations. In this summary we first present brief water quality overviews for each watershed from data collected between January and July 2019; note that fewer samples were collected at some sites in 2019 because funding did not arrive until 2020.

Barnards Creek – Barnards Creek drains into the Cape Fear River Estuary. It drains a 4,173 acre watershed that consists of 22.3% impervious surface coverage, and a human population of approximately 12,200. Due to late funding this site was only sampled twice, so limited conclusions can be drawn. Dissolved oxygen was good, and turbidity and suspended solids were generally moderate. Ammonium was low, but nitrate concentrations were relatively high among tidal creeks in this area. There was a minor algal bloom (chlorophyll a of 28 µg/L) in May 2019. Fecal coliform bacteria were low on both sampling occasions.

Bradley Creek – Bradley Creek drains a watershed of 4,583 acres, including much of the UNCW campus, into the Atlantic Intracoastal Waterway (AICW). The watershed contains about 27.8% impervious surface coverage, with a population of about 16,470. Three sites were sampled, all from shore, on two occasions in spring.

Turbidity was not a problem and total suspended solids (TSS) were slightly elevated (about 17 mg/L) in one sample. Dissolved oxygen was within standard (> 5.0 mg/L) on both sampling occasions. Ammonium and nitrate concentrations were low to moderate and highest at the upstream station BC-CA (where the tributary crosses under College Acres Dr.). Total nitrogen concentrations were low to moderate in general and highest at BC-CA. Orthophosphate concentrations were low with highest levels at BC-CA; total phosphorus levels were likewise low in general. Our Bradley Creek stations did not host significant algal blooms during the spring sampling trips in 2019, just a minor bloom of chlorophyll a of 21 µg/L at BC-CA in February. Fecal coliform bacteria counts were within standard at BC-NB (north branch of creek at Wrightsville Ave.), exceeded the standard of 200 CFU/100 mL slightly on one trip at BC-SB (south branch of creek at Wrightsville Ave.), and were well over standard on both occasions at BC-CA, with a geometric mean of 1,956 CFU/100 mL, about 10X the NC standard for safe waters.

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 2019, on four occasions. High fecal coliform counts occurred at two sites in 2019, especially at the uppermost site BMC-API above Anne McCrary Pond and at the lowermost station BMC-PP at Princess Place. One major and one minor algal bloom were recorded in 2019 at the Princess Place location. Dissolved oxygen concentrations were good in the two upper stations and fair in the remaining lower creek site. 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 four occasions. Of the tributaries of Greenfield Lake, Squash

Branch (near Lake Branch Drive), Jumping Run Branch at 17th Street, Jumping Run Branch at Lakeshore Dr., and Clay Bottom Branch (near Lakeshore Commons Apartments), two suffered from low dissolved oxygen problems, although main lake stations maintained good oxygen concentrations.

Algal blooms are periodically problematic in Greenfield Lake, and have occurred during all seasons, but are primarily a problem in spring and summer. In 2019 a massive spring-summer blue-green algal bloom of *Anabaena* occurred. In the period 2007-2013 there was a statistically significant relationship within the lake between chlorophyll a and five-day biochemical oxygen demand (BOD5) meaning that the algal blooms are an important cause of low dissolved oxygen in this lake, and high BOD occurred congruent with the blooms in 2019. In 2019 three tributary stations exceeded the fecal coliform State standard on 50% of occasions sampled, but the in-lake stations were in good condition.

Greenfield Lake is currently on the NC 303(d) list for impaired waters due to excessive algal blooms. In the previous report (for 2018) we reported on the thesis work of UNCW graduate student Nick Iraola, who performed wet-period and dry-period sampling of the five main inflowing tributaries to the lake to assess where the principal nutrient inputs came from. The results showed 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 a consulting firm) have been awarded funds for 2020-2022 to begin nutrient reduction efforts on Jumping Run Branch.

Hewletts Creek – Hewletts Creek drains a large (7,478 acre) watershed into the Atlantic Intracoastal Waterway. This watershed has about 25.1% impervious surface coverage with a population of about 20,210. In 2019 the creek was sampled at four tidal sites and one non-tidal freshwater site (PV-GC-9) on two occasions in spring.

Incidents of low dissolved oxygen did not occur at Hewletts Creek in 2019 during the spring samples. Turbidity was low and did not exceed the state standard, and no algal blooms occurred. Fecal coliform bacteria counts exceeded State standard 100% of the time at NB-GLR (the north branch) and MB-PGR (the middle branch) and PVGC-9. The geometric means at PVGC-9, MB-PGR, and NB-GLR all exceeded 200 CFU/100 mL for a Poor rating for this pollutant parameter, but the geometric mean of fecal bacteria counts at HC-3 was well under the state shellfishing standard.

Howe Creek – Howe Creek drains a 3,516 acre watershed into the ICW. This watershed hosts a population of approximately 6,460 with about 21.4% impervious surface coverage. Howe Creek was sampled at two locations on two occasions during spring 2019 (HW-GP and HW-DT- Fig. 8.1). Turbidity and suspended solids were generally low to moderate (< 17 mg/L). Dissolved oxygen concentrations dropped slightly below the NC standard of 5 mg/L on one sampling occasion at both HW-DT and HW-GP in 2019. Nitrate, ammonium and orthophosphate concentrations were low at both sites in 2019. Chlorophyll a concentrations exceeded the NC standard at the uppermost station HW-DT on one of the two occasions in 2019, with a bloom (chlorophyll a of 85 µg/L) that doubled the state standard. Fecal coliform bacteria counts were below the water contact standard of 200 CFU/100 mL on both sampling occasions.

Motts Creek – Motts Creek drains a watershed of 3,342 acres into the Cape Fear River Estuary with a population of about 9,530; impervious surface coverage 23.4%. This site was sampled twice in spring. Dissolved oxygen was generally good, and turbidity and suspended solids were generally low. Ammonium was low and nitrate concentrations moderate, as were phosphorus concentrations. There were no notable algal blooms. Fecal coliform bacteria were somewhat high in one of the two months sampled.

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

The dissolved oxygen standard for Smith Creek, which is rated as C Sw waters, is 4.0 mg/L, which was violated on two of 12 occasions in our 2019 samples for a fair rating. The North Carolina turbidity standard for estuarine waters (25 NTU) was not exceeded. There were no major algal blooms present in our 2019 sampling. Fecal coliform bacterial concentrations exceeded 200 CFU/100 mL on only one of 12 sampling occasions in 2019 for a Good rating.

Whiskey Creek – Whiskey Creek is the southernmost large tidal creek in New Hanover County that drains into the AICW. It has a watershed of 2,078 acres, a population of about 8,000, and is covered by approximately 25.1% impervious surface area. One station, on Masonboro Loop Road, was sampled from the bridge over this creek in 2019. This creek was sampled twice in spring. Turbidity was very low on both sampling occasions, and total suspended solids (TSS) not a problem. Dissolved oxygen was within standard (> 5.0 mg/L) on both sampling occasions. Nitrogen and phosphorus concentrations were low on both sampling occasions. Our Whiskey Creek station did not host significant algal blooms during the two spring sampling trips in 2019. Fecal coliform bacteria counts were within standard on both sampling occasions.

Water Quality Station Ratings – The UNC Wilmington Aquatic Ecology Laboratory utilizes a quantitative system with four parameters (dissolved oxygen, chlorophyll a, turbidity, and fecal coliform bacteria) to rate water quality at our sampling sites. If a site exceeds the North Carolina water quality standard 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 2019 data, and have designated each station as good, fair, and poor accordingly (Appendix B). Again, note that data are limited for 2019 and should be viewed in that light.

Fecal coliform bacterial conditions for the entire Wilmington City and New Hanover County Watersheds system (24 sites sampled for fecal coliforms) showed 50% to be in good condition, 8% in fair condition and 42% in poor condition, an improvement over the previous year. Dissolved oxygen conditions (measured at the surface) system-wide (24 sites) showed 75% of the sites were in good condition, 12% were in fair condition, and 13% were in poor condition, but we note the most stressful season, mid-summer and early fall was not sampled. For algal bloom presence, measured as chlorophyll a, 75% of the 24 stations sampled were rated as good, 8% as fair and 17% as poor. For turbidity, 22 sites sampled were rated as good, and two sites as fair. It is important to note that the water bodies with the worst water quality in the system also have the most developed watersheds with the highest impervious surface coverage; Burnt Mill Creek – 39% impervious coverage; Greenfield Lake – 37% impervious coverage; Bradley Creek – 28% impervious coverage

## **2019-2020 NPDES PROGRAM HIGHLIGHTS & ANNUAL REPORTING**

### **Public Education & Outreach**

- 70 presentations delivered to 8<sup>th</sup> grade science classes in New Hanover County serving approximately 2100 students. Due to Covid-19, several Spring 2020 presentations were offered to teachers and students virtually.
- Educational signage projects included Buffer – No Mow Zone signs for Burnt Mill Creek and Retention Pond/Wetland Caution Signage to warn the public about pollutants and the risks of cyanobacteria blooms.
- Mass media efforts focused on yard waste and litter and included advertising on digital billboards, online newspaper, direct newsletters, television, and digital and mobile marketing campaigns.

### **Public Involvement & Participation**

- 14 watershed cleanups involving 279 volunteers contributing 573 volunteer hours cleaned up 5.8 miles of riverine watersheds within the city limits. The last 3 months of volunteer cleanups were conducted by individuals or family units, due to Covid-19 and social distancing measures.
- 44 storm drain markers were placed in neighborhoods off 17<sup>th</sup> Street Extension, utilizing 49 volunteers and distributing 123 educational doorhangers.
- Public meetings and one-on-one property owners' meetings were conducted for Clear Run Branch and Garden Avenue. Public notice was provided for the following projects: 11<sup>th</sup> & Anne, Hinton Road, River Road, Montgomery Avenue, and Scotland Lane.
- Interactive Hurricane Florence Recovery Map is posted online for the public to view as point repair projects progress and reach completion.

### **Illicit Discharge Detection and Elimination (IDDE)**

- Stormwater infrastructure mapping has continued with the goal of mapping the public drainage system throughout the City. Currently, approximately 95% of the City has been mapped.
- The City conducted IDDE training for City Stormwater Field Maintenance crews.
- The City conducted staff training for dry weather flow investigators.
- The City is in planning with Moffatt & Nichol consultants to perform a program review 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 are ongoing.
- Continued site plan reviews of all new development and redeveloped sites.
- NC State's SCM Inspection and Maintenance certification completed by 5 Stormwater Field Staff.

### **Pollution Prevention and Good Housekeeping for Municipal Operations**

- GIS database for all City owned structural SCMs was updated this year.
- Planning continues for I&M procedures for City owned facilities with oil/water separators.
- Conducted inventory of City owned facilities with potential to pollute stormwater. Planning and execution of contract for Moffatt & Nichol consultants to provide overview of compliance of City facilities for NPDES requirements.

- Continued utilization of BMPs that help reduce polluted stormwater runoff from streets, roads, and public parking lots within its jurisdictional area.

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

- Parking lot retrofits using pervious pavement successfully installed at University of North Carolina-Wilmington using Heal Our Waterways funds to capture a total of 22,896 cubic feet (165,917 gallons) of stormwater.
- Seven total projects were installed on private properties through the HOWBMP contract with New Hanover Soil and Water Conservation District, capturing a total of 716 cubic feet (5356 gallons) of stormwater.
- More volume reduction projects were spearheaded on City properties this year, including a new cistern at Fire Station 7 and tree plantings at Fire Station 9.
- The HOW Program co-hosted a rain garden maintenance workshop and gave two webinar presentations about stormwater solutions.
- Two new PSAs were created by WECT and featured the HOW Program and the benefits of rain gardens specifically.

## 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 plan including goals, objectives, target pollutants, sources, and target audiences is included in the Public Education & Outreach Appendix of this report.

The plan defines the likely origin and sources for each pollutant and includes suggested outreach messages and strategies for reaching specified target audiences. Staff regularly utilizes this information for planning, implementing, and evaluating outreach and education efforts throughout the city. The plan is updated and modified as pollutant sources, target audience demographics, public awareness, water quality, funding, and other program variables change over time. The plan was most recently updated in 2019.

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

#### Accomplishments:

Staff continued to update the robust Stormwater Services website with relevant stormwater and program content such as the stormwater news and events, monthly rain barrel sale, annual Stormwater Watch Newsletter, capital and in-house improvement projects, UNCW water quality report, new Litter



|   |   |
|---|---|
| <p>f. Distribute public education materials to identified target audiences and user groups.</p> | <p>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.</p> |
|---|---|

**Accomplishments:**

This year’s annual Stormwater Watch newsletter was mailed to 40,000+ city residents and contained articles highlighting trees and stormwater, a large tree benefits graphic, and the UNCW water quality monitoring report of creeks and lakes that fall within the city limits. State classification and rating data is also included about each creek and is updated as the State 303(d) Integrated List of Impaired Waters is updated every 2 years.



The Enviroscope Watershed Education Program has been fully incorporated into the 8<sup>th</sup> grade curriculum since 2005. The program reaches all 8<sup>th</sup> grade science classes in New Hanover County Schools each year. The Enviroscope presentation focuses on watersheds, water quality, non-point source pollution and solutions, and stewardship. Cape Fear River Watch, New Hanover Soil & Water Conservation District, and the City of Wilmington Stormwater Services use trained and certified instructors to deliver presentations.

In 2019-2020, presentations occurred in the Fall but were impacted by the closure of schools mid-way through the Spring presentations, due to Covid-19 closing the schools. For presentations that were missed because of the closure, two virtual Enviroscope presentations were recorded and delivered to teachers and students that missed the live presentation in the latter half of the year. This year we served approximately 70 classes and 2,100 students, via in-classroom presentations and virtually during Covid-19 closures. An instructor training was conducted for new and veteran instructors in the Fall of 2019.

Fall and Spring coordinated media campaigns aired on digital billboards, television, online newspapers, direct email newsletters, media websites, and digital and mobile platforms. The fall campaign focused on yard waste pollution, and the spring campaign focused on litter prevention. Two new litter PSAs were developed and filmed for airing on TV, digital, and mobile platform campaigns.



- <https://www.youtube.com/watch?v=ci9VgAhvgFo&feature=youtu.be>
- <https://www.youtube.com/watch?v=5mNOwAV4Zao&feature=youtu.be>

In a review of post-campaign stats with media agencies, message formats on digital and mobile platforms continue to perform at or above the national averages for ad engagement, reach/impressions, and click thru to stormwater content.

For example, the fall stormwater campaign from Sept – November 2019 on WECT/NBC digital and mobile platforms:

- Total ads delivered in Fall Campaign: 450,443
- Total engagements: 4,833
- 1.07 % engagement rate (national average is .10%)



Stormwater Education and Code Compliance coordinated to conduct pet waste education in the community. We are now offering free pet waste roll bags that hang on the city’s moveable pet waste signage, which allows us to reach more pet owners throughout different parks in the city. We posted some of these new signs with bags and observed pet owners immediately taking advantage of the free bag rolls, so initially this seems like a successful educational and pollution control venture.

Also in coordination with Code Compliance, an educational flyer was developed for the Stormwater Maintenance Crews to hand out to the public while in the field. The fliers were given to all stormwater field trucks.

The city also implemented several important sign projects to educate citizens. The first project involved developing and posting signage at all city-owned retention ponds and wetlands to inform the public about the potential dangers of these facilities, especially in the warmer months when swimming in ponds/wetlands has been known to kill pets that swim in water impacted by cyanobacteria.



For posting in city parks, a Riparian Buffer / No Mow sign was developed to educate the public about the purpose and importance of buffers and not mowing them along city creeks.

This year, the city collaborated with New Hanover Soil & Water Conservation District and New Hanover County Animal Services to collect pet data from the county database. The data will be utilized in GIS to map and determine the number of dogs within the city limits and their specific locations to compare with water quality “hotspots” from UNC-Wilmington monitoring data. We also plan to develop a community survey of pet owners to assess their awareness, attitudes, and behaviors regarding the collection of pet waste in the city.

Activity was busy at the Stormwater Demonstration Site in Anne McCrary Park in collaboration with the Parks Division and Stormwater Maintenance crews to address maintenance and replanting needs at the site. Rehab work progressed nicely with planting beginning this summer and fall.

The city began collaboration with several partners on a 319 grant led by Cape Fear River Watch. Work is beginning on plans for modification of a city-owned public wet pond to develop more wetland type features that will help reduce nutrient inputs into Greenfield Lake. As a public outreach component, the city developed signage to post at the wet pond while work is being conducted.

|                               |  |
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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](http://www.wilmingtonnc.gov/reportstormwaterpollution).

|  |  |
|--|--|
| <p><b>Stormwater 101</b></p> <p><b>See it. Report it.</b></p> <p><b>Stormwater Pollution</b><br/><b>910.341.1020</b></p> <p><a href="http://wilmingtonnc.gov/reportstormwaterpollution">wilmingtonnc.gov/reportstormwaterpollution</a></p>  | <p>If you have information about pollution being spilled, dumped or discharged into the stormwater drainage system, which includes storm drains, ditches, swales, creeks, lakes, ponds, streets, or directly into a waterway, please</p> <p><b>Call the Stormwater Pollution Hotline</b><br/><b>910.341.1020 or <u>Report Online</u></b></p> |
|--|--|

Hotline/web reports are routed to the Stormwater Code Compliance Officer who tracks, investigates, and responds to each hotline report. The hotline and online reporting webform are advertised in a variety of ways:

- City’s cable TV channel
- City of Wilmington Stormwater Services website
- Annual Stormwater Watch Newsletter mailed to all city residents
- Public presentations and displays
- Large educational magnets on stormwater vehicles and compliance officer vehicles
- Promotional outreach giveaways such as hotline pens, magnets, notepads, and bags

To summarize hotline/web reporting activity this past year:

0 calls were placed to the City’s Stormwater hotline, 9 online webform reports were submitted, and 431 emails and 86 calls were received by the Compliance Officer related to stormwater violations. The nature of the hotline reports are found in the Enforcement section of the Appendix.

Of note, in FY19/20 the Report Stormwater Pollution hotline and web reporting tool experienced technical issues and was down for several months until IT could remedy the issue. However, in that time period, pollution calls still came into the Compliance Officers and our admin line, but were not "credited" to hotline or webform reporting."

|  |  |
|--|--|
| <p>h. Implement a Public Education and Outreach Program.</p> | <p>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.</p> |
|--|--|

**Accomplishments:**

The extent of exposure requirement is documented in tables in the Public 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.

**Assessment of Program Implementation**

The city’s stormwater outreach and education program continues to implement a variety of outreach and

educational events and programs. These programs educate and involve the community in stormwater runoff pollution and solutions and inspire action and behavior change. However, Covid-19 impacted direct education events and presentations to the community in the latter half of the fiscal year, during Spring 2020. Measures were taken to provide community education via alternative means, such as virtual classroom presentations, virtual Earth Day Festival, eco-tours, and field days. Measures and new programmatic procedures will likely need to be implemented beginning in Fall 2020 as well.

**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 public involvement and participation activities, as well as public education and outreach services. Both agencies sign an extended contract to coincide with the NPDES permitting period, which specifies deliverables that help Stormwater Services fulfill 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 encourages citizens to become involved in stormwater outreach, education and involvement efforts.

Services performed by CFRW & NHSWCD include volunteer watershed clean-ups, volunteer creek monitoring, educational presentations for schools and the community, participation in the Lower Cape Fear Stewardship Awards program, monthly rain barrel sales, volunteer storm drain marking, eco-tours, school field days, website content, community stormwater best management practice (BMP) installations, and more. See Appendix C.

In the latter half of 2020, due to Covid-19, each agency worked with the city to develop “alternative services” due to social distancing and stay at home orders in North Carolina. Many of these alternatives provided education for the community using virtual methods.

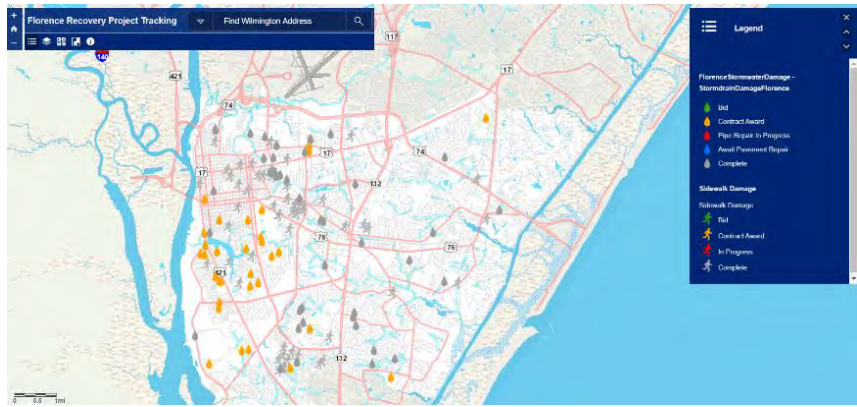
Each agency provides the City with four quarterly progress reports and invoices during the annual contract period for services performed. The cumulative year-end 4<sup>th</sup> quarter progress report for each agency is included in the Public Involvement and Participation Appendix (C) of this annual report.

|                                     |   |
|-------------------------------------|---|
| 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:**

Hurricane Dorian impacted the Wilmington-area in the Fall, although it was nothing compared to the damage caused by Hurricane Florence the year prior. Therefore, the city was able to perform 70+ Florence point repair and other FEMA related projects during this fiscal year. Public notifications were made for each of these projects through the city’s contractor, with provisions for the public to contact the city to ask questions or obtain clarification on the projects.

In addition, several in-house and capital projects were resumed. Public meetings and one-on-one property owners' meetings were conducted for Clear Run Branch and Garden Avenue. Public notice was also provided for the following projects: 11th & Anne, Hinton Road, River Road, Montgomery Avenue, Scotland Lane and the Emergency Watershed Protection projects.



The Hurricane Florence Recovery Map is still posted and updated on the city's website to enable citizens to view and search for the status of repair projects at their convenience.

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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](http://www.wilmingtonnc.gov/reportstormwaterpollution).

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**Assessment of Program Implementation**

The City again contracted with Cape Fear River Watch and New Hanover Soil & Water Conservation District to implement public education, involvement and participation activities. These extended, contractual agreements have resulted in activities and events that involve the public and community due to their existing volunteer base and membership.

Capital and in-house improvement projects resumed again this year and involved public participation including one-on-one meetings with homeowners for several projects. Other projects distributed public notices to homes and businesses in the vicinity of project areas and provided an opportunity to call or ask questions with appropriate contact info.

**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.cfpuia.org/703/Water-Sewer-Emergencies>

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

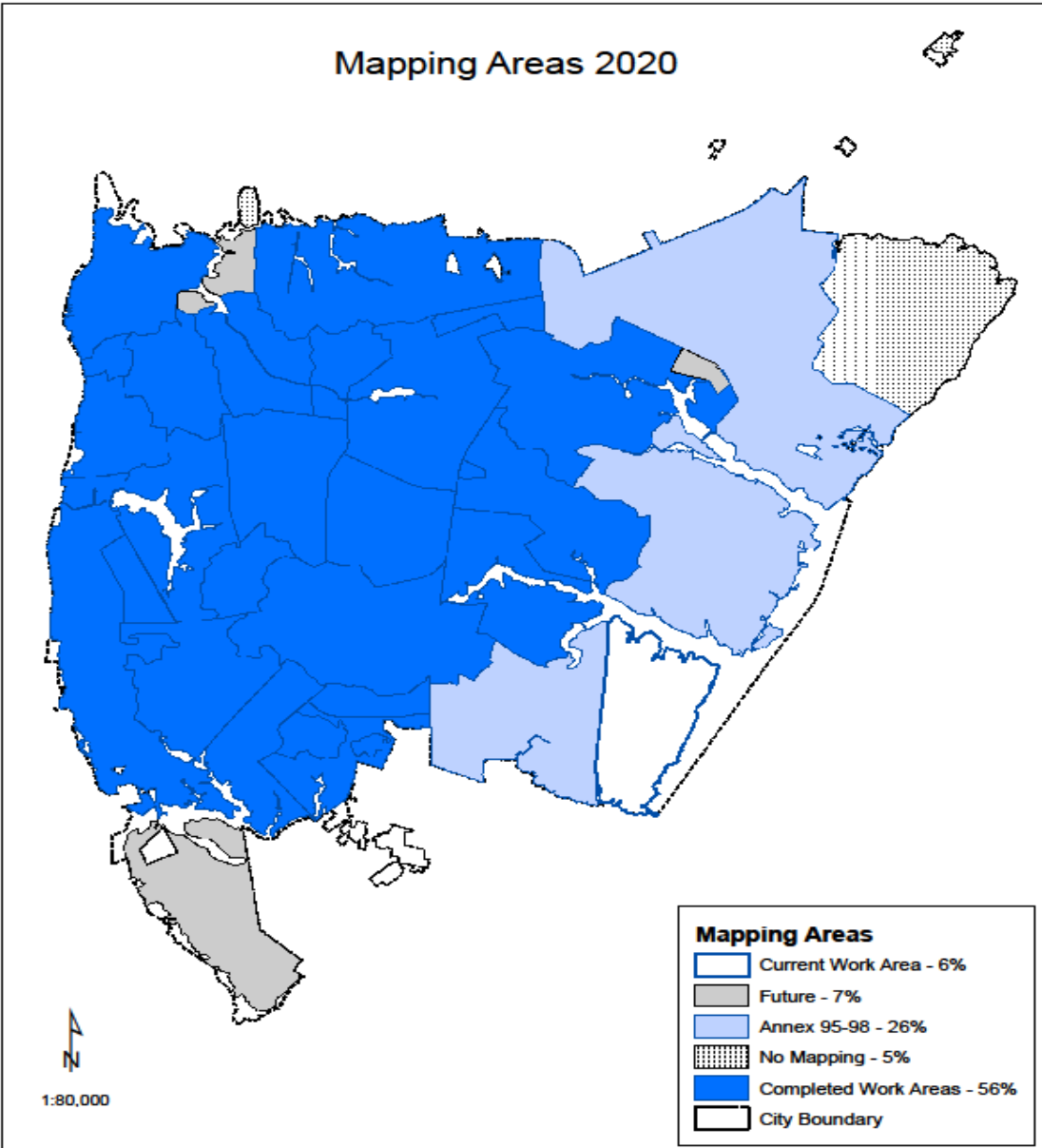
|  |   |
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| b. Maintain a Storm Sewer System Base Map of Major Outfalls. | The permittee shall maintain a current map showing major outfalls and receiving streams |
|--|---|

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



Outfalls are classified and added to the GIS dataset as mapping of the City MS4 proceeds. Additionally, the City has made significant improvements and updates to the GIS mapping of watershed boundaries using the best available data. At this time, percentages mapped are shown in below figure of mapped areas. The City updated work locations within the previously “Completed Work Areas” this past year to bring the data to our current mapping standards. In the next several years, the City will be re-mapping “Annex 95-98” areas to also bring the data into our current mapping standards. Also, the “Future” mapped area (River Lights) will be 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.

Stormwater Inventory Mapping was conducted this past reporting year in the Hewletts Creek and Greenfield Lake Watersheds. The mapping areas within these two watersheds are in older parts of the City where the stormwater inventory needs to be updated. The new stormwater inventory data will help staff to understand where current drainage systems are located as well as provide data to help in future planning for the requirements of our NPDES Phase II permit. Future locations are shown below on the map.



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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. |
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**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 is currently reviewing the existing IDDE Program Manual to address changing any new NPDES requirements.

The number of outfalls investigated this reporting year was severely hampered by Covid-19 (Appendix D). City staff conducted field training in December of 2019 for existing and new staff to the department. The City’s goal is to train as many knowledgeable staff as possible in hopes of being able to form an investigative team(s) so that individual schedules will have more flexibility for site visits and improve safety in numbers. Seven staff members were trained on dry weather flow protocols and procedures (Appendix D). The City anticipated increasing field investigations in the early spring of 2020 with the newly trained staff. However, due to Covid-19, work at home requirements and staff availability was limited. Also, City safety protocols limited staff interaction, preventing field visits.

City Staff have refocused their goals and objectives for the next reporting year. City Staff has a goal to conduct 25% of total identified outfall locations in the City per year for dry weather flow investigations. Outfall investigations will begin on this schedule goal in fall 2020.

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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. |
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**Accomplishments:**

The City has continued to utilize its Illicit Discharge Detection Elimination (IDDE) Policy and Procedures Manual document. 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 *Intelligov*, our data management system. All details of incidences are reported are entered from the start of an incidence until the investigation is closed. This documentation into *Intelligov* 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 continues to look at upgrading all data management systems throughout the organization. The schedule for rolling out the new systems for some departments has begun in 2020. 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. |
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**Accomplishments:**

The City continues to address illicit discharges in the stormwater system and to protect public water under its Ordinance. This Ordinance change went into effect on November 1, 2009. The City continues to update the Illicit Discharge Detection Elimination (IDDE) Policy and Procedures manual as the program evolves. The purpose of this document is to provide standards for protocol, field guidance and information for the effective and efficient implementation of the Illicit Discharge Detection and Elimination (IDDE) Program. We continue to update as procedures change and become more efficient for data collection and reporting into the City’s tracking database *Intelligov*. (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 a combined IDDE, NPDES and SCM training his year in November 2019 for stormwater services field employees and staff. Forty-nine (49) employees attended the presentations.

Additional training was scheduled for spring 2020 for other departments but was postponed due to Covid-19 restrictions.

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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. |
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**Accomplishments:**

In 2019-2020, presentations occurred in the Fall but were impacted by the closure of schools mid-way through the Spring presentations, due to Covid-19 closing the schools. For presentations that were missed because of the closure, two virtual Enviroscope presentations were recorded and delivered to teachers and students that missed the live presentation in the latter half of the year. This year we served approximately 70 classes and 2,100 students, via in-classroom presentations and virtually during Covid-19 closures. An instructor training was conducted for new and veteran instructors in the Fall of 2019.

Fall and Spring coordinated media campaigns aired on digital billboards, television, online newspapers, direct email newsletters, media websites, and digital and mobile platforms. The fall campaign focused on yard waste pollution, and the spring campaign focused on litter prevention. Two new litter PSAs were developed and filmed for airing on TV, digital, and mobile platform campaigns.

- <https://www.youtube.com/watch?v=ci9VgAhvgFo&feature=youtu.be>
- <https://www.youtube.com/watch?v=5mNOwAV4Zao&feature=youtu.be>

See Section B.(f) for further information on pet waste efforts and accomplishments.

The City’s Public Services Code Enforcement Officer also works hard to educate the public on Illicit Discharges through educational material and flyers when making site visits and meeting with the public during investigations.

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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. |
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**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](http://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. |
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**Accomplishments:**

The City of Wilmington uses *Intelligov* 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 2019-2020 there were 2 repeat offenders identified 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.

Dry weather flow investigations goal has been reassessed 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 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. 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 will be hiring Moffat and Nichol (fall 2020) 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, will be reviewing the IDDE program beginning in the fall/winter of 2020. A review of the City's ordinances, mapping, staff training, reporting, procedures, and documentation will occur over the 2020-2021 period. This will help 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.

| <b>BMP</b>                    | <b>Measurable Goals</b>  |
|-------------------------------|--|
| a. Adequate legal authorities | <p>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.</p> <p>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</p> <p>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.</p> <p>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.</p> |

**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 been making draft updates to its Land Development Code. Revisions for these updates 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 on stormwater permit renewals and expirations. Tentatively, the draft of the revised Code will be available to review and discuss in summer 2021.

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| <p>b. Strategies which include Stormwater Control Measures (SCMs) appropriate for the MS4</p> | <p>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.</p> <p>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 &amp; Maintenance.</p> <p>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.</p> |
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**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

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| <p>c. Plan reviews</p> | <p>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</p> |
|------------------------|---|



**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. |
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**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 currently 50% complete incorporating spreadsheet data into a GIS application in order to improve the database of permits and help with future permit renewals. This process should begin in summer of 2021. This date aligns with code changes being complete, new document management submittal software being implemented and completion of the GIS 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. |
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**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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| <p>f. Provide a mechanism to require long-term inspection and maintenance of Stormwater Control Measures (SCMs).</p> | <p>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.</p> |
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**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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| <p>g. Inspections</p> | <p>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.</p> <p>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.</p> <p>The permittee shall document and maintain records of inspection findings and enforcement actions and make them available for review by the permitting authority.</p> |
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**Accomplishments:**

Under the current stormwater management ordinance of the City, permittees 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 on January 31, 2017. NC State has currently extended renewal dates due to Covid-19.

For this reporting year, a total of 230 private sites were inspected for their respective SCMs with 35 sites out of compliance (see Appendix F). The total number of sites inspected decreased from the last reporting year due to the current volume of private SCMs (368) and the limited resources and time available for staff. The City is re-evaluating the inspection process for the upcoming year and will have Moffatt & Nichol consultants review the City’s inspection process to possibly help with restructuring its goals.

The City also conducts inspections of facilities during the development process and before a Certificate of Occupancy is issued to ensure compliance of permit conditions.

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.

Stormwater Staff were trained on SCM I&M this past reporting year (see Sec.D.(f). Another training session is planned for fall 2020.

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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. |
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**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.

Training is tentatively scheduled for winter 2020-21 by the Engineering Dept. for consultants and developers at a local ACE meeting. This training will present proposed changes to the Land Development Code and TRC processes The City is also planning, pending Covid-19 restrictions, to provide additional training opportunities.

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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. |
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**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 through 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 Phase II permit. Ordinances will be evaluated annually to determine if modifications are needed.

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

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

Engineering Staff are scheduled to conduct developer training on the proposed updated Land Development Code in winter 2020.

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 is working to keep and update an inventory of its known facilities with the potential for generating polluted runoff. This past reporting year, the City has identified 18 of its sites for Pollution Prevention/ Good Housekeeping (PP/GH) review. The City is in planning stages with Moffat and Nichol consultants for a review of the City’s NPDES Phase II program in anticipation of a 2023 audit from NC DEQ. Execution of contracts for this service will likely take place in fall 2020 with phase I review following shortly.

The City had previously opted to be proactive in reducing the potential for contaminants and other pollutants that could leave the sites at 4 of its facilities by creating GH/PP plans. Site SCM recommendations are implemented as needed at these locations when site conditions change (i.e., renovations, equipment changes). Three Parks and Recreation locations and one Police Storage facility will be evaluated in the coming reporting year. Moffat and Nichol will be reviewing these documents for compliance with NPDES requirements in the next reporting year.

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 maintains a list of all structural SCMs. Currently, there are over 60. 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. |
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**Accomplishments:**

Currently, The City relies on a SPCC plan and a SPPP for the Operations Complex and Fleet Maintenance building. These plans focus on the activities at Fleet Maintenance and also preventive inspections at the City’s fueling islands, (2) 10,000g fuel tanks and the 6 generators on site. An additional SPCC for the Police Headquarters addresses inspections for their fueling island and backup generator as well. Analytical and qualitative monitoring of the outfall per the requirements of the SPPP and General Permit (NCG08000) for Fleet Maintenance indicate parameter levels well below benchmark values.

Stormwater staff evaluates any changes or modifications that may have occurred to the site within the year and works with the site managers to address any operation and maintenance practices that can be improved.

The City has begun implementing an I&M plan for all of its locations where oil/water separators are present. The Buildings Manager has begun to budget for getting these locations on a regular quarterly schedule for inspection and maintenance in order to ensure their longevity and functionality. The I&M plan could not make it into this reporting year’s budget but is set for the following budget year with cost sharing from the Building Section and Stormwater Services Section.

Moffat & Nichol consultants will review the City facilities in the next reporting year and make recommendations, as necessary.

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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.

Stormwater staff and the Public Services Safety Specialist have been reviewing video training modules on spill response procedures for appropriate staff this past year. The Covid-19 health and safety requirements put this process on hold for most of the 2020 year. Staff plans to continue viewing and finalizing training video recommendations in the fall of 2020 so that spill response team members can be provided comprehensive annual training. Also, upon review of the City’s spill response procedures by our consultants in fall/winter 2020-21, Moffatt & Nichol may be able to provide training on their own.

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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 2019-20, street sweepers swept 9,946 curb miles while collecting sediment, vegetation and trash potentially diverted from the stormwater sewer system. The amount of debris volume could not be calculated this entire reporting year due to the scale house being inoperable and phased out. The City began to calculate approximate volume by observation in Jan./Feb. 2020. It was estimated that sweeping volume for the remainder of the reporting year was 7,305 cubic yards.

In fiscal year 2019-20, stormwater crews conducted hand maintenance of 136,327 feet of ditch, 20,566 linear feet of ditch by mechanical methods, cleaned 104,619 linear feet of pipe, and removed blockages and cleaned 13,503 drainage inlets and manholes thus reducing debris, sediment, vegetation and trash potentially diverted from being discharged into our receiving waters. An estimated 1,190 cubic yards of debris was removed by vacuum trucks from Feb. – June 2020.

The City has been a member of the Urban Stormwater Consortium of the Water Resources Research Institute of the University of North Carolina. This group funded and completed a study at nutrient loading in urban areas. One of the conclusions from the study indicated that urbanized, downtown areas of cities were the highest contributors of gross solids in catch basins. The study recommended that street sweeping should be conducted more frequently in these areas to help minimize the solids from entering the catch basins. Currently, the City follows this practice by conducting routine street sweeping in the Central Business District, 7 days/week to help prevent and reduce the amount of gross solids from entering the downtown stormwater system.

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

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

**Accomplishments:**

The City currently has a program for the operation and maintenance of all City owned structural SCMs, storm sewer system, and street sweeping. This program includes repair, inspection and maintenance of all City owned right of ways and officially accepted easements. This information was previously included in this report under *Operations/Maintenance – Yearly Maintenance Activities Table*.

|  |   |
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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 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.



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. New City software is proposing to integrate with the GIS database to provide documentation but is still going through trial processes. Documentation is still being captured however, through the older City software.

|  |   |
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| <p>g. I&amp;M for municipally-owned or maintained structural stormwater controls</p> | <p>The permittee shall maintain and implement an I&amp;M program for municipally-owned or maintained structural stormwater controls installed for compliance with the permittee’s post-construction ordinance.</p> <p>The I&amp;M program shall specify the frequency of inspections and routine maintenance requirements.</p> <p>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.</p> |
|--|---|

**Accomplishments:**

The City keeps and updates a BMP Manual for all its City owned BMPs. 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.

SOPs to address the frequency of inspections and routine maintenance requirements for its SCMs could not be addressed this reporting year but is being planned for the next year.

|   |  |
|---|--|
| <p>h. Pesticide, Herbicide and Fertilizer Application Management.</p> | <p>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.</p> |
|---|--|

**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 20 certifications for Parks and Recreation staff and 4 certifications for Stormwater/Public Services staff.

|                          |  |
|--------------------------|--|
| <p>i. Staff training</p> | <p>The permittee shall implement an employee training program for municipal employees involved in implementing pollution prevention and good housekeeping practices.</p> |
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**Accomplishments:**

Staff training was scheduled for spring of 2019 but due to Covid-19 it was postponed due to safety protocols and work from home schedules. Training will be reevaluated for the next reporting year.

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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. 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 will be evaluating the City’s Fire Station locations and procedures that occur at each facility in the next reporting year and providing recommendations. Currently, all City Fire Stations have designated wash down areas for vehicle cleaning.

Moffat & Nichol will also be reviewing other locations across the City’s operations facilities as planning occurred in the 2020 reporting year. Site investigations will occur and recommendation plans will be determined as needed in the next reporting year.

**Assessment of Program Implementation**

The City will continue to keep an inventory of its known facilities with the potential for generating polluted runoff. Sites are identified by location, type of facility and potential pollution sources. Inspection and Maintenance programs will begin to be implemented at locations within 1-3 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 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 will be developing SOPs to address the routine inspections of its own SCMs in the next year.

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

Moffatt & Nichol consultants will be evaluating up to 18 City facilities in the next reporting year for PP/GH programs, procedures, and recommendations 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):**

| <b>BMP</b>   | <b>Measurable Goals</b>   |
|--|---|
| a. Identify, describe and map watershed, outfalls, and streams | <p>Within 12 months the permittee shall prepare a plan that:</p> <ul style="list-style-type: none"> <li>• Identifies the watershed(s) subject to an approved TMDL with an approved Waste Load Allocation (WLAs) assigned to the permittee; and</li> <li>• Includes a description of the watershed(s); and</li> <li>• Includes a map of watershed(s) showing streams &amp; outfalls</li> <li>• 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</li> <li>• 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.</li> </ul> |
| b. Evaluate existing measures                                  | <p>Within 12 months the Permittee's plan:</p> <ul style="list-style-type: none"> <li>• Shall describe existing measures currently being implemented by the Permittee designed to achieve the <u>MS4's NPDES WLA</u> and to reduce the TMDL pollutant of concern to the MEP within the watershed to which the TMDL applies; and</li> <li>• Provide an explanation as to how those measures are designed to reduce the TMDL pollutant of concern.</li> <li>• The Permittee shall continue to implement the existing measures until notified by the Division.</li> </ul>   |
| c. Assessment of available monitoring data                     | <p>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.</p>  |
| d. Monitoring Plan   | <p>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.</p>   |

| BMP                    | Measurable Goals   |
|------------------------|--|
| e. Additional Measures | <p>Within 24 months the permittee's plan shall:</p> <ul style="list-style-type: none"> <li>• 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</li> <li>• 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.</li> </ul> |
| f. Implementation Plan | <p>Within 48 months the permittee's plan shall:</p> <ul style="list-style-type: none"> <li>• 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</li> <li>• Identify a schedule, subject to Division approval, for completing the activities.</li> </ul>   |
| g. Incremental Success | <p>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.</p>  |
| h. Reporting           | <p>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.</p>   |

**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 2019-2020 year in promoting and installing volume-reducing best management practices (BMPs). The Heal Our Waterways (HOW) Program, which is the informal name of the restoration plan, has seen an uptick in the number of citizens requesting stormwater solutions on their properties and is becoming more known among departments within the City of Wilmington. This has been accomplished through continued educational campaigns, more outreach with City employees, and community partnerships.

As with previous years, two educational postcards were created and mailed, this time in the fall and spring, to 20,852 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 2019 postcard featured projects that were recently installed using HOW funds. The spring 2020 postcard featured the local monthly rain barrel sale and provided directions for rain barrel installation and use.



In August of 2019, prior to establishing any media campaigns for the 2019-2020 year, the HOW Program summarized results from an awareness survey distributed at events throughout the previous year. The findings highlighted which sources watershed residents used for local news and events, concerns about maintenance of BMPs that may hinder participation, and that few respondents had heard of the HOW Program or its website. The insight gained from the survey results was very helpful for designing and cultivating media campaigns with local media agencies.

Following the success of previous marketing campaigns with local news station WECT, two new PSAs were generated featuring rain gardens and general information about the HOW Program. Both PSAs included contact information and the link to the HOW Program website. These PSAs played whenever a HOW advertisement was clicked on the WECT.com website. Web and digital platforms, including video pre-roll ads, mobile ads, and digital weather channel ads, were also part of this advertisement campaign. WECT.com is viewed by an average of 753,000 unique users per month. The HOW Program was also featured in several “Homepage Takeovers” on WECT’s website homepage. 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.



In addition to the PSAs, HOW utilized new online marketing features offered by WECT. WECT posted two HOW-related sponsored Facebook posts using the newly created PSAs. Both posts performed very well, garnering 2,131 total engagements.

To raise more awareness about the HOW Program and the website, Lamar Billboards produced artwork that

prominently featured the website address. This billboard was posted next to a busy intersection in an urban area within the Bradley Creek Watershed to reach watershed residents. The campaign ran for the full months of November 2019 and April 2020.

HOW also renewed its presence as an underwriting partner with local National Public Radio affiliate, WHQR. This year, the campaign focused on “stormwater solutions” and how the HOW Program could help homeowners. The messaging was broken into fall and spring campaigns. The first ran in through November and December 2019 and included 28 total announcements. The second ran in late spring for 8 weeks and included a total of 48 announcement. Each week, WHQR reached about 40,000 listeners in the Wilmington Designated Market Area.

Unfortunately, due to COVID-19 restrictions, the Wilmington Earth Day Festival and several other spring events were cancelled and moved to a virtual platform. The HOW Program submitted a blurb, photos, and link to the webpage and was featured as part of the “Virtual Earth Day Event”, which took place on April 25<sup>th</sup>, 2020.

City Communications and HOW staff continue to maintain a visually appealing website. A new page featuring stormwater solutions was added in August 2019. The page organizes the stormwater solutions into categories so that webpage visitors can easily find solutions that would work well for their specific site and situation. In 2020, the Heal Our Waterways home page received 2,510 unique views. The Heal Our Waterways social media presence, with Twitter and Facebook followers of 250 and 246, respectively. The HOW Program also partnered with the City of Wilmington’s Communications Department to begin promoting stormwater solutions and the HOW Program on the City’s main social media pages.

The HOW Program continued its participation in the ongoing EPA 319 grant in partnership with the North Carolina Coastal Federation and the University of North Carolina at Wilmington. The HOW Program contributed additional plants and funds for signage for the recently installed rain gardens by DePaolo and DeLoach Halls. The team applied grant funding towards new pervious parking stalls in two existing parking lots on campus, which are treating nearly 165,917 gallons of stormwater each time it rains.



City Planning, Stormwater, and Parks Divisions met several times during the year to discuss next steps for using urban forests and trees to treat stormwater. The citywide study (completed previously by the Green Infrastructure Center) looked at tree canopy and opportunities to use trees in the city. Input from the tree work group was incorporated into a ranked summary of which recommendations to pursue and presented it to City Council in January 2020. Staff recommended pursuing an Urban Forestry Management Plan as a first step to determine specific goals and strategies for implementation.

Through that partnership, a greater emphasis has been placed on trees by the HOW Program. The Parks Division partnered with the HOW Program to develop planting lists, order trees, and physically plant the trees while the HOW Program provides the funding and administrative work. These trees are focused on City properties that fall within the Bradley and Hewletts Creeks Watersheds. The HOW Program has also



partnered with Parks and Communications to highlight tree plantings in the area, describe the stormwater benefits of trees, and educate other environmental and governmental specialists through presentations.

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 7 total installations this year and identified interested potential participants for next year. Of this year's participants in the program, the homeowners were spread between the Bradley and Hewletts Creek Watersheds. There was also a mixture of rain gardens and cisterns installed this year. The total volume reduction from the HOWBMP program this year was 716 cubic feet (5356 gallons).



HOW Program staff continues to track BMP volume reduction projects that are in design or in the ground using the GIS Atlas, which was reformed in FY 17-18. This tracking tool allows HOW to analyze current impacts and assess stormwater volume reduction numbers from BMPs within the two target watersheds and continues to be a key factor in HOW's progress, both in scope and accuracy. All the 319 and NCCF grant projects, HOWBMP projects, tree plantings, discovered private SCMs, and city-wide rain barrel sale data was recorded in the GIS Atlas for the 19-20 fiscal year.

Finally, HOW established collaborative relationships with the NHC Arboretum, Airlie Gardens, and the Wilmington Farmer's Market at Tidal Creek. While the COVID-19 restrictions cancelled and impeded several spring events, HOW was still able to visit events that took place during the summer and fall of 2019 with raffles and educational displays. The HOW Program partnered with NC State Cooperative Extension to host a rain garden maintenance workshop in October 2019, which was well-attended and positively received. HOW was also present at The Native Plant Festival, Family Fun Night at Airlie Gardens, Wilmington Workshops on the Water with 350 Wilmington, and the Family Smart Start Festival. These partnerships are a great avenue for continuous community outreach and for keeping interest in working with partners.

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

This year the HOW program implemented multiple successful projects, despite the impacts from the COVID-19 pandemic occurring in the spring of 2020. City of Wilmington staff were asked to telework starting in late March and many events that had been planned were cancelled.

Despite these hurdles, the HOW program accomplished several large projects. Pervious pavement was installed in two UNC-Wilmington parking lots and will treat 165,917 gallons of stormwater each time it rains. The HOWBMP Program implemented nearly \$20,000 worth of projects and already has a waitlist for the next Fiscal Year. A new cistern was installed at Fire Station 7 to be used for washing vehicles. The HOW Program also purchased 52 trees to be planted on City properties within the Bradley and Hewletts Creeks Watersheds in the fall. Staff shortages and less than ideal planting conditions pushed the original planting dates back from the spring. The volume reduction data will be included in the 20-21 annual report, after the trees have been planted.



This was a year of program expansion and momentum. Despite not having the opportunity to connect with



the community through local events and gatherings in the spring of 2020, the program garnered greater attention through successful media campaigns and online collaborations. There were also some administrative changes to the HOWBMP funding program to streamline the application process and solidify the roles of all partners involved. With the development of a Standard Operating Procedure, the program should begin to have more autonomy and be able to withstand the pressure of greater participation. Finally, there was movement internally to incorporate the principles that the HOW Program promotes into the planning and ordinance development processes. There is more awareness within City Departments regarding the Bradley and Hewletts Creeks Watersheds and restoration plan, the existence of the HOW Program, and the benefits of stormwater solutions.

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

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

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

HOW continued the fall and spring postcard mailers to watershed residents and businesses again this year. The fall mailer highlighted recently installed stormwater solutions within the neighborhoods and the spring mailer discussed the benefits of rain barrels and how to purchase one. Both were mailed to over 20,000 residents and businesses within the target watersheds.

All of the media partnerships also continued this year for educational messaging. HOW partnered with WECT, WHQR, and Lamar Billboards to bring awareness to the HOW Program, promote the HOW Program website, and discuss the benefits of rain gardens. Several residents mentioned they had heard the advertisements on WHQR and saw WECT ads on Facebook. These partnerships were especially beneficial during the COVID-19 closures and Stay-At-Home orders. This feedback solidifies the benefit of continuing partnerships with local news media into the coming year.

Another existing program with continued success this year is the partnership with New Hanover Soil and Water Conservation District (NHSWCD), called the HOWBMP Program. There were a total of 7 projects this year between 7 properties. The total volume reduction was greater than last year at 716 cubic feet (5356

gallons). The program continues to spread through word-of-mouth among neighbors, through neighborhood mailings, and social marketing campaigns. The entire budget of \$20,000 was exhausted and prompted an increase in funding for the next fiscal year. HOWBMP has already almost completely committed the funding for next year as the waitlist continues to grow.

Outreach throughout the year not only raised awareness for HOW programs, but also promoted the use of Low Impact Development on private properties. Each HOW outreach event that was able to happen prior to COVID-19 closures included an educational table with information from a “Smart Yards” booklet drafted by the North Carolina Coastal Federation. The booklets are now also sponsored by HOW and have been an invaluable resource at events. Since HOW funding is only applicable to target watersheds, having these booklets on hand helps to reach people that live outside of the watersheds and may want to implement their own projects at home. HOW also participated in two webinars that promoted LID practices. The first discussed the use of trees as a stormwater solution to forestry professionals and the second discussed rain gardens and maintenance tips to the local Sierra Club chapter.

The HOW Program has also made a larger effort to communicate LID practices to developers through plan review and is building a stronger relationship with the City’s Planning Department to do so. The Land Development Code is undergoing a rewrite and the HOW Program was involved with suggesting changes to make LID easier and more rewarding to implement during development.

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

|  |            |   |  |   |
|--|------------|---|--|---|
| 2. Determine Appropriate Water Quality Classifications and Designated Uses Where Water Quality Impairment Exists | Action 2-1 | Work with SS, UNCW, WB and NCCF to conduct preliminary evaluations of water quality to determine where more intensive state (SS) water quality investigations are needed  | Year 1, establish preliminary monitoring   | City of Wilmington –Stormwater Services; UNCW, SS, WB, NCCF |
|  | Action 2-2 | Work with SS to establish new monitoring stations within impaired waters influenced by the Bradley Creek watershed  | Year 2 based upon preliminary monitoring   | City of Wilmington –Stormwater Services; UNCW, SS, WB, NCCF |
|  | Action 2-3 | Work with SS to establish new monitoring stations within impaired waters influenced by the Hewletts Creek watershed   | Year 2 based upon preliminary monitoring   | City of Wilmington –Stormwater Services; UNCW, SS, WB, NCCF |
|  | Action 2-4 | Evaluate the results of bacterial source monitoring in Banks Channel that is being conducted by UNC-CH  | Study underway, evaluate results in Year 1 | WB, UNC-CH, UNCW, NCCF                                      |
|  | Action 2-5 | Request Use Attainability Study on SA waters along Wrightsville Beach shoreline in Banks Channel. These waters are automatically closed to Shellfish Harvest due to marinas, and have been polluted since 1947. | Year 2                                     | WB, NCCF, NC DWQ  |
|  | Action 2-6 | Request Use Attainability Study on SB waters now “Approved” for shellfish harvest in waters influenced by the Bradley Creek Watershed   | Year 2                                     | City of Wilmington, WB, NCCF, NC DWQ                        |
|  | Action 2-7 | Determine if there is potential to restore shellfish harvest in any additional waters classified as SB that are influenced by the Bradley Creek watershed   | Years 4-5                                  | City of Wilmington –Stormwater Services; UNCW, SS, WB, NCCF |

|  |            |   |        |   |
|--|------------|---|--------|---|
|  | Action 2-8 | Evaluate the status and trends in bacteria contamination within the entire Hewletts Creek watershed based upon more intensive data collected as part of plan implementation | Year 5 | City of Wilmington –Stormwater Services; UNCW, SS, NC DWQ, NCCF |
|--|------------|---|--------|---|

In accordance with Action 2-1, Dr. Mike Mallin’s office with the University of North Carolina at Wilmington (UNCW) continues to conduct regular surface water sampling to determine what effects the program’s volume reduction efforts are having on the health of the creeks.

This plan objective concentrates heavily on the classification of local waters and the appropriateness of current classifications considering today’s conditions. While not critical to the success of the plan at this stage, as the plan continues to gain traction and improve water quality, reclassification will become a more pressing concern.

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

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

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

The North Carolina Coastal Federation’s (NCCF) grant for stormwater retrofits on UNCW’s campus was a major contributor to exceeding the internal performance measure of 0.15-acre feet of volume reduction within the Bradley Creek Watershed. The pervious retrofits in 2 parking lots on campus are designed to capture 22,180 cubic feet (165,917 gallons) of stormwater. This initiative, in addition to the other projects completed within the Bradley Creek Watershed, helped achieve the volume reduction goal for the Bradley Creek Watershed by 345%.

HOWBMP installed retrofits in the Bradley and Hewletts Creek Watersheds this year. There were 7 total projects between 7 homeowners. For two cisterns and five rain garden installations, the volume reduction was 716 cubic feet (5356 gallons).

Due to increased advertising and, most likely, more people being home during the COVID-19 shutdowns, there were a record number of rain barrels sold through the City of Wilmington and New Hanover County joint Rain Barrel Sale. While they do not capture a significant amount of stormwater, there were a record number of rain barrels reported within the Bradley and Hewletts Creeks Watersheds that added to volume reduction totals.

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

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

During the 19-20 fiscal year, a new visual map was created in accordance with Action 4-1 to highlight the mapping capabilities of the GIS Atlas. It also provides a visual for the distribution of HOW Program projects and gives website visitors an idea of how extensive the program is. The GIS Atlas has also been promoted internally among City staff. Several tree plantings were able to be added to the database this year due to collaboration between Community Services and Stormwater Services. Likewise, trees purchased by the HOW Program will also be reported as part of a City-wide tree planting initiative.

A new development this year has been the Watershed Coordinator’s presence on the City’s Technical Review Committee. This has opened an opportunity to discuss more green infrastructure practices while site plans are still under review for approval which supports Actions 4-2, 4-3, and 4-4. While the suggestions are all voluntary at this stage, it has been helpful to promote the HOW Program and introduce the realm of possibilities to developers that may not have considered green infrastructure previously. Participating in the TRC meetings is also helpful for tracking how much impervious surface coverage is being added to the Bradley and Hewletts Creeks Watersheds, which can paint a picture for how the watersheds have changed over the years and why water quality improvements may not be happening as quickly as desired.

Action 4-4 has also been a major topic for the 19-20 fiscal year. Many City residents have expressed frustrations over the number of trees that have been lost through development, particularly in light of all of the trees lost due to recent major hurricanes. HOW staff continued its presence on the staff review workgroup of the results from the Green Infrastructure Center (GIC) tree study grant. This year, staff ranked the recommendations and presented the feasibility of each option to City Council. The Mayor also announced an initiative to increase tree canopy coverage within City limits to be competitive with more forested cities.

The budget proposal included an amount designated towards development of an Urban Forestry Management Plan which will be pursued next year. In the interim, the HOW Program has partnered with Community Services to plant additional trees at Fire Station 9 (City property) and procured 52 trees to be planted at parks within the Bradley and Hewletts Creeks Watersheds in the fall. The HOW Program also published an article discussing how trees help treat and reduce stormwater runoff. Through that news article, the HOW Program also advertised that trees can be funded through the HOWBMP funding program. The Watershed Coordinator also did a virtual presentation to the North Carolina Urban Forest Council discussing the recent tree projects and how trees can be incorporated into green infrastructure.

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

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

Partnerships are one of the greatest strengths of the HOW Program and contributed to its continued growth this year. HOW continued its partnerships with local news media outlets (WECT, WHQR, and Lamar Billboards), NHSWCD, NCCF, UNCW, NC State Cooperative Extension, and members of the Wilmington Tree Commission. The Wilmington Farmer’s Market at Tidal Creek Co-op, New Hanover County Arboretum, and Airlie Gardens continued to be vital partners for outreach events and providing educational opportunities to the community.

In accordance with Action 5-1, HOW attended several educational events with partners new and old. The HOW Program continued to be a presence at the Wilmington Farmer’s Market, located within the Bradley Creek Watershed. HOW also participated in Family Fun Night at Airlie Gardens and the Native Plant Festival at the NHC Arboretum. New events this year included Wilmington Workshops on the Water hosted by 350 Wilmington and the Family Smart Start Festival hosted by Smart Start NHC. HOW also did a virtual presentation to the local chapter of the Sierra Club about rain garden maintenance. The Earth Day Festival, which is one of the biggest events the HOW Program attends, unfortunately did not occur in person this year

due to COVID-19 restrictions. A virtual Earth Day event was held instead and highlighted the HOW Program as an event sponsor.

A new event that happened in October 2019 was a Rain Garden Maintenance Workshop at the NHC Arboretum. The HOW Program and NC State Cooperative Extension co-hosted the event, which included presentations and a hands-on maintenance session on a rain garden located on the Arboretum grounds. The event was well-attended and received positive feedback from several of the participants.

The ongoing partnership with NCCF continues to fulfil Action 5-2, securing 319 grants for retrofits within the Bradley Creek Watershed. The 319 UNCW grant continued to contribute to tremendous success for Action 5-6 with the installation of pervious parking lot retrofits on campus. North Carolina State University (NCSU) also approached the City this year with ideas for commercial retrofits within the Bradley Creek Watershed. A 319 grant application was submitted June 2020 and will hopefully be funded in the coming year.

**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. However, there were some contract complications that pushed the start date for monitoring activities back by nearly 6 months. The most recent report, published in April 2020, shows that fecal bacteria are still a concern in both creeks for the months that they were monitored. Though 1 station in Hewletts Creek and 1 station in Bradley Creek were meeting state standards for shellfish harvest, all other stations exceed recreation and shellfish harvest standards. It is also worth noting that because of contract issues at the start of the fiscal year, monitoring did not occur during the warmer summer months in 2019.

To highlight the program’s progress through Action 6-1, the volume reduction internal performance measure for Bradley Creek was exceeded by 345%. Hewletts Creek did not meet its volume reduction measure this year, but still had 23 total projects implemented. For private homeowners, larger stormwater retrofits are not always feasible, so volume reductions are often smaller in residential areas. Staff were not able to adjust the volume reduction goals originally established in 2012 during the 19-20 fiscal year but will revisit them in 20-21 and revise them to more accurately reflect the types of projects implemented through the program.

Awareness about the program continues to grow and participation is at an all-time high. The partnership with NHSWCD will receive more funding in the coming year to install more projects and additional operating funds will continue to fund projects on City properties. More awareness of the HOW Program is also occurring internally, which will continue to support restoration efforts within the Bradley and Hewletts Creeks Watersheds.

**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**

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**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/<br>ACTIVITY | EVENT/ACTIVITY | AUDIENCE | DELIVERED BY<br>(AGENCY) | METHOD OF DELIVERY /<br>MESSAGE | ATTENDANCE/<br>PARTICIPATION |
|----------------------------|----------------|----------|--------------------------|---------------------------------|------------------------------|
|----------------------------|----------------|----------|--------------------------|---------------------------------|------------------------------|

|   |
|---|
| <b>BMP a. Define outreach/education program goals and objectives.</b>   |
| <b>BMP b. Describe target pollutants and/or stressors</b>   |
| <b>BMP c. Describe target audiences</b>   |
| <b>BMP d. Describe residential and industrial/commercial issues</b>   |
| Outreach and education program goals, 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/Involvement Plan, which is included in the Appendix. This plan is updated as necessary to reflect changes in target audience characteristics, awareness, etc. |

| <b>BMP e. Informational Web Site (www.wilmingtonnc.gov/stormwater)</b> |  |   |                     |   |  |
|--|--|---|---------------------|---|--|
| Ongoing/Regular Updates  | Stormwater Services website                                  | General public, website viewers                         | Stormwater Services | Dedicated stormwater website  | <a href="http://www.wilmingtonnc.gov/stormwater">www.wilmingtonnc.gov/stormwater</a> |
| 8/13/19  | City of Wilmington website homepage and social media outlets | General public<br>Web Viewers<br>Social Media Followers | Communications Div. | News article - Drainage Improvements at Williston School to close portion of 10th St. temporarily | 32,000 Facebook Followers<br>24,100 Instagram Followers<br>36,400 Twitter Followers  |
| 10/24/19   | City of Wilmington website homepage and social media outlets | General public<br>Web Viewers<br>Social Media Followers | Communications Div. | News article - Hurricane repairs to close portion of Montgomery Avenue                            | 32,000 Facebook Followers<br>24,100 Instagram Followers<br>36,400 Twitter Followers  |
| 10/28/19   | City of Wilmington website homepage and social media outlets | General public<br>Web Viewers<br>Social Media Followers | Communications Div. | News article -Williston Middle School drainage improvement project now complete                   | 32,000 Facebook Followers<br>24,100 Instagram Followers<br>36,400 Twitter Followers  |
| 12/10/19   | City of Wilmington website homepage and social media outlets | General public<br>Web Viewers<br>Social Media Followers | Communications Div. | News article - Crews finishing up hurricane repairs on Montgomery Ave.                            | 32,000 Facebook Followers<br>24,100 Instagram Followers<br>36,400 Twitter Followers  |

|          |  |  |                        |   |   |
|----------|--|--|------------------------|---|---|
| 12/18/19 | City of Wilmington website homepage and social media outlets | General public<br>Web Viewers<br>Social Media<br>Followers | Communications<br>Div. | News article - Statuses of Major Hurricane Florence Repairs (70 point repair projects, River Road, etc) | 32,000 Facebook Followers<br>24,100 Instagram Followers<br>36,400 Twitter Followers |
| 4/15/20  | City of Wilmington website homepage and social media outlets | General public<br>Web Viewers<br>Social Media<br>Followers | Communications<br>Div. | News article - An update on major projects that are continuing or ongoing during Covid19                | 32,000 Facebook Followers<br>24,100 Instagram Followers<br>36,400 Twitter Followers |
| 4/25/20  | Social Media Outlets   | General public<br>Web Viewers<br>Social Media<br>Followers | Communications<br>Div. | Virtual Earth Day promotion   | 32,000 Facebook Followers<br>24,100 Instagram Followers<br>36,400 Twitter Followers |

**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, the Stormwater Compliance Officer also distributes education materials to the public and targeted user groups (i.e. pet owners, auto shops, restaurants, residents, etc) and issues NOVs and fines to citizens and businesses that have been identified as non-compliant with the City's stormwater ordinances. Information about code enforcement actions are included in the that section.

|                    |   |   |                                       |  |   |
|--------------------|---|---|---------------------------------------|--|---|
| Annually           | 8th Grade EnviroScape Watershed Presentations | All 8th Grade NHC Schools Science Classes | Stormwater Services<br>CFRW<br>NHSWCD | Classroom presentation about watersheds, water quality, nonpoint source pollution, BMPs and stewardship  | 68 classes scheduled with 13 in-classroom spring presentations cancelled due to Covid19. Virtual presentation link sent to teachers. 2100 students served |
| July - August 2019 | Martin Luther King Center                     | At risk youth in summer camps             | Stormwater Services                   | Different stormwater educational activities each week all summer. Participants were given stormwater educational materials and promo items.  | 30 participants   |
| 9/28/2019          | LakeFest                                      | General public                            | Stormwater Services                   | Watershed Activity for attendees with educational stormwater prizes given to each participant.   | 600 attendees   |
| 10/25/2019         | Pet Waste Signage for Compliance Program      | Pet Owners<br>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. | 60 additional pet waste signs purchased for program outreach.   |

|           |   |   |  |   |  |
|-----------|---|---|--|---|--|
| 1/20/2020 | 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   | 250 tidy bag pet waste dispensers purchased. |
| 2/8/2020  | StriperFest Education Day                                 | General public  | Stormwater Services  | Interactive watershed pollution activity for participant with educational stormwater prizes. Distributed 15 watershed maps, 8 Stormwater is a Dirty Word Brochures, 2 Pet Waste brochures, 2 Greenfield Lake brochures  | 508 attendees                                |
| 2/20/2020 | Lower Cape Fear Stewardship Awards Program - sponsorship  | Realtors, Developers, Environmental Agencies, Politicians | Stormwater Services  | Sponsorship with the Planning Department and exhibit with stormwater info and staff.<br><br>Stormwater/HOW educational materials and promo items distributed to attendees.  | 75 attendees                                 |
| 2/23/2020 | Monty's Home Pet Expo                                     | Pet owners  | NHSWCD   | Canines for Clean Water booth - interactive event where pet owners sign a pledge to clean up after their pet and submit a photo of their pet to be featured on our website <a href="http://wilmingtonnc.gov/canines">wilmingtonnc.gov/canines</a> . Free educational pet waste goodie bags given to every pledge signee | 30 pledges signed                            |
| 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 our major sponsorship posted on social media. Virtual scavenger hunt stormwater question-random winner selected to receive free rain barrel.   | Virtual Earth Day online. 500 estimated.     |

#### **BMP g. Maintain Hotline/Help line**

The Stormwater Pollution Prevention Hotline was established 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/reportsstormwaterpollution](http://www.wilmingtonnc.gov/reportsstormwaterpollution)**. Hotline/web reports are routed to the Stormwater Code Compliance Officer who tracks, investigates, and responds to all hotline reports. Information regarding hotline reports is included in the Enforcement Appendix section of this report and includes the number and nature of hotline phone/web reports. ***\*In FY19/20, the Report Stormwater Pollution hotline and web reporting tool experienced technical issues and was down for several months until IT could remedy the issue. However, in that time period, pollution calls still came in to the Compliance Officers and admin line, but were not "credited" to hotline and webform reporting.***

|         |   |                |                     |  |   |
|---------|---|----------------|---------------------|--|---|
| 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 | Hotline calls and webform reports vary each year. More info can be found in the "Enforcement" section of the annual report. |
|---------|---|----------------|---------------------|--|---|

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

**Media Advertising Campaigns**

|  |  |  |                          |   |   |
|--|--|--|--------------------------|---|---|
| September 2 - November 30, 2019              | WECT-TV6 website, digital, mobile and targeted ad campaign | General public<br>Mobile, digital, and web viewers | Stormwater Services      | Yard Waste Ads on digital, mobile, and social media:<br><ul style="list-style-type: none"> <li>• 23,442 Pre-roll video ads</li> <li>• 211,527 Targeted display banner ads</li> <li>• 215,474 social media posts (FB)</li> </ul> Click thrus to "Get Educated" stormwater webpage  | <u>Target Audience:</u><br>General public<br><u>Ads Served:</u><br>450,443 on website and news/weather app<br><u>Ads Clicked:</u> 4833<br><u>Engagement Rate:</u><br>1.07 (above the national average)<br><u>Total cost:</u> \$4745   |
| 10/14/19 - 11/10/19                          | Lamar Digital Billboard Advertising                        | Motorists<br>Pedestrians                           | Stormwater Services      | Yard Waste pollution digital billboards - "Keep Your Leaves to Yourself"<br>Two locations - 1101 S. College Road & Wrightsville Avenue and 706 S. College Road & Fountain Drive.  | <u>Target Audience:</u><br>General public<br><u>Reach:</u> Motorists<br><u>Frequency:</u><br>Rotating billboard shown for 8 seconds every minute 24/7 using rotating billboard locations<br><u>Ads Served:</u><br>921,600<br><u>Total cost:</u> \$2000  |
| Summer / Fall 2019 Issue; Volume 11, Issue 2 | Going Green Magazine                                       | Magazine and web viewers                           | Going Green Publications | Magazine Ad -Don't forget to Scoop the Poop ad  | <u>Target Audience:</u><br>Adults, General public, Environmental groups<br><u>Reach &amp; Frequency:</u> 8000 printed   |
| March 16 - May 17, 2020                      | WECT-TV6 website, digital, mobile and targeted ad campaign | General public<br>Mobile, digital, and web viewers | Stormwater Services      | Litter Prevention ads on TV, digital, mobile, and social media:<br><ul style="list-style-type: none"> <li>• 24 TV ads</li> <li>• 7,779 Pre-roll video ads</li> <li>• 45,003 Homepage native ads</li> <li>• 148,556 Targeted display banner ads</li> <li>• 149,005 targeted social media ads (FB &amp; Insta)</li> </ul> Click thrus lead to "Get Educated" stormwater webpage | <u>Target Audience:</u><br>General public<br><u>Ads Served:</u><br>24 ads on TV<br>350,343 ads on website, news/weather mobile app, and targeted social media posts<br><u>Ads Clicked:</u> 1061<br><u>Engagement Rate:</u><br>.30% (within the national average range)<br><u>Total cost:</u> \$4755 |

|                         |  |   |                     |  |  |
|-------------------------|--|---|---------------------|--|--|
| April - May 2020        | Lamar Digital Billboard Advertising        | Motorists<br>Pedestrians                          | Stormwater Services | Litter Prevention Billboard<br>"People Litter, Animals Don't, Please Act Like Animals".<br>Two locations - 1101 S. College Road & Wrightsville Avenue and 706 S. College Road & Fountain Drive.  | <u>Target Audience:</u><br>General public<br><u>Reach:</u> Motorists<br><u>Frequency:</u><br>Rotating billboard shown for 8 seconds every minute 24/7 using rotating billboard locations<br><u>Ads Served:</u><br>921,600<br><u>Total cost:</u> \$2000 |
| March 15 - May 16, 2020 | Local Voice Wilmington                     | Radio & Digital viewers                           | Stormwater Services | Digital Advertising Litter Prevention Campaign:<br><br>60 total 300x250 in-story placement in the Local News Section main page<br><br>60 total 300x250 digital ad in afternoon headlines newsletter<br><br>920,000 unique users annually | <u>Target Audience:</u><br>General public<br><u>Reach:</u> 393,533 impressions<br><u>Click Thrus:</u> 1074<br><u>Ads Served:</u> 60<br><u>Newsletter subscribers:</u><br>18,543<br><u>Total cost:</u> \$2,200  |
| Ongoing                 | Cape Fear Public Utility Authority (CFPUA) | General public<br>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<br>Visitors to city offices             | Stormwater Services | Stormwater education slides for city office's Marlin Board streaming TVs   | City office employees and visitor  |

**News Coverage**

|           |          |   |                    |   |   |
|-----------|----------|---|--------------------|---|---|
| 7/23/2019 | WECT-TV6 | Online newspaper readers<br>Radio listeners | WECT News reporter | Print and online newspaper article - City of Wilmington is looking for stormwater workers   | <u>Stats:</u><br>-190, 390 households served<br>-3.67 million monthly page views<br>-2.92 million page views in mobile news app |
| 8/7/2019  | WECT-TV6 | Online newspaper readers<br>Radio listeners | WECT News reporter | Print and online newspaper article - Stormwater repairs, Rail Realignment take focus at infrastructure-heavy Wilmington council meeting | <u>Stats:</u><br>-190, 390 households served<br>-3.67 million monthly page views<br>-2.92 million page views in mobile news app |
| 9/23/2019 | WWAY-TV3 | TV News<br>Online website                   | WWAY Reporter      | TV News, website, social media outlets - Toxic Algae found in Wilmington pond after death of dogs                                       | Stats unavailable.  |

|            |                  |   |                       |   |   |
|------------|------------------|---|-----------------------|---|---|
| 12/18/2019 | WWAY-TV3         | TV News Online website                      | WWAY Reporter         | TV News, website, social media outlets - Repairs to 70 locations damaged during Florence underway     | Stats unavailable.  |
| 1/7/2020   | Port City Daily  | Online newspaper readers<br>Radio listeners | Port City Daily staff | Online newspaper article - Using trees to manage stormwater: City council hears Wilmington case study | 920,000 unique website users annually   |
| 1/15/2020  | Star News Online | Online newspaper readers<br>Radio listeners | Star News reporter    | Print and online newspaper article Can Wilmington be a city of trees?                                 | Stats unavailable.  |
| 1/20/2020  | WECT-TV6         | Online newspaper readers<br>Radio listeners | WECT News reporter    | Print and online newspaper article - Neighbors raise stormwater concerns at Echo Farms Development    | <u>Stats:</u><br>-190, 390 households served<br>-3.67 million monthly page views<br>-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. | 32,000 Facebook Followers<br>24,100 Instagram Followers<br>36,400 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<br>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 <a href="http://wilmingtonnc.gov/canines">wilmingtonnc.gov/canines</a> | Goodie bag includes Canines for Clean Water pet bandana, pet waste pick up bags, pet waste brochure, pens, notepads |
| July - August 2019 | Martin Luther King Center  | At risk youth in summer camps | Stormwater Services           | Stormwater educational items distributed to participants.   | 150 educational items distributed   |
| 9/28/2019          | LakeFest   | General public                | Stormwater Services           | Stormwater educational items distributed to participants.   | 35 educational items distributed  |
| 11/12/2019         | GIS Day  | UNCW Students and Faculty     | Stormwater Services           | Stormwater educational items distributed to participants  | 58 educational items distributed  |
| 11/26/2019         | Stormwater Maintenance Crew Outreach   | General public                | Stormwater Services           | Distributed stormwater wallets to educational crews to carry and hand out the Stormwater Compliance Officers business cards   | 30 educational items distributed  |

|           |   |  |  |   |   |
|-----------|---|--|--|---|---|
| 2/8/2020  | StriperFest Education Day                                 | General public                             | Stormwater Services  | Stormwater educational items distributed to participants  | 306 educational items distributed   |
| 2/23/2020 | Monty's Home Pet Expo                                     | Pet owners                                 | NHSWCD   | Canines for Clean Water booth - interactive event where pet owners sign a pledge to clean up after their pet and submit a photo of their pet to be featured on our website <a href="http://wilmingtonnc.gov/canines">wilmingtonnc.gov/canines</a> | 30 pledges signed   |
| 2/26/2020 | Cool Women, Hot Jobs                                      | GLOW Academy Students                      | Stormwater Compliance  | Stormwater educational wallets  | 50 educational items distributed  |
| 3/3/2020  | Stormwater Decision Makers Summit                         | Stormwater managers and professionals      | Stormwater Manager Watershed Coordinator   | Stormwater brochures and giveaways  | 68 educational items distributed  |
| 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 our major sponsorship posted on social media. Virtual scavenger hunt stormwater question-random winner selected to receive free rain barrel  | 1 rain barrel raffled off to participants   |
| Annually  | 8th Grade Enviroscope Watershed Presentations             | All 8th Grade NHC Schools Science Classes  | Stormwater Services CFRW NHSWCD  | Classroom presentation about watersheds, water quality, nonpoint source pollution, BMPs and stewardship   | 68 classes scheduled with 13 in-classroom spring presentations cancelled due to Covid19. Virtual presentation link sent to teachers that missed in-person instruction. 2100 students served |

**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. |
| 7/1/2019                     | Stormwater Services brochures delivered to CFPUA         | CFPUA / Stormwater customers | Stormwater Services | Two CFPUA Offices received updated Stormwater Services brochures to distribute to customers                  | 2750 brochures  |



**Newsletters**

|             |  |                                  |  |  |  |
|-------------|--|----------------------------------|--|--|--|
| Spring 2020 | Stormwater Watch Newsletter Insert included in Citywide Public Information Report Newsletter | City residents<br>Special events | Stormwater Services<br>Communications Div. | UNCW Annual Water Quality Report including articles about trees and stormwater, and tree benefits graphic. | 40,000+ newsletters mailed to city residents |
|-------------|--|----------------------------------|--|--|--|

**Grant Projects**

|  |  |   |  |  |  |
|--|--|---|--|--|--|
| EPA 319 CFRW Grant for Jumping Run Branch tributary of Greenfield Lake | 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          | Phase 1 grant project slated thru 2022.<br>Developed Grant Data Sheet & Jumping Run Branch Signage |
| EPA 319 NCCF Grant for UNCW BMP installations in Bradley Creek         | Bradley Creek  | Stormwater Services<br>NC Coastal Federation                | Grant to install BMPs in Hewletts and Bradley Creek Watersheds   | Collaboration with NCCF and UNCW to implement projects that align with the Bradley & Hewletts Creek Watershed Restoration plan | BMP projects slated for installation thru 2020   |
| 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                               |
| Monthly Meetings   | NHC Tree Group                                 | NH County Soil & Water                         | Stormwater Education Program Manager | Participation in collaborative meetings to encourage tree canopy in the entire county | Ongoing                               |

**Employee Trainings**

|            |   |                   |                                      |   |                        |
|------------|---|-------------------|--------------------------------------|---|------------------------|
| 8/6/2019   | Guidelines for Excellence in EE                         | EE Certification  | Stormwater Education Program Manager | Guidelines for Excellence in EE Workshop to attain CEs for EE Recertification | Held at Airlie Gardens |
| 7/17/2019  | IDDE/Stormwater Presentation for Code Enforcement Staff | Engineering Staff | Compliance Officer                   | Illicit Discharge Detection & Elimination                                     | 8 attendees            |
| 10/13/2019 | IDDE/Stormwater Presentation for Stormwater Staff       | Engineering Staff | Compliance Officer                   | Illicit Discharge Detection & Elimination AND ???                             | 49 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 9 Weekly Updates |
|--------|---------------------|------------------------------------|--------------------|--|---|

**Citizen Contacts**

|                   |   |                         |                     |   |   |
|-------------------|---|-------------------------|---------------------|---|---|
| Ongoing/regularly | Stormwater office via phone, email or walk-in | Citizens/<br>Businesses | Stormwater Services | Responses to requests for information, literature, etc. | Information provided regarding 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



**NPDES  
Public Outreach & Education  
&  
Public Involvement & Participation**

**Updated 2019**

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**NPDES PERMIT: PUBLIC EDUCATION & OUTREACH (SECTION B)**

**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.

| <b>BMP</b>  | <b>Measurable Goals</b>   |
|---|---|
| <b>a.</b> Goals and Objectives  | Define goals and objectives of the Local Public Education and Outreach Program based on community wide issues.  |
| <b>b.</b> Describe target pollutants and/or stressors   | The permittee shall maintain a description of the target pollutants and/or stressors and likely sources.  |
| <b>c.</b> 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.   |
| <b>d.</b> 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.  |
| <b>e.</b> Informational Web Site  | The permittee shall promote and maintain, an internet web site designed to convey the program’s message.  |
| <b>f.</b> 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.    |
| <b>g.</b> Maintain Hotline/Help line  | The permittee shall promote and maintain a stormwater hotline/helpline for the purpose of public education and outreach.  |
| <b>h.</b> 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. |

## GOALS & OBJECTIVES FOR PUBLIC EDUCATION & OUTREACH:

| BMP (a, b, c, d)                     | <b>Define program goals, and describe target pollutants and/or stressors, target audiences, and residential and industrial/commercial issues.</b>   |
|--------------------------------------|---|
| <b>Goal</b>                          | <ul style="list-style-type: none"> <li>▪ Define goals and objectives of the Local Public Education and Outreach Program based on community wide issues.</li> <li>▪ Maintain a description of the target pollutants and/or stressors and likely sources, a description of the target audiences likely to have significant storm water impacts and why they were selected,</li> <li>▪ Describe issues, such as pollutants, likely sources of those pollutants, impacts, and the physical attributes of stormwater runoff, in their education/outreach program.</li> </ul> |
| <b>Implementation Responsibility</b> | <ul style="list-style-type: none"> <li>▪ City of Wilmington Stormwater Services – Education Program Manager</li> <li>▪ Heal Our Waterways Program – Watershed Coordinator</li> </ul>  |
| <b>Implementation Schedule</b>       | <ul style="list-style-type: none"> <li>▪ The outreach/education and public involvement/participation goals and pollutants, audiences, issues are described at length in the section (below). Staff will update the plan as audiences change, become more educated, etc.</li> </ul>  |
| <b>Measurement</b>                   | <ul style="list-style-type: none"> <li>▪ Update each year, if necessary.</li> </ul>   |

| BMP (e)                              | <b>Informational Stormwater Website</b>   |
|--------------------------------------|---|
| <b>Goal</b>                          | <ul style="list-style-type: none"> <li>▪ Update and regularly maintain the Stormwater Services and Heal Our Waterways websites to include bi-monthly updates to the News section and updates and/or review for every website page every 90 days. Add educational materials as necessary.</li> <li>▪ <a href="http://www.wilmingtonnc.gov">www.wilmingtonnc.gov</a></li> <li>▪ <a href="http://www.healourwaterways.org">www.healourwaterways.org</a></li> </ul> |
| <b>Implementation Responsibility</b> | <ul style="list-style-type: none"> <li>▪ City of Wilmington Stormwater Services – Education Program Mgr.</li> <li>▪ Heal Our Waterways Program – Watershed Coordinator</li> </ul>   |
| <b>Implementation Schedule</b>       | <ul style="list-style-type: none"> <li>▪ Updates to News Section – Bi-Monthly</li> <li>▪ Review and update every page on website – every 90 days</li> </ul>   |
| <b>Measurement</b>                   | <ul style="list-style-type: none"> <li>▪ News section updated every other month.</li> <li>▪ Content updated and/or reviewed on each website page every 90 days.</li> <li>▪ Working with the city’s Public Information Office, Stormwater Services will obtain stats for the dedicated website pages including specific Outreach/Education pages.</li> </ul>   |

| BMP (f, h)                           | <b>Enviroscape Watershed Education Program (school presentations)</b>  |
|--------------------------------------|--|
| <b>Goal</b>                          | <ul style="list-style-type: none"> <li>▪ Deliver presentations to every 8<sup>th</sup> grade middle school science class in New Hanover County Schools each school year – approximately 69-75 classes per year serving 2,200 students</li> </ul>   |
| <b>Implementation Responsibility</b> | <ul style="list-style-type: none"> <li>▪ City of Wilmington Stormwater Services – Education Program Mgr. coordinates program and city delivers 1/3 of total presentations annually</li> <li>▪ Cape Fear River Watch - delivers 1/3 of total presentations annually (under contract)</li> <li>▪ New Hanover Soil &amp; Water Conservation District - delivers 1/3 of total presentations annually (under contract)</li> </ul> |
| <b>Implementation Schedule</b>       | <ul style="list-style-type: none"> <li>▪ Deliver presentations in coordination with NHCS Science Coordinator and fulfilling the schedule established by the school system.</li> </ul>  |
| <b>Measurement</b>                   | <ul style="list-style-type: none"> <li>▪ At the end of each school year, tally:               <ul style="list-style-type: none"> <li>- Number of middle schools visited</li> <li>- Number of classroom presentations given</li> <li>- Number of students served</li> <li>- Number of educational materials distributed to teachers and/or students in support of the program.</li> </ul> </li> </ul>                         |

| <b>BMP (f, h)</b>                    | <b>Pet Waste (Fecal Coliform) Education / Canines for Clean Water</b>  |
|--------------------------------------|--|
| <b>Goal</b>                          | <ul style="list-style-type: none"> <li>▪ Increase awareness about pet waste/fecal coliform bacterial pollution and the City’s pet waste ordinance by staffing the Canines for Clean Water (C4CW) booth at three pet-related events each year and recruiting pet owners to sign the C4CW Pet Waste Pledge.</li> </ul>   |
| <b>Implementation Responsibility</b> | <ul style="list-style-type: none"> <li>▪ City of Wilmington Stormwater Services – Education Program Mgr.</li> <li>▪ Heal Our Waterways Program – Watershed Coordinator</li> <li>▪ New Hanover Soil &amp; Water Conservation District (under contract)</li> </ul>   |
| <b>Implementation Schedule</b>       | <ul style="list-style-type: none"> <li>▪ Events occur throughout the year and largely depend on community organizations that schedule each community event and venue.</li> </ul>   |
| <b>Measurement</b>                   | <ul style="list-style-type: none"> <li>▪ Each fiscal year, tally: <ul style="list-style-type: none"> <li>- Name, date, location of each pet-related event</li> <li>- Number of people in attendance at each event</li> <li>- Number of pet owners that signed the Pet Waste Pledge</li> <li>- How many attendees received educational materials or promo items (ie pet waste goodie bags)</li> </ul> </li> </ul> |

| <b>BMP (f, h)</b>                    | <b>Stormwater 101 Outreach Presentations</b>   |
|--------------------------------------|--|
| <b>Goal</b>                          | <ul style="list-style-type: none"> <li>▪ Conduct a minimum of two Stormwater 101 education presentations each fiscal year to civic groups such as HOAs, businesses, college students, developers, or during watershed-wide meetings.</li> </ul>  |
| <b>Implementation Responsibility</b> | <ul style="list-style-type: none"> <li>▪ City of Wilmington Stormwater Services – Education Program Mgr.</li> <li>▪ Heal Our Waterways Program – Watershed Coordinator</li> <li>▪ New Hanover Soil &amp; Water Conservation District (under contract)</li> </ul>   |
| <b>Implementation Schedule</b>       | <ul style="list-style-type: none"> <li>▪ Staff markets and schedules presentations throughout the year, dependent on the group served and their available schedule.</li> </ul>   |
| <b>Measurement</b>                   | <ul style="list-style-type: none"> <li>▪ Each fiscal year, tally: <ul style="list-style-type: none"> <li>- Name, date, location of each event/presentation</li> <li>- Number of people in attendance at each presentation</li> <li>- How many attendees viewed or received educational materials</li> <li>- Number of promo/giveaway items distributed to attendees</li> </ul> </li> </ul> |

| <b>BMP (f, h)</b>                    | <b>Stormwater Events &amp; Promotional Giveaways</b>  |
|--------------------------------------|---|
| <b>Goal</b>                          | <ul style="list-style-type: none"> <li>▪ Participate in community events to engage and provide stormwater education and promo/giveaway items to citizens &amp; businesses.</li> </ul>   |
| <b>Implementation Responsibility</b> | <ul style="list-style-type: none"> <li>▪ City of Wilmington Stormwater Services – Education Program Manager</li> <li>▪ Heal Our Waterways Program – Watershed Coordinator</li> <li>▪ Cape Fear River Watch</li> <li>▪ New Hanover Soil &amp; Water Conservation District</li> </ul>   |
| <b>Implementation Schedule</b>       | <ul style="list-style-type: none"> <li>▪ Ongoing, events occur throughout the year</li> </ul>   |
| <b>Measurement</b>                   | <ul style="list-style-type: none"> <li>▪ Each fiscal year, tally: <ul style="list-style-type: none"> <li>- Name &amp; Date of each event attended</li> <li>- Number of events attended in the fiscal year</li> <li>- Number of people in attendance at each event</li> <li>- How many attendees viewed or received educational materials at each event</li> <li>- Number of promo/giveaway items distributed at each event</li> </ul> </li> </ul> |

| <b>BMP (f, h)</b> | <b>Paid Stormwater Media Campaigns</b>   |
|-------------------|--|
| <b>Goal</b>       | <ul style="list-style-type: none"> <li>▪ Conduct a fall and spring paid media campaign on WECT-TV (NBC) focused on a stormwater pollutant (ie pet waste, litter, lawn care, general</li> </ul> |

|                                      |   |
|--------------------------------------|---|
|                                      | stormwater overview, etc) aiming for 200,000 ads served on mobile and digital platforms (campaign dependent)  |
| <b>Implementation Responsibility</b> | <ul style="list-style-type: none"> <li>▪ City of Wilmington Stormwater Services – Education Program Manager</li> <li>▪ Heal Our Waterways Program – Watershed Coordinator</li> </ul>  |
| <b>Implementation Schedule</b>       | <ul style="list-style-type: none"> <li>▪ Meet with WECT media reps to design campaigns and associated ads for each campaign. Use each campaigns stats to improve on the next campaign.</li> </ul>   |
| <b>Measurement</b>                   | <ul style="list-style-type: none"> <li>▪ At the end of the fiscal year, obtain data from WECT showing: <ul style="list-style-type: none"> <li>- Number of ads served on digital/mobile platforms</li> <li>- Engagement rate at or above the national average (if applicable)</li> <li>- Reach and frequency (if airing specifically on TV)</li> </ul> </li> </ul> |

|                                      |  |
|--------------------------------------|--|
| <b>BMP (f, h)</b>                    | <b>Environmental Field Day Events</b>  |
| <b>Goal</b>                          | <ul style="list-style-type: none"> <li>▪ Organize and facilitate at least 2 Environmental Field Days a year serving an entire grade at a New Hanover County School.</li> </ul>   |
| <b>Implementation Responsibility</b> | <ul style="list-style-type: none"> <li>▪ New Hanover Soil &amp; Water Conservation District (under contract)</li> </ul>  |
| <b>Implementation Schedule</b>       | <ul style="list-style-type: none"> <li>▪ Work with individual school teachers and administration to schedule each field day</li> </ul>   |
| <b>Measurement</b>                   | <ul style="list-style-type: none"> <li>▪ For each field day: <ul style="list-style-type: none"> <li>- School served</li> <li>- Grade served</li> <li>- Number of students involved in field day</li> </ul> </li> </ul> |

|                                      |   |
|--------------------------------------|---|
| <b>BMP (g)</b>                       | <b>Hotline</b>  |
| <b>Goal</b>                          | <ul style="list-style-type: none"> <li>▪ Maintain, promote, and respond to the city’s “Report Stormwater Pollution” hotline and web reporting form.</li> </ul>  |
| <b>Implementation Responsibility</b> | <ul style="list-style-type: none"> <li>▪ Stormwater Compliance Officer (tracks &amp; responds)</li> <li>▪ Stormwater Specialist (responds to reports in Compliance Officer’s absence)</li> <li>▪ City of Wilmington Stormwater Services – Education Program Mgr. (ensure hotline &amp; webform functionality and promotes)</li> </ul> |
| <b>Implementation Schedule</b>       | <ul style="list-style-type: none"> <li>▪ Ongoing/Continuous promotion of hotline/webform</li> </ul>   |
| <b>Measurement</b>                   | <ul style="list-style-type: none"> <li>▪ Stormwater Compliance Officer tracks and responds to all hotline calls and webform reports. At the end of each fiscal year, a tally for each hotline report is provided and compared to previous year totals to help gauge outreach and compliance efforts.</li> </ul>                       |



## 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.

| <b>BMP</b>                                 | <b>Measurable Goals</b>   |
|--|---|
| <b>a.</b> Volunteer community involvement  | The permittee shall include and promote volunteer opportunities designed to promote ongoing citizen participation.                                  |
| <b>b.</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. |
| <b>c.</b> Hotline/Help line                | The permittee shall promote and maintain a hotline/helpline for the purpose of public involvement and participation.                                |

## GOALS & OBJECTIVES FOR PUBLIC INVOLVEMENT & PARTICIPATION:

| <b>BMP (a)</b>                       | <b>Storm Drain Marking Program</b>  |
|--------------------------------------|---|
| <b>Goal</b>                          | <ul style="list-style-type: none"> <li>▪ Do two storm drain marking events resulting in 28 total drains marked and at least 10 total community volunteers by the end of the fiscal year. Distribute educational doorhangers to residents and businesses each marking event. (Note: Storm drain marking is weather dependent for volunteers, temperature, and adhesive).</li> </ul>  |
| <b>Implementation Responsibility</b> | <ul style="list-style-type: none"> <li>▪ City of Wilmington Stormwater Services – Education Program Mgr.</li> <li>▪ Cape Fear River Watch (under contract)</li> <li>▪ New Hanover Soil &amp; Water Conservation District (under contract)</li> </ul>  |
| <b>Implementation Schedule</b>       | <ul style="list-style-type: none"> <li>▪ During the fiscal year, as groups are recruited and weather conditions permit</li> </ul>   |
| <b>Measurement</b>                   | <ul style="list-style-type: none"> <li>▪ At the end of the year, tally:               <ul style="list-style-type: none"> <li>- Date</li> <li>- Number of drains marked</li> <li>- Indicate drain specific marker (Drains to River OR Drains to Waterway)</li> <li>- Name of volunteer organization that participated</li> <li>- Number of volunteers at each event</li> <li>- Number of educational doorhangers distributed to community</li> </ul> </li> </ul> |

| <b>BMP (a)</b>                       | <b>Stream / Watershed Cleanups</b>   |
|--------------------------------------|--|
| <b>Goal</b>                          | <ul style="list-style-type: none"> <li>▪ Coordinate 10 annual volunteer cleanups of city watersheds/creeks (1 per month with the exception of July and December).</li> </ul>   |
| <b>Implementation Responsibility</b> | <ul style="list-style-type: none"> <li>▪ Cape Fear River Watch (under contract)</li> </ul>   |
| <b>Implementation Schedule</b>       | <ul style="list-style-type: none"> <li>▪ Monthly, except July &amp; December</li> </ul>  |
| <b>Measurement</b>                   | <ul style="list-style-type: none"> <li>▪ Each cleanup, report on:               <ul style="list-style-type: none"> <li>- Specific creek/watershed and area cleaned</li> <li>- Number of bins or bags of trash collected</li> <li>- Number of bins or bags of recycling collected</li> <li>- Number of volunteers</li> <li>- Number of volunteer hours contributed</li> <li>- Number of stream miles cleaned</li> </ul> </li> </ul> |

| <b>BMP (a)</b>                       | <b>Rain Barrel Sale</b>   |
|--------------------------------------|---|
| <b>Goal</b>                          | <ul style="list-style-type: none"> <li>▪ Implement monthly rain barrel sale for the public to promote stormwater reduction and water conservation. Also, survey buyers to record and educate them about the watershed they live in.</li> </ul>          |
| <b>Implementation Responsibility</b> | <ul style="list-style-type: none"> <li>▪ City of Wilmington Stormwater Services</li> <li>▪ New Hanover Soil &amp; Water Conservation District (under contract)</li> </ul>   |
| <b>Implementation Schedule</b>       | <ul style="list-style-type: none"> <li>▪ Currently, the sale is held monthly, although the frequency may change in the future.</li> </ul>   |
| <b>Measurement</b>                   | <ul style="list-style-type: none"> <li>▪ At the end of the fiscal year, tally:               <ul style="list-style-type: none"> <li>- Number of rain barrels sold</li> <li>- Type of rain barrels sold (ie 60-gallon, 80 gallon)</li> </ul> </li> </ul> |

| <b>BMP (a)</b>                       | <b>CreekWatchers Volunteer Monitoring Program</b>   |
|--------------------------------------|---|
| <b>Goal</b>                          | <ul style="list-style-type: none"> <li>▪ Conduct a volunteer CreekWatchers Monitoring program and submit reports to city every other month, as well as alert Stormwater Services to problem areas as they are observed.</li> </ul>  |
| <b>Implementation Responsibility</b> | <ul style="list-style-type: none"> <li>▪ Cape Fear River Watch (under contract)</li> </ul>  |
| <b>Implementation Schedule</b>       | <ul style="list-style-type: none"> <li>▪ Two volunteer reports submitted every August, October, December, February, April &amp; June. Compliance Officer will respond as necessary to problem areas</li> </ul>  |
| <b>Measurement</b>                   | <ul style="list-style-type: none"> <li>▪ Every other month, review volunteer CreekWatcher reports for: <ul style="list-style-type: none"> <li>- Creek Appearance</li> <li>- Odor</li> <li>- Algae Presence: Color, Texture, Amount</li> <li>- Bank Stability</li> <li>- Turbidity</li> <li>- Creek Flow</li> <li>- Creek Shade</li> <li>- Biodiversity</li> <li>- Litter Presence</li> <li>- Surrounding Land Use</li> <li>- Other noted observations or issues</li> <li>- Photo documentation</li> </ul> </li> </ul> |

| <b>BMP (b)</b>                       | <b>Public Notice/Input/Meetings</b>  |
|--------------------------------------|--|
| <b>Goal</b>                          | <ul style="list-style-type: none"> <li>▪ Provide an opportunity for the public to offer input or learn about stormwater projects/issues through public meetings and public notices to citizens and businesses.</li> </ul>  |
| <b>Implementation Responsibility</b> | <ul style="list-style-type: none"> <li>▪ Stormwater Services Manager</li> <li>▪ Stormwater Engineer</li> </ul>   |
| <b>Implementation Schedule</b>       | <ul style="list-style-type: none"> <li>▪ As stormwater projects come to fruition or as community stormwater issues dictate.</li> </ul>   |
| <b>Measurement</b>                   | <ul style="list-style-type: none"> <li>▪ At the end of the fiscal year, tally: <ul style="list-style-type: none"> <li>- Number of public notices distributed and distribution method</li> <li>- Topic of notice</li> <li>- Number of public meetings held</li> <li>- Meeting topic</li> <li>- Number of attendees</li> <li>- Number of materials/promotional items distributed &amp; what they were</li> <li>- Actions taken as a result of a stakeholder meeting</li> </ul> </li> </ul> |

| <b>BMP (c)</b>                       | <b>Hotline</b>  |
|--------------------------------------|---|
| <b>Goal</b>                          | <ul style="list-style-type: none"> <li>▪ Maintain, promote, and respond to the city’s “Report Stormwater Pollution” hotline and web reporting form.</li> </ul>  |
| <b>Implementation Responsibility</b> | <ul style="list-style-type: none"> <li>▪ Stormwater Compliance Officer (tracks &amp; responds)</li> <li>▪ Stormwater Specialist (responds to reports in Compliance Officer’s absence)</li> <li>▪ City of Wilmington Stormwater Services – Education Program Mgr. (ensure hotline &amp; webform functionality and promotes)</li> </ul> |
| <b>Implementation Schedule</b>       | <ul style="list-style-type: none"> <li>▪ Ongoing/Continuous promotion of hotline/webform</li> </ul>   |
| <b>Measurement</b>                   | <ul style="list-style-type: none"> <li>▪ Stormwater Compliance Officer tracks and responds to all hotline calls and webform reports. At the end of each fiscal year, a tally for each hotline report is provided and compared to previous year totals to help gauge outreach and compliance efforts.</li> </ul>                       |

## 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 water cannot penetrate, such as driveways, streets, parking lots and rooftops, which prevent stormwater runoff from naturally soaking into the ground. 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 waterways.

In Wilmington, 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:

- 17,601 storm drains, manholes, and other structures
- 298 miles of pipes/culverts
- 168 miles of open drainage (ditches and channels)
- 38 acres of retention ponds, infiltration basins, and lakes including Randall Pond, Silver Stream Pond, and Greenfield Lake
- 110 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 Education and Outreach and Public Participation and Involvement is a component of the City of Wilmington's Comprehensive 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.

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

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

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. Approximately 22 sampling sites assess the water quality of 10 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 water quality in the area and guide our outreach/education/involvement efforts.

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

### **CITY OF WILMINGTON’S OUTREACH & PARTICIPATION PROGRAM**

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.

Our program educates citizens, businesses, and employees about the stormwater drainage system, sources of stormwater pollution, the impacts of stormwater pollution on local waterways, and what we can do as a community to prevent and reduce stormwater pollution through stewardship and community action. Our program complies with the City of Wilmington’s NPDES federal stormwater permit.

Our program is based on the principle 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.”

Best practice for developing outreach and education campaigns follows the steps below as illustrated in the EPA’s Getting in Step: A Guide for Conducting Watershed Outreach Programs, 3<sup>rd</sup> 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 Outreach Plan/Campaign

Once driving forces/goals/objectives are developed, identifying and analyzing the target audience is one of the most important 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, etc.

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 think 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 plan 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 strongly considered when determining the appropriate methods to reach them with campaign messages. Formats and distribution methods range from mass media outlets, large events and field trips to more intimate formats such as focus groups, neighborhood meetings and presentations, as well as 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 collaborations whenever possible, to jointly work on outreach/education campaigns with other agencies that have similar goals.

Evaluating your outreach 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, is important for adapting your program so that it is successful.

- Process Evaluations involve evaluating the campaign and components during implementation (ie 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 (ie 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 (ie pet owners cleaning up after pets, lawn care companies not blowing yard waste into streets, etc.)

Our program addresses the following concepts as a basis for outreach/education efforts and public involvement/participation:

- Awareness is the first step to 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 overall water quality, aquatic habitat, shellfish harvesting, recreational water quality and access, and drinking water resources, etc.
- Storm drains and drainage conveyances (i.e. swales, ditches, pipes, etc.) carry water 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 waterways.
- More impervious surfaces, means more degraded water quality.
- The quality and amount of polluted stormwater runoff entering local waterways can be mitigated by installing BMPs (Best Management Practices). BMPs are any action or on-the-ground practice that reduces the amount of stormwater and pollution flowing into waterways. BMPs such as rain gardens, rain barrels, grassy swales, pervious pavement, and re-routing downspouts to grassy areas allow stormwater runoff to soak into the ground and be cleaned and filtered naturally.
- Plants, shrubs, trees, and other vegetation greatly reduce stormwater pollution by absorbing and filtering stormwater runoff and preventing soil from washing away. Native vegetation is especially important for decreasing fertilizer and pesticide use.
- Everyone can and should make a difference to improve and protect our waterways.

The program also addresses the six major pollutants that impact Wilmington's waterways. These pollutants can come mainly from nonpoint sources, however, we also address commercial and industrial potential sources of water quality contamination.

- 1) Fecal coliform bacteria
- 2) Nutrients
- 3) Sediment
- 4) Chemicals
- 5) Litter
- 6) Vehicle Pollution

## TARGET POLLUTANTS, SOURCES, AND AUDIENCES

The following table identifies 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, 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, City of Wilmington Stormwater Services maintenance activities and data, education data, New Hanover Animal Control statistics, and the Statewide Stormwater Survey of North Carolina residents.

This is a working document; therefore the goals and target pollutants will change over time based on the target audiences’ knowledge and implementation of stormwater-friendly practices, as well as changes in water quality data and trends. The pollutants, sources, audiences, messages, etc. are described in the depth in the pages that follow.

| Target Pollutant                  | Pollutant Source   | Target Audiences<br>(Residential & Commercial/Industrial)   |
|-----------------------------------|--|---|
| Fecal Coliform Bacteria           | <ul style="list-style-type: none"> <li>⊕ Domestic Pets (dogs, cats)</li> <li>⊕ Sewer Spills</li> </ul> | <ul style="list-style-type: none"> <li>▪ Pet owners</li> <li>▪ Veterinarians</li> <li>▪ Boarding kennels</li> <li>▪ Pet-related businesses (ie pet sitters, dog walkers)</li> <li>▪ Pet adoption fairs</li> <li>▪ Rabies clinics</li> <li>▪ City parks</li> <li>▪ Pooper scooper businesses</li> <li>▪ School students (8<sup>th</sup> grade water quality program integrated into New Hanover County Schools)</li> <li>▪ Apartment complex onsite management, management companies, and residents</li> <li>▪ Local sewer utility - Cape Fear Public Utility Authority (CFPUA)</li> </ul> |
| Nutrients (nitrogen, phosphorous) | <ul style="list-style-type: none"> <li>⊕ Fertilizers</li> <li>⊕ Yard debris/waste</li> </ul>           | <ul style="list-style-type: none"> <li>▪ Homeowners / HOAs</li> <li>▪ Businesses</li> <li>▪ Gardeners / Nurseries</li> <li>▪ HOAs</li> <li>▪ Landscaping companies</li> <li>▪ Turf Maintenance Professionals</li> <li>▪ Golf courses</li> <li>▪ School students (8<sup>th</sup> grade water quality program integrated into New Hanover County Schools)</li> <li>▪ Multi-family complex management companies</li> <li>▪ Realty management companies</li> <li>▪ City of Wilmington Parks management</li> </ul>   |
| Sediment (sand, soil, etc)        | <ul style="list-style-type: none"> <li>⊕ Construction sites</li> </ul>                                 | <ul style="list-style-type: none"> <li>▪ Construction sites/land-disturbing activities</li> <li>▪ Landscapers/landscaping companies</li> </ul>  |



|                   |  |   |
|-------------------|--|---|
|                   | <ul style="list-style-type: none"> <li>⊕ Eroding stream banks</li> <li>⊕ Exposed soil</li> </ul>   | <ul style="list-style-type: none"> <li>▪ Homeowners</li> <li>▪ Farming operations</li> <li>▪ School students (8<sup>th</sup> grade water quality program integrated into New Hanover County Schools)</li> </ul>   |
| Chemicals         | <ul style="list-style-type: none"> <li>⊕ Pesticides</li> <li>⊕ Pressure washing chemicals</li> <li>⊕ Vehicle and boat washing soaps</li> <li>⊕ Illicit Discharge</li> <li>⊕ Household Hazardous Waste</li> </ul> | <ul style="list-style-type: none"> <li>▪ Homeowners</li> <li>▪ Pressure washing businesses</li> <li>▪ Mobile detailers</li> <li>▪ Pressure washers</li> <li>▪ Turf/landscape professionals</li> <li>▪ Restaurants</li> <li>▪ School students (8<sup>th</sup> grade water quality program integrated into New Hanover County Schools)</li> </ul>   |
| Litter            | <ul style="list-style-type: none"> <li>⊕ Plastics</li> <li>⊕ Paper</li> <li>⊕ Cigarette butts</li> </ul>   | <ul style="list-style-type: none"> <li>▪ Homeowners</li> <li>▪ Motorists</li> <li>▪ Smokers</li> <li>▪ Restaurants</li> <li>▪ Retail centers</li> <li>▪ Construction sites</li> <li>▪ School students (8<sup>th</sup> grade water quality program integrated into New Hanover County Schools)</li> </ul>  |
| Vehicle Pollution | <ul style="list-style-type: none"> <li>⊕ Vehicle fluids (motor oil, antifreeze, etc)</li> <li>⊕ Vehicle washing soaps/detergents</li> </ul>  | <ul style="list-style-type: none"> <li>⊕ Homeowners</li> <li>⊕ Motorists' vehicles</li> <li>⊕ Backyard mechanics</li> <li>⊕ Vehicle maintenance repair shops</li> <li>⊕ Mobile detailers</li> <li>⊕ Dealership lots</li> <li>⊕ School students (8<sup>th</sup> grade water quality program integrated into New Hanover County Schools)</li> </ul> |

**TARGET POLLUTANT: FECAL COLIFORM BACTERIA (DOMESTIC AND WILD ANIMAL WASTE)**

*Fecal coliform bacteria are found in the feces of domesticated and wild animals, as well as human waste. Stormwater runoff carries this bacterial pollution into local surface waters via the storm drainage system. Bacteria contaminates waterways commonly used for recreational activities such as swimming, fishing, and shellfishing resulting in swimming advisories and oyster beds closed to harvest.*

**Pollutant Source:**

Likely Residential Sources: Domesticated Animals, Stray and Feral Animals, Sewer Spills

Likely Commercial/Industrial Sources: Boarding Kennels, Veterinarian Facilities, Pet-Related 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. The primary source of this 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 animal waste directly into our waterways.
- ⊕ Fecal bacteria is an indicator bacteria. High levels of fecal coliform bacteria indicate the potential for diseases and infections in humans upon contact. Pathogens such as roundworm, salmonellosis, toxoplasmosis, E. coli, and gastroenteritis can be contracted via contaminated water. These can also make other animals and wildlife ill as well.
- ⊕ Once in our waterways, these pathogens can cause shellfish bed closures, swimming advisories, algal blooms, low dissolved oxygen levels, fish kills, 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.

**Target Pollutant: FECAL COLIFORM BACTERIA (domestic and wild animal waste)**

**Key Outreach Messages:**

- Messages should connect uncollected pet waste to water quality problems and human health impacts.
- Domesticated dog waste is a major source of bacterial pollution considering their population, daily defecation rate, and bacterial production. Outdoor cats are also a major problem for these same reasons; steps should be taken to control their waste as well.
- Bacteria can cause diseases and infections in humans and other animals.
- Pet owners have a responsibility to clean up after pets and dispose of the waste properly.
- Debunk barriers and myths to cleaning up after pets (i.e. it's not fertilizer, its 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, etc).
- Pet owners should be aware of and abide by 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
- 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.

| Target Audience        | Audience Description (Why Selected?)  | Suggested Outreach Strategies   |
|------------------------|---|---|
| Pet Owners             | 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. | <ul style="list-style-type: none"> <li>• Educate citizens about the City's pet waste ordinance via the stormwater website, social media outlets, GTV</li> <li>• Canines for Clean Water outreach program for pet owners</li> <li>• Host Super Pooper Scooper photo booth to educate pet owners in a fun and interactive way</li> <li>• Participate in local pet-related events to provide direct education to pet owners</li> <li>• Post educational signs on pet waste stations</li> <li>• Media campaigns to air PSAs and ads and on media digital and mobile platforms in paid campaigns</li> <li>• Include information in the citywide newsletter</li> <li>• Distribute pet waste education brochures and flyers during special events</li> <li>• Enviroscape 8<sup>th</sup> Grade watershed education program Utilize enforcement actions when necessary for violators of the pet waste ordinance (ie fines)</li> <li>• Encourage community participation in storm drain marking program</li> <li>• Outreach via the Heal Our Waterways Program</li> <li>• Promote pet waste ordinance &amp; fines</li> <li>• Compliance Officer direct contact and outreach with public</li> <li>• Direct mail enforcement letter to neighborhoods with complaints or problem areas</li> <li>• Utilize enforcement actions when necessary for violators of pet waste ordinance</li> <li>• Compliance Officer rotating signage program for problem areas and customer driven complaints</li> <li>• Stormwater pollution hotline promotion</li> </ul> |
| Pet-Related Businesses | Targeting pet-related businesses will educate those in the profession about best  | <ul style="list-style-type: none"> <li>• Encourage businesses to be models for environmental stewardship (i.e. install pet waste receptacles in parking lot</li> </ul>  |

|   |  |   |
|---|--|---|
|   | <p>practices for pet waste management and also serve as a conduit to deliver outreach messages to the public. Businesses include:</p> <ul style="list-style-type: none"> <li>- Veterinarians</li> <li>- Animal hospitals</li> <li>- Kennels</li> <li>- Pet stores</li> <li>- Groomers</li> <li>- Trainers</li> <li>- Petsitters</li> <li>- Doggie day care</li> <li>- Pooper Scooper Companies</li> <li>- Local pet magazines</li> <li>- Local adoption agencies</li> <li>- NHC Animal Control</li> <li>- NH Humane Society</li> </ul> | <p>islands or properly design kennel runs for waste removal, DNA testing, etc.)</p> <ul style="list-style-type: none"> <li>• Encourage businesses to post the pet waste educational poster and/or materials for customers to view</li> </ul>  |
| Management/Residents of Multi-Family Apartment Complexes  | <p>Apartment complexes often experience problems with uncollected pet waste on their property. In Wilmington, a large number of college students with pets reside in these complexes. 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.</p>  | <ul style="list-style-type: none"> <li>• 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</li> <li>• Encourage management to be make it easy for their residents to manage pet waste by installing pet waste receptacles around the property</li> <li>• Encourage apartment complex management to educate their residents by distributing the City’s pet waste management packet to apartment complexes</li> <li>• Encourage management to post the pet waste education poster and/or brochure in common areas for their residents to view</li> <li>• Encourage DNA Testing Services for multi-family complexes</li> </ul> |
| <b>Assessment &amp; Evaluation</b>  |  |   |
| <ul style="list-style-type: none"> <li>• Assess and evaluate local water quality utilizing UNCW Center for Marine Science annual water quality monitoring, specifically Fecal Coliform counts in local waters</li> <li>• Periodically assess the habits of pet owners and pet industry professionals by: <ul style="list-style-type: none"> <li>- Direct observation of habits (<i>collects vs. doesn't collect, where dispose, etc.</i>)</li> <li>- Surveys of pet owners</li> <li>- Count of reported complaints to Stormwater Hotline regarding pet waste violations</li> </ul> </li> <li>• Track Stormwater Pollution Prevention Hotline calls</li> </ul> |  |   |

**TARGET POLLUTANT: NUTRIENTS (FERTILIZERS, YARD WASTE)**

*Nutrients, such as nitrogen and phosphorus, enter our waterways via stormwater runoff that carries fertilizers and yard waste into the storm drainage system. High nutrient loads cause algal blooms, low dissolved oxygen levels, fish kills, and impaired aquatic habitats.*

**Pollutant Source:**

Likely Residential Sources: Homeowners, Gardeners, etc. Landscaping Contractors

Likely Commercial/Industrial Sources: Landscapers, Turf Maintenance, Golf Courses, 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!
- ⊕ Lawn fertilization is one of the most widespread watershed behaviors by homeowners and contracted 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. This debris can also wash into waterways via lawn/sprinkler watering. This organic matter washes through the drainage system introducing nutrients and pesticides into waterways.
- ⊕ Fertilizers and yard waste that end up in local surface waters impact aquatic ecosystems by introducing 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 (i.e. fish) need to survive. This can lead to 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.

**Target Pollutant: NUTRIENTS (fertilizers, yard waste)**

**Key Outreach Messages:**

- A direct link exists between improper fertilizer application and yard waste disposal to poor water quality resulting in algal blooms, fish kills, and habitat degradation.
- Grasscycle! Leave grass clippings on the lawn to reduce or eliminate the need for fertilizer. Clippings conserve soil moisture and are 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 money spent on fertilizer.
- Design and maintain lawns with the goal of absorbing runoff. For instance, minimize the use of lawn area and fertilizer by replacing with native trees, shrubs, plants and groundcover.
- Use alternatives to fertilizer such as organic fertilizer, compost, grasscycling, worm poop, etc.
- If fertilizer must be used, read the label and apply correctly. Improper application includes over-applying by frequency or volume, applying the wrong type, applying before rain, and failure to clean excess fertilizer from driveways and streets after application.
- Improper disposal of yard waste (leaves, grass clippings, pine straw) can clog the storm drainage system causing flooding of streets and property.
- Landscapers/Property owners 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.
- Landscaping company employees should be trained on proper fertilization and yard waste disposal practices.
- 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          | Audience Description (Why Selected?)   | Suggested Outreach Strategies   |
|--------------------------|--|---|
| Homeowners/<br>Residents | Many citizens improperly apply fertilizer and/or blow yard waste into the street or storm drain. Target audience is majority male homeowners for self-application of fertilizer and yard waste disposal. Also target households that hire landscaping companies. | <ul style="list-style-type: none"> <li>• Educate citizens about nutrient pollution and the City’s yard waste ordinance via the stormwater website, social media outlets, GTV</li> <li>• Distribute fertilizer and yard waste education brochures and soil test kits to Wilmington residents during HOA presentations or special events like Earth Day</li> <li>• Mass media campaigns to inform residents about proper disposal methods for yard waste including grasscycling, composting, and collecting yard waste for pick-up</li> <li>• Include information in the citywide newsletter</li> <li>• Media campaigns to air PSAs and ads and on media digital and mobile platforms in paid campaigns</li> <li>• Distribute pet waste education brochures and flyers during special events</li> <li>• Enviroscope 8<sup>th</sup> Grade watershed education program</li> <li>• Encourage community participation in storm drain marking program</li> <li>• Utilize enforcement actions when necessary for violators of the pet waste ordinance (ie fines)</li> <li>• Outreach via the Heal Our Waterways Program</li> <li>• Compliance Officer direct contact and outreach with public</li> <li>• Utilize enforcement actions when necessary for violators of yard waste ordinance</li> <li>• Promote stormwater pollution prevention hotline</li> </ul> |

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|---|--|---|
| Landscapers,<br>Turf<br>Maintenance<br>Professionals,<br>Golf Courses | Landscaping and turf<br>maintenance companies<br>frequently use fertilizers and<br>produce a large amount of<br>yard waste on a regular basis.<br>Employees in this field of<br>work are often male. | <ul style="list-style-type: none"> <li>• Distribute large format education poster about yard waste disposal to landscapers and lawn maintenance companies, available in both English and Spanish</li> <li>• Emphasize proper staff training on practices like fertilization application and yard waste disposal</li> <li>• Distribute fertilizer education info to golf course management</li> <li>• Post outreach materials in English and Spanish on stormwater website and GTV</li> <li>• Provide companies with the yard waste poster that addresses sediment/debris to post in employee gathering areas</li> <li>• Utilize enforcement actions when necessary for violators of yard waste ordinance</li> </ul> |
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**Assessment & Evaluation**

- 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
- 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

**TARGET POLLUTANT: SEDIMENT (SAND, DIRT, GRAVEL, CLAY, SOIL PARTICLES)**

*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 soil particles from a disturbed land area or eroding stream bank to surface waters. Sediment can quickly fill in a waterbody, clog the storm drainage system, and cause turbidity and problems for aquatic life.*

**Pollutant Source:**

Likely Residential Sources: Yards, Driveways, Poorly Vegetated or Eroding Sites

Likely Commercial/Industrial Sources: Construction Sites, Landscapers, Clear-cut Land, Farming, 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!
- ⊕ 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. 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 (eroding streambanks, construction, exposed soil)**

**Key Outreach Messages:**

- Any land-disturbing activity including gardening, planting, 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.
- There is a direct link between sedimentation and poor water quality and impacts on aquatic ecosystems and habitat.
- Residents can plant groundcover, shrubs, and trees to hold soil in place and prevent erosion. Use native plants whenever possible – they don’t need fertilizers and pesticides. For properties with sandy soil, mix organic matter (i.e. compost) in with the sand to allow plants to grow better.
- 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.
- Lack of vegetation along waterfront property and streambanks can produce significant erosion. Waterfront property owners should be encouraged to plant vegetative buffers to stabilize eroding streambanks.
- 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                       | Audience Description (Why Selected?)  | Suggested Outreach Strategies  |
|---------------------------------------|---|--|
| General Public/<br>Homeowners         | The environmental consequences of sedimentation are not widely understood by citizens. Sources of sediment in our surface waters are primarily the result of human-related activities. Residential properties may have exposed soil or poorly vegetated areas. Target both males and females. | <ul style="list-style-type: none"> <li>• Encourage homeowners to plant vegetation or apply mulch to anchor soil in place and prevent erosion during HOA or community presentations</li> <li>• Post outreach materials on stormwater website and GTV</li> <li>• Lack of vegetation along waterfront property and streambanks can produce significant erosion. These types of property owners should be encouraged to plant vegetative buffers.</li> <li>• The public should be made aware of the City’s yard waste ordinance via GTV and paid spots on mass media</li> <li>• Educate citizens about the City’s debris/yard waste ordinance and fines via the stormwater website, social media outlets, GTV</li> <li>• Media campaigns to air PSAs and ads and on media digital and mobile platforms in paid campaigns</li> <li>• Include information in the citywide newsletter</li> <li>• Distribute educational info during special events</li> <li>• Enviroscope 8<sup>th</sup> Grade watershed education program</li> <li>• Encourage community participation in storm drain marking program</li> <li>• Outreach via the Heal Our Waterways Program</li> <li>• Utilize enforcement actions when necessary for violators of yard waste ordinance (ie fines)</li> <li>• Promote stormwater pollution prevention hotline</li> <li>• Promote NH County Sedimentation &amp; Erosion Control program and the State Hotline: 1-866-STOP-MUD</li> </ul> |
| Construction, Landscape Professionals | Construction, landscape, and related industries may significantly contribute to sediment loading in waterways. Employees in this field of work are often male.  | <ul style="list-style-type: none"> <li>• Promote compliance with the land development code and sedimentation and erosion control laws</li> <li>• Encourage proper staff training with construction, landscaping, and related businesses</li> <li>• Post outreach materials on stormwater website and GTV</li> </ul>  |

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|   |  | <ul style="list-style-type: none"> <li>• Construction workers and landscapers should be aware of the City's yard waste ordinance which prohibits sediment from being blown into streets and storm drains.</li> <li>• Provide landscaping companies with the yard waste poster that addresses sediment/debris to post in employee gathering areas</li> </ul> |
| <b>Assessment &amp; Evaluation</b>  |  |   |
| <ul style="list-style-type: none"> <li>• Assess and evaluate local water quality utilizing UNCW Center for Marine Science annual water quality reporting, specifically Total Suspended Solids (TSS)</li> <li>• Gather information from NHC Sedimentation and Erosion program about violations within the city</li> <li>• Track Stormwater Pollution Prevention Hotline calls</li> </ul> |  |   |

**TARGET POLLUTANT: CHEMICALS (PESTICIDES, PRESSURE WASHING AND CLEANING SOAPS)**

*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 pollutant sources can contain toxic chemicals that can persist in the environment, causing toxicity in humans and aquatic organisms, in addition to contaminating drinking water resources.*

**Pollutant Source:**

Likely Residential Sources: Homeowners, Gardeners, Car/Boat Owners, etc.

Likely Commercial/Industrial Sources: Pressure Washers, Vehicle Washing Businesses, Turf/Landscape Professionals, Restaurants, Other Businesses, 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 into the storm drainage system.
- ⊕ 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 (pesticides, pressure washing/vehicle washing soaps and cleaners, 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).
- Install native plants which do not require pesticides or fertilizers.
- Use alternatives to pesticides such as ladybugs, weeding by hand, and organic pesticides.
- If you must apply pesticides, read the labels and apply the correct amounts. Spot treat, and do not apply before rain.
- Suggest less toxic, environmentally-friendly alternatives to chemicals.
- 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 and washing cars/boats 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.
- Wash vehicles, boats, or equipment on grassy areas that can absorb and naturally filter chemicals and washwater.
- Utilize car washes because they recycle and/or treat their water onsite or discharge to the wastewater treatment plant.
- 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.
- 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                    | Audience Description (Why Selected?)   | Suggested Outreach Strategies   |
|------------------------------------|--|---|
| Homeowners / Residents             | All citizens have the potential to contribute chemical pollution by washing outdoors (i.e. driveways, homes, lawn furniture) or by using pesticides and other chemicals on their property. Target a higher % of males. | <ul style="list-style-type: none"> <li>• Educate citizens about the City’s Illicit Discharge ordinance and fines via the stormwater website, social media outlets, GTV</li> <li>• Distribute educational materials to residents about practicing environmentally safe gardening/lawn maintenance and washing of materials outdoors</li> <li>• Emphasize compliance with the City’s Illicit Discharge ordinance</li> <li>• Promote the stormwater hotline to report illicit discharges</li> <li>• Promote Household Hazardous Waste Collection Days</li> <li>• Media campaigns to air PSAs and ads and on media digital and mobile platforms in paid campaigns</li> <li>• Post outreach materials on stormwater website and GTV</li> <li>• Include information in the citywide newsletter</li> <li>• Distribute educational info during special events</li> <li>• Enviroscope 8<sup>th</sup> Grade watershed education program</li> <li>• Encourage community participation in storm drain marking program</li> <li>• Outreach via the Heal Our Waterways Program</li> <li>• Utilize enforcement actions when necessary for violators of Illicit Discharge ordinance (ie fines)</li> </ul> |
| Mobile Detailers, Pressure Washers | 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.       | <ul style="list-style-type: none"> <li>• Mail educational info to pressure washing businesses and mobile detailers</li> <li>• Post outreach materials on stormwater website and GTV</li> </ul>  |

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| Landscape/Turf Maintenance Professionals  | Landscape/turf maintenance professionals frequently use pesticides. Employees in this field are often male.  | <ul style="list-style-type: none"> <li>• Promote training of workers for proper application of pesticides</li> <li>• Emphasize use of pesticides as a last resort; promote alternatives</li> <li>• Promote BMP &amp; Rain Garden certification programs</li> </ul>   |
| Restaurants   | Restaurants often clean equipment or dump mop wash water outdoors. The discharge of any type of wastewater into the storm drainage system is unlawful. | <ul style="list-style-type: none"> <li>• Distribute educational info and posters to local restaurants</li> <li>• Disseminate business checklist to ensure stormwater-friendly practices</li> <li>• Encourage employee training on wastewater practices, proper chemical use and disposal, grease traps, etc.</li> <li>• Mark storm drains near restaurants</li> <li>• Give presentation to restaurant association</li> </ul> |
| <b>Assessment &amp; Evaluation</b>  |  |  |
| <ul style="list-style-type: none"> <li>• Periodically assess the pesticide application habits of homeowners and landscape professionals by: <ul style="list-style-type: none"> <li>- Direct observation of pesticide application habits of homeowners and landscape professionals</li> <li>- Surveys of pesticide application habits of homeowners and landscape professionals</li> </ul> </li> <li>• Conduct a survey of restaurants to gauge compliance with local stormwater ordinances and stormwater-friendly practices</li> <li>• Assess and evaluate local water quality utilizing UNCW Center for Marine Science annual water quality reporting, specifically focusing on illicit discharge tested locations</li> </ul> |  |  |

**TARGET POLLUTANT: LITTER (PLASTIC, PAPER, CIGARETTE BUTTS, ETC.)**

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

**Pollutant Source:**

Likely Residential Sources: General public, Motorists, Smokers, Students, etc.

Likely Commercial/Industrial Sources: Restaurants, Retail Centers, Construction Sites, 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!
- ⊕ Litter is carried by stormwater runoff into the drainage system where it can clog storm drains and drainage routes and cause flooding on streets and property.
- ⊕ Litter that washes into local surface waters can be mistaken by fish, birds and other wildlife for food that become sick or die from ingesting it. Wildlife also can 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, 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 clean tend to repel litter.

**Target Pollutant: LITTER (plastic, paper, cigarette butts, etc.)**

**Key Outreach Messages:**

- Flooding of streets/property can often be attributed to the accumulation of litter in the drainage system.
- A direct link exists between animal impacts, habitat destruction, and poor water quality as a result of littering.
- 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 is illegal and carries associated fines.
- 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. BMPs can also trap litter so it doesn't wash away into waterways.

| Target Audience           | Audience Description (Why Selected?)  | Suggested Outreach Strategies   |
|---------------------------|---|---|
| General Public & Youth    | Litter habits cannot be confined to a particular demographic in most cases. Therefore, targeting the general public is advisable. However, focusing on 8 <sup>th</sup> graders during annual school presentations should be a priority, since they are in the developmental stage of thinking and forming opinions. | <ul style="list-style-type: none"> <li>• Promote awareness of the impact of littering and the toxicity and wildlife impacts of many littered items.</li> <li>• Specifically explain the negative impacts on wildlife species (i.e. plastic bags look like jellyfish to sea turtles)Emphasize easy solutions to littering - using trash or recycling receptacles</li> <li>• Promote the 5 R's: Reduce, Reuse, Recycle, Refuse, Repurpose</li> <li>• Promote plastic return programs (ie for plastic bags)</li> <li>• Promote North Carolina's Swat-a-Litterbug Program</li> <li>• Media campaigns to air PSAs and ads and on media digital and mobile platforms in paid campaigns</li> <li>• Post outreach materials on stormwater website and GTV</li> <li>• Include information in the citywide newsletter</li> <li>• Distribute educational info during special events</li> <li>• Enviroscope 8<sup>th</sup> Grade watershed education program</li> <li>• Promote the stormwater hotline to report illicit discharges</li> <li>• Encourage community participation in storm drain marking program</li> <li>• Outreach via the Heal Our Waterways Program</li> </ul> |
| Smokers                   | Cigarette butts are one of the largest environmental litter problems, both locally and worldwide. Target both male and female smokers.  | <ul style="list-style-type: none"> <li>• Display signs encouraging proper disposal of cigarette butts in public areas (i.e. Wave Transit buses)</li> <li>• Media campaigns to air PSAs and ads and on media digital and mobile platforms in paid campaigns</li> <li>• Post outreach materials on stormwater website and GTV</li> <li>• Encourage use of ashtrays for smokers</li> <li>• Distribute pocket ashtrays at public events</li> </ul>  |
| Motorists and Pedestrians | Along roadways, motorists (52%) and pedestrians (23%) are the largest contributors of litter. Target males and females.   | <ul style="list-style-type: none"> <li>• Educate citizens about North Carolina's Swat-A-Litterbug</li> <li>• Remind motorists about the proper disposal of trash by displaying educational signs on public transportation vehicles (i.e. Wave Transit buses)</li> <li>• Encourage use of car litterbags for proper trash disposal</li> </ul>  |

**Assessment & Evaluation**

- Conduct an informal poll before 8<sup>th</sup> grade presentations to gauge how many students litter and then pledge not to litter after the presentation.
- Elicit count of Stormwater Maintenance Department responses to clogged stormwater drainage system components as a result of 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 of citations issued pertaining to improper litter disposal
  - Count of reported violations to Stormwater Hotline, Keep America Beautiful of NHC, or Swat-a-Litterbug from New Hanover county



## **TARGET POLLUTANT: VEHICLE POLLUTION (VEHICLE FLUIDS, WASHING SOAPS/DETERGENTS)**

*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 via washing of vehicles, boats, and other equipment. These fluids are insoluble and can easily contaminate water resources, as well as poison fish and other aquatic organisms.*

### **Pollutant Source:**

Likely Residential Sources: Motorists, Backyard Mechanics

Likely Commercial/Industrial Sources: Vehicle Maintenance Repair Shops, Mobile Detailers, 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.
- ⊕ 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.
- ⊕ 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.
- ⊕ 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 and detergents and their impact on water quality.

**Target Pollutant: VEHICLE POLLUTION (vehicle fluids, washing soaps/detergents)**

**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.
- Washing vehicles or boats using soaps/detergents can negatively affect water quality by contaminating them with chemicals, debris, or sediment that is washed off of vehicles, driveways, parking lots, etc.
- Wash vehicles on the grass using a phosphate-free detergent, or use a commercial car wash which recycles and treats washwater. If you must wash on pavement, use plain, clear water and no chemicals.
- On-site storage (i.e. fluids, batteries) has the potential to leak during filling, emptying, storage unit failure, or vandalism.
- Business owners should be aware of and abide by the City’s Illicit Discharge Ordinance which states that
  - 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                                | Audience Description (Why Selected?)   | Suggested Outreach Strategies   |
|--|--|---|
| General Public/Motorists<br>Backyard Mechanics | 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. | <ul style="list-style-type: none"> <li>• Emphasize vehicle maintenance is the #1 priority (i.e. tune ups)</li> <li>• Post outreach materials on stormwater website and GTV</li> <li>• Promote alternative methods of transportation (i.e. public transportation, carpooling, bikes, walking, bio-fuels)</li> <li>• Encourage environmental stewardship to practice eco-friendly vehicle washing using commercial car wash businesses or washing vehicles in a grassy area to absorb polluted runoff</li> <li>• Mark storm drains in visible areas to prevent illegal dumping</li> <li>• Promote the stormwater hotline to report illicit discharges</li> <li>• Media campaigns to air PSAs and ads and on media digital and mobile platforms in paid campaigns</li> <li>• Post outreach materials on stormwater website and GTV</li> <li>• Include information in the citywide newsletter</li> <li>• Distribute educational info during special events</li> <li>• Enviroscope 8<sup>th</sup> Grade watershed education program</li> </ul> |

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|  |   | <ul style="list-style-type: none"> <li>• Encourage community participation in storm drain marking program</li> <li>• Outreach via the Heal Our Waterways Program</li> <li>• Utilize enforcement actions when necessary for violators of yard waste ordinance (ie fines)</li> </ul>   |
| Vehicle Maintenance Repair, and Auto Parts Businesses  | Businesses in vehicle and boat parts or maintenance/repair-related fields deal with vehicle fluids on a regular basis. Most employees are male.   | <ul style="list-style-type: none"> <li>• 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</li> <li>• Promote the stormwater hotline to report illicit discharges</li> <li>• Post outreach materials on stormwater website and GTV</li> </ul> |
| Pressure Washers, Vehicle Washing Businesses, Dealership Lots, Boat Storage  | Vehicle washing businesses often use cleaning agents containing chemicals that are harmful to our waterways. These chemicals, along with other vehicle fluids, can be easily washed into the storm drainage system. Employees are typically male. | <ul style="list-style-type: none"> <li>• Distribute educational flyer to businesses</li> <li>• Encourage environmental stewardship to practice eco-friendly vehicle washing using commercial car wash businesses or washing vehicles in a grassy area, or washing using plain water and no chemicals over pavement</li> <li>• Post outreach materials on stormwater website and GTV</li> </ul> |
| <b>Assessment &amp; Evaluation</b>   |   |  |
| <ul style="list-style-type: none"> <li>• Periodically assess vehicle fluid disposal habits of Wilmington residents and businesses <ul style="list-style-type: none"> <li>- Direct observation of habits</li> <li>- Surveys of habits</li> <li>- Count of reported violations pertaining to chemical leaks or disposal habits to Stormwater Hotline</li> </ul> </li> <li>• Periodically assess vehicle washing and exterior home washing habits of Wilmington residents by: <ul style="list-style-type: none"> <li>- Direct observation of habits</li> <li>- Surveys of habits</li> </ul> </li> <li>• Assess and evaluate local water quality utilizing UNCW Center for Marine Science annual water quality monitoring</li> </ul> |   |  |

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## 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/<br>ACTIVITY   | EVENT/ACTIVITY | AUDIENCE | DELIVERED BY<br>(AGENCY) | METHOD OF<br>DELIVERY /<br>MESSAGE | ATTENDANCE/<br>PARTICIPATION |
|--|----------------|----------|--------------------------|------------------------------------|------------------------------|
| <p>Many Public Involvement &amp; Participation events/activities were cancelled in Spring 2020 due to Covid-19 stay at home restrictions, including school being cancelled for the remainder of the year. Virtual events and activities were scheduled where appropriate. Spring is typically our heaviest public outreach &amp; involvement season.</p> |                |          |                          |                                    |                              |

### BMP a. Volunteer community involvement program

#### Community Events / Programs for the Public

|                    |  |   |                                 |   |  |
|--------------------|--|---|---------------------------------|---|--|
| Annually           | 8th Grade EnviroScape Watershed Presentations            | All 8th Grade NHC Schools Science Classes                 | Stormwater Services CFRW NHSWCD | Classroom presentation about watersheds, water quality, nonpoint source pollution, BMPs and stewardship                             | 68 classes scheduled with 13 in-classroom spring presentations cancelled due to Covid19. Virtual presentation link sent to teachers. 2100 students served. |
| July - August 2019 | Martin Luther King Center                                | At risk youth in summer camps                             | Stormwater Services             | Different stormwater educational activities each week all summer  | 30 participants  |
| 9/28/2019          | LakeFest   | General public  | Stormwater Services             | Watershed Activity for attendees  | 600 attendees  |
| 10/21/2019         | Lions Gate HOA   | General public  | NHSWCD                          | PowerPoint presentation about stormwater pollution, solutions, and BMPs   | 5 attendees  |
| 1/20/2020          | 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 | 250 tidy bag pet waste dispensers purchased.   |
| 2/20/2020          | Lower Cape Fear Stewardship Awards Program - sponsorship | Realtors, Developers, Environmental Agencies, Politicians | Stormwater Services             | Sponsorship with the Planning Department and exhibit with stormwater info and staff   | 75 attendees   |

|           |   |  |  |   |  |
|-----------|---|--|--|---|--|
| 2/23/2020 | Monty's Home Pet Expo                                     | Pet owners                                 | NHSWCD   | Canines for Clean Water booth - interactive event where pet owners sign a pledge to clean up after their pet and submit a photo of their pet to be featured on our website <a href="http://wilmingtonnc.gov/canines">wilmingtonnc.gov/canines</a> | 30 pledges signed                        |
| 2/8/2020  | StriperFest Education Day                                 | General public                             | Stormwater Services  | Interactive watershed pollution activity for participant with educational stormwater prizes. Distributed 15 watershed maps, 8 Stormwater is a Dirty Word Brochures, 2 Pet Waste brochures, 2 Greenfield Lake brochures                            | 508 attendees                            |
| 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 our major sponsorship posted on social media. Virtual scavenger hunt stormwater question-random winner selected to receive free rain barrel.   | Virtual Earth Day online. 500 estimated. |

**Monthly Public Rain Barrel Sale**

|         |   |                |  |   |                          |
|---------|---|----------------|--|---|--------------------------|
| Monthly | Monthly rain barrel sale to the general public. Held the 2nd Thursday of each month at NHC Government Center with partner agency, NHSWCD. | General public | Stormwater Services NHSWCD RainBarrelUSA | Stormwater runoff reduction, watershed and water conservation education with rain barrel sale attendees.<br><br>Due to Covid-19, April sale was cancelled and May & June sales were virtual with curbside pickup. | 55 total sales this year |
|---------|---|----------------|--|---|--------------------------|

**Storm Drain Marking**

|                  |   |   |   |  |  |
|------------------|---|---|---|--|--|
| Ongoing campaign | Campaign to place storm drain awareness markers and educational doorhangers throughout the City | City residents, businesses, landscapers | Contract agencies: CFRW NHSWCD and their volunteers | Stormwater awareness activity. Volunteers place educational markers on storm drains and distribute educational doorhangers to residents in neighborhoods where markers are installed | CFRW: 44 storm drain markers utilizing 49 volunteers and placing 123 educational doorhangers were placed in neighborhoods off 17th Street. |
|------------------|---|---|---|--|--|

**Stream & Litter Clean-ups**

|         |   |            |                 |  |   |
|---------|---|------------|-----------------|--|---|
| Ongoing | Watershed cleanups including the Annual Big Sweep event | Volunteers | CFRW volunteers | 14 watershed cleanups were held. However, individual, socially distanced cleanups were held for the months of April, May, and June due to Covid-19 restrictions.<br><br>Areas cleaned included Greenfield Lake, Smith Creek, Cape Fear River, Burnt Mill Creek, Randall Pond | 14 total cleanups including annual International Coastal Cleanup event.<br><br>279 volunteers contributed a total of 573 volunteer hours<br><br>Collected:<br>-7.25 (96-gallon) bins of trash<br>-6.5 (96-gallon) bins of recycling<br>-50 (30 gallon) bags of trash<br>-28 (50 gallon) bags of recycling |
|---------|---|------------|-----------------|--|---|

**CreekWatchers Observation Monitoring**

|  |  |  |                     |   |   |
|--|--|--|---------------------|---|---|
| Every other month - two location reports | Volunteer monitoring of creek segments that drain to Cape Fear River | CFRW volunteers are trained to do observations. City staff receive these reports | 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 | 11 bi-Monthly volunteer observations include creek and corridor conditions, vegetation and wildlife present, litter quantity, and suggestions for remediation |
|--|--|--|---------------------|---|---|

**Contracts / Cooperative Agreements**

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 creek 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.

**BMP b. Mechanism for Public Involvement**

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

|           |                            |  |                     |  |                |
|-----------|----------------------------|--|---------------------|--|----------------|
| 9/28/2019 | Targeted Doorhanger notice | Residents and businesses affected by the Williston Middle School drainage project-11th & Ann Streets | Stormwater Services | Project info notice distributed to local residents and businesses in advance of project work | 83 doorhangers |
|-----------|----------------------------|--|---------------------|--|----------------|

|            |   |  |   |  |                            |
|------------|---|--|---|--|----------------------------|
| 9/1/2019   | Targeted Mailing                            | Residents and businesses affected by River Road project                            | Stormwater Services Vortex - Contractor | Project info mailed to local residents and businesses in advance of project work   | 38 mailings                |
| 10/1/2019  | Targeted Doorhanger notice                  | Residents and businesses affected by Hinton Ave. project                           | Stormwater Services                     | Project info notice distributed to local residents and businesses in advance of project work   | 79 doorhangers             |
| 10/23/2019 | Targeted Doorhanger notice                  | Residents and businesses affected by Montgomery Ave. project                       | Stormwater Services                     | Project info notice distributed to local residents and businesses in advance of project work   | 37 doorhangers             |
| 10/25/2019 | Face-to-face meetings with property owners. | Residents and businesses impacted by Amber Drive project                           | Stormwater Services                     | One-on-one meetings with property owners in the project area.  | 2 property owner meetings  |
| 1/10/2020  | Face-to-face meetings with property owners. | Residents and businesses impacted by Garden Avenue project                         | Stormwater Services                     | One-on-one meetings with property owners in the project area.  | 2 property owner meetings  |
| 5/10/2020  | Targeted Doorhanger notice                  | Residents and businesses impacted by Scotland Lane project                         | Stormwater Services                     | Project info notice distributed to local residents in advance of project work  | 35 doorhangers             |
| 6/1/20     | Targeted Letter                             | Residents and businesses impacted by Emergency Watershed Protection (EWP) projects | Stormwater Services McGill Associates   | Project info notice distributed to local residents and businesses in advance of project work   | 279 letters distributed    |
| 6/1/20     | One-on-One property owner meetings          | Residents and businesses impacted by Emergency Watershed Protection (EWP) projects | McGill Associates                       | Project info notice distributed to local residents and businesses in advance of project work   | 22 property owner meetings |
| 2019-2020  | Face-to-face meetings with property owners. | Residents and businesses impacted by Clear Run Drive major capital project         | Stormwater Services                     | One-on-one meetings with property owners in the project area. Often, there is more than one meeting held with the same property owner. | 15 property owner meetings |



|  |   |   |                     |  |  |
|--|---|---|---------------------|--|--|
| Throughout the year, as projects are implemented   | Targeted doorhanger notices for each point repair   | Residents and businesses on either side of the point repair project | Stormwater Services | Point repair projects due to Hurricane Florence  | 10 project notices per 50 locations: 500 total notices distributed to residents and businesses.                      |
| Posted online until projects are 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   |
| <b>BMP c. Maintain Hotline/Help line</b>   |   |   |                     |  |  |
| <p>The Stormwater Pollution Prevention Hotline was established 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 <b>910-341-1020</b> and the web reporting address is <b><a href="http://www.wilmingtonnc.gov/reportstormwaterpollution">www.wilmingtonnc.gov/reportstormwaterpollution</a></b>. Hotline/web reports are routed to the Stormwater Code Compliance Officer who tracks, investigates, and responds to all hotline reports. Information regarding hotline reports is included in the Enforcement Appendix section of this report and includes the number and nature of hotline phone/web reports.</p> <p><b><i>*In FY19/20, the Report Stormwater Pollution hotline and web reporting tool experienced technical issues and was down for several months until IT could remedy the issue. However, in that time period, pollution calls still came in to the Compliance Officers and admin line, but were not "credited" to hotline and webform reporting.</i></b></p> |   |   |                     |  |  |
| 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 | Hotline calls and webform reports vary each year. More info can be found in the "Enforcement" section of the report. |

# Cumulative Year End Contract Agency Reports



FY 1920

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

## Quarterly Progress Report #4: April 1 – June 30, 2020

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, 2019** through **June 30, 2020** 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 8<sup>th</sup> 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 8<sup>th</sup> 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 8<sup>th</sup> 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 8<sup>th</sup> 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, 2019

| 8 <sup>th</sup> Grade Enviroscape Presentations |               |       |                    |               |
|---|---------------|-------|--------------------|---------------|
| Date  | School        | Grade | # of presentations | # of students |
| 10/7/2019                                       | Holly Shelter | 8     | 2                  | 49            |
| 10/8/2019                                       | Holly Shelter | 8     | 2                  | 52            |
| 10/23/2019                                      | Noble         | 8     | 2                  | 50            |
| 11/6/2019                                       | Williston     | 8     | 1                  | 21            |
| 11/21/2019                                      | Myrtle Grove  | 8     | 2                  | 59            |
| 11/22/2019                                      | Myrtle Grove  | 8     | 2                  | 60            |

| Other Enviroscope Presentations |                        |       |                    |                |
|---------------------------------|------------------------|-------|--------------------|----------------|
| Date                            | School / Group / Event | Grade | # of presentations | # of attendees |
|                                 |                        |       |                    |                |

### January 1 - March 31, 2020

| 8 <sup>th</sup> Grade Enviroscope Presentations |        |       |                    |               |
|---|--------|-------|--------------------|---------------|
| Date  | School | Grade | # of presentations | # of students |
| 2/17/2020                                       | Trask  | 8     | 2                  | 49            |
| 2/18/2020                                       | Trask  | 8     | 2                  | 51            |
| 3/4/2020  | Murray | 8     | 2                  | 45            |
| 3/5/2020  | Murray | 8     | 2                  | 47            |

| Other Enviroscope Presentations |                        |       |                    |                |
|---------------------------------|------------------------|-------|--------------------|----------------|
| Date                            | School / Group / Event | Grade | # of presentations | # of attendees |
|                                 |                        |       |                    |                |

### April 1 - June 30, 2020

| 8 <sup>th</sup> Grade Enviroscope Presentations |                                     |       |                    |               |
|---|-------------------------------------|-------|--------------------|---------------|
| Date  | School                              | Grade | # of presentations | # of students |
| 3/20/2020                                       | Gregory – COVID-19 Alt Service      | 8     | 1                  | 30            |
| 4/21/2020                                       | Roland Grise – COVID-19 Alt Service | 8     | 2                  | 60            |

| Other Enviroscope Presentations |                        |       |                    |                |
|---------------------------------|------------------------|-------|--------------------|----------------|
| Date                            | School / Group / Event | Grade | # of presentations | # of attendees |
|                                 |                        |       |                    |                |

A pre-recorded, virtual Enviroscope presentation was developed by CFRW on April 9<sup>th</sup>, 2020. This presentation was recorded to provide a virtual learning session for classes that missed the Enviroscope Presentation, due to Covid-19 cancelling in-person school in March for the remainder of the school year. The City of Wilmington distributed this presentation link to teachers. Link to CFRW Virtual Enviroscope:

[https://drive.google.com/file/d/1Fg5r\\_nldZNFTgAmn9\\_Ira9uJKB2Gs8l8/view?usp=sharing\\_eil&invite=CJnW0fEP&ts=5e8f7455](https://drive.google.com/file/d/1Fg5r_nldZNFTgAmn9_Ira9uJKB2Gs8l8/view?usp=sharing_eil&invite=CJnW0fEP&ts=5e8f7455)

**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, 2019

| First Saturday Seminars                            |   |  |            |
|--|---|--|------------|
| Date   | Topic   | Speaker  | Attendance |
| 7/6/2019   | Rowing on the River   | Mark Wilde-Ramsing   | 45         |
| 8/3/2019   | “The Devil We Know” Screening   | N/A  | 30         |
| Other Presentations by CFRW Staff                  |   |  |            |
| Date   | Organization/Audience   | Topic / Speaker  | Attendance |
| 7/15/2019  | CFRW/Summer Campers   | Stormwater and other Water Quality Impacts/Kay Lynn Hernandez                  | 24         |
| 7/22/2019  | CFRW/Summer Campers   | Stormwater and other Water Quality Impacts/Kay Lynn Hernandez                  | 22         |
| 7/29/2019  | CFRW/Summer Campers   | Stormwater and other Water Quality Impacts/Kay Lynn Hernandez                  | 24         |
| 8/30/2019  | Wilmington Academy of Arts and Science/6 <sup>th</sup> , 7 <sup>th</sup> and 8 <sup>th</sup> grades | CFRW Mission and Local Conservation Issues/Kay Lynn Hernandez                  | 84         |
| 9/17/2019  | UNCW/Students   | Water Quality/Kemp Burdette  | 30         |
| 9/18/2019  | Porters Neck Garden Club  | Water Quality/Kemp Burdette  | 50         |
| Greenfield Lake Eco-Tours & Paddle Tours on Creeks |   |  |            |
| Date   | Group Served/Audience   | Type of Tour /Topic / Location / Speaker                                       | Attendance |
| 7/1/2019   | YWCA/Summer Campers   | Eco-Tour/Stormwater, flora and fauna of GFL/Greenfield Lake/Kay Lynn Hernandez | 25         |
| 7/3/2019   | YWCA/Summer Campers   | Eco-Tour/Stormwater, flora and fauna of GFL/Greenfield Lake/Kay Lynn Hernandez | 25         |
| 7/9/2019   | YMCA/Summer Campers   | Eco-Tour/Stormwater, flora and fauna of GFL/Greenfield Lake/Kay Lynn Hernandez | 20         |
| 7/10/2019  | Home School/8 <sup>th</sup> Graders   | Eco-Tour/Stormwater, flora and fauna of GFL/Greenfield Lake/Kay Lynn Hernandez | 15         |
| 7/11/2019  | Giggles/8 year olds   | Eco-Tour/Stormwater, flora and fauna of GFL/Greenfield Lake/CFRW intern        | 25         |
| 7/16/2019  | CFRW/Summer Campers   | Eco-Tour/Stormwater, flora and fauna of GFL/Greenfield Lake/Kay Lynn Hernandez | 24         |
| 7/23/2019  | CFRW/Summer Campers   | GFL/Greenfield Lake/Kay Lynn Hernandez   | 22         |
| 7/30/2019  | CFRW/Summer Campers   | GFL/Greenfield Lake/Kay Lynn Hernandez   | 24         |
| 9/28/2019  | LakeFest/Community members  | Eco – Tour/Stormwater, flora and fauna/Greenfield Lake/Kay Lynn Hernandez      | 27         |

## October 1 - December 31, 2019

| First Saturday Seminars           |   |   |            |
|-----------------------------------|---|---|------------|
| Date                              | Topic   | Speaker   | Attendance |
| 10/5/2019                         | Community Education and the Environment                   | Keni Reinks   | 51         |
| 11/2/2019                         | Sea Level Rise  | Roger Shew  | 65         |
| Other Presentations by CFRW Staff |   |   |            |
| Date                              | Organization/Audience                                     | Topic / Speaker   | Attendance |
| 10/7/2019                         | UNCW/Teaching Lab   | CFRW mission & internships/Kay Lynn Hernandez           | 55         |
| 10/15/2019                        | Wilmington Chamber of Commerce Leadership                 | CFR Basin Water Quality/Kemp Burdette                   | 30         |
| 11/4/2019                         | Wrightsboro Elementary                                    | Stormwater Impacts & BMPs/Kay Lynn Hernandez            | 102        |
| 11/8/2019                         | Men’s Club  | CFR Basin Water Quality/Kemp Burdette                   | 100        |
| 11/12/2019                        | Grace Methodist/Seniors                                   | CFR Basin Water Quality/Kemp Burdette                   | 20         |
| 11/12/2019                        | Forrest Hills/4 <sup>th</sup> and 5 <sup>th</sup> Graders | Straws and other Single Use Plastics/Kay Lynn Hernandez | 55         |
| 11/23/2019                        | St. Mark Catholic School/4 <sup>th</sup> Graders          | Stormwater impacts & BMPs/Kay Lynn Hernandez            | 85         |

|   |  |  |                   |
|---|--|--|-------------------|
| 11/20/2019  | Kiwanis Club of Wilmington                       | CFRW Mission/Kay Lynn Hernandez  | 85                |
| 11/24/2019  | American Ass. Of Geographers/Annual Meeting      | CFR Basin Water Quality/Kemp Burdette  | 150               |
| <b>Greenfield Lake Eco-Tours &amp; Paddle Tours on Creeks</b> |  |  |                   |
| <b>Date</b>   | <b>Group Served/Audience</b>                     | <b>Type of Tour /Topic / Location / Speaker</b>  | <b>Attendance</b> |
| 10/1/2019   | NC Solid Waste Enforcement Officers              | Paddling Eco Tour/Water Quality, flora and fauna, history/Greenfield Lake/Kay Lynn Hernandez | 28                |
| 10/8/2019   | UNCW/OLLIE                                       | Paddling Eco Tour/Water Quality, flora and fauna, history/Greenfield Lake/Kay Lynn Hernandez | 18                |
| 10/15/2019  | UNCW/OLLIE                                       | Paddling Eco Tour/Water Quality, flora and fauna, history/Greenfield Lake/Kay Lynn Hernandez | 21                |
| 10/17/2019  | UNCW/OLLIE                                       | Walking Eco Tour/Water Quality, flora and fauna, history/Greenfield Lake/Kay Lynn Hernandez  | 14                |
| 10/29/2019  | St. Mark Catholic School/4 <sup>th</sup> Graders | Raindrop Journey/Stormwater/Greenfield Lake/Kay Lynn Hernandez                               | 85                |
| 11/5/2019   | Wrightsboro Elementary/4 <sup>th</sup> Graders   | Raindrop Journey/Stormwater/Greenfield Lake/Kay Lynn Hernandez                               | 50                |
| 11/6/2019   | Wrightsboro Elementary/4 <sup>th</sup> Graders   | Raindrop Journey/Stormwater/Greenfield Lake/Kay Lynn Hernandez                               | 51                |
| 11/19/2019  | UNCW/OLLIE                                       | Walking Eco Tour/Water Quality, flora and fauna, history/Greenfield Lake/Kay Lynn Hernandez  | 16                |
|   |  |  |                   |

### January 1 - March 31, 2020

|   |   |   |                   |
|---|---|---|-------------------|
| <b>First Saturday Seminars</b>                                |   |   |                   |
| <b>Date</b>   | <b>Topic</b>  | <b>Speaker</b>  | <b>Attendance</b> |
| 1/4/2020  | Wilmington Climate & Weather                                  | Richard Neuherz & Tim Armstrong/NOAA                                | 74                |
| 2/1/2020  | American Oystercatchers                                       | Lindsay Addison/Audubon   | 58                |
| 3/7/2020  | Fighting Env. Threats in N.C.                                 | Erin Carey/Sierra Club  | 83                |
| <b>Other Presentations by CFRW Staff</b>                      |   |   |                   |
| <b>Date</b>   | <b>Organization/Audience</b>                                  | <b>Topic / Speaker</b>  | <b>Attendance</b> |
| 1/15/2020   | Elon University/Students                                      | Water Quality of CFR/Kemp Burdette                                  | 25                |
| 1/29/2020   | The Forum/Wilmington residents                                | Community Education Day/Kay Lynn Hernandez                          | 100 (approximate) |
| 1/31/2020   | Peace Rose Montessori/4 <sup>th</sup> graders                 | Water quality GFL/Audrey Dunn                                       | 15                |
| 2/1/2020  | CoffeeFest/Wilmington Residents                               | Water Quality of the CFR/Kemp Burdette                              | 150               |
| 2/3/2020  | WWAY/New Hanover & Brunswick residents                        | Community Education Day/Kay Lynn Hernandez                          | 750(approximate)  |
| 2/4/2020  | Women's Impact Network/members                                | Water Quality of the CFR/Kemp Burdette                              | 50                |
| 2/8/2020  | StriperFest Community Education Day/Attendees                 | Water Quality/Environmental Impacts/All CFRW staff                  | 508               |
| 3/6/2020  | Sea Tech High School/Students                                 | Water Quality of the CFR/Kemp Burdette                              | 150               |
| 3/10/2020   | S&W Cons. District Region 9 Regional Meeting/attendees        | Water Quality of the CFR/Kemp Burdette                              | 75                |
|   |   |   |                   |
| <b>Greenfield Lake Eco-Tours &amp; Paddle Tours on Creeks</b> |   |   |                   |
| <b>Date</b>   | <b>Group Served/Audience</b>                                  | <b>Type of Tour /Topic / Location / Speaker</b>                     | <b>Attendance</b> |
| 1/22/2020   | Upper El Montessori/4 <sup>th</sup> & 5 <sup>th</sup> Graders | Raindrop Journey/Stormwater/GFL/Kay Lynn Hernandez                  | 24                |
| 2/13/2020   | Douglas Academy/2 <sup>nd</sup> Graders                       | Eco Tour/Stormwater,history,flora&fauna/GFL/Kay Lynn Hernandez      | 20                |
| 3/11/2020   | Duke Energy/Employees   | Water & land based/water quality/GFL/Audrey Dunn and Patrick Connel | 30                |

## April 1 - June 30, 2020

| First Saturday Seminars                            |   |   |            |
|--|---|---|------------|
| Date   | Topic   | Speaker   | Attendance |
| 4/4/2020   | Effects of PFAS on Aquatic Wildlife in the CFR Basin – COVID-19 Alt Service Virtual   | Madi Polera   | 49         |
| 5/2/2020   | Factory Farming – COVID-19 Alt Service Virtual  | Kemp Burdette   | 72         |
| 6/6/2020   | GenX Exposure Study – COVID-19 Alt Service Virtual                                    | Jane Hoppin   | 30         |
| Other Presentations by CFRW Staff                  |   |   |            |
| Date   | Organization/Audience   | Topic / Speaker   | Attendance |
| 6/3/2020   | CFRW/UNCW Island Ecology Students – COVID-19 Alt Service Virtual                      | Mission and work of CFRW/Kay Lynn Hernandez   | 20         |
| Greenfield Lake Eco-Tours & Paddle Tours on Creeks |   |   |            |
| Date   | Group Served/Audience   | Type of Tour /Topic / Location / Speaker  | Attendance |
| 4/28/2020  | Virtual tour – COVID-19 Alt Service – YouTube   | Paddling Eco-Tour/Stormwater Impacts, Plants, Animals and History of GFL/Kay Lynn Hernandez | 762        |
| 5/15/2020  | 4 <sup>th</sup> Graders/Forest Hills Elementary – COVID-19 Alt Service - virtual tour | Paddling Eco-Tour/Animal adaptations in GFL/Tyler Rhorback                                  | 22         |

CFRW created a 15-minute virtual eco tour of Greenfield Lake on April 24<sup>th</sup>. This virtual eco tour was recorded to provide a virtual learning session for groups and individuals that could not gather for the eco-tours due to Covid-19. CFRW and the City of Wilmington distributed this video.

Link to video: <https://www.youtube.com/watch?v=2tC4lNXkdvU&t=258s>

## 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)**

## July 1 - September 30, 2019

| Storm Drain Marking |   |   |                 |                    |                               |
|---------------------|---|---|-----------------|--------------------|-------------------------------|
| Date                | Name of Volunteer Organization/Business/Etc | Specific Area Marked  | # of Volunteers | # of Drains Marked | # of door hangers distributed |
| 7/17/19             | Cape Fear River Watch Eco-Camp              | Carriage Hills/Hollybriar/Woodstock ad adjacent streets         | 18              | 19                 | 100                           |
| 7/21/19             | Cape Fear River Watch Eco-Camp              | Carriage Hills/Pollocks Way/Chippenham Dr. and adjacent streets | 22              | 17                 | 100                           |

**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, 2019

| 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<br><i>ie. # of 96 gallon bins of trash<br/># of 96 gallon bins of recycling<br/>Type of trash collected, etc.</i> | # of Volunteers/<br>Total Volunteer Hours Contributed |
|                     |  |                                      |   |   |

|           |  |          |  |   |
|-----------|--|----------|--|---|
| 8/10/2019 | GFL #5- Medical Center Drive- Along tributary of Greenfield lake and retention pond behind Hess St/Bojangles | .2 miles | Trash: 12 thirty gallon bags (Total 120 lbs.)<br>Recycling: 9 thirty-gallon bags (Total 36 lbs.)<br>Miscellaneous: Several miscellaneous items | 47 volunteers for a total of 94 volunteer hours |
| 9/20/2019 | GFL#2 / Entire Lake  | 1 mile   | Trash: 2.5 Full 90 gallon Bins<br>Recycling: 3.5 Full 90 gallon Bins<br>Miscellaneous: Camp materials from homeless camps, buckets, water guns | 44 volunteers for a total of 88 volunteer hours |

### October 1 - December 31, 2019

| 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<br><i>ie. # of 96 gallon bins of trash<br/># of 96 gallon bins of recycling<br/>Type of trash collected, etc.</i> | # of Volunteers/<br>Total Volunteer Hours Contributed |
| 10/12/2019          | BMC#9 McCumbers Ditch  | .4 miles                             | Trash: 1.75 Full 90 gallon Bins<br>Recycling: 2 Full 90 gallon Bins<br>Miscellaneous: Bicycle   | 25 Volunteers/50 Volunteer hours                      |
| 11/9/2019           | BMC#8 Shirley Road   | .8 miles                             | Trash: 7 thirty-gallon bags<br>Recycling: 9 thirty-gallon bags<br>Miscellaneous: 8 Needles, Pipe, Fishing Pole                              | 42 Volunteers/84 Volunteer hours                      |

### January 1 - March 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<br><i>ie. # of 96 gallon bins of trash<br/># of 96 gallon bins of recycling<br/>Type of trash collected, etc.</i>  | # of Volunteers/<br>Total Volunteer Hours Contributed |
| 1/16/2020                              | GFL #4- Along 13th & Lakeshore Dr.   | .3 miles                             | Trash: 3 Full 96-gal trash bins, 5 thirty-gallon bags<br>Recycling: 3 Full 96-gal bins<br>Miscellaneous: 20 ft of rebar, shopping cart, tire | 52 Volunteers/104 Volunteer hours                     |
| 2/13/2020                              | BMC #9- McCumbers Ditch  | .4 miles                             | Trash: 16 thirty-gallon bags (Est 160 lbs.)<br>Recycling: 8 thirty-gallon bags (Est 40lbs)<br>Miscellaneous: Wheelbarrow, tire, cooler       | 48 Volunteers/96 Volunteer hours                      |
| March cleanup canceled due to COVID-19 | N/A  | N/A                                  | N/A  | N/A   |



## April 1 - June 30, 2020

| Watershed Clean-ups |  |                                      |   |   |
|---------------------|--|--------------------------------------|---|---|
| Date of Cleanup     | Watershed Name & Specific Area Cleaned <i>(Include map # and specific location cleaned)</i>                                | # of Creek or Ditch Ft/Miles Cleaned | Amount of Trash Collected<br><i>ie. # of 96 gallon bins of trash<br/># of 96 gallon bins of recycling<br/>Type of trash collected, etc.</i> | # of Volunteers/<br>Total Volunteer Hours Contributed |
| 4/18/2020           | Clear Run Branch near Clear Run Drive (5400 block) – COVID-19 Alt Service  | .1 miles                             | 1 30-gallon bag and 2 5-gallon buckets full of assorted trash   | 1 Volunteer/.5 Volunteer Hours                        |
| 4/22/2020           | 34.210244, -77.856169 (Park St, River to the Sea Bikeway across from Colonial Village Trailer Park) – COVID-19 Alt Service | .2miles                              | 1 25-gallon bag full of assorted trash  | 1 Volunteer/2 Volunteer Hours                         |
| 6/6/2020            | GFL #3 – Willard St. – COVID-19 Alt Service  | .3 miles                             | 4 30-gallon bags full or assorted trash   | 1 Volunteer/1 Volunteer Hour                          |
| 6/6/2020            | BMC #8 – Shirley Road  | .3 miles                             | 2 42-gallon contractor bags full of assorted trash  | 7 Volunteers/17 Volunteer Hours                       |
| 6/6/2020            | Randall Pond – entire lake – COVID-19 Alt Service  | .5 miles                             | 9 full 5-gallon buckets of small litter   | 6 Volunteers/24 Volunteer Hours                       |
| 6/7/2020            | BMC #8 – Shirley Road – COVID-19 Alt Service   | .5 miles                             | 1 bucket full of assorted trash   | 1 Volunteer/1 Volunteer Hour                          |
| 6/11/2020           | BMC #3 – Kerr Avenue Wetland – COVID-19 Alt Service  | .3 miles                             | 1 50-gallon bag of trash and minimal recyclables  | 2 Volunteers/5 Volunteer Hours                        |
| 6/23/2020           | Greenfield Lake Watershed/Around boathouse and the lake – COVID-19 Alt Service   | .5 miles                             | 1 30-gallon bag and 10 buckets of assorted trash  | 2 Volunteers/2 Volunteer Hours                        |

Due to COVID-19, Monthly Watershed Clean-ups were conducted as individuals or small families in accordance to current safety measures. The City of Wilmington approved that clean-ups can be conducted anywhere within Wilmington and need not be conducted within the identified clean-up locations. Two clean-up weeks in April were suggested to volunteers in an effort to replace our missed March clean-up due to the COVID outbreak. A new report form was created and used by volunteers. Safety measures were conveyed to volunteers by CFRW including social distancing, hand washing and the need to work with only volunteers from the same household.

**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, 2019

| CreekWatchers Reports |                                |           |  |
|-----------------------|--------------------------------|-----------|--|
| Date of Report        | CreekWatcher Volunteer Name(s) | Watershed | Specific Creek Location Monitored<br><i>(reference the list of locations provided)</i> |
| 8/25/2019             | Deanna Dupree & James Bitto    | Barnards  | Appleton Way/Golf Course   |
|                       |                                |           |  |

### October 1 - December 31, 2019

| CreekWatchers Reports |                                |                  |  |
|-----------------------|--------------------------------|------------------|--|
| Date of Report        | CreekWatcher Volunteer Name(s) | Watershed        | Specific Creek Location Monitored<br><i>(reference the list of locations provided)</i> |
| 10/26/2019            | MM Vaught                      | Smith Creek      | Hurst Branch/Maides Park   |
| 10/26/2019            | Bernard Roels                  | Burnt Mill Creek | Downey Branch  |
| 12/29/2019            | Amy & Kevin McClane            | Burnt Mill Creek | Shirley to Princess  |
| 12/29/2019            | MM Vaught                      | Smith Creek      | Hurst Branch at Maides Park  |

### January 1 – March 31, 2020

| CreekWatchers Reports |                                |                  |  |
|-----------------------|--------------------------------|------------------|--|
| Date of Report        | CreekWatcher Volunteer Name(s) | Watershed        | Specific Creek Location Monitored<br><i>(reference the list of locations provided)</i> |
| 2/29/2020             | Amy & Kevin McClane            | Burnt Mill Creek | Shirley/Klein Rd.  |
| 2/3/2020              | Bridget Tarrant                | Burnt Mill Creek | Wrightsville at Dawson   |

### April 1 – June 30, 2020

| CreekWatchers Reports |                                |                  |  |
|-----------------------|--------------------------------|------------------|--|
| Date of Report        | CreekWatcher Volunteer Name(s) | Watershed        | Specific Creek Location Monitored<br><i>(reference the list of locations provided)</i> |
| 4/25/2020             | Jim Depree & Deanna Bertino    | Barnards         | Appleton Way   |
| 4/30/2020             | Gloria Shirley                 | Burnt Mill Creek | Metts Ave. to Market St.   |
| 6/24/2020             | Gloria Shirley                 | Burnt Mill Creek | Grady South to Metts Ave.  |
| 6/27/2020             | Mary Martha Vaught             | Smith Creek      | Maides Park/Hurst Branch   |

### Contract Administration

*Total Allocated Cost: \$1342*

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

Submit cumulative quarterly progress reports and invoices according to the following quarters: July 1 - Sept 30 (1<sup>st</sup> Quarter); October 1 - Dec. 31 (2<sup>nd</sup> Quarter); January 1 -March 31 (3<sup>rd</sup> Quarter); April 1 - June 30 (4<sup>th</sup> 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 4<sup>th</sup> 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)**

**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:** Kay Lynn Hernandez

**Date:** 6/30/2020



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

**Quarterly Progress Report #4: April 1 – June 30, 2020**

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, 2019** through **June 30, 2020** 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 Enviroscope Presentations for at least 1/3 of 8<sup>th</sup> grade science classes in New Hanover County Schools each semester for the entire school year.** The Enviroscope watershed education presentation is an integral component of the 8<sup>th</sup> 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. Enviroscope instructors will be trained, certified, and follow all applicable Enviroscope presentation policies and procedures as set forth by the City of Wilmington Stormwater Services. A maximum of 3 trained Enviroscope instructors from each agency (which includes the Enviroscope supervisor) are permitted to deliver presentations in 8<sup>th</sup> grade. Enviroscope 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 Enviroscope 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 8<sup>th</sup> grade NHCS Enviroscope 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, 2019**

| 8 <sup>th</sup> Grade Enviroscope Presentations |                        |                 |                    |                |
|---|------------------------|-----------------|--------------------|----------------|
| Date  | School                 | Grade           | # of presentations | # of students  |
| 9/12/19   | Virgo                  | 8 <sup>th</sup> | 1                  | 17             |
| 9/12/19   | Virgo                  | 8 <sup>th</sup> | 1                  | 12             |
| Other Enviroscope Presentations                 |                        |                 |                    |                |
| Date  | School / Group / Event | Grade           | # of presentations | # of attendees |
|   |                        |                 |                    |                |

Helped lead and instruct during Enviroscope Instructor training held 9/17/19. Also organized NHSWCD schedule of presentations during this meeting.

### October 1 – December 31, 2019

| 8 <sup>th</sup> Grade Enviroscope Presentations |                  |                 |                    |               |
|---|------------------|-----------------|--------------------|---------------|
| Date  | School           | Grade           | # of presentations | # of students |
| 10/7/19   | Holly Shelter MS | 8 <sup>th</sup> | 2                  | 63            |
| 10/24/19  | Noble MS         | 8 <sup>th</sup> | 3                  | 92            |
| 11/4/19   | Williston MS     | 8 <sup>th</sup> | 2                  | 38            |
| 11/5/19   | Williston MS     | 8 <sup>th</sup> | 2                  | 36            |
| 11/6/19   | Williston MS     | 8 <sup>th</sup> | 1                  | 18            |

### January 1 – March 31, 2020

| 8 <sup>th</sup> Grade Enviroscope Presentations |                        |                 |                    |                |
|---|------------------------|-----------------|--------------------|----------------|
| Date  | School                 | Grade           | # of presentations | # of students  |
| 2/17/20   | Trask MS               | 8 <sup>th</sup> | 2                  | 57             |
| 2/18/20   | Trask MS               | 8 <sup>th</sup> | 2                  | 55             |
| 3/6/20  | Murray MS              | 8 <sup>th</sup> | 1                  | 31             |
| Other Enviroscope Presentations                 |                        |                 |                    |                |
| Date  | School / Group / Event | Grade           | # of presentations | # of attendees |
| 2/4/20  | Cape Fear Academy      | 8 <sup>th</sup> | 3                  | 40             |
| 2/5/20  | Cape Fear Academy      | 8 <sup>th</sup> | 1                  | 16             |

*\*\*The 3/19/20 presentation at JC Roe was cancelled as a result of to COVID-19 school closure.*

### April 1 – June 30, 2020

| 8 <sup>th</sup> Grade Enviroscope Presentations |   |                 |                    |               |
|---|---|-----------------|--------------------|---------------|
| Date  | School  | Grade           | # of presentations | # of students |
| 4/9/20  | JC Roe- Virtual Pre-recorded Enviroscope Presentation ( <i>Covid-19 Alternative Service</i> )<br>Scheduled for 3/19 | 8 <sup>th</sup> | 1                  | 10 estimated  |
| 4/17/20   | Lake Forest Academy-Virtual Pre-recorded Enviroscope Presentation ( <i>Covid-19 Alternative Service</i> )           | 8 <sup>th</sup> | 1                  | 10 estimated  |
| 4/20/20   | Roland-Grise- Virtual Pre-recorded Enviroscope Presentation ( <i>Covid-19 Alternative Service</i> )                 | 8 <sup>th</sup> | 4                  | 130 estimated |

\*A pre-recorded, virtual Enviroscope presentation was developed by NHSWCD on 3/31/20. This presentation was recorded to provide a virtual learning session for classes that missed the Enviroscope Presentation, due to Covid-19 cancelling in-person school in March for the remainder of the school year. The City of Wilmington distributed this presentation link to teachers: <https://youtu.be/76bKf3IebhM>

**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, 2019

Coordinated meeting with NHC Animal Services unit to discuss information needs from their department for 9/3/19. Meeting was rescheduled to a later date due to Hurricane Dorian.

### October 1 – December 31, 2019

\*Secured participation in three spring events: Monty’s Home Pet Expo (2/23), Paws on Parade (3/14), and the NHC Animal Services Rabies Shot Clinic (3/28). Also coordinated and meet with NHC Animal Services to work on an updated pet database on 10/17/19.

### January 1 – March 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 |
| 2/23/20                                    | Monty’s Home Pet Expo | Coastline Convention Center               | C4CW display table with signs, info, banners; communication with attendees and pledge signatures acquired | 30 pet waste ‘goody’ bags (containing refrigerator magnet, pet-waste dispenser and bags, program information, pen) 25 bandanas | 30                            |
| 2/28/30                                    | February Newsletter   | Online email distribution via GovDelivery | Email newsletter focusing on bacteria from pet waste as stormwater runoff pollution                       | 231 recipients of newsletter   | N/A                           |

\* Paws on Parade (3/14) and the NHC Animal Services Rabies Shot Clinic (3/28) were canceled in response to COVID-19.

### April 1 – June 30, 2020

| Pet Events / Pet Waste Ordinance Education |   |          |   |   |   |
|--|---|----------|---|---|---|
| Date                                       | Event                                       | Location | Method of Delivery  | # and Name of Education Materials Distributed   | # of signed Pet Waste Pledges                   |
| 5/22/20                                    | ‘Scoop the Poop’ art contest                | Online   | Facebook post and email ( <i>Covid-19 Alternative Service</i> ) | Post with contest flyer that contained educational information related to impact on waterways, ordinance, and more. Also emailed to ~300 teachers.  | 400+ people reached on Facebook. Seven entries. |
| 6/9/20                                     | ‘Scoop the Poop’ educational outreach video | Facebook | Video post-( <i>Covid-19 Alternative Service</i> )              | Short educational video filmed in Hewletts Creek watershed demonstrating ‘scoop the poop’ and sharing statistics regarding pet waste and information on City ordinance.                           | 226 people reached                              |
| 6/16/20                                    | Pet Waste Survey                            | Online   | Survey emailed to COWSS ( <i>Covid-19 Alternative Service</i> ) | 5-questions survey developed to help obtain data from citizens on their knowledge related to the city’s pet ordinance, associated fines, importance of scooping the poop, and rabies information. | N/A   |

‘Scoop the Poop’ video on website at: <https://soilwater.nhcgov.com/programs/education-and-outreach> under the ‘Stormwater Runoff and Water Quality’ tab and on Facebook at <https://www.facebook.com/NHSWCD/videos/954385178344012/>. Pet waste contest post found at <https://www.facebook.com/NHSWCD>

**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, 2019**

| Stormwater 101 Presentations |                         |                    |   |                |
|------------------------------|-------------------------|--------------------|---|----------------|
| Date                         | Organization / Audience | Method of Delivery | # and Name of Education Materials Distributed | # of attendees |
| 10/21/19                     | Lions Gate HOA          | Power Point        | n/a   | 5              |

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

**April 1 – June 30, 2020**

| Hewletts Creek Educational Contact |                               |                              |   |                 |                |
|------------------------------------|-------------------------------|------------------------------|---|-----------------|----------------|
| Date                               | Audience Name or School/Grade | Topic(s) and/or Activity     | # and Name of Education Materials Distributed | # presentations | # of attendees |
| 6/26/20                            | Hewletts Creek area residents | Annual newsletter mailed out | 210- <i>Changing Tides</i> newsletter         | N/A             | 210 addresses  |

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

**July 1 - September 30, 2019**

| Environmental Education Presentations |                                 |   |   |                    |                |
|---------------------------------------|---------------------------------|---|---|--------------------|----------------|
| Date                                  | Audience Name or School / Grade | Topic(s) and/or Activity  | # and Name of Education Materials Distributed | # of presentations | # of attendees |
| 7/15/19                               | Summer Ventures Camp – UNCW     | Who, what, when, where, how of SWCDs. Stormwater pollution and BMPs included during presentation. | n/a   | 1                  | 17             |
| 7/17/19                               | UNCW MPA Fellows                | Who, what, when, where, how of SWCDs. Stormwater pollution and BMPs included during presentation. | n/a   | 1                  | 3              |

**October 1 – December 31, 2019**

| Environmental Education Presentations |                                      |   |   |                    |                |
|---------------------------------------|--------------------------------------|---|---|--------------------|----------------|
| Date                                  | Audience Name or School / Grade      | Topic(s) and/or Activity                  | # and Name of Education Materials Distributed | # of presentations | # of attendees |
| 10/2/19                               | Homeschool Group, 6-12 <sup>th</sup> | Envirothon, local water quality, and BMPs | n/a   | 1                  | 12             |

|          |                                  |   |     |   |     |
|----------|----------------------------------|---|-----|---|-----|
| 10/26/19 | SeaTech High School              | Soils, including stormwater runoff pollution impacts  | n/a | 2 | 43  |
| 11/4/19  | Roland Grise MS, 6 <sup>th</sup> | Forestry and Environmental Camp at Hugh MacRae Park. Water quality discussed.   | n/a | 5 | 175 |
| 11/8/19  | Roland Grise MS and Murray MS    | Forestry and Environmental Camp at Hugh MacRae Park. Water quality discussed.   | n/a | 1 | 275 |
| 11/20/19 | Mosley Performance Center        | Coastal Geology and Education contest presentation. Water quality in relation to wetlands (education contest) discussed.          | n/a | 1 | 30  |
| 12/3/19  | Ogden ES, 5 <sup>th</sup>        | Ecosystems, including stormwater runoff pollution impacts on the food web and local water quality. Food web activity.             | n/a | 3 | 73  |
| 12/6/19  | Ogden ES, 5 <sup>th</sup>        | Ecosystems. Ecosystems, including stormwater runoff pollution impacts on the food web and local water quality. Food web activity. | n/a | 2 | 54  |

### January 1 – March 31, 2020

| Environmental Education Presentations |   |   |   |                    |                |
|---------------------------------------|---|---|---|--------------------|----------------|
| Date                                  | Audience Name or School / Grade   | Topic(s) and/or Activity  | # and Name of Education Materials Distributed | # of presentations | # of attendees |
| 1/24/20                               | Murray MS, 8 <sup>th</sup>  | Wildlife; included how stormwater pollution impacts the food web and local water quality. | n/a   | 4                  | 128            |
| 2/12/20                               | Honours Guild Homeschool Group, 6-11 <sup>th</sup>                                | Envirothon, local water quality, and BMPs   | n/a   | 2                  | 27             |
| 3/6/20                                | AIG students, Wrightsville Beach ES at Blair, 4 <sup>th</sup> and 5 <sup>th</sup> | Estuary; how water quality is impacted by stormwater pollution                            | n/a   | 2                  | 20             |
| 3/11/20                               | Blair elementary (at Porters Neck), 3 <sup>rd</sup>                               | Soil and Plants; how stormwater causes erosion  | n/a   | 3                  | 108            |

### April 1 – June 30, 2020

| Environmental Education Presentations |                                  |   |  |                    |                |
|---------------------------------------|----------------------------------|---|--|--------------------|----------------|
| Date                                  | Audience Name or School / Grade  | Topic(s) and/or Activity  | # and Name of Education Materials Distributed  | # of presentations | # of attendees |
| 6/2/20                                | Castle Hayne ES, 3 <sup>rd</sup> | Soil & Plants: included how stormwater is absorbed by plants and trees as well as how it is absorbed into different soil types. | Virtual Pre-recorded Presentation: YouTube video link emailed to teacher ( <i>Covid-19 Alternative Service</i> ) | 5                  | 100 estimated  |
| 6/2/20                                | Anderson ES, 4 <sup>th</sup>     | Weathering & Erosion: discussed accelerated vs  | Virtual Pre-recorded Presentation: YouTube video   | 2                  | 60 estimated   |



|        |                                 |   |  |   |              |
|--------|---------------------------------|---|--|---|--------------|
|        |                                 | normal erosion and how stormwater flow can effect and change that.  | link emailed to teacher ( <i>Covid-19 Alternative Service</i> )  |   |              |
| 6/2/20 | Winter Park ES, 3 <sup>rd</sup> | Soil & Plants: included how stormwater is absorbed by plants and trees as well as how it is absorbed into different soil types. | Virtual Pre-recorded Presentation: YouTube video link emailed to teacher ( <i>Covid-19 Alternative Service</i> ) | 3 | 60 estimated |

\* Soil and Plants presentation: <https://youtu.be/XrZT8MTfQBY>

\*Weathering and Erosion presentation: <https://youtu.be/OiVnQNI3Ev8>

**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)**

### October 1 – December 31, 2019

| Community Outreach Events |                            |                     |  |   |                |
|---------------------------|----------------------------|---------------------|--|---|----------------|
| Date                      | Event                      | Location            | Method of Delivery   | # and Name of Education Materials Distributed   | # of attendees |
| 10/12/19                  | Fire in the Pines Festival | Halyburton Park     | Set up a display table to inform attendees about District roles/programs, potential volunteer opportunities, and water quality | Sammy Soil coloring books: 15<br>'Healthy Water-Healthy People' flyer: 5<br>'Stormwater Pollution Simple Solutions' brochures: 30<br>Kids coloring sheets: 23 | 1433           |
| 11/1/19-11/10/19          | Cape Fear Fair and Expo    | Airport Fairgrounds | Set up a display to inform attendees about BMP cost share programs and rain barrel sales. Included flyer for citizens to take. | Rain Barrel sale information flyers: 30   | 10,000         |
| 11/15/19                  | STRAWs film presentation.  | Holly Shelter MS    | Film screening, Q&A with participants, discussion on watersheds and ways to reduce stormwater runoff pollution.                | N/A   | 126            |

### January 1 – March 31, 2020

| Community Outreach Events |                  |                             |  |  |                |
|---------------------------|------------------|-----------------------------|--|--|----------------|
| Date                      | Event            | Location                    | Method of Delivery   | # and Name of Education Materials Distributed  | # of attendees |
| 1/17-1/18/2020            | TreeFest         | Independence Mall           | Assisted with tree tagging, tree selection, and other customer service                                     | n/a  | 1,100          |
| 2/8/2020                  | StriperFest      | Coastline Convention Center | Had booth at the event where stormwater related materials and natural resource materials were distributed. | "Sammy Soil" coloring books: 20<br>Educational coloring sheets: 30<br>District brochure: 8 | 508            |
| 2/27/2020                 | WWAY Health Fair | Independence Mall           | Had District information on NHC  | District brochures: 30<br>'Healthy Water, Healthy People' flyer: 50                        | 2,000          |

|          |                       |             |  |   |    |
|----------|-----------------------|-------------|--|---|----|
|          |                       |             | tables for attendees to pick up  |   |    |
| 3/2/2020 | UNCW Clean Water Fair | UNCW Campus | Had booth at the event and shared District program information, had erosion demonstration. | District brochure: 10<br>Reusable straws: 8<br>Refrigerator magnets: 15 | 40 |

### April 1 – June 30, 2020

| Community Outreach Events |                                       |          |  |  |                |
|---------------------------|---------------------------------------|----------|--|--|----------------|
| Date                      | Event                                 | Location | Method of Delivery   | # and Name of Education Materials Distributed  | # of attendees |
| 4/27/20                   | Wilmington Earth Day Virtual Festival | Online   | Facebook event with live streams, videos from exhibitors, and mini concerts. District was promoted during the event. <i>(Covid-19 Alternative Service)</i> | Post discussed District offerings and programs, including stormwater runoff solutions and programs. COW-SS and HOW were featured as questions on the scavenger hunt and theoretically should receive increased web traffic | 500 estimated  |

**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, 2019

Completed 1 plan for New Hanover County Planning regarding soil types found on proposed building sites. Recommended LID within the means of the development and recommended using the county LID ordinance rules.

### October 1 – December 31, 2019

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.

### January 1 – March 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.

### April 1 – June 30, 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.

**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)**

### October 1 – December 31, 2019

| Environmental Field Days |                                |  |                 |               |
|--------------------------|--------------------------------|--|-----------------|---------------|
| Date                     | School / Grade                 | Topic(s) and/or Activity   | # presentations | # of students |
| 10/14/19                 | Pine Valley ES 4 <sup>th</sup> | Wildlife, soils, water cycle, forestry stations. Water quality discussed at soils and forestry stations (erosion and filtration) | 4               | 100           |

### January 1 – March 31, 2020

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

### April 1 – June 30, 2020

| Environmental Field Days |                          |  |                 |               |
|--------------------------|--------------------------|--|-----------------|---------------|
| Date                     | School / Grade           | Topic(s) and/or Activity   | # presentations | # of students |
| 6/10/20                  | Virgo MS/6 <sup>th</sup> | Virtual field day-Pre-recorded presentations: YouTube links emailed to teacher ( <i>Covid-19 Alternative Service</i> ) | 4               | 75 estimated  |

\* Soils presentation: <https://youtu.be/XrZT8MTfQBY>

\*Weathering and Erosion presentation: <https://youtu.be/OiVnQNI3Ev8>

\*Wildlife presentation: [https://youtu.be/\\_fbtpIB6AVs](https://youtu.be/_fbtpIB6AVs)

\*Forestry presentation: [https://youtu.be/rp\\_N3iFpEj8](https://youtu.be/rp_N3iFpEj8)

\* Water Quality presentation: <https://youtu.be/ce5XcdWjWoo>

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

### July 1 - September 30, 2019

Program education and outreach on District social media and website, promoted rain barrel sales, created and upload an Education and Outreach Request form on the website.

### October 1 – December 31, 2019

Promoted new education and outreach form on District social media and website, which resulted in increased presentations throughout the city and county. Also posted regarding rain barrel sales, district attendance at community outreach events, soils and worms, and stormwater.

### January 1 – March 31, 2020

Promoted education and outreach request form on the website so that educators can easily submit a request for educational programming; shared information on monthly rain barrel sales, District attendance at community events (i.e., TreeFest, Health Fair, StriperFest, Canines for Clean Water event). Updated broken links on website, added new information about county’s water quality

improvement program to the Stormwater Solutions page (<https://soilwater.nhcgov.com/programs/stormwater-solutions/>)

The education and outreach request form is accessed via the Education page, which is easily accessible from the home page. <https://soilwater.nhcgov.com/programs/education-and-outreach/>

**April 1 – June 30, 2020**

Updated website to reflect new rain barrel sale protocol and board meeting changes. Posted on Facebook to promote rain barrel sales; worked with HOW staff to create rain barrel flyer that was mailed out to residents; added ‘Scoop the Poop’ educational outreach video to website (<https://soilwater.nhcgov.com/programs/education-and-outreach/> under Stormwater Runoff and Water Quality tab). Updated BMP map for how located <https://soilwater.nhcgov.com/programs/stormwater-solutions/> under HOW tab. Also added pictures of completed projects to <https://soilwater.nhcgov.com/about-us/photo-galleries/> under Heal Our Waterways BMPs tab.

**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)**

**April 1 – June 30, 2020**

| Storm Drain Marking |   |   |                 |                                      |                               |
|---------------------|---|---|-----------------|--------------------------------------|-------------------------------|
| Date                | Name of Volunteer Organization/Business/Etc | Specific Area Marked                      | # of Volunteers | # of Drains Marked                   | # of door hangers distributed |
| 6/23/20             | Mundorf Family                              | Robert S. Garnett and John S. Mosby Drive | 4               | 13 (one marker was missing from kit) | 23                            |

**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, 2019

| Public Rain Barrel Sale |                       |                             |                             |
|-------------------------|-----------------------|-----------------------------|-----------------------------|
| Date of Sale            | Sale Location         | # of 60 gallon barrels sold | # of 80 gallon barrels sold |
| July 11, 2019           | NHC Government Center | 1                           | 0                           |
| August 8, 2019          | NHC Government Center | 2                           | 3                           |
| September 12, 2019      | NHC Government Center | 1                           | 4                           |

### October 1 – December 31, 2019

| Public Rain Barrel Sale |                       |                             |                             |
|-------------------------|-----------------------|-----------------------------|-----------------------------|
| Date of Sale            | Sale Location         | # of 60 gallon barrels sold | # of 80 gallon barrels sold |
| October 10, 2019        | NHC Government Center | 1                           | 2                           |
| November 14, 2019       | NHC Government Center | 0                           | 1                           |
| December 12, 2019       | NHC Government Center | 0                           | 0                           |

### January 1 – March 31, 2020

| Public Rain Barrel Sale |                       |                             |                             |
|-------------------------|-----------------------|-----------------------------|-----------------------------|
| Date of Sale            | Sale Location         | # of 60 gallon barrels sold | # of 80 gallon barrels sold |
| January 9, 2020         | NHC Government Center | 1                           | 1                           |
| February 13, 2020       | NHC Government Center | 1                           | 4                           |
| March 12, 2020          | NHC Government Center | 0                           | 3                           |

### April 1 – June 30, 2020

| Public Rain Barrel Sale |                       |                             |                             |
|-------------------------|-----------------------|-----------------------------|-----------------------------|
| Date of Sale            | Sale Location         | # of 60 gallon barrels sold | # of 80 gallon barrels sold |
| May 14, 2020            | NHC Government Center | 4                           | 13                          |
| May 28, 2020            | NHC Government Center | 1                           | 9                           |
| June 11, 2020           | NHC Government Center | 1                           | 2                           |

**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, 2019

Attended meetings 7/22 and 9/25 as voting member of coalition. A request for applications for program applicants as well as scholarship applicants was made in August 2019 with a due date of September 30, 2019. To date SDC has only received 1 submission. The deadline for applications was extended due to the consensus of the group that we need at least 3 applications. The question was raised about the validity of the group, which will continue in future conversations.

### October 1 – December 31, 2019

1 meeting was held during this quarter, however staff could not attend or participate due to a family emergency.

### **January 1 – March 31, 2020**

The Lower Cape Fear Stewardship Development Coalition Annual Luncheon was held on 2/20/2020. Staff helped with logistics of event as well as digitally recording the event to post on SDC website. Three sites were recognized, all in New Hanover County. The CFCC Sustainability Program was also recognized as the local Stewardship Champion for their efforts at teaching and promoting green technologies for the future.

### **April 1 – June 30, 2020**

Annual LCFSDC retreat scheduled for May was rescheduled to an electronic meeting to be held via zoom in July 2020.

Held newly formed NHC Trees group via Zoom in May. This group is formed of local partners from the City of Wilmington, New Hanover County, and private groups to learn, explore, and increase the tree canopy as well as stormwater absorption in New Hanover County. The group is currently looking for ways to partner and serve the community in an efficient way.

### **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 (1<sup>st</sup> Quarter); October 1 - Dec. 31 (2<sup>nd</sup> Quarter); January 1 -March 31 (3<sup>rd</sup> Quarter); April 1 - June 30 (4<sup>th</sup> Quarter). The 4th quarter progress report will serve as a compiled year-end summary report and will be included in the City's NPDES annual report.

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

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

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

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

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

NHSWCD will maintain all records and reports related to this contract on a fiscal year (FY) basis (July 1-June 30). These records should be retained for a period of at least 5 years. These files are

public record and should be accessible at the contracted agency location. In addition, an annual compilation of all contract documents, records, reports, invoices, and pertinent educational materials or related materials will be provided to the City of Wilmington Stormwater Services on a USB Flash Drive, CD, or DVD (June 1 – July 31) for the entire contract year *within 12 calendar days of the 4<sup>th</sup> 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 & Elissa Anderson

**Date:** 6-29-20

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

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### **Dry Weather Flow Monitoring Locations**

- Burnett Blvd. – 24” outfall to open ditch, checked for suspicious flow.
- Sunset Ave. – 24” outfall eastward on Sunset Ave. to Hardison St., investigated for interference structures
- Hardison St./Jackson St. – 24” pipe southward, investigated for interference structures.

### **Dry Weather Flow Field Training**

Date: December 15, 2019

Time: 0900-1200

Location: Burnett Blvd./Sunset Ave.

Seven (7) employees trained



## 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](http://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](mailto:Corey.Boyett@wilmingtonnc.gov)

2) Brian Rostholder  
Public Services Compliance Officer  
910-341 -0191  
[Brian.Rostholder@wilmingtonnc.gov](mailto:Brian.Rostholder@wilmingtonnc.gov)

3) Jim Quinn  
Stormwater Specialist  
910-341-4694  
[Jim.Quinn@wilmingtonnc.gov](mailto:Jim.Quinn@wilmingtonnc.gov)

4) Fred Royal  
Stormwater Services Manager  
910-341-5818  
[Frederic.Royal@wilmingtonnc.gov](mailto:Frederic.Royal@wilmingtonnc.gov)

### **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**

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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

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Included in this section:

Inspection Reporting Summary  
Stormwater Detention Facility Compliance Inspection Report

| <b>Dates of Inspections</b>            | <b>Fall 2019</b> | <b>Summer 2020</b> |
|--|------------------|--------------------|
| <b>Total # Sites Inspected</b>         | 230              | TBD                |
| <b><i>Response Letter Severity</i></b> |                  |                    |
| Level 1 (first letter)                 | 35               | TBD                |
| Level 2 (second letter)*               | 0                | TBD                |
| Level 3 (third letter)**               | 0                | TBD                |
| # of Sites Requiring Maintenance       | 35               | TBD                |

\*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:

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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:

## Summary of Plan Review Activities

| Project Name                                      | Project Type   | Type of Permit  | Type of New SCM                | Permit Number | Permit Issue Date | Pervious (Y or N) | # of new SCM's Onsite | Notes  |
|---|----------------|-----------------|--------------------------------|---------------|-------------------|-------------------|-----------------------|--|
| Needham Animal Hospital Expansion                 | Offsite Permit | Permit Revision | None                           | 2009022R2     | 8/20/2019         | N                 | 0                     | No new SCM's   |
| Home 2 Suites by Hilton                           | SWP HD         | New Permit      | Pervious Concrete              | 2019038       | 7/11/2019         | Y                 | 1                     | 9 Pervious Concrete Areas (14,026sf)                       |
| Sir Tyler Dr Parking Lot Expansion                | Offsite Permit | Permit Revision | None                           | 2010015R1     | 12/2/2019         | N                 | 0                     | No new SCM's   |
| Seagate Point                                     | SWP HD         | New Permit      | PC, Infiltration Basin         | 2020006       | 2/14/2020         | Y                 | 2                     | 1 Pervious Concrete Area (3,226sf), Infiltration Basin     |
| S Kerr Assembly Hall                              | Drain Plan     | New Permit      | Pervious Concrete              | 2019053       | 9/11/2019         | Y                 | 1                     | 1 Pervious Concrete Area (18,628sf)                        |
| KFC Market Street                                 | SWP HD         | New Permit      | Pervious Concrete              | 2019046       | 7/26/2019         | Y                 | 2                     | 2 Pervious Concrete Areas (4,115sf)                        |
| Ansley Park                                       | SWP HD         | New Permit      | Wet Pond                       | 2019045       | 7/29/2019         | N                 | 1                     | Pre/Post Wet Pond; Water Quality Pond Offsite              |
| Ansley Park (Name Change R1)                      | SWP HD         | Permit Revision | None                           | 2019045R1     | 8/27/2019         | N                 | 0                     | No new SCM's   |
| Cottages at College Acres                         | SWP HD         | New Permit      | Wet Pond, Infiltration Trench  | 2019050       | 11/15/2019        | N                 | 3                     | 1 Wet Pond, 2 Infiltration Trenches                        |
| Starbucks-Hospital Plaza                          | SWP HD         | New Permit      | Pervious Concrete              | 2019044       | 7/19/2019         | Y                 | 1                     | 1 Pervious Concrete Area (2,080sf)                         |
| NHC Senior Resource Center Parking Lot            | Drain Plan     | New Permit      | None                           | 2019042       | 7/18/2019         | N                 | 0                     | No SCM's Required  |
| Echo Farms Park                                   | Redevelopment  | New Permit      | None                           | 2019060       | 10/28/2019        | N                 | 0                     | No SCM's Required  |
| Noble Middle School Renovations                   | SWP HD         | New Permit      | None                           | 2019043       | 7/19/2019         | N                 | 0                     | No SCM's Required  |
| Autumn Hall Commercial Phase 1                    | SWP HD         | Permit Revision | None                           | 2006046R11    | 12/31/2019        | N                 | 0                     | No new SCM's   |
| Hendrick Honda                                    | SWP HD         | New Permit      | Infiltration Basin             | 2019041       | 7/29/2019         | N                 | 1                     | 1 Infiltration Basin                                       |
| Discount Tire NCC39                               | Offsite Permit | New Permit      | None                           | 2019048       | 8/21/2019         | N                 | 0                     | No SCM's Required  |
| Houston Moore Parking                             | Drain Plan     | New Permit      | None                           | 2019039       | 7/12/2019         | N                 | 0                     | No SCM's Required  |
| Riverlights Watercraft Ferry Extension            | SWP HD         | New Permit      | Infiltration Basins & Trenches | 2019040       | 7/19/2019         | N                 | 4                     | 2 Underground Infiltration Trenches, 2 Infiltration Basins |
| Flitwick Flats aka Cherry Avenue Mixed Use        | SWP HD         | New Permit      | Infiltration Trench            | 2019059       | 10/14/2019        | N                 | 1                     | 1 Underground Infiltration Trench                          |
| Woodlands Offsite Improvements                    | SWP HD         | Permit Revision | None                           | 2018027R3     | 1/23/2020         | N                 | 0                     | No SCM's Required  |
| The Pointe at Barclay Street & Utility Extensions | SWP HD         | New Permit      | None                           | 2019067       | 2/3/2020          | N                 | 0                     | No new SCM's   |
| Hendrick Mazda of Wilmington                      | SWP HD         | New Permit      | None                           | 2019055       | 10/1/2019         | N                 | 0                     | No new SCM's   |
| Howard RV Center                                  | SWP HD         | New Permit      | Wet Pond                       | 2020007       | 2/13/2020         | N                 | 1                     | 1 Wet Pond   |
| Middleburg Apartment Community                    | Offsite Permit | New Permit      | None                           | 2019058       | 10/15/2019        | N                 | 0                     | Offsite Permit   |
| 52nd Street Duplexes                              | Drain Plan     | New Permit      | None                           | 2019047       | 7/26/2019         | N                 | 0                     | No SCM's Required  |
| Lofts at Park Avenue                              | Drain Plan     | New Permit      | PC, Pre/Post Basin             | 2019065       | 12/16/2019        | Y                 | 2                     | Pervious Concrete (6,408sf), Pre/Post Detention Basin      |
| Oleander Commons                                  | SWP HD         | New Permit      | Infiltration Trench and Basin  | 2020008       | 3/10/2020         | N                 | 3                     | 2 Infiltration Trenches, 1 Infiltration Basin              |
| Coastal Kia Parking Lot                           | SWP HD         | Permit Revision | None                           | 2008012R1     | 12/2/2019         | N                 | 0                     | No new SCM's   |
| City Block Apartments II                          | SWP HD         | New Permit      | Infiltration Trench            | 2020004       | 2/4/2020          | N                 | 1                     | 1 Underground Infiltration Trench                          |
| AAA Car Wash - Wilsire                            | SWP HD         | New Permit      | Dry Detention Basin            | 2019057       | 10/10/2019        | N                 | 2                     | 2 Dry Detention Basins                                     |
| Maides Park Gymnasium Addition                    | SWP HD         | Permit Revision | None                           | 2019068       | 1/31/2020         | N                 | 0                     | No new SCM's   |
| The Mini Pearl/The Pearl                          | Drain Plan     | Permit Revision | None                           | 2018015R3     | 11/25/2019        | N                 | 0                     | No SCM's Required  |
| Baker Luxury Collection                           | SWP HD         | Permit Revision | None                           | 1999032R3     | 11/25/2019        | N                 | 0                     | No new SCM's   |
| SECU 17th Street                                  | SWP HD         | New Permit      | None                           | 2020003       | 2/3/2020          | N                 | 0                     | No new SCM's   |
| Arboretum West (MOD)                              | SWP HD         | Permit Revision | None                           | 2019022R1     | 9/20/2019         | N                 | 0                     | No new SCM's   |
| Friends School of Wilmington                      | SWP HD         | Permit Revision | None                           | 2019028R1     | 3/25/2020         | N                 | 0                     | No new SCM's   |
| Mayfaire Self Development                         | Drain Plan     | New Permit      | None                           | 2019061       | 10/24/2019        | N                 | 0                     | No SCM's Required  |
| Renaissance Apartments                            | SWP HD         | New Permit      | None                           | 2020023       | 7/17/2020         | N                 | 0                     | No new SCM's   |
| North Market Storage Expansion                    | Redevelopment  | New Permit      | None                           | 2020012       | 4/20/2020         | N                 | 0                     | No new SCM's   |
| Pacific Place Sub                                 | SWP HD         | Permit Revision | None                           | 2018013R1     | 8/29/2019         | N                 | 0                     | No new SCM's   |
| Walk-On's   | Redevelopment  | Permit Revision | None                           | 2019006R1     | 9/11/2019         | N                 | 0                     | No SCM's Required  |
| Flow Acura  | SWP HD         | Permit Revision | None                           | 2002043R2     | 8/22/2019         | N                 | 0                     | No new SCM's   |
| Triangle Auto Sales                               | Redevelopment  | New Permit      | None                           | 2020001       | 1/8/2020          | N                 | 0                     | No SCM's Required  |
| Village Green Poolhouse                           | Drain Plan     | New Permit      | None                           | 2019056       | 10/10/2019        | N                 | 0                     | No SCM's Required  |
| Home 2 Suites by Hilton (Mod)                     | SWP HD         | Permit Revision | None                           | 2019038R1     | 11/27/2019        | N                 | 0                     | No new SCM's   |
| McDonald's Gordon Road                            | Redevelopment  | New Permit      | None                           | 2019069       | 12/23/2019        | N                 | 0                     | No SCM's Required  |
| 17th Street Mixed Use                             | SWP HD         | New Permit      | Infiltration Trench            | 2020010       | 3/24/2020         | N                 | 2                     | 2 Underground Infiltration Trenches                        |
| Indie Ice House Lofts                             | Drain Plan     | New Permit      | None                           | 2020009       | 3/3/2020          | N                 | 0                     | No SCM's Required  |
| Wilmington Treatment Center Ph. II                | SWP HD         | Permit Revision | None                           | 2017032R3     | 3/27/2020         | N                 | 0                     | No new SCM's   |
| Chemserv Terminal Storage Tank No. 6              | Drain Plan     | New Permit      | None                           | 2019064       | 12/4/2019         | N                 | 0                     | No SCM's Required  |
| Crossroads Infiniti                               | SWP HD         | New Permit      | Wet Pond                       | 2020020       | 6/30/2020         | N                 | 1                     | 1 Wet Pond   |
| Tru Colors Brewery                                | SWP HD         | New Permit      | Infiltration Trench            | 2020005       | 2/10/2020         | N                 | 1                     | 1 Underground Infiltration Trench                          |
| Indie Ice Townhomes                               | SWP HD         | New Permit      | PC, Infiltration Basins/Trench | 2020002       | 1/29/2020         | Y                 | 7                     | 3 PC Areas (3,307sf), 5 Infiltration Basins, 1 Trench      |
| Massengill's Garden Center                        | SWP HD         | New Permit      | None                           | 2020013       | 5/19/2020         | N                 | 0                     | No SCM's Required  |
| Oakwood Homes, Inc.                               | Drain Plan     | New Permit      | None                           | 2020015       | 5/6/2020          | N                 | 0                     | No SCM's Required  |
| Creekside (Modification)                          | SWP HD         | Permit Revision | None                           | 2019030R2     | 12/3/2019         | N                 | 0                     | No new SCM's   |
| Independence South HOA                            | SWP HD         | Permit Revision | None                           | 2004054R1     | 5/21/2020         | N                 | 0                     | No new SCM's   |
| ABC Store #104                                    | SWP HD         | New Permit      | None                           | 2019066       | 12/13/2019        | N                 | 0                     | No SCM's Required  |
| Saxon Place Rev                                   | SWP HD         | Permit Revision | Infiltration Trench            | 2014012R1     | 6/24/2020         | N                 | 1                     | 1 Underground Infiltration Trench                          |
| COW Fire Station 5 Shipyard                       | SWP HD         | Permit Revision | None                           | 2017018R2     | 7/15/2020         | N                 | 0                     | No new SCM's   |
| Cottages at College Acres                         | SWP HD         | Permit Revision | None                           | 2019050R1     | 3/25/2020         | N                 | 0                     | No new SCM's   |
| NC National Guard Armory                          | Drain Plan     | New Permit      | None                           | 2020014       | 4/28/2020         | N                 | 0                     | No SCM's Required  |
| Autumn Hall Bank Building                         | SWP HD         | Permit Revision | None                           | 2006046R13    | 4/8/2020          | N                 | 0                     | No new SCM's   |
| Autumn Hall Commercial Phase 1                    | SWP HD         | Permit Revision | None                           | 2006046R12    | 4/8/2020          | N                 | 0                     | No new SCM's   |
| Mayfaire Self Development                         | Drain Plan     | Permit Revision | None                           | 2019061R1     | 3/23/2020         | N                 | 0                     | No SCM's Required  |
| Needham Animal Hospital Expansion                 | SWP HD         | Permit Revision | None                           | 2009022R3     | 5/7/2020          | N                 | 0                     | No new SCM's   |
| Kerr Station Lofts                                | SWP HD         | Permit Revision | None                           | 2019001R3     | 4/21/2020         | N                 | 0                     | No new SCM's   |
| Dollar General Pine Grove (MOD)                   | SWP HD         | Permit Revision | None                           | 2018053R1     | 3/30/2020         | N                 | 0                     | No new SCM's   |
| Bradley Creek Station                             | SWP HD         | Permit Revision | None                           | 2019014R1     | 9/11/2019         | N                 | 0                     | No new SCM's   |
| The Crown   | Drain Plan     | New Permit      | None                           | 2020018       | 5/19/2020         | N                 | 0                     | No SCM's Required  |
| 17th Street Mixed Use Offsite Improvements        | SWP HD         | Permit Revision | None                           | 2020010R1     | 5/27/2020         | N                 | 0                     | No new SCM's   |
| Dram Tree Tavern                                  | Drain Plan     | New Permit      | Pervious Concrete              | 2020019       | 6/16/2020         | Y                 | 1                     | 1 Pervious Concrete Area (4532sf)                          |
| Tate Division                                     | Drain Plan     | New Permit      | None                           | 2020016       | 5/12/2020         | N                 | 0                     | No SCM's Required  |
| Ansley Park (Mod R2 Continued)                    | SWP HD         | Permit Revision | None                           | 2019045R2     | 5/27/2020         | N                 | 0                     | No new SCM's   |
| Wilmington Municipal Golf Course (Mod)            | SWP HD         | Permit Revision | None                           | 2019004R1     | 6/9/2020          | N                 | 0                     | No new SCM's   |
| Peregrine Way (Osprey Landing)                    | SWP HD         | Permit Revision | None                           | 2018060R2     | 5/20/2020         | N                 | 0                     | No new SCM's   |
| Dollar General Pine Grove (MOD Name Change)       | SWP HD         | Permit Revision | None                           | 2018053R1     | 3/30/2020         | N                 | 0                     | No new SCM's   |
| Indie Ice (MOD Name Change)                       | SWP HD         | Permit Revision | None                           | 2020002R1     | 6/16/2020         | N                 | 0                     | No new SCM's   |
| Hendrick Mazda of Wilmington (MOD)                | SWP HD         | Permit Revision | None                           | 2019055R2     | 6/9/2020          | N                 | 0                     | No new SCM's   |
| Aloft Coastline Hotel                             | Redevelopment  | Permit Revision | None                           | 2019002R1     | 6/5/2020          | N                 | 0                     | No SCM's Required  |
| Port City Produce                                 | Drain Plan     | New Permit      | None                           | 2020025       | 7/23/2020         | N                 | 0                     | No SCM's Required  |
| Bradley Creek Station                             | SWP HD         | Permit Revision | None                           | 2019014R2     | 6/4/2020          | N                 | 0                     | No new SCM's   |

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

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

## 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 |
|------------------------|--|--|--|---|---------------------------|
| <b>Events</b>          |  |  |  |   |                           |
| 7/27/2019              | Wilmington Farmer's Market @ Tidal Creek Co-op               | Residents of Bradley and Hewletts Creeks; Farmers Market Attendees                               | Heal Our Waterways                                 | Educational booth   | ~100 market visitors      |
| 7/27/2019              | Family Fun Night @ Airlie Gardens                            | Families within Bradley and Hewletts Creeks  | Heal Our Waterways                                 | "To See or Turbidity?" hands-on stormwater game   | ~250 attendees            |
| 9/21/2019              | Native Plant Festival @ NHC Arboretum                        | Watershed residents and environmentally-minded residents   | Heal Our Waterways                                 | Educational booth   | ~400 attendees            |
| 9/24/2019              | Wilmington Workshops on the Water (hosted by 350 Wilmington) | Concerned citizens; local environmental groups   | Heal Our Waterways                                 | Educational booth   | ~20 attendees             |
| 9/28/2019              | Wilmington Farmer's Market @ Tidal Creek Co-op               | Residents of Bradley and Hewletts Creeks; Farmers Market Attendees                               | Heal Our Waterways                                 | Educational booth   | ~80 market visitors       |
| 11/2/2019              | Family Smart Start Festival (hosted by Smart Start NHC)      | Families within Bradley and Hewletts Creeks  | Heal Our Waterways                                 | Educational booth   | ~250 attendees            |
| 6/3/2020               | Wilmington Farmer's Market @ Tidal Creek Co-op               | Residents of Bradley and Hewletts Creeks; Farmers Market Attendees                               | Heal Our Waterways                                 | Educational booth   | ~100 market visitors      |
| <b>Presentations</b>   |  |  |  |   |                           |
| 10/14/2019             | Rain Garden Maintenance Workshop                             | Residents that are interested in installing a rain garden or already had a rain garden installed | Heal Our Waterways/ NC State Cooperative Extension | Powerpoint presentations and a hands-on maintenance session on an existing rain garden at the NHC Arboretum | 23 participants           |
| 10/21/2019             | Stormwater 101 Presentation to Lions Gate HOA                | Lions Gate HOA Board Members   | NHSWCD/ Heal Our Waterways/ Rainstorm Solutions    | Powerpoint presentation and question and answer session   | 5 HOA Board Members       |
| 11/18/2019             | Engineering 101 Class Presentation @ UNCW                    | Undergraduate engineering students   | Heal Our Waterways                                 | Powerpoint Presentation   | 60 students; 1 professor  |
| 4/14/2020              | Stormwater & Urban Trees WebEx Presentation                  | North Carolina Urban Forest Council and members  | Heal Our Waterways                                 | Powerpoint Presentation via WebEx software  | 30 attendees              |
| 4/20/2020              | Heal Our Waterways: Rain Gardens                             | Sierra Club members  | Heal Our Waterways                                 | Powerpoint Presentation via Zoom software   | 10 attendees              |

| <b>Informational Website</b>       |  |   |                    |   |   |
|------------------------------------|--|---|--------------------|---|---|
| Ongoing                            | Heal Our Waterways informational website<br><a href="http://healourwaterways.org">healourwaterways.org</a> | Watershed residents<br>General public                             | Heal Our Waterways | Continuously updated, dedicated Heal Our Waterways website  | 2501 unique page views as of 3091 total page views. Data as of 6/30/2020  |
| <b>Media Advertising Campaigns</b> |  |   |                    |   |   |
| 9/2/2019-10/9/2019                 | WECT Fall Rain Barrel Campaign   | Watershed residents<br>General public                             | WECT               | 2 Homepage takeovers & targeted Facebook posts  | <u>Total Ads Delivered:</u> 142,587<br><u>Total Ad Engagements:</u> 2,850<br><u>Engagement Rate:</u> 2.00%<br>Total Cost: \$1600  |
| 11/11/19-12/18/19                  | WHQR Fall HOW Campaign   | Watershed residents<br>General public                             | WHQR               | 28 spots during drive time (6a-9a and 4p-7p Mon-Fri)  | <u>Total Ads Delivered:</u> 28<br>Total Cost: \$840   |
| 11/11/19-12/08/19                  | Lamar Fall HOW Campaign  | Watershed residents<br>General public                             | Lamar Billboards   | 1 billboard within Bradley Creek watershed, "Help Us Heal Bradley Creek!"   | <u>1-month, 1 billboard</u><br>Total Cost: \$1,000  |
| 3/15/20 - 6/30/20                  | WECT Spring HOW Campaign   | Watershed residents<br>General public                             | WECT               | 2 Homepage takeovers, targeted Facebook posts using new PSA videos, website PSA videos. Videos discussed the HOW Program and availability of rain garden funding. | <u>Total Ads Delivered:</u> 555,891<br><u>Total Ad Engagements:</u> 5,882<br><u>Engagement Rate:</u> 1.06%<br>Total Cost: \$4,400 |
| 4/15/20 - 5/15/20                  | WHQR SpringHOW Campaign  | Watershed residents<br>General public                             | WHQR               | 28 spots during drive time (6a-9a and 4p-7p Mon-Fri)  | <u>Total Ads Delivered:</u> 28<br>Total Cost: \$840   |
| 04/06/20 - 05/03/20                | Lamar Spring HOW Campaign  | Watershed residents<br>General public                             | Lamar Billboards   | 1 billboard within Bradley Creek watershed, "Help Us Heal Bradley Creek!"   | <u>1-month, 1 billboard</u><br>Total Cost: \$1,000  |
| 5/21/20-6/24/20                    | WHQR June HOW Campaign   | Watershed residents<br>General public                             | WHQR               | 28 spots during drive time (6a-9a and 4p-7p Mon-Fri)  | <u>Total Ads Delivered:</u> 20<br>Total Cost: \$600   |
| <b>News Coverage</b>               |  |   |                    |   |   |
| 2/24/2020                          | "Trees Help with Stormwater" Star News Article   | Residents of Bradley and Hewletts Creeks;<br>Star News Readers    | Heal Our Waterways | Article featured on Star News Online and in print discussing the role of trees in stormwater management   | 41,300 printed; online readership   |
| Fall 2020                          | Heal Our Waterways article in Going Green! Magazine  | Residents of Bradley and Hewletts Creeks;<br>Going Green! Readers | Heal Our Waterways | Article featured in Going Green Fall 2020 magazine discussing the HOW Program   | Print circulation of 8,000  |

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| 4/24/2020                            | "UNCW Parking Lot Absorbs Rain"  | Residents of Bradley and Hewletts Creeks; NC Coastal Federation Followers | North Carolina Coastal Federation | Online news article about recent pervious parking stalls installed at UNC-Wilmington's campus   | Reach of 300,000                                       |
| <b>Social Media Campaigns</b>        |  |   |                                   |   |  |
| Ongoing                              | Twitter site campaign  | Twitter followers Interested public                                       | Heal Our Waterways                | Dedicated Heal Our Waterways account handle   | Currently have _250_ followers                         |
| Ongoing                              | Facebook site campaign   | Facebook followers Interested public                                      | Heal Our Waterways                | Dedicated Heal Our Waterways page   | Currently have 231_ page "likes", 246_ followers       |
| <b>Distributing promos/giveaways</b> |  |   |                                   |   |  |
| Ongoing                              | Introductory application swag packets to HOWBMP site visits/applicants | Applicants to the HOWBMP Program  | Heal Our Waterways; NHSWCD        | Application "Swag Bag" with HOW giveaways, including grocery tote, pens, notepads, stickers, dry bag, and informational papers  | 31 Total Site Visits for the HOWBMP Program            |
| 7/27/2019                            | Wilmington Farmer's Market @ Tidal Creek Co-op                         | Residents of Bradley and Hewletts Creeks; Farmers Market Attendees        | Heal Our Waterways                | Educational booth featuring giveaways, such as reusable straws, grocery totes, rain gages, pens, dry bags, the HOW Brochure and educational booklets featuring stormwater solutions                               | 96 total giveaways distributed                         |
| 7/27/2019                            | Family Fun Night @ Airlie Gardens                                      | Families within Bradley and Hewletts Creeks                               | Heal Our Waterways                | Provided HOW cups, rain gages, or dry bags to kids that played the featured game. Provided other giveaways to parents of participants. Raffled off one rain barrel.   | 230 total giveaways distributed; 1 Rain barrel awarded |
| 9/21/2019                            | Native Plant Festival @ NHC Arboretum                                  | Watershed residents and environmentally-minded residents                  | Heal Our Waterways                | Educational booth featuring giveaways, such as reusable straws, grocery totes, rain gages, pens, dry bags, the HOW Brochure and educational booklets featuring stormwater solutions. Raffled off one rain barrel. | 260 total giveaways distributed; 1 rain barrel awarded |
| 9/28/2019                            | Wilmington Farmer's Market @ Tidal Creek Co-op                         | Residents of Bradley and Hewletts Creeks; Farmers Market Attendees        | Heal Our Waterways                | Educational booth featuring giveaways, such as reusable straws, grocery totes, rain gages, pens, dry bags, the HOW Brochure and educational booklets featuring  | 79 total giveaways distributed                         |



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|  |   |  |  | stormwater solutions   |   |
| 11/2/2019  | Family Smart Start Festival (hosted by Smart Start NHC) | Families within Bradley and Hewletts Creeks  | Heal Our Waterways                                 | Provided HOW cups, rain gages, or dry bags to kids that played the featured game. Provided other giveaways to parents of participants. Raffle off one rain barrel. | 186 total giveaways distributed   |
| 10/14/2019   | Rain Garden Maintenance Workshop                        | Residents that are interested in installing a rain garden or already had a rain garden installed | Heal Our Waterways/ NC State Cooperative Extension | 1 swag bag packet per participant, including giveaways and information regarding rain gardens; raffled off one rain barrel   | 23 total swag bags; 1 rain barrel   |
| 11/18/2019   | Engineering 101 Class Presentation @ UNCW               | Undergraduate engineering students   | Heal Our Waterways                                 | Provided HOW bumper stickers and brochures to professor to distribute to students  | 120 giveaways distributed (60 x 2)  |
| 2/20/2020  | Lower Cape Fear Stewardship Development Awards          | Local environmental groups, developers, political figures  | Heal Our Waterways                                 | Distribution table including information about the HOW Program, example BMPs, and giveaways, such as reusable straws, stickers, pens, dry bags, and grocery totes  | ~55 total giveaways distributed   |
| <b>Local Cable Access (GTV-8)</b>                              |   |  |  |  |   |
| 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 |
| <b>Watershed Resident Mailings, Displays, Signs, Pamphlets</b> |   |  |  |  |   |
| 10/3/2019  | Fall Postcard Mailer                                    | Bradley and Hewlett Creek Watersheds   | Stormwater Staff                                   | BMP VIPs postcard showing recent projects installed at UNCW and resident properties  | 20,254 addresses  |
| 4/9/2020   | Spring Postcard Mailer                                  | Bradley and Hewlett Creek Watersheds   | Stormwater Staff                                   | Featured rain barrel benefits and information for how to purchase one.   | 20,852 addresses  |
| <b>Newsletters and E-newsletters</b>                           |   |  |  |  |   |

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| 8/14/2019   | "Summer Recap!" e-newsletter   | Heal Our Waterways newsletter subscribers | Heal Our Waterways           | E-newsletter highlighting recent projects installed by the HOWBMP program and projects put in at UNCW                       | Sent: 278<br>Open Rate: 31%<br>Click Rate: 10%     |
| 10/3/2019   | "Rain Garden Maintenance Workshop Invitation" e-newsletter                                   | Heal Our Waterways newsletter subscribers | Heal Our Waterways           | Invitation to the rain garden maintenance workshop that occurred at the NHC arboretum 10/14/2019                            | Sent: 330<br>Open Rate: 26%<br>Click Rate: 10%     |
| 12/9/2019   | "Seasons Greetings!"   | Heal Our Waterways newsletter subscribers | Heal Our Waterways           | Year-end summary of program highlights, Christmas tree recycling programs, volunteer events, and tree giveaway announcement | Sent: 334<br>Open Rate: 31%<br>Click Rate: 16%     |
| 2/5/2020  | Lower Cape Fear Stewardship Development Awards Invitation                                    | Heal Our Waterways newsletter subscribers | Heal Our Waterways           | Save the date announcement for the LCFSDA and link to reserve tickets.  | Sent: 335<br>Open Rate: 36%<br>Click Rate: 3%      |
| 3/31/2020   | Earth Day Campaign   | Heal Our Waterways newsletter subscribers | Heal Our Waterways           | Celebrated 50 years of Earth Day with updates and ideas for how people could celebrate Earth Day at home                    | Sent: 334<br>Open Rate: 25%<br>Click Rate: 5%      |
| <b>Grant Projects</b>                                       |  |   |                              |   |  |
| Began January 2019  | EPA 319 Grant UNCW NCCF  | Bradley Creek Watershed                   | UNCW, NCCF, Stormwater       | Several planned stormwater retrofits on UNCW campus.  | Collaboration with UNCW, NCCF, and City Stormwater |
| <b>Watershed Coordinator Training and Networking Events</b> |  |   |                              |   |  |
| 7/24/2019   | Webinar: "Early Detection of Algal Blooms in US Freshwater Systems: CyAN Mobile Application" | Water quality professionals               | EPA                          | Webinar discussing ways to use the CyAN Mobile App for reporting algal blooms   | Watershed Coordinator                              |
| 8/7/2019  | Webinar: "The Conservation Cobenefits of Green"  | Water quality professionals               | Environmental Resource Group | Webinar discussing conservation benefits for green infrastructure   | Watershed Coordinator                              |
| 8/21/2019   | Webinar: "Mapping Wetland Inundation"  | Water quality professionals               | Wetland Mapping Consortium   | Webinar showing online mapping tools to use for wetland mapping   | Watershed Coordinator                              |
| 9/18/2019   | Webinar: "Geospatial Patterns of Antimicrobial Resistance Genes in US Rivers and Streams"    | Water quality professionals               | EPA                          | Webinar discussing research regarding distribution and influences of antimicrobial resistance genes                         | Watershed Coordinator                              |

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| 10/17/2019        | Webinar: "Don't Overreact, but Don't Underreact: Building Resiliency for Better Outcomes"                           | Employees, Managers   | Lance Strategies                        | Webinar discussing ways to work through stressful situations and respond to stressful coworkers         | Watershed Coordinator |
| 10/24/2019        | Understanding the Budget Process  | City Employees  | City of Wilmington Finance Department   | In-person presentation discussing the City's budget process   | Watershed Coordinator |
| 11/13/2019        | Illicit Discharge and SCM Maintenance   | City Employees  | City of Wilmington Stormwater Admin     | In-person presentation featuring types of illicit discharges and SCMs                                   | Watershed Coordinator |
| 11/19/19-11/20/19 | NC SeaGrant Coastal Conference  | Professionals in coastal sciences, planning, and resiliency | NC SeaGrant                             | Presentations and break-out sessions at a conference with a focus on coastal resiliency                 | Watershed Coordinator |
| 11/22/2019        | Successful Rain Gardens   | Environmental and stormwater professionals and faculty      | Claudia West                            | In-person presentation discussing why many rain gardens fail and different methods to use for success   | Watershed Coordinator |
| 12/2/2019         | EE Local Grants Program Webinar   | Professionals in coastal sciences, planning, and resiliency | Office of Environmental Education (EPA) | Webinar describing the EE grants process  | Watershed Coordinator |
| 12/3/2019         | GoToWebinar - Wetland Mapping Consortium Webinar - NWI Data in Support of Conservation Efforts and Habitat Modeling | Professionals in coastal sciences, planning, and resiliency | Association of Wetlands Managers        | Webinar discussing how to use National Wetlands Inventory data for where to focus conservation projects | Watershed Coordinator |
| 12/12/2019        | GoToWebinar - Extending Your Influence: Building a Powerful Professional Reputation                                 | Employees, Managers   | Lance Strategies                        | Webinar providing tips for how to build relationships and improve reputation                            | Watershed Coordinator |
| 1/8/2020          | Webinar Investigating the Stormwater: Quantity and Quality Impacts of Urban Trees                                   | Water quality professionals, municipalities, and arborists  | USDA Forest Services                    | Webinar discussing the stormwater benefits of urban trees   | Watershed Coordinator |
| 1/15/2020         | EPA EnviroAtlas Update Webinar  | Professionals in coastal sciences, planning, and resiliency | EPA                                     | Webinar showing the online EnviroAtlas tool and recent updates  | Watershed Coordinator |
| 1/16/2020         | FEAR: Release to Receive Webinar  | Employees, Managers   | Lance Strategies                        | Webinar discussing how to build confidence within the workplace   | Watershed Coordinator |
| 2/19/2020         | Facilitating Inclusion Across Differences – Generational Differences  | Employees, Managers   | Cape Fear Community College             | In-person training discussing ways to communicate across generations                                    | Watershed Coordinator |

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| 2/20/2020 | Facilitating Inclusion Across Differences – Unconscious Bias                   | Employees, Managers   | Cape Fear Community College      | In-person training discussing ways to notice and prevent unconscious bias                                    | Watershed Coordinator                      |
| 2/26/2020 | Facilitating Inclusion Across Differences – Inclusion During Recruitment       | Employees, Managers   | Cape Fear Community College      | In-person training discussing ways to notice and prevent unconscious bias during the recruitment process     | Watershed Coordinator                      |
| 2/27/2020 | Facilitating Inclusion Across Differences – Cultural Differences               | Employees, Managers   | Cape Fear Community College      | In-person training discussing ways to communicate across different cultures                                  | Watershed Coordinator                      |
| 2/26/2020 | EPA Webinar: Science to Support and Implement Microbial Water Quality Criteria | Water quality professionals                                 | EPA                              | Webinar discussing the research that supports the microbial water quality criteria                           | Watershed Coordinator                      |
| 3/3/2020  | Stormwater Decision Maker Summit @ UNC Institute of Marine Sciences            | Professionals in coastal sciences, planning, and resiliency | NC SeaGrant                      | In-person presentation session to share ideas for stormwater management and coastal resiliency               | Watershed Coordinator & Stormwater Manager |
| 4/15/2020 | EPA Webinar: Citizen Science @ EPA   | Water quality professionals                                 | EPA                              | Webinar discussing the Citizen Science programs and how it supports ongoing research                         | Watershed Coordinator                      |
| 4/28/2020 | EPA Webinar: EnviroAtlas Training  | Water quality professionals                                 | EPA                              | Webinar showing most recent updates to EnviroAtlas and how to use the system                                 | Watershed Coordinator                      |
| 5/7/2020  | Webinar: Effective Public Outreach in Massachusetts MS4 communities            | Water quality professionals                                 | EPA                              | Webinar featuring MS4 outreach strategies for stormwater pollution   | Watershed Coordinator                      |
| 5/13/2020 | Webinar: Urban Forest Connections  | Water quality professionals, municipalities, and arborists  | USDA Forest Services             | Webinar discussing the benefits of urban forests   | Watershed Coordinator                      |
| 5/20/2020 | Center for Watershed Protection Webcast: Small Scale BMPs                      | Water quality professionals                                 | Center for Watershed Protection  | Webcast featuring presentations from water quality professionals regarding BMP placement and function        | Watershed Coordinator                      |
| 5/21/2020 | Webinar: Scicomm in a virtually connected world                                | Researchers, faculty, science professionals                 | American Geophysical Union (AGU) | Webinar featuring strategies to effectively communicate research and science topics through virtual learning | Watershed Coordinator                      |
| 6/9/2020  | Graphic Design and Introduction to Canva Online Training                       | Outreach and communication professionals                    | UNCW                             | Zoom meeting showing techniques and tricks to use through Canva  | Watershed Coordinator                      |

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|--------------------------------------|--|--|---|--|------------------------------|
| 6/10/2020                            | The Science and Practice of Managing Forests in Cities   | Water quality professionals, municipalities, and arborists | USDA Forest Services                            | Webinar discussing ways to keep healthy forest areas within urban boundaries   | Watershed Coordinator        |
| 6/19/2020                            | Awareness, Engagement, and Action Around Water   | Water quality professionals                                | WRRRI   | Virtual conference presentations featuring projects that engaged communities for water projects  | Watershed Coordinator        |
| 6/25/2020                            | Making Your PowerPoints Pop!   | Outreach and communication professionals                   | UNCW  | Zoom meeting showing techniques and tricks to make efficient PowerPoints   | Watershed Coordinator        |
| 6/24/2020                            | Building Capacity to Protect and Manage Wetlands through the Development of State Wetland Associations | Water quality professionals                                | Association of Wetlands Managers                | Webinar featuring how to create community engagement through wetland associations, featuring projects from the Carolina Wetlands Association | Watershed Coordinator        |
| <b>Citizen Contacts- Site Visits</b> |  |  |   |  |                              |
| 7/2/2019                             | 5006 Carleton Drive HOWBMP Site Visit  | 1 Homeowner  | Heal Our Waterways/ NHSWCD/ Rainstorm Solutions | Site visit with property owner to discuss potential participation in the HOWBMP retrofit program   | 1 Homeowner                  |
| 7/2/2019                             | 245 Bradley Drive HOWBMP Site Visit  | 1 Homeowner  | Heal Our Waterways/ NHSWCD/ Rainstorm Solutions | Site visit with property owner to discuss potential participation in the HOWBMP retrofit program   | 1 Homeowner                  |
| 7/2/2019                             | 5104 Treybrooke Drive HOWBMP Site Visit  | 1 Homeowner  | Heal Our Waterways/ NHSWCD/ Rainstorm Solutions | Site visit with property owner to discuss potential participation in the HOWBMP retrofit program   | 1 Homeowner                  |
| 7/2/2019                             | 5618 Greenville Loop Rd HOWBMP Site Visit  | 1 Homeowner  | Heal Our Waterways/ NHSWCD/ Rainstorm Solutions | Site visit with property owner to discuss potential participation in the HOWBMP retrofit program   | 1 Homeowner                  |
| 7/8/2019                             | Lions Gate HOA HOWBMP Site Visit   | Lions Gate HOW Board Members                               | Heal Our Waterways/ NHSWCD/ Rainstorm Solutions | Site visit with property owner to discuss potential participation in the HOWBMP retrofit program   | Lions Gate HOW Board Members |
| 7/8/2019                             | 9 Merrimac Drive HOWBMP Site Visit   | 1 Homeowner  | Heal Our Waterways/ NHSWCD/ Rainstorm Solutions | Site visit with property owner to discuss potential participation in the HOWBMP retrofit program   | 1 Homeowner                  |
| 7/8/2019                             | 5417 Dawning Creek Way HOWBMP Site Visit   | 2 Homeowners   | Heal Our Waterways/ NHSWCD/ Rainstorm Solutions | Site visit with property owner to discuss potential participation in the HOWBMP retrofit program   | 2 Homeowners                 |

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| 7/8/2019   | 309 Yorkshire Lane<br>HOWBMP Site Visit         | 2 Homeowners | Heal Our Waterways/<br>NHSWCD/ Rainstorm<br>Solutions | Site visit with<br>property owner to<br>discuss potential<br>participation in the<br>HOWBMP retrofit<br>program | 2 Homeowners |
| 8/7/2019   | 206 West Blackbeard<br>Rd HOWBMP Site<br>Visit  | 2 Homeowners | Heal Our Waterways/<br>NHSWCD/ Rainstorm<br>Solutions | Site visit with<br>property owner to<br>discuss potential<br>participation in the<br>HOWBMP retrofit<br>program | 2 Homeowners |
| 8/15/2019  | 112 King Arthur Drive<br>HOWBMP Site Visit      | 1 Homeowner  | NHSWCD/ Rainstorm<br>Solutions                        | Site visit with<br>property owner to<br>discuss potential<br>participation in the<br>HOWBMP retrofit<br>program | 1 Homeowner  |
| 8/22/2019  | 7801 Masonboro<br>Sound Rd HOWBMP<br>Site Visit | 1 Homeowner  | Heal Our Waterways/<br>NHSWCD/ Rainstorm<br>Solutions | Site visit with<br>property owner to<br>discuss potential<br>participation in the<br>HOWBMP retrofit<br>program | 1 Homeowner  |
| 9/30/2019  | 4056 Tamarisk Lane<br>HOWBMP Site Visit         | 1 Homeowner  | NHSWCD/ Rainstorm<br>Solutions                        | Site visit with<br>property owner to<br>discuss potential<br>participation in the<br>HOWBMP retrofit<br>program | 1 Homeowner  |
| 9/30/2019  | 3529 Iris Street<br>HOWBMP Site Visit           | 1 Homeowner  | NHSWCD/ Rainstorm<br>Solutions                        | Site visit with<br>property owner to<br>discuss potential<br>participation in the<br>HOWBMP retrofit<br>program | 1 Homeowner  |
| 9/30/2019  | 205 White Oak Drive<br>HOWBMP Site Visit        | 1 Homeowner  | NHSWCD/ Rainstorm<br>Solutions                        | Site visit with<br>property owner to<br>discuss potential<br>participation in the<br>HOWBMP retrofit<br>program | 1 Homeowner  |
| 10/7/2019  | 226 Brightwood Drive<br>HOWBMP Site Visit       | 1 Homeowner  | NHSWCD/ Rainstorm<br>Solutions                        | Site visit with<br>property owner to<br>discuss potential<br>participation in the<br>HOWBMP retrofit<br>program | 1 Homeowner  |
| 10/7/2019  | 6233 Mallard Drive<br>HOWBMP Site Visit         | 1 Homeowner  | NHSWCD/ Rainstorm<br>Solutions                        | Site visit with<br>property owner to<br>discuss potential<br>participation in the<br>HOWBMP retrofit<br>program | 1 Homeowner  |
| 10/10/2019 | 2323 Oasis Drive<br>HOWBMP Site Visit           | 2 Homeowners | Heal Our Waterways/<br>NHSWCD/ Rainstorm<br>Solutions | Site visit with<br>property owner to<br>discuss potential<br>participation in the<br>HOWBMP retrofit<br>program | 2 Homeowners |
| 10/10/2019 | 3316 Bougainvillea<br>Way HOWBMP Site<br>Visit  | 2 Homeowners | Heal Our Waterways/<br>NHSWCD/ Rainstorm<br>Solutions | Site visit with<br>property owner to<br>discuss potential<br>participation in the<br>HOWBMP retrofit<br>program | 2 Homeowners |
| 10/10/2019 | 1205 Green Bay<br>Circle HOWBMP Site<br>Visit   | 1 Homeowner  | Heal Our Waterways/<br>NHSWCD/ Rainstorm<br>Solutions | Site visit with<br>property owner to<br>discuss potential<br>participation in the<br>HOWBMP retrofit<br>program | 1 Homeowner  |

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| 10/24/2010 | 100 Hooker Rd<br>HOWBMP Site Visit              | 1 Homeowner                                    | Heal Our Waterways/<br>NHSWCD/ Rainstorm<br>Solutions | Site visit with<br>property owner to<br>discuss potential<br>participation in the<br>HOWBMP retrofit<br>program | 1 Homeowner                                    |
| 11/14/2019 | 204 S. MacMillan Ave<br>HOWBMP Site Visit       | Winter Park<br>Elementary<br>Principal & Staff | Heal Our Waterways/<br>NHSWCD/ Rainstorm<br>Solutions | Site visit with<br>property owner to<br>discuss potential<br>participation in the<br>HOWBMP retrofit<br>program | Winter Park<br>Elementary<br>Principal & Staff |
| 11/21/2019 | 6252 Turtle Hall Drive<br>HOWBMP Site Visit     | 1 Homeowner                                    | Heal Our Waterways/<br>NHSWCD/ Rainstorm<br>Solutions | Site visit with<br>property owner to<br>discuss potential<br>participation in the<br>HOWBMP retrofit<br>program | 1 Homeowner                                    |
| 2/4/2020   | 109 Braxlo Lane<br>HOWBMP Site Visit            | 2 Homeowners                                   | Heal Our Waterways/<br>NHSWCD/ Rainstorm<br>Solutions | Site visit with<br>property owner to<br>discuss potential<br>participation in the<br>HOWBMP retrofit<br>program | 1 Homeowner                                    |
| 3/12/2020  | 6227 Riptide Drive<br>HOWBMP Site Visit         | 1 Homeowner                                    | NHSWCD/ Rainstorm<br>Solutions                        | Site visit with<br>property owner to<br>discuss potential<br>participation in the<br>HOWBMP retrofit<br>program | 1 Homeowner                                    |
| 3/17/2020  | 211 Myrtle Avenue<br>HOWBMP Site Visit          | 1 Homeowner                                    | NHSWCD/ Rainstorm<br>Solutions                        | Site visit with<br>property owner to<br>discuss potential<br>participation in the<br>HOWBMP retrofit<br>program | 1 Homeowner                                    |
| 5/20/2020  | 3605 Bohicket Way<br>HOWBMP Site Visit          | 1 Homeowner                                    | NHSWCD/ Rainstorm<br>Solutions                        | Site visit with<br>property owner to<br>discuss potential<br>participation in the<br>HOWBMP retrofit<br>program | 1 Homeowner                                    |
| 5/20/2020  | 3612 Needle Sound<br>Way HOWBMP Site<br>Visit   | 1 Homeowner                                    | NHSWCD/ Rainstorm<br>Solutions                        | Site visit with<br>property owner to<br>discuss potential<br>participation in the<br>HOWBMP retrofit<br>program | 1 Homeowner                                    |
| 5/20/2020  | 3513 Sentinel Court<br>HOWBMP Site Visit        | 1 Homeowner                                    | NHSWCD/ Rainstorm<br>Solutions                        | Site visit with<br>property owner to<br>discuss potential<br>participation in the<br>HOWBMP retrofit<br>program | 1 Homeowner                                    |
| 5/27/2020  | 7226 Masonboro<br>Sound Rd HOWBMP<br>Site Visit | 1 Homeowner                                    | Heal Our Waterways/<br>NHSWCD/ Rainstorm<br>Solutions | Site visit with<br>property owner to<br>discuss potential<br>participation in the<br>HOWBMP retrofit<br>program | 1 Homeowner                                    |
| 5/27/2020  | 2514 Royal Palm<br>Lane HOWBMP Site<br>Visit    | 2 Homeowners                                   | Heal Our Waterways/<br>NHSWCD/ Rainstorm<br>Solutions | Site visit with<br>property owner to<br>discuss potential<br>participation in the<br>HOWBMP retrofit<br>program | 2 Homeowners                                   |
| 5/27/2020  | 2510 Royal Palm<br>Lane HOWBMP Site<br>Visit    | 2 Homeowners                                   | Heal Our Waterways/<br>NHSWCD/ Rainstorm<br>Solutions | Site visit with<br>property owner to<br>discuss potential<br>participation in the<br>HOWBMP retrofit<br>program | 2 Homeowners                                   |

| <b>BMP Projects Installed</b> |   |                      |  |   |  |
|-------------------------------|---|----------------------|--|---|--|
| 6/30/2020                     | 1205 Green Bay Circle Drive Rain Garden | 2 Homeowners         | Heal Our Waterways/<br>NHSWCD/ Rainstorm Solutions | Installation of one rain garden         | <u>Total Volume Reduction:</u><br><b>112 cubic feet;<br/>837.82 gallons</b>  |
| 12/31/2019                    | 9 Merrimac Drive Cistern                | 2 Homeowners         | Heal Our Waterways/<br>NHSWCD/ Rainstorm Solutions | Installation of one cistern             | <u>Total Volume Reduction:</u><br><b>46 cubic feet;<br/>344.10 gallons</b>   |
| 10/31/2019                    | 245 Bradley Drive Rain Garden           | 2 Homeowners         | Heal Our Waterways/<br>NHSWCD/ Rainstorm Solutions | Installation of one rain garden         | <u>Total Volume Reduction:</u><br><b>92 cubic feet;<br/>688.21 gallons</b>   |
| 12/31/2019                    | 5417 Dawning Creek Way Cistern          | 2 Homeowners         | Heal Our Waterways/<br>NHSWCD/ Rainstorm Solutions | Installation of one cistern             | <u>Total Volume Reduction:</u><br><b>37 cubic feet;<br/>276.78 gallons</b>   |
| 6/30/2020                     | 205 White Oak Drive Rain Garden         | 1 Homeowner          | Heal Our Waterways/<br>NHSWCD/ Rainstorm Solutions | Installation of one rain garden         | <u>Total Volume Reduction:</u><br><b>156 cubic feet;<br/>1166.96 gallons</b> |
| 6/30/2020                     | 2323 Oasis Drive Rain Garden            | 2 Homeowners         | Heal Our Waterways/<br>NHSWCD/ Rainstorm Solutions | Installation of one rain garden         | <u>Total Volume Reduction:</u><br><b>135 cubic feet;<br/>1009.87 gallons</b> |
| 6/30/2020                     | 6227 Riptide Drive Rain Garden          | 2 Homeowners         | Heal Our Waterways/<br>NHSWCD/ Rainstorm Solutions | Installation of one rain garden         | <u>Total Volume Reduction:</u><br><b>138 cubic feet;<br/>1032.31 gallons</b> |
| 6/30/2020                     | Fire Station #7 Cistern                 | City Fire Department | Heal Our Waterways/Rainstorm Solutions             | Installation of one 1000-gallon cistern | <u>Total Volume Reduction:</u><br><b>134 cubic feet;<br/>1000 gallons</b>    |
| 6/30/2020                     | 325 Pemberton Drive Rain Barrel         | 1 Homeowner          | City of Wilmington/<br>NHSWCD/                     | One 60-gallon Rain Barrel               | <u>Total Volume Reduction:</u><br><b>8.021 cubic feet; 60 gallons</b>        |
| 6/13/2019                     | Fleet Road Rain Barrel                  | 1 Homeowner          | City of Wilmington/<br>NHSWCD/                     | One 80-gallon Rain Barrel               | <u>Total Volume Reduction:</u><br><b>10.694 cubic feet; 80 gallons</b>       |
| 2/20/2020                     | 3 Pine Valley Drive Rain Barrel         | 1 Homeowner          | City of Wilmington/<br>NHSWCD/                     | One 60-gallon Rain Barrel               | <u>Total Volume Reduction:</u><br><b>8.021 cubic feet; 60 gallons</b>        |
| 10/10/2019                    | 2323 Oasis Drive Rain Barrel #2         | 2 Homeowners         | City of Wilmington/<br>NHSWCD/                     | One 60-gallon Rain Barrel               | <u>Total Volume Reduction:</u><br><b>8.021 cubic feet; 60 gallons</b>        |
| 7/1/2019                      | 2323 Oasis Drive Rain Barrel #1         | 2 Homeowners         | City of Wilmington/<br>NHSWCD/                     | One 60-gallon Rain Barrel               | <u>Total Volume Reduction:</u><br><b>8.021 cubic feet; 60 gallons</b>        |



|            |   |                              |                              |  |  |
|------------|---|------------------------------|------------------------------|--|--|
| 8/15/2019  | 2017 MacCumber Lane Rain Barrel             | 1 Homeowner                  | Heal Our Waterways           | One 80-gallon Rain Barrel                                | <u>Total Volume Reduction:</u><br><b>10.694 cubic feet; 80 gallons</b>         |
| 3/17/2020  | Fire Station #9 Bald Cypress Plantings      | City Fire Department         | Heal Our Waterways           | Bald cypress trees planted at Fire Station 9             | <u>Total Volume Reduction:</u><br><b>1.46 cubic feet; 10.92 gallons</b>        |
| 3/17/2020  | Fire Station #9 Tulip Poplar Tree Plantings | City Fire Department         | Heal Our Waterways           | Tulip Poplar trees planted at Fire Station 9             | <u>Total Volume Reduction:</u><br><b>1.03 cubic feet; 7.70 gallons</b>         |
| 3/26/2020  | UNCW Pervious Pavement Lot EE               | UNCW                         | Heal Our Waterways/NCCF/UNCW | Pervious pavement in parking stalls                      | <u>Total Volume Reduction:</u><br><b>20,130 cubic feet; 150,582.87 gallons</b> |
| 3/26/2020  | UNCW Pervious Pavement Lot E                | UNCW                         | Heal Our Waterways/NCCF/UNCW | Pervious pavement in parking stalls                      | <u>Total Volume Reduction:</u><br><b>2,050 cubic feet; 15,335.07 gallons</b>   |
| 10/10/2019 | 1205 Green Bay Circle Drive Rain Barrel #1  | 2 Homeowners                 | City of Wilmington/ NHSWCD/  | One 80-gallon Rain Barrel                                | <u>Total Volume Reduction:</u><br><b>10.694 cubic feet; 80 gallons</b>         |
| 10/10/2019 | 1205 Green Bay Circle Drive Rain Barrel #2  | 2 Homeowners                 | City of Wilmington/ NHSWCD/  | One 80-gallon Rain Barrel                                | <u>Total Volume Reduction:</u><br><b>10.694 cubic feet; 80 gallons</b>         |
| 3/30/2020  | Long Leaf Hills Drive Redbuds               | City of Wilmington residents | City of Wilmington           | Eastern Redbud trees planted along Long Leaf Hills Drive | <u>Total Volume Reduction:</u><br><b>0.50 cubic feet; 3.74 gallons</b>         |
| 3/30/2020  | 6267 Hawksbill Drive Laurel Oak             | City of Wilmington residents | City of Wilmington           | Laurel Oak planted along Hawksbill Drive                 | <u>Total Volume Reduction:</u><br><b>0.33 cubic feet; 2.47 gallons</b>         |
| 3/30/2020  | 4704 Park Avenue Live Oak                   | City of Wilmington residents | City of Wilmington           | Live Oak planted along Park Avenue                       | <u>Total Volume Reduction:</u><br><b>0.58 cubic feet; 4.34 gallons</b>         |
| 3/30/2020  | 106 Pecan Avenue Sawtooth Oak Tree          | City of Wilmington residents | City of Wilmington           | Sawtooth Oak tree planted along Pecan Avenue             | <u>Total Volume Reduction:</u><br><b>0.42 cubic feet; 3.14 gallons</b>         |
| 3/30/2020  | 106 Pecan Avenue Pecan Tree                 | City of Wilmington residents | City of Wilmington           | Pecan tree planted along Pecan Avenue                    | <u>Total Volume Reduction:</u><br><b>0.48 cubic feet; 3.59 gallons</b>         |
| 6/30/2020  | 209 Pinecliff Drive Rain Barrel             | 1 Homeowner                  | City of Wilmington/ NHSWCD/  | One 80-gallon Rain Barrel                                | <u>Total Volume Reduction:</u><br><b>10.694 cubic feet; 80 gallons</b>         |
| 6/30/2020  | 3503 Kirby Smith Drive Rain Barrel          | 1 Homeowner                  | City of Wilmington/ NHSWCD/  | One 60-gallon Rain Barrel                                | <u>Total Volume Reduction:</u><br><b>8.021 cubic feet; 60 gallons</b>          |
| 6/30/2020  | 1203 Bayside Circle Rain Barrel             | 1 Homeowner                  | City of Wilmington/ NHSWCD/  | One 60-gallon Rain Barrel                                | <u>Total Volume Reduction:</u><br><b>8.021 cubic feet; 60 gallons</b>          |
| 6/30/2020  | 429 Stonewall Jackson Drive Rain Barrel     | 1 Homeowner                  | City of Wilmington/ NHSWCD/  | One 60-gallon Rain Barrel                                | <u>Total Volume Reduction:</u><br><b>8.021 cubic feet; 60 gallons</b>          |

|           |                                      |             |                                |                           |  |
|-----------|--------------------------------------|-------------|--------------------------------|---------------------------|--|
| 6/30/2020 | 2547 Croquet Drive Rain Barrel       | 1 Homeowner | City of Wilmington/<br>NHSWCD/ | One 60-gallon Rain Barrel | <u>Total Volume Reduction:</u><br><b>8.021 cubic feet; 60 gallons</b>  |
| 6/30/2020 | 3620 Saint Francis Drive Rain Barrel | 1 Homeowner | City of Wilmington/<br>NHSWCD/ | One 80-gallon Rain Barrel | <u>Total Volume Reduction:</u><br><b>10.694 cubic feet; 80 gallons</b> |
| 6/30/2020 | 3808 Sweetbriar Road Rain Barrel 1   | 1 Homeowner | City of Wilmington/<br>NHSWCD/ | One 80-gallon Rain Barrel | <u>Total Volume Reduction:</u><br><b>10.694 cubic feet; 80 gallons</b> |
| 6/30/2020 | 3808 Sweetbriar Road Rain Barrel 2   | 1 Homeowner | City of Wilmington/<br>NHSWCD/ | One 80-gallon Rain Barrel | <u>Total Volume Reduction:</u><br><b>10.694 cubic feet; 80 gallons</b> |
| 6/30/2020 | Brightwood Drive Rain Barrel 1       | 1 Homeowner | City of Wilmington/<br>NHSWCD/ | One 80-gallon Rain Barrel | <u>Total Volume Reduction:</u><br><b>10.694 cubic feet; 80 gallons</b> |
| 6/30/2020 | Brightwood Drive Rain Barrel 2       | 1 Homeowner | City of Wilmington/<br>NHSWCD/ | One 80-gallon Rain Barrel | <u>Total Volume Reduction:</u><br><b>10.694 cubic feet; 80 gallons</b> |
| 6/30/2020 | 5812 Perennial Lane Rain Barrel 1    | 1 Homeowner | City of Wilmington/<br>NHSWCD/ | One 80-gallon Rain Barrel | <u>Total Volume Reduction:</u><br><b>10.694 cubic feet; 80 gallons</b> |
| 6/30/2020 | 5812 Perennial Lane Rain Barrel 2    | 1 Homeowner | City of Wilmington/<br>NHSWCD/ | One 80-gallon Rain Barrel | <u>Total Volume Reduction:</u><br><b>10.694 cubic feet; 80 gallons</b> |
| 6/30/2020 | 7024 Orchard Trace Rain Barrel       | 1 Homeowner | City of Wilmington/<br>NHSWCD/ | One 60-gallon Rain Barrel | <u>Total Volume Reduction:</u><br><b>8.021 cubic feet; 60 gallons</b>  |
| 6/30/2020 | Panamera Way Rain Barrel             | 1 Homeowner | City of Wilmington/<br>NHSWCD/ | One 60-gallon Rain Barrel | <u>Total Volume Reduction:</u><br><b>8.021 cubic feet; 60 gallons</b>  |

COW = City of Wilmington

HOW = Heal Our Waterways Program

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

| BMP Owner   | BMP Type              | Gallons          | Volume Reduction (cu ft) | Volume Reduction (ac ft) |
|---|-----------------------|------------------|--------------------------|--------------------------|
| <b>Bradley Creek Watershed Volume Reduction Data</b>    |                       |                  |                          |                          |
| 245 Bradley Drive Rain Garden                           | Rain Garden           | 688.21           | 92.00                    | 0.002112                 |
| 2017 MacCumber Lane Rain Barrel                         | Rain Barrel           | 80.00            | 10.69                    | 0.000246                 |
| Fire Station #9 Bald Cypress Plantings                  | Tree Planting         | 10.92            | 1.46                     | 0.000034                 |
| Fire Station #9 Tulip Poplar Tree Plantings             | Tree Planting         | 7.70             | 1.03                     | 0.000024                 |
| 6227 Riptide Drive Rain Garden                          | Rain Garden           | 1032.31          | 138.00                   | 0.003168                 |
| UNCW Pervious Pavement Lot EE                           | Pervious Cement       | 150582.87        | 20130.00                 | 0.462122                 |
| UNCW Pervious Pavement Lot E                            | Pervious Cement       | 15335.07         | 2050.00                  | 0.047062                 |
| Pecan Avenue Sawtooth Oak                               | Tree Planting         | 3.14             | 0.42                     | 0.000010                 |
| Pecan Avenue Pecan Tree                                 | Tree Planting         | 3.59             | 0.48                     | 0.000011                 |
| 1203 Bayside Circle Rain Barrel                         | 60-gallon Rain Barrel | 60.00            | 8.02                     | 0.000184                 |
| 5812 Perennial Lane Rain Barrel 1                       | 80-gallon Rain Barrel | 80.00            | 10.69                    | 0.000246                 |
| 5812 Perennial Lane Rain Barrel 2                       | 80-gallon Rain Barrel | 80.00            | 10.69                    | 0.000246                 |
| 1205 Green Bay Circle Drive Rain Barrel #1              | 60-gallon Rain Barrel | 60.00            | 8.02                     | 0.000184                 |
| 1205 Green Bay Circle Drive Rain Garden                 | Rain Garden           | 837.82           | 112.00                   | 0.002571                 |
| 1205 Green Bay Circle Drive Rain Barrel #2              | 80-gallon Rain Barrel | 80.00            | 10.69                    | 0.000246                 |
| <b>TOTAL BRADLEY CREEK WATERSHED VOLUME REDUCTION:</b>  |                       | <b>168941.62</b> | <b>22584.21</b>          | <b>0.518463</b>          |
| <b>TOTAL NUMBER OF PROJECTS BRADLEY CREEK WATERSHED</b> |                       |                  |                          | <b>15</b>                |
| <b>Drains To ICW2 Volume Reduction Data</b>             |                       |                  |                          |                          |
| <b>TOTAL DRAINS TO ICW2 VOLUME REDUCTION:</b>           |                       | <b>0</b>         | <b>0</b>                 | <b>0</b>                 |
| <b>TOTAL NUMBER OF PROJECTS DRAINS TO ICW2</b>          |                       |                  |                          | <b>0</b>                 |
| <b>Hewletts Creek Watershed Volume Reduction Data</b>   |                       |                  |                          |                          |
| 5417 Dawning Creek Way Cistern                          | Cistern               | 276.78           | 37.00                    | 0.000849                 |
| 9 Merrimac Drive Cistern                                | Cistern               | 344.10           | 46.00                    | 0.001056                 |
| 205 White Oak Drive Rain Garden                         | Rain Garden           | 1166.96          | 156.00                   | 0.003581                 |
| 2323 Oasis Drive Rain Garden                            | Rain Garden           | 1009.87          | 135.00                   | 0.003099                 |
| 2323 Oasis Drive Rain Barrel #1                         | 60-gallon Rain Barrel | 60.00            | 8.02                     | 0.000184                 |
| 2323 Oasis Drive Rain Barrel #2                         | 60-gallon Rain Barrel | 60.00            | 8.02                     | 0.000184                 |
| Fire Station #7 Cistern                                 | 1000-gallon Cistern   | 1000.00          | 133.68                   | 0.003069                 |
| Fleet Road Rain Barrel                                  | 80-gallon Rain Barrel | 80.00            | 10.69                    | 0.000246                 |
| 325 Pemberton Drive Rain Barrel                         | 60-gallon Rain Barrel | 60.00            | 8.02                     | 0.000184                 |
| Long Leaf Hills Drive Redbuds                           | Tree Planting         | 3.74             | 0.50                     | 0.000011                 |

|  |                       |                  |                        |                   |
|--|-----------------------|------------------|------------------------|-------------------|
| Park Avenue Live Oak                                     | Tree Planting         | 4.34             | 0.58                   | 0.000013          |
| 209 Pinecliff Drive Rain Barrel                          | 80-gallon Rain Barrel | 80.00            | 10.69                  | 0.000246          |
| 3503 Kirby Smith Drive Rain Barrel                       | 60-gallon Rain Barrel | 60.00            | 8.02                   | 0.000184          |
| 429 Stonewall Jackson Drive Rain Barrel                  | 60-gallon Rain Barrel | 60.00            | 8.02                   | 0.000184          |
| 2547 Croquet Drive Rain Barrel                           | 60-gallon Rain Barrel | 60.00            | 8.02                   | 0.000184          |
| 3620 Saint Francis Drive Rain Barrel                     | 80-gallon Rain Barrel | 80.00            | 10.69                  | 0.000246          |
| 3808 Sweetbriar Road Rain Barrel 1                       | 80-gallon Rain Barrel | 80.00            | 10.69                  | 0.000246          |
| 3808 Sweetbriar Road Rain Barrel 2                       | 80-gallon Rain Barrel | 80.00            | 10.69                  | 0.000246          |
| Brightwood Drive Rain Barrel 1                           | 80-gallon Rain Barrel | 80.00            | 10.69                  | 0.000246          |
| Brightwood Drive Rain Barrel 2                           | 80-gallon Rain Barrel | 80.00            | 10.69                  | 0.000246          |
| 7024 Orchard Trace Rain Barrel                           | 60-gallon Rain Barrel | 60.00            | 8.02                   | 0.000184          |
| Panamera Way Rain Barrel                                 | 60-gallon Rain Barrel | 60.00            | 8.02                   | 0.000184          |
| 3 Pine Valley Drive Rain Barrel                          | 60-gallon Rain Barrel | 60.00            | 8.02                   | 0.000184          |
| <b>TOTAL HEWLETTS CREEK WATERSHED VOLUME REDUCTION:</b>  |                       | <b>4905.78</b>   | <b>655.81</b>          | <b>0.015055</b>   |
| <b>TOTAL NUMBER OF PROJECTS HEWLETTS CREEK WATERSHED</b> |                       |                  |                        | <b>23</b>         |
| <b>Drains To ICW3 Volume Reduction Data</b>              |                       |                  |                        |                   |
| Hawksbill Drive Laurel Oak                               | Tree Planting         | 2.47             | 0.33                   | 0.000008          |
| <b>TOTAL DRAINS TO ICW3 VOLUME REDUCTION:</b>            |                       | <b>2.47</b>      | <b>0.33</b>            | <b>0.000008</b>   |
| <b>TOTAL NUMBER OF PROJECTS DRAINS TO ICW3</b>           |                       |                  |                        | <b>1</b>          |
| <b>TOTAL COMBINED VOLUME REDUCTION (All Watersheds):</b> |                       |                  |                        |                   |
| <b>TOTAL COMBINED VOLUME REDUCTION (All Watersheds):</b> |                       | <b>173849.87</b> | <b>23240.35</b>        | <b>0.533526</b>   |
| <b>TOTAL NUMBER OF PROJECTS (All Watersheds)</b>         |                       |                  |                        |                   |
| <b>Volume Reduction Goals</b>                            | <b>Goal (ac.ft)</b>   | <b>Gallons</b>   | <b>Actual (ac.ft.)</b> | <b>% Achieved</b> |
| <b>Bradley Creek FY 19</b>                               | <b>0.15</b>           | <b>168941.62</b> | <b>0.518463</b>        | <b>345.64</b>     |
| <b>Hewletts Creek FY19</b>                               | <b>1</b>              | <b>4908.25</b>   | <b>0.015055</b>        | <b>1.51</b>       |



FY 1920

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

## **HOWBMP Quarterly Progress Report #4: April 1 – June 30, 2020**

### **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 a project manager for the Heal Our Waterways- Best Management Practice Installations Program (HOWBMP). The HOWBMP Program supports the council-adopted Bradley & Hewletts Creek Watershed Restoration Plan, with the goal of reducing polluted stormwater runoff entering the creeks in order to improve water quality.

NHSWCD will provide project management and oversight for the installation of BMPs within the designated watersheds in conjunction with the Heal Our Waterways program. 'Project management' includes activities such as the execution of a BMP project from start to finish including program promotion, identifying sites and projects, collaboration, current owner title search, obtaining HOA covenants/restrictions/permits, budgeting, technical assistance, design/engineering, permitting, contracting, construction, homeowner/business/media relations, selection and reimbursement of contractors, monitoring, and reporting.

BMPs will be identified for the purpose of reducing runoff volume and pollution into Hewletts Creek, Bradley Creek, and the associated areas that drain directly into the Intracoastal Waterway. A potential BMP project's location, type, estimated volume reduction, and proposed budget will require written notification to, and approval from, City Stormwater Services prior to any design, construction or other contracted work. Acceptable BMPs are listed on the GIS Atlas form.

A recommended minimum of 4-6 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 can be prioritized based on cost per cubic foot of volume reduction, as necessary.

During site evaluations, NHSWCD will educate property owners about the HOW Program (i.e. information about the specific BMP, maintenance, annual spot checks, HOW Brochure distribution, etc.) Once BMPs are installed, NHSWCD will provide the property owner with more specific BMP maintenance hardcopy information, Creek Friendly yard sign, 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 database for all installations and submit it at the end of each annual contract period.

The BMP installations will be funded by the City with a lump-sum allocation of \$20,000 to NHSWCD at the beginning of the contract period. Any unused funds from this allocation will be reimbursed to the City at the end of the contract period. NHSWCD will also reimburse the City for any returned funds from non-compliant property owners. NHSWCD will issue any necessary tax forms to contractors or property owners.

## **Reporting**

### **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 (1<sup>st</sup> Quarter); October 1 - Dec. 31 (2<sup>nd</sup> Quarter); January 1 -March 31 (3<sup>rd</sup> Quarter); April 1 - June 30 (4<sup>th</sup> Quarter). The 4th quarter progress report will serve as a compiled year-end summary report and will be included in the City's NPDES annual report.

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

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

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

The quarterly invoice should use the supplied template which shows the % of each service completed each quarter, invoice amount, and amount remaining to be paid. Invoices will be paid once the quarterly progress report and invoice(s) are received and reviewed by the City

for adequate progress. Non-performance or inadequate progress may result in non-payment or reduction of payment. No pre-payment of services will occur.

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

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

For each BMP project, NHSWCD will provide the City with the necessary BMP project packet to include:

BMP Info-

- Heal Our Waterways GIS Atlas Form
- Calculations sheet from Engineer - sizing and volume calculations
- Specific BMP design (ie. Rain garden, bioretention area, cistern, etc.)

Site Specific Info-

- Site plan (include aerials if available)
- Before & After photos of site (pre-BMP & post-BMP)
- Proof of property ownership through title search
- HOA covenants & restrictions, ownership title, stormwater permits, etc.
- Copy of written email request/approval for BMP from City

Contractor Info-

- Itemized Contractor Invoice(s) – for design, installation, plants, etc. (Contractor invoice(s) should also be included on the quarterly invoice.)

Homeowner Info-

- Maintenance Agreement with homeowner/business owner
- HOWBMP Pre-Inspection Checklist

The annual, cumulative spot check tracking summary will be submitted annually by the end of each contract period.

### **Fee Schedule**

**Lump Sum:** NHSWCD shall receive a lump sum of **\$20,000** annually upon execution and approval of this contract to specifically fund Best Management Practice (BMP) installations in the Hewletts and Bradley Creek Watersheds. 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.

**Contract Fee:** NHSWCD shall provide quarterly reports, invoices, and BMP project packets according to the schedule defined in Reporting for the total fee amount of **\$7,318** to execute the HOWBMP program.

**Total Cost:** The total cost of the Project shall not exceed **\$27,318** 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 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**

### July 1 - September 30, 2019

Completed site visits at the following 14 addresses:

- 5006 Carleton Dr., Unit 135 on 7/2/2019 (suggested a rain garden and possible pervious surface conversion),
- 245 Bradley Dr. on 7/2/2019 (Suggested a backyard rain garden),
- 5104 Treybrooke Dr. on 7/2/2019 (suggested a front and back rain garden),
- 5618 Greenville Loop Rd on 7/2/2019 (Suggested a backyard rain garden and a potential cistern in the front),
- 9 Merrimac Dr. on 7/8/2019 (Suggested a cistern),
- 5417 Dawning Creek Way on 7/8/2019 (Suggested a rain barrel or cistern),
- Lions Gate Community, 1800 Eastwood Rd on 7/8/2019 (Suggested a rain garden and swale and possible cost share agreement),
- 309 Yorkshire Ln on 7/9/2019 (Suggested a backyard or front yard rain garden),
- 206 West Blackbeard Rd. on 8/7/2019 (Suggested possible permeable surface conversion or backyard rain garden, but must wait until they install gutter system),
- 112 King Arthur Dr. on 8/15/2019 (Suggested pervious pavement conversion of driveway),
- 7801 Masonboro Sound Rd. on 8/22/2019 (Suggested a rain garden),
- 4056 Tamarisk Lane on 9/30/2019 (Site visit concluded that property layout was not conducive to any suggested BMP),
- 3529 Iris Street on 9/30/2019 (suggested rain garden), and
- 205 White Oak Drive on 9/30/2019 (suggested front yard rain garden and possible tree planting).

Tabling at the Native Plant Festival helped recruit 3 of the 14 site visits.

Approval for 3 sites has been made by HOW for the fall season and one site is set to begin construction in the spring. A cistern will be installed at 9 Merrimac Drive, a rain garden will be installed at 245 Bradley Drive, and a cistern is set to be installed at 5417 Dawning Creek Way all this fall. The approved rain garden waiting until spring to be installed is at 6935 Masonboro Sound Rd. More approvals are being explored for the spring.

### October 1 - December 31, 2019



Completed site visits at the following 8 addresses:

- 226 Brightwood Drive on 10/7/2019 (Suggested rain garden and possible pervious paving).
- 6233 Mallard Dr. on 10/7/2019 (Suggested a rain garden).
- 3316 Bougainvillea Way on 10/10/2019 (Suggested a rain garden).
- 2323 Oasis Dr. on 10/10/2019 (Suggested a front yard rain garden).
- 1205 Green Bay Circle on 10/10/2019 (Suggested a rain garden)
- 100 Hooker Rd. on 10/24/2019 (Suggested a rain garden and long swale/rain garden).
- 6252 Turtle Hall Dr. on 11/21/2019 (Suggested a rain garden, swale, and interested in pervious pavement).
- 204 S. MacMillan Ave (Winter Park Elementary School) on 11/14/2019 (Suggested a rain garden and tree planting).

There was also approval for 3 more sites at the following addresses:

- 2323 Oasis Dr. for a front yard rain garden.
- 205 White Oak Drive for a front yard rain garden.
- 6935 Masonboro Sound Rd for a rain garden.

All rain gardens are on hold to be installed in the spring when there is greater plant availability.

Three projects from the previous quarter have been installed. A cistern at 9 Merrimac Drive has been installed and the final invoice totals \$1,981.06, completed on 12/12/2019. A cistern has also been installed at 5417 Dawning Creek Way and the final invoice totals \$1,925.49, completed on 12/12/2019. A rain garden at 245 Bradley Drive was installed with an invoice of \$4,518.80 completed on 12/11/19.

The Soil & Water Technician attended and assisted with a Rain Garden Workshop held on October 14<sup>th</sup>, 2019 by HOW Watershed Coordinator and NC State Cooperative Extension.

A stormwater presentation was held at a Lions Gate HOA meeting on October 21, 2019. This presentation and meeting was requested by the Lions Gate HOA board members to obtain more information and ask questions about a proposed rain garden and swale project on their property. The board did not support a partial cost share agreement between the HOA and HOW for the funding of the swale and rain garden project.

### **January 1 - March 31, 2020**

Completed site visits at the following 3 addresses:

- 109 Braxlo Lane on 2/4/2020 (Suggested a rain garden or wetland depending on the perc test)
- 6227 Riptide Drive on 3/12/2020 (Suggested rain garden and tree plantings).
- 211 Myrtle Ave on 3/17/2020 (suggested Cistern for irrigation, looking into cistern for grey water application).

There are 2 rain gardens that are on schedule to be installed soon. They are located at: 2323 Oasis Drive and 205 White Oak Drive. One approved rain garden installation is still being considered by the homeowner at 6935 Masonboro Sound Road.

A site re-visit was performed on 3/17/20 at 112 King Arthur Dr. to solidify pervious pavement options with the homeowner.

Follow-up site visits for the installed projects was done on 1/21/20. Projects were checked and homeowners were consulted.

### April 1 - June 30, 2020

Completed site visits at the following 6 addresses:

- 3605 Bohicket Way (Suggested a cistern)
- 3612 Needle Sound Way (Suggested a rain garden)
- 3513 Sentinel Ct (Suggested tree plantings and possible wetland)
- 7226 Masonboro Sound Rd. (Suggested a rain garden and possible tree planting)
- 2514 Royal Palm Lane (Suggested a rain garden)
- 2510 Royal Palm Lane (Suggested a rain garden and possible tree planting)

Due to the COVID-19 related stay at home order for NC, a site visit waiting list was made. The remaining 9 households interested in a site visit will be scheduled in July.

Completed Follow-up site visits on May 22<sup>nd</sup>, 2020 for BMPs installed in the 3<sup>rd</sup> quarter at the following 2 addresses:

- 2323 Oasis Dr. for a front yard rain garden for \$3,115.64.
- 205 White Oak Drive for a front yard rain garden for \$2,435.84

One approved rain garden project at 6935 Masonboro Sound Rd decided to furlough their participation in the program until the next fiscal year. They were told their project priority was reset and will be moved to the end of the waiting list.

Annual spot check site visits were performed on June 11<sup>th</sup>. A total of 12 projects were checked and 4 of the 12 met compliance standards, which includes an adequate amount of mulch, low amount of weeds, low amount of debris litter such as leaves, and at least 75% native plant cover. Most of the remaining 8 BMPs out of compliance have minor changes that need to be completed by July 31<sup>st</sup>, such as bare soil spots covered by an inch and a half of mulch, weeding, debris removed, or the addition of native plants. Follow-up compliance checks will be performed beginning of August on the 8 sites currently out of compliance.

There were 5 properties which phased out of the HOWBMP program this year. These addresses have participated in annual spot checks for 5 years as required by the program. These properties are:

- 215 Braxlo Lane, Wilmington, NC
- 226 Braxlo Ln, Wilmington NC
- 236 Brightwood Rd, Wilmington, NC
- 6913 Eschol Ct, Wilmington, NC
- 6133 Chilcot Ln, Wilmington, NC

These properties were sent a certified letter thanking them for their participation in the program and hopefully their continued participation and maintenance of their BMP(s). A S&WCD contact name, email, and phone number was given if they have any questions.

The approval and installation of 2 additional projects will close out the fiscal year. These projects are:

- A rain garden at 1205 Green Bay Cir, installed by Rain Storm Solutions, with an invoice of \$2,986.77
- A Rain garden at 6227 Riptide Dr., installed by Rain Storm Solutions, with an invoice of \$3,036.40.

Follow-up site visits for these two rain gardens was performed on June 30<sup>th</sup>, 2020.

**Report Compiled By:** Dru Harrison & Haley Moccia

**Date:** 6/30/2020

## **APPENDIX I: REGULATORY ENFORCEMENT ACTIONS**

In 19-20 the Public Services Department Compliance Officer provided stormwater education and investigated approximately 90 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 2019-2020**

Reporting period (FY20) July 1, 2019- June 30, 2020

| Nature of Complaint         | Number of Reports | Resolved thru Public Education | NOVs Incidents | Referred to DWQ | # Civil Penalties |
|-----------------------------|-------------------|--------------------------------|----------------|-----------------|-------------------|
| Pet Waste                   | 13                | 92%                            | 1              | N/A             | 0                 |
| Outreach                    | 7                 |                                | 0              | N/A             | N/A               |
| Illicit Discharge/Sediment  | 70                | 80.0%                          | 14             | 2               | 0                 |
| <i>Illicit Connection</i>   | 3                 | 66.7%                          | 1              | 0               | 0                 |
| <i>Dry Weather Flow</i>     | 0                 | 100.0%                         | 0              | 0               | 0                 |
| <i>SSO</i>                  | 4                 | 25.0%                          | 3              | 2               | 0                 |
| <b>Totals for 1,2 and 3</b> | <b>90</b>         | <b>79%</b>                     | <b>19</b>      | <b>4</b>        | <b>0</b>          |

### **CIVIL PENALTIES 2019-2020**

| Nature of Compliant | Responsible Party | Address of violation | Date of Violation | Total Penalty |
|---------------------|-------------------|----------------------|-------------------|---------------|
| N/A                 | N/A               | N/A                  | N/A               | \$0.00        |

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**

| <b>Watershed</b> | <b>Latitude</b> | <b>Longitude</b> | <b>Size</b> | <b>Material</b> | <b>Number</b> | <b>Classification</b>          | <b>Map Date</b> | <b>Condition</b> |
|------------------|-----------------|------------------|-------------|-----------------|---------------|--------------------------------|-----------------|------------------|
| 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**

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### 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: (1) 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)(14). 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.