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, 2018 – June 30, 2019

REPORTING CERTIFICATION

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

10/28/19

Fredric T. Royal, PE, CFM — Date

Manager, Stormwater Services

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INTRODUCTION

Stormwater Management Plan Overview

The North Carolina Division of Water Quality issued NPDES Phase II Permit NCS000406 to the City of Wilmington effective February 1, 2018. The Stormwater Management Plan is the City of Wilmington's program to comply with NPDES Phase II permit NCS000406 for stormwater discharges from Small Municipal Separate Storm Sewer Systems (MS4s). The plan defines strategies and guidelines necessary for protecting water quality and reducing pollutant discharges to the maximum extent practicable. The plan also includes reporting results for the current yearly reporting period from July 1, 2018 to June 30, 2019.

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

- Continued implementation of amended ordinances related to Post Construction and Illicit Discharge BMPs.
- Continued mapping of stormwater infrastructure along with improvements to the GIS database design.
- Continuation of Public Outreach and Public Participation efforts.
- Continued implementation of SPPP and SPCC plans and inventory of municipally owned operations with the potential to pollute.
- 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 their permit. Considerable progress related to Illicit Discharge Detection and Elimination has been made during the past year with respect to dry weather flow monitoring and planning. 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.

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 two semi-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 or stormwater control measures (SCM's) to improve water quality and reduce the volume of stormwater runoff.

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. Porous 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

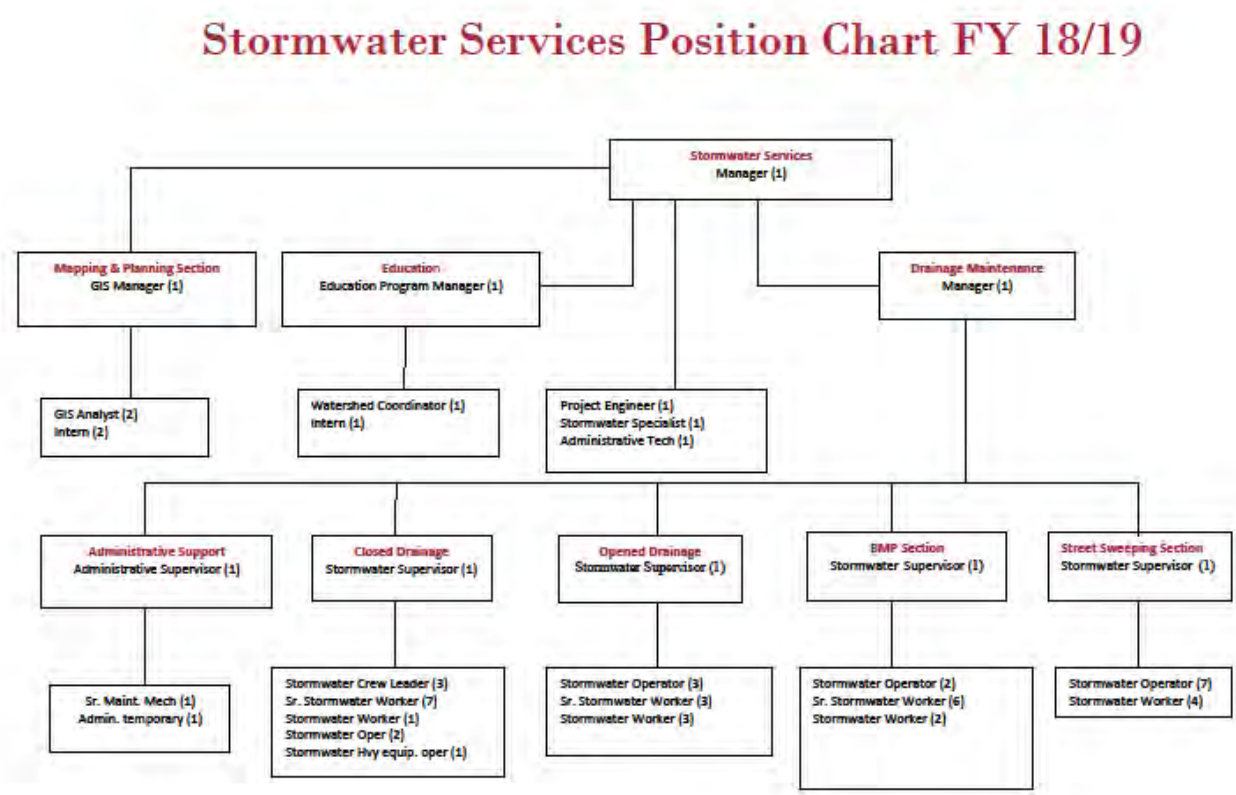
Water quality monitoring is executed by the University of North Carolina at Wilmington under annual contract with the City. Monitoring is performed on specific creeks and waterways within the City limits. Monitoring tests for specific pollutants and resulting data is used to plan water quality improvements 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.

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



Estimated FY 18-19 Stormwater Management Fund Budget for NPDES

	FY 18-19 Adopted	FY 19-20 Adopted	
REVENUES			
Storm Water Utility Fees	8,570,211	8,940,758	
City Streets Storm Water Fees	2,742,393	2,839,062	
Storm Water Discharge permits	50,000	100,100	
NCDOT Drainage Maintenance	37,000	37,000	
Interest Earnings	164,860	164,680	
Miscellaneous	-	-	
Appropriated Fund Balance	212,475	-	
TOTAL REVENUES	11,776,939	12,081,600	
EXPENDITURES			
Public Services	5,530,674	6,547,294	
Non-departmental	1,026,322	1,554,865	
Debt Service	1,843,480	1,841,944	
Contingency	76,463	-	
Transfer to Capital Project Fund	3,300,000	2,137,497	
TOTAL EXPENDITURES	11,776,939	12,081,600	[1]

[1] The FY 2020 budget was adopted by the Wilmington City Council on June 18, 2019.

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 2018-2019, 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

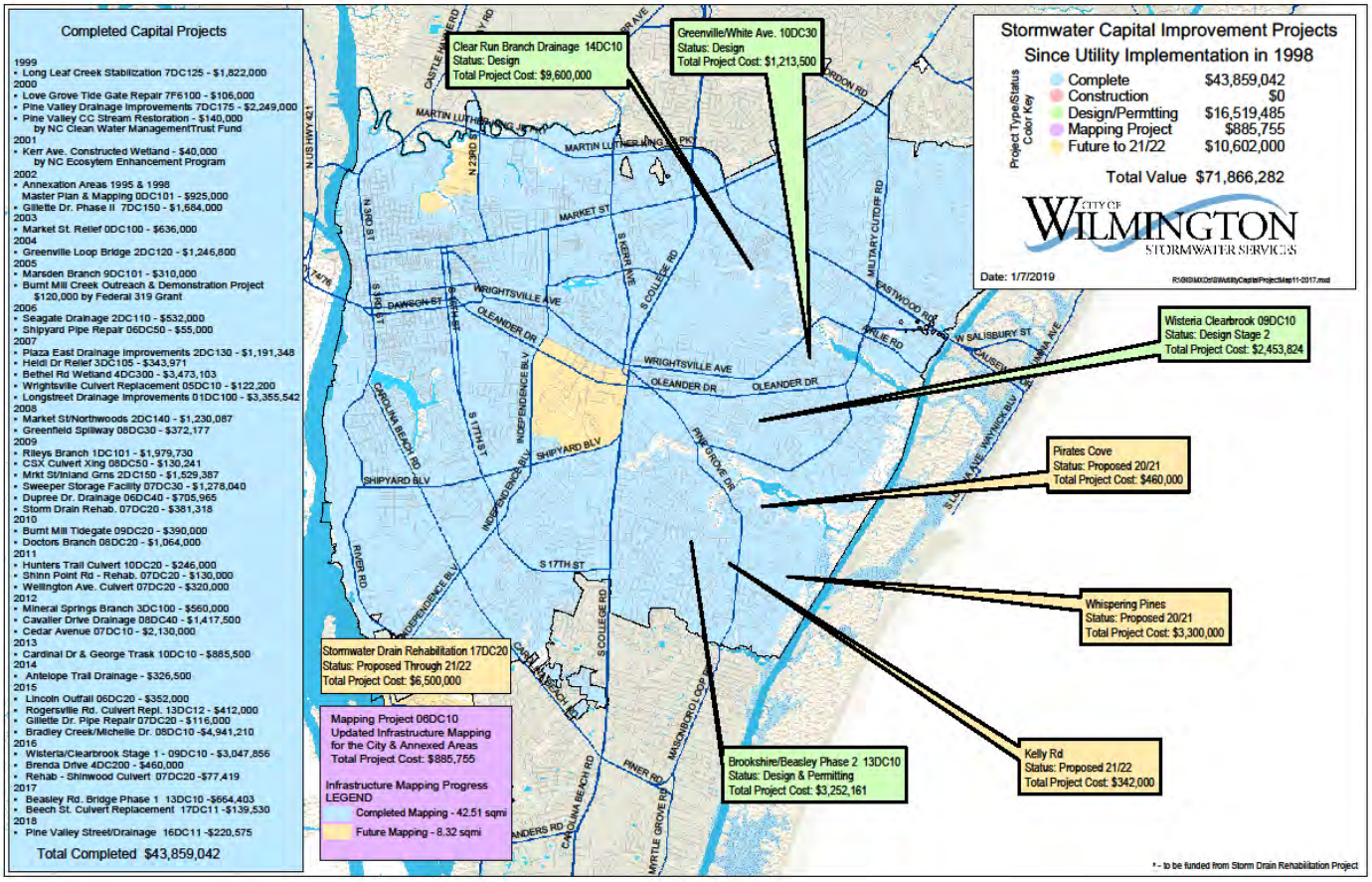
Reports of illicit discharges are addressed on a case by case basis. Informational posters and brochures for general use have been developed for distribution and others for specific common source types. These posters are distributed to specific types of businesses to display for employees in restaurants,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

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

Capital Improvements



In-House Projects

Location	Pipe				Structures			BMP			**Total Cost**
	Amt.	Size	Type	Cost	Amt.	Type	Cost	Amt.	Type	Cost	
111 Lansdowne Rd	32 Ft.	18"	RCP	$ 7,848.32							$ 7,848.32
Shell Rd Village & Wrighsville Ave.	67 Ft.	24"	ADS Double wall	$ 8,397.18	2	Casting, manhole complete, 24" x 8"	$ 8,351.46				$ 16,748.64
3308 Grey Leaf Dr					1 1	Specialty made bottom, 5 x 5 Specialty made top, 5 x 5	$ 8,704.25				$ 8,704.25
Wrighsville Ave & Oak Grove Terrace								1	4' swale	$ 1,836.06	$ 1,836.06
Total				**$ 16,245.50**			**$ 17,055.71**			**$ 1,836.06**	**$ 35,137.27**

Note: Due to Hurricane Florence emergency maintenance requirements, the in-house projects was reduced to those listed above.

Operations and Maintenance

Yearly Maintenance Activities Chart

	Amount	Unit of Measure	Total Labor Hrs.		Total Cost
SECTION 1: CONSTRUCTION					
C-1 Construction - Structure	3.00	each	314.00	$	18,004.25
C-1 Construction - Pipe	99.00	ft.	237.50	$	16,245.50
C-2 Construction - Flume			-	$	-
C-3 Construction - Ditch	1.00	each	34.00	$	1,836.06
C-3 Construction - BMP	-	each	-	$	-
C-0 Construction - Stock pile material	89.00	load	117.75	$	7,840.94
C-0 Construction - Plan work			54.00	$	2,421.25
			757.25	**$**	**46,348.00**
SECTION 2: INSPECTION					
I-1 Inspection - Closed			3,128.90	$	114,568.85
I-1 Inpection - Video	61,733.00	ft.	1,306.50	$	34,848.58
I-1 Inspection-Video data management			38.00	$	961.82
I-1 Inspection-new system			-	$	-
I-1 Inspection-Survey			15.00	$	573.95
I-2 Inspection-Open			608.00	$	19,274.75
I-3 Inspection-BMP	68.00	each	111.50	$	3,138.10
I-3 Inspection-Lake			-	$	-
I-4 Inspection-Tide gate			-	$	-
I-0 Inspection-Miscellaneous			-	$	-
I-0 Inspection-Plan work			158.50	$	6,584.30
			5,366.40	**$**	**179,950.35**
SECTION 3: MAINTENANCE					
M-1 Maintenance-BMP	243.00	each	1,966.50	$	73,764.91
M-1 Maintenance-Right of Way			2,190.00	$	94,607.64
M-2 Maintenance-Ditching manual	173,011.00	ft.	3,056.00	$	104,513.05
M-3 Maintenance-Ditching mechanical	19,657.00	ft.	2,393.00	$	162,695.01
M-4 Maintenance-Culvert	78.00	each	14,050.00	$	4,507.17
M-5 Maintenance-Pipe	66,916.00	ft.	1,791.00	$	91,887.00
M-5 Maintenance-Structure	8,468.00	each	2,667.00	$	121,570.88
M-5 Maintenance-Reset cover	609.00	each	265.50	$	8,251.82
M-6 Maintenance-Lake	23.00	each	126.00	$	5,163.45
M-7 Maintenance-Mowing	258,016.75	ft.	1,263.75	$	98,150.33
M-7 Maintenance-Mowing right of way	413.26	acre	149.50	$	14,196.28
M-8 Maintenance-Tide gate	4.00	each	33.60	$	1,171.56
M-9 Maintenance-Sweep streets	7,949.33	mile	4,599.50	$	417,558.33
M-9 Maintenance-Sweep support			2,117.50	$	149,383.83
M-10 Maintenance-Haul waste	315.00	load	819.75	$	48,124.61
M-10 Maintenance-Screen material			-	$	-
M-11 Maintenance-Vehicle			1,806.00	$	155,869.72
M-0 Maintenance-Yard			421.25	$	15,880.51
M-0 Maintenance- Ditching (creek walk thru)	18820.00	ft.	1,586.00	$	54,785.80
M-0 Maintenance-Plan work			6.00	$	240.64
			41,307.85	**$**	**1,622,322.54**
SECTION 4: REPAIR					
R-1 Repair-Pipe failure	134.00	each	4,376.60	$	237,369.89
R-2 Repair Pipe work	983.00	ft.	1,370.00	$	98,196.21
R-2 Repair-Convert structure	-	each	-		
R-3 Repair Structure	63.00	each	1,365.50	$	71,973.34
R-4 Repair Erosion	414.00	ft.	200.50	$	15,530.16
R-5 Repair Replace cover	155.00	each	178.50	$	24,337.38
R-5 Repair Tidegate	-	each	-	$	-
R-0 Repair- Plan work			456.00	$	24,315.22
			7,947.10	**$**	**471,722.20**

Water Quality

Monitoring Program Overview

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

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

Water Quality Methods

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

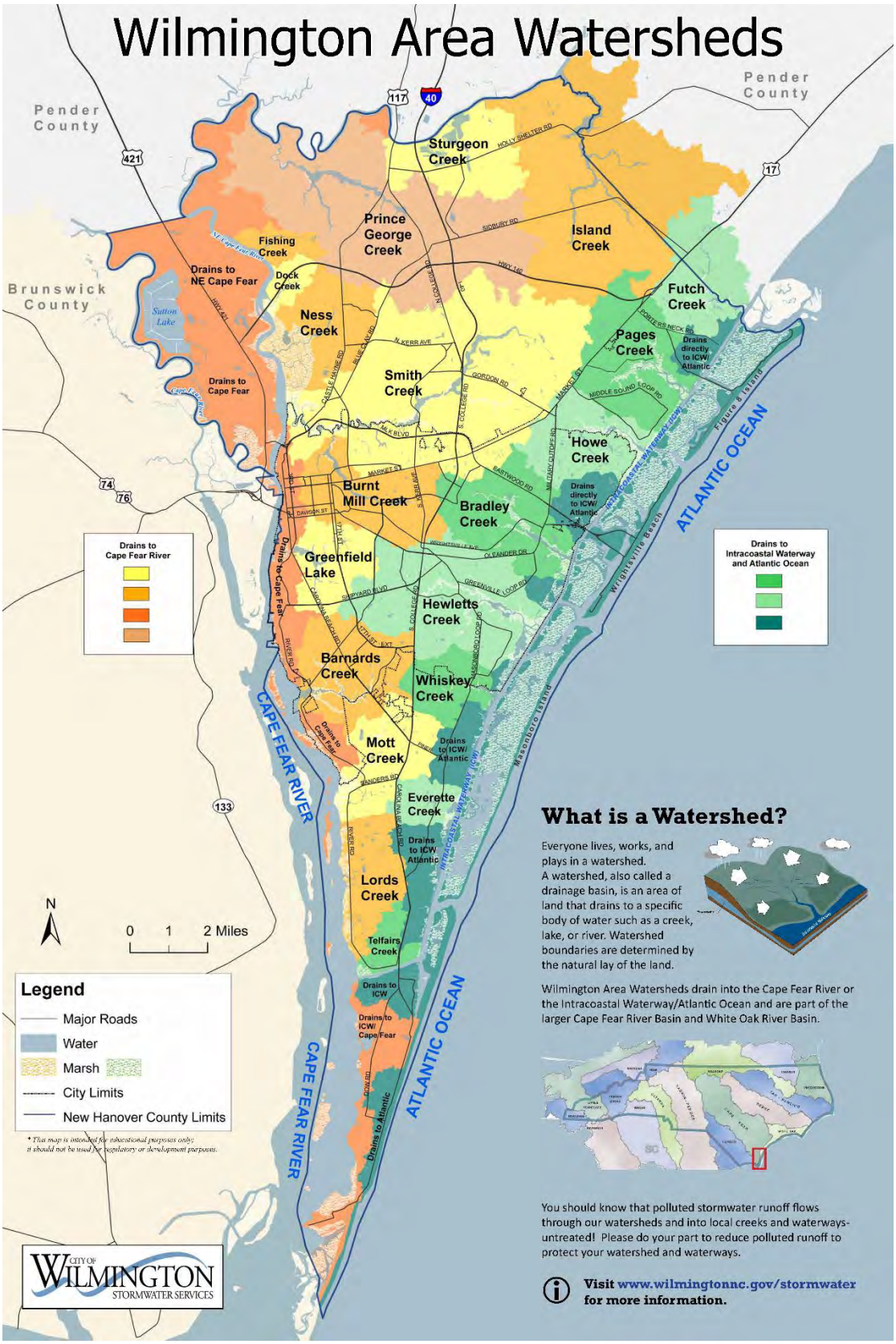
The analytical method used to measure chlorophyll *a* is described in Welschmeyer (1994) and US EPA (1997). Chlorophyll *a* concentrations were determined from the 1.0 micrometer glass fiber filters used for filtering samples for nitrate+nitrite and orthophosphate analyses. All filters were wrapped individually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

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

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

distributed data parameters were tested using the Wilcoxon Signed Rank test. Statistical analyses were conducted using SAS (Schlotzhauer and Littell 1987).

Wilmington (New Hanover County) Watersheds Map



ENVIRONMENTAL QUALITY OF WILMINGTON AND NEW HANOVER COUNTY WATERSHEDS, 2018

by

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

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Center for Marine Science
University of North Carolina Wilmington
Wilmington, N.C. 28409

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Executive Summary

This report represents combined results of Year 21 of the Wilmington Watersheds Project. Water quality data are presented from a watershed perspective, regardless of political boundaries. The 2018 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 December 2018; note that fewer samples were collected at some sites in 2018 because funding did not arrive until late fall; additionally, Hurricane Florence disrupted sampling as well..

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. Dissolved oxygen concentrations were good on all sampling occasions, and turbidity was within standard. However, one major and one minor algal bloom occurred. Fecal coliform counts were somewhat elevated on two 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. In 2018 there were no significant algal blooms recorded, but there were several incidents of low dissolved oxygen, especially at the uppermost site BC-CA on College Acres. All three sites sampled were rated poor due to high fecal coliform bacteria, with the College Acres station BC-CA having especially high counts.

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 2018.

High fecal coliform counts occurred at all three sites in 2018, especially at the uppermost site BMC-AP1 above Anne McCrary Pond and at the lowermost station BMC-PP at princess Place. Several major algal blooms (chlorophyll *a* > 40 µg/L) were recorded in 2018. Dissolved oxygen concentrations were good in the two upper stations and poor in the remaining lower creek site.

The effectiveness of Ann McCrary wet detention pond on Randall Parkway as a pollution control device for upper Burnt Mill Creek was mixed for 2018. Comparing inflows to outflows, there was a significant increase in dissolved oxygen concentrations as the water passed through the pond due to in-pond algal photosynthesis and physical aeration at the outfall. There was likewise a significant increase in pH due to photosynthesis using up CO2 (an acid) and driving the water to a more alkaline state.

On a positive pollutant –reduction note, ammonium concentrations significantly decreased through the detention pond.

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, orthophosphate, ammonium and nitrate.

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. Of the four 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 maintained good oxygen concentrations on all sampling occasions (non-hurricane periods).

Algal blooms are periodically problematic in Greenfield Lake, and have occurred during all seasons, but are primarily a problem in spring and summer. In 2018 a massive summer blue-green algal bloom of *Anabaena* occurred late spring – late fall. 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 very high BOD occurred congruent with the blooms in 2018. In 2018 all tributary stations and one of the in-lake stations exceeded the fecal coliform State standard on 66% or more of occasions sampled.

We note that Greenfield Lake suffered a fish kill of about 600 fish in the discharge canal in August, then suffered a massive fish kill involving thousands of fish or many species in late September following Hurricane Florence. Cape Fear River Watch personnel reported low dissolved oxygen in association with the September kill. Nutrient loading from hurricane runoff, coupled with decomposition of dead fish likely contributed nutrients that kept the algal blooms occurring until fall.

Greenfield Lake is currently on the NC 303(d) list for impaired waters due to excessive algal blooms. In the previous report 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, and best management practices (BMPs) to reduce nutrient loading should be targeted for those streams. In summer 2018 UNCW personnel collected bottom sediment samples at 27 locations within the lake, finding the highest phosphorus levels in Jumping Run and Squash Branch, and lowest levels in areas of significant natural wetlands, again providing guidance for restoration work.

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 2018 the creek was sampled at four tidal sites and one non-tidal freshwater site (PV-GC-9).

Incidents of low dissolved oxygen were rare at Hewletts Creek in 2018; DO dipped below 5.0 mg/L on several occasions but not below 4.0 mg/L. Turbidity was low and did not exceed the

state standard. Two major algal blooms occurred at PVGC-9 following Hurricane Florence, and one bloom occurred in summer at SB-PGR. Fecal coliform bacteria counts exceeded State standard 100% of the time at NB-GLR (the north branch) and MB-PGR (the middle branch), 83% of the time at PVGC-9, and 67% of the time at SB-PGR (the south branch). The geometric means at PVGC-9, MB-PGR, SB- 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 standard.

Howe Creek – Howe Creek drains a 3,516 acre watershed into the AICW. This watershed hosts a population of approximately 6,460 with about 21.4% impervious surface coverage. Two stations were sampled in Howe Creek in 2018. The uppermost site HW-DT had two major algal blooms in the 2018 sampling, and the middle creek station had one bloom. The uppermost station HW-DT was rated poor for fecal coliform pollution in 2018, exceeding the state standard on 75% of the times sampled.

However, dissolved oxygen concentrations were good at both sites in 2018.

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%. One major and one minor algal bloom occurred at our site in 2018. Dissolved oxygen concentrations were fair in 2018, and turbidity was low. Motts Creek was strongly impacted by high fecal coliform counts in 2018.

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 three of 11 occasions in our 2018 samples. The North Carolina turbidity standard for estuarine waters (25 NTU) was not exceeded. There were no major algal blooms present in our 2018 sampling. However, fecal coliform bacterial concentrations exceeded 200 CFU/100 mL on 36% of samples in 2017, for a Poor rating, although it should be noted that fecal coliform counts in 2018 were considerably lower than in 2017.

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 shore along this creek in 2018. This site had low to moderate nutrient concentrations and no algal bloom problems.

Dissolved oxygen was substandard (below 5.0 mg/L) on one of six occasions sampled, and fecal coliform bacteria counts exceeded 200 CFU/100 mL on 50% of occasions sampled.

Water Quality Station Ratings – The UNC Wilmington Aquatic Ecology Laboratory utilizes a quantitative system with four parameters (dissolved oxygen, chlorophyll *a*, turbidity, and fecal coliform bacteria) to rate water quality at our sampling sites. If a site exceeds the North Carolina water quality standard (see Appendix A) for a parameter less than 10% of the time sampled, it is

rated Good; if it exceeds the standard 10-25% of the time it is rated Fair, and if it exceeds the standard > 25% of the time it is rated Poor for that parameter. We applied these numerical standards to the water bodies described in this report, based on 2018 data, and have designated each station as good, fair, and poor accordingly (Appendix B).

Fecal coliform bacterial conditions for the entire Wilmington City and New Hanover County Watersheds system (24 sites sampled for fecal coliforms) showed 4% to be in good condition, 13% in fair condition and **83%** in poor condition, a worsening over the previous year. Dissolved oxygen conditions (measured at the surface) system-wide (24 sites) showed 54% of the sites were in good condition, 8% were in fair condition, and 38% were in poor condition, a worsening from 2017. For algal bloom presence, measured as chlorophyll *a*, 46% of the 24 stations sampled were rated as good, 25% as fair and 29% as poor, again, worse than 2017. 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. We also note that Hurricane Florence led to worsening of the water quality compared with 2017, as well.

2018-2019 NPDES PROGRAM HIGHLIGHTS & ANNUAL REPORTING

Public Education & Outreach

- 67 presentations delivered to 8th grade science classes in New Hanover County serving approximately 2200 students
- Direct education and materials provided to 37 apartment complex managers within a 1-mile radius of the UNCW Campus to address the issue of fecal coliform pollution in this area.
- Mass media efforts included advertising on digital billboards, television, radio and digital/mobile marketing campaigns.

Public Involvement & Participation

- In response to hurricane Florence, over 250 calls were placed to the city's emergency center regarding drainage and stormwater impacts. In addition, city staff met with local residents to assess infrastructure in response to the hurricane. A Florence Recovery Map was posted to enable citizens to view and search the status of repair projects.
- 10 watershed cleanups involving 305 volunteers contributing 610 volunteer hours to clean up riverine watersheds in the city limits.
- 41 storm drain markers were placed in neighborhoods off 17th Street Extension.

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.
- Enforcement of IDDE violations continues to be tracked through the City's management system.
- The City continues to use its data collection procedures established for dry weather flow investigations.

Post-Construction Site Runoff Controls

- Continued implementation of the City's Land Ordinance Code to provide post construction controls to meet the requirements of the City's Phase II permit.
- Continues site plan reviews of all new development and redeveloped sites.
- Conducted inspections on privately owned BMPs located within the City limits in order to ensure that maintenance requirements were being met by property owners.

Pollution Prevention and Good Housekeeping for Municipal Operations

- Continues implementation of SPPP and SPCC plans for City owned facilities.
- Planning continues for O&M procedures for City owned facilities with oil/water separators.
- Conducted inventory of City owned facilities with potential to pollute stormwater.
- 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

- Three rain gardens successfully installed at University of North Carolina-Wilmington using Heal Our Waterways funds.
- Six total projects were installed on private properties through the HOWBMP contract with New Hanover Soil and Water Conservation District.
- A watershed-wide survey was conducted during the spring of 2019 to gage perceptions of local waterways, stormwater, and BMPs.

- Three separate media campaigns advertising downspout reroutes were simultaneously completed in spring of 2019.
- From March 2019 to June 2019, Heal Our Waterways was present at more than ten events to advertise the program and educate residents about stormwater retrofit

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 origin and sources for each pollutant and includes suggested outreach messages and strategies for reaching target audiences. Staff regularly uses this information as a guide 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 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 Stormwater Services website with relevant stormwater and program content such as the annual Stormwater Watch Newsletter, Canines for Clean Water photos, news and events, UNCW water quality report, and more. www.wilmingtonnc.gov/stormwater

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

Accomplishments:

Direct education and materials were provided to 37 apartment complex managers within a 1-mile radius of UNCW to address the issue of fecal coliform pollution detected via water quality monitoring near campus. A comprehensive database of the apartment complexes was developed and included direct contact and inquiry resulting in data about pet waste policies, number of pets, DNA tracking, management company, issues/concerns at each complex.

A pet waste toolkit was developed containing resources for supplies, city ordinances, successful pet waste management programs at other complexes, free signage, etc. The Stormwater Compliance Officer worked with us to include a letter in the toolkit addressing the city's pet waste ordinance and fines and serve as a contact for apartment complex managers should they have further questions. The toolkits and signage were delivered in person to each apartment complex. As a result, several managers requested additional signage and are interested in having us participate in future pet events on their properties.

This year's annual Stormwater Watch newsletter was mailed to 40,000+ city residents and contained articles highlighting pet waste/fecal coliform pollution, Canines for Clean Water Program, Heal Our Waterways Program, 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 in the water quality information for each creek.

The Enviroscape Watershed Education Program has been integrated into the 8th grade curriculum since 2005. The program reaches all 8th grade science classes in New Hanover County Schools each year. In 2018-2019, the majority of presentations occurred in the spring due to Hurricane Florence. This year we served 67 classes and 2,200+ students. The interactive presentations focus 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. An instructor training was conducted for new and veteran instructors in October 2018.

Anonymous teacher feedback was positive this school year, with some suggestions for technology incorporation.

Stormwater education staff presented and/or exhibited at Isaac Bear Early College, the MLK Center Summer Camps, Cape Fear Academy, Earth Day Festival, and UNCW Environmental Policy classes and field trips.

Fall and Spring coordinated media campaigns aired on digital billboards, radio, television, media websites, and digital and mobile platforms. In a review of post-campaign stats with media agencies, message formats on digital and mobile platforms outperformed the national average by 10 times.

For example, the fall stormwater campaign from Sept – November 2018 on WECT/NBC digital and mobile platforms:

- Total ads viewed in Fall Campaign: 341,568
- .71% engagement rate (national average is 10%)

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

Accomplishments:

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

Hotline/web reports are routed to the Stormwater Code Compliance Officer who tracks, investigates, and responds to each hotline report. The hotline and online reporting webform are advertised on the City's cable TV channel and via the stormwater website, citywide newsletters, public presentations and displays, large educational magnets on stormwater vehicles, and promotional outreach items including cups, pens, reusable bags, magnets, and other giveaways to the public.

To summarize hotline/web reporting activity this past year:
17 calls were placed to the City's Stormwater hotline, 18 online hotline webform reports were submitted, and 388 emails and 65 calls were directly received by the Compliance Officer related to stormwater violations. The nature of the hotline reports are found in the Enforcement section of the Appendix.

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

Accomplishments:

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

Assessment of Program Implementation

The city's stormwater outreach and education program continues to implement a variety of innovative activities and programs that meet or exceed the minimum requirements of our NPDES permit to educate the community about stormwater runoff pollution/solutions and inspire action and behavior change. These extensive activities can be viewed in the Appendix

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 annual contract with the City 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, a monthly rain barrel sale, volunteer creek monitoring, volunteer storm drain marking, eco-tours, school field days, website content, community stormwater best management practice (BMP) installations, and more.

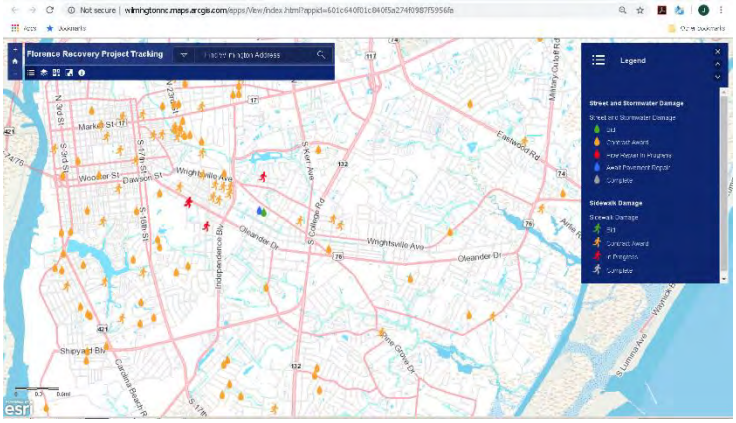
Each agency provides the City with four quarterly progress reports and invoices during the annual contract period for services performed. The cumulative year-end progress 4th quarter progress report for each agency is included in the Public Involvement and Participation Appendix of this annual report.

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 Florence impacted the Wilmington-area beginning with landfall of the storm on our coast in September 2018. Much of the fiscal year (FY18/19) was spent dealing with response to the hurricane. Many slated in-house and capital improvement projects were put on hold in order to respond to the damage that occurred to the stormwater system because of the storm. Therefore, public meetings and project notices for "regular" projects largely did not occur this year.

Immediately after the storm, over 250 calls were placed to the city's emergency center regarding stormwater impacts including drainage, flooding, sink holes, etc. Since the storm hit, city staff have met with local residents and FEMA to assess infrastructure and repairs to the stormwater drainage system.

A Hurricane Florence Recovery Map was posted to enable citizens to view and search the status of repair projects.



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

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

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To summarize hotline activity this past year:
17 calls were placed to the City's Stormwater hotline, 18 online hotline webform reports were submitted, and 388 emails and 65 calls were directly received by the Compliance Officer related to stormwater violations. The nature of the hotline reports are found in the Enforcement section of the Appendix.

Assessment of Program Implementation
The City has continued to partner with contract agencies to implement public education, involvement and participation activities. These annual, contractual agreements have resulted in activities and events that involve the public and community to a large degree.

With Hurricane Florence impacting our area, public meetings and notices for capital improvement projects and in-house projects were delayed this year due to hurricane response.

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.

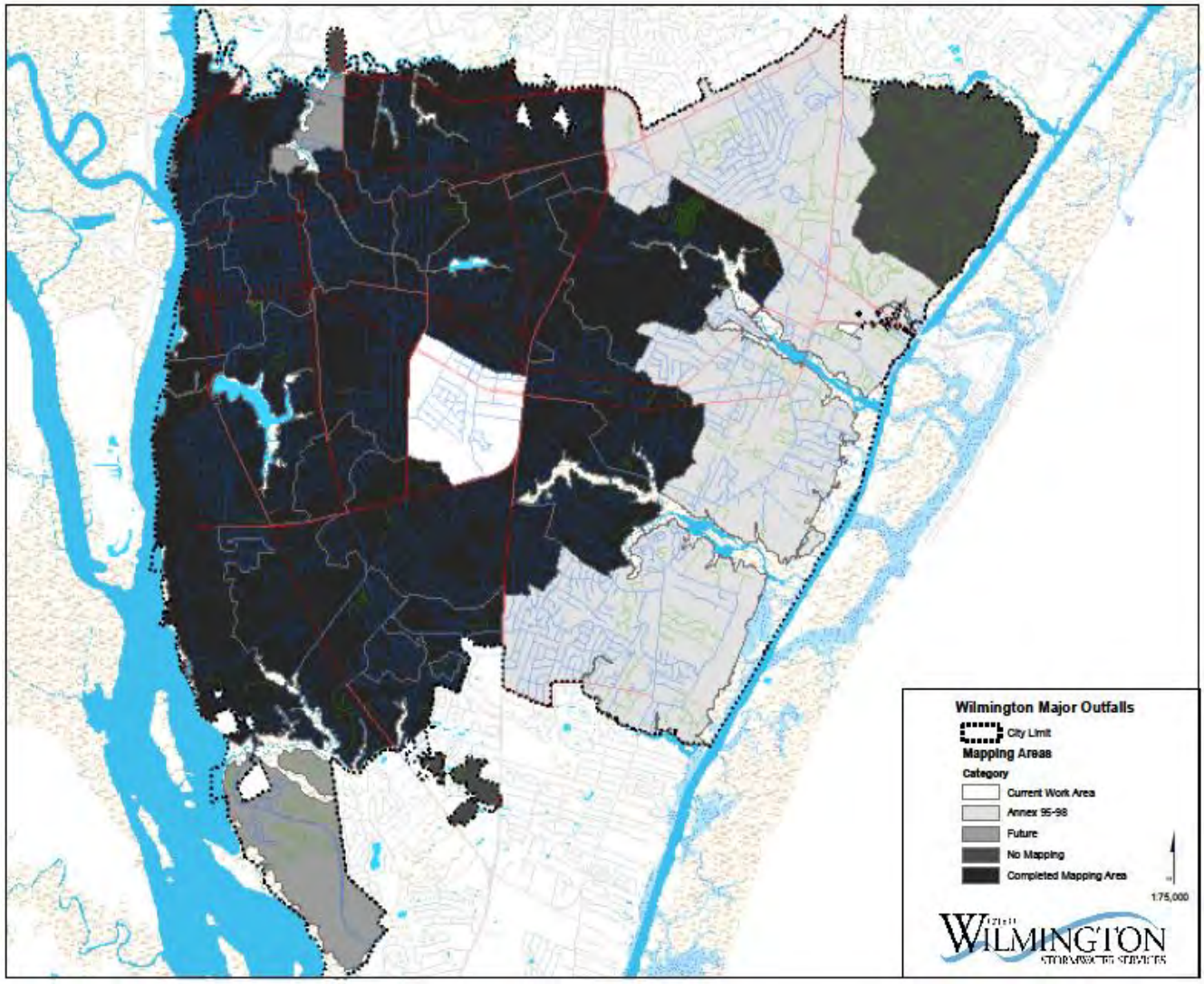
The City also utilizes a policy for reporting SSOs from the Cape Fear Public Utility Authority to the City (see Appendix D).

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

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

The City continues to maintain and update a base map of major outfalls and receiving water bodies. Outfalls are classified and added to the GIS dataset as mapping of the City MS4 proceeds. Additionally, the City has made significant improvements to the GIS mapping of watershed boundaries using the best available data. At this time, approximately 95.4% of the City has been mapped as part of its stormwater inventory. This percentage demonstrates an increase from 93% last due to a concerted effort to map the remaining portions of the City that are still unknown. A continued effort to map the remaining portions of the City will be a goal in the next few years.

Stormwater Inventory Mapping was completed this past reporting year in the Burnt Mill Creek Watershed. Burnt Mill Creek Watershed, an impaired water body as noted on the 303d list, was noted in the previous year's report as an area to be prioritized. This area is an older part of the City where the stormwater inventory is not fully known. 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 for our NPDES Phase II permit. Future locations are shown below on the map.



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

Accomplishments:

The City continues to use its data collection procedures established during the previous reporting years. The process has streamlined time spent at each structure while providing copious information that can be exported into a spreadsheet for reviews. Several Stormwater Services staff utilize the field procedures in order to provide additional assistance and scheduling flexibility throughout the next year. Dry weather flow procedures are included in Appendix D. City Staff will be reviewing the existing IDDE Program Manual in the next year to address changing NPDES requirements.

The dry weather flow web map, when accessed through the Collector app (as shown below), allows staff to collect relevant data while in the field, including photographs, using only a tablet or smart phone. The inspector is able to enter the data, including date and time, color, odor, turbidity and other relevant characteristics of the location into the preformatted database. The data are then uploaded to the City servers in real time, allowing office staff to see the data and develop reports without the need for cumbersome data transfer routines or post processing.

The number of outfalls investigated this reporting year was severely hampered by Hurricane Florence (Appendix D). Staff time and resources were directed to emergency operations for several months after the storm, and repairs took upwards of a year. This took away from normal scheduling of dry weather flow investigations. City Staff have been discussing how to ramp up the number of investigations for the next reporting year. With the addition of Stormwater interns and a new Code Compliance Officer position, Staff should be able to increase investigations. The plan in the upcoming years is to get all outfalls on a 2 year rotation with 50% of the outfalls in one year and the remaining 50% in the second year. The justification for this rotation was due to the time it takes to do investigations in the coastal plain. A single dry weather flow investigation sometimes takes as much as a half of day in some instances due to tidal influence and groundwater intrusion into the piped drainage system, which is very common. In order to determine where flows are originating, staff must follow main trunk lines and lateral lines for blocks to eliminate sources of flow, which is very time consuming when groundwater infiltration is involved.

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

Accomplishments:

The City has continued to utilize its 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 until 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 to begin rolling out the new systems for certain departments may begin in 2020.

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

Accomplishments:

The City continues to 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*.

The City also continues to utilize its process for collecting data for dry weather flow monitoring during this reporting period.

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 wasn't able to conduct training for staff this year due to the impacts from Hurricane Florence and time and resources being allocated to repairs and cleanup efforts. The City has training scheduled for July and November 2019 which will be documented in next year's report.

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

Accomplishments:

The Education Program Manager and staff do an outstanding job of providing the public information through education regarding illegal discharges. One of these ways is through The Enviroscape Watershed Education Program. The Enviroscape Watershed Education Program has been integrated into the 8th grade curriculum since 2005. As a result, the program reaches all 8th grade science classes in New Hanover County Schools, this year serving 27 classes and 2,200+ students

Direct education and materials were provided to 37 apartment complex managers within a 1-mile radius of UNCW to address the issue of fecal coliform pollution detected via water quality monitoring near campus.

This year's annual Stormwater Watch newsletter was mailed to 40,000+ city residents and contained articles highlighting pet waste/fecal coliform pollution, Canines for Clean Water Program, Heal Our Waterways Program, 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 in the water quality information for each creek.

Stormwater education staff presented and/or exhibited at Isaac Bear Early College, the MLK Center Summer Camps, Cape Fear Academy, Earth Day Festival, and UNCW Environmental Policy classes and field trips.

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.

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

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

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 on the City's cable TV channel and via the stormwater website, citywide newsletters, public presentations and displays, large educational magnets on stormwater vehicles, and promotional outreach items including cups, pens, reusable bags, magnets, and other giveaways to the public.

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

Accomplishments:
The City of Wilmington uses *Intelligov* 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 2018-2019 there were no repeat offenders 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. The City will continue with its goal for getting the remaining areas mapped, outfalls added as necessary and updating any relevant information.

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. The City will evaluate the effectiveness of the training by tracking the number of complaints initiated by City Staff.

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

SECTION E: CONSTRUCTION SITE RUNOFF CONTROLS

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

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

SECTION F: POST-CONSTRUCTION SITE RUNOFF CONTROLS

1. Objectives for Post-Construction Site Runoff Controls

a. Implement and enforce a program to address storm water runoff from new development and redevelopment projects that disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale, that discharge into the small MS4. The program shall ensure that controls are in place that would prevent or minimize water quality impacts.

b. Implement strategies which include a combination of structural Stormwater Control Measures (SCM) and/or non-structural SCMs appropriate for the community;

c. Use an ordinance or other regulatory mechanism to address post-construction runoff from new development and redevelopment projects; and

d. Ensure adequate long-term inspection and maintenance of SCMs.

2. BMPs for Post-Construction Site Runoff Controls

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

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

Accomplishments:

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

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

Currently the City is looking at making updates to its Land Development Code. Planning for these changes has been occurring during the last year with City staff meeting weekly to review sections within the Code. Tentatively, the draft of the revised Code should be available to review and discuss in spring 2020.

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

Accomplishments:

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

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

The Engineering Dept. employs three P.E.s and one E.I. 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

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

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

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

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

Engineering and Stormwater Staff are planning to incorporate the spreadsheet data into a GIS application in order to improve the database of permits and help with future permit renewals. This planning should begin in Fall of 2019.

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

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

Record (as-built) drawings (reproducible mylar) 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, an access agreement in a form approved by the City attorney, granting the City and its agents and representatives adequate and perpetual access to the facility and sufficient area for inspection and maintenance, if necessary, by the City, its agents and representatives. Said agreement shall be filed in the New Hanover County Registry, at the expense of the applicant, and shall bind all subsequent owners and assigns of the facility and of the property on which the facility is located.

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

The approval of the stormwater permit shall require an enforceable restriction on property

usage that runs with the land, such as recorded deed restrictions or protective covenants, to ensure that future development and redevelopment maintains the site consistent with the approved project plans.

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

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

Accomplishments:
The DWQ SCM manual was adopted when the stormwater ordinance was amended in 2009. This ordinance contains provisions addressing the use of combinations of structural and non-structural SCMs to manage stormwater runoff. With this adoption, the City also reviews and approves the O&M requirements and plans of the State through the review process.

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

Accomplishments:
Under the current stormwater management ordinance of the City, permitees of structural SCMs are required to properly maintain their stormwater management systems to ensure long term operation. The City conducts semi-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. An inspection summary is included in Appendix F.

The City continues to review and update its manual for all O&M plans for known City owned and/or maintained SCMs under their respective NCDWQ stormwater permits. This manual provides access to SCM schedules for O&M and permit renewal dates.

City Stormwater field staff who work on the maintenance of City owned SCMs will be getting their SCM Inspection and Maintenance certifications through NC State's program in the Fall/Winter 2019. Approximately 5 staff members are signed up to take the certification class.

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

Accomplishments:

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

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

Accomplishments:

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

Assessment of Program Implementation

The City will continue to utilize the Land Development Code to provide post construction controls in order to meet the requirements of the City's Phase II permit Ordinances will be evaluated annually to determine if modifications are needed.

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 continues 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. These sites were evaluated to determine if further implementation of pollution prevention measures and BMPs could help to minimize current on-site procedures and equipment from potentially polluting the surrounding stormwater systems. Although no formal SPPP was required for each individual site, the City opted to be proactive in reducing the potential for contaminants and other pollutants that could leave the sites. Site SCM recommendations are implemented as needed at the locations when site conditions change (i.e., renovations, equipment changes). Three Parks and Recreation locations will be evaluated in the coming reporting year. This process was delayed in this reporting year die to Hurricane Florence and its major impact on the City.

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.

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

Accomplishments:
Currently, The City relies on a SPCC plan and a SPPP for the Operations Complex 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 meets annually with appropriate site managers to ensure that proper documentation of the SPCC and SPPP is occurring. 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 O&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 O&M plan could not make it into the 2019-20 budget but is set for the following budget year. However, if funds can be appropriated for the 2019-20 calendar year through other means, then securing a contractor may happen sooner.

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 also ensure documentation is occurring within the plans.

Stormwater staff and the Public Services Safety Specialist have implemented the requirement for appropriate staff to complete training courses regarding spill prevention and small spill cleanup. Eight (8) Fleet Maintenance Staff completed training for the *prevention of spills* and *small spills cleanup*. During the upcoming reporting year, Stormwater Field Supervisors will be included in the same training.

Planning has begun for the 2019-20 reporting year to bring all relevant personnel into a field training session at all necessary locations. . This process was delayed in this reporting year due to Hurricane Florence and its major impact on the City.

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 2018-19, street sweepers swept 7,949 curb miles while collecting sediment, vegetation and trash potentially diverted from the stormwater sewer system. The amount of debris tonnage could not be calculated this reporting year due to the scale house being inoperable. The City will be phasing out the scale house due to costs and constant repairs so the amount of debris will need to be calculated by other methods. Currently, City Stormwater Staff are discussing procedures to estimate the amount of cubic yards collected daily and report quantities in that manner. Staff will be conduction discussions in Fall 2019.

In fiscal year 2018-19, stormwater crews conducted hand maintenance of 173,011 feet of ditch, 19,657 linear feet of ditch by mechanical methods, cleaned 66,916 linear feet of pipe, and removed blockages and cleaned 8,468 drainage inlets and manholes thus reducing debris, sediment, vegetation and trash potentially diverted from being discharged into our receiving waters.

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 of 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 BMPs, 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* on page 10 .

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 of its City owned SCMs. The manual includes all associated 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.

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

Accomplishments:
The City keeps and updates a BMP Manual for all its City owned BMPs. The manual includes all associated 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 BMP site visit and maintenance activity.

The City plans to develop SOPs to address the frequency of inspections and routine maintenance requirements for its SCMs during the next reporting year.

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

Accomplishments:
The City has compiled all pesticide, herbicide and fertilizer application certifications for its Parks and Recreation and Stormwater personnel to ensure that they are current. These certifications are updated and renewed annually. Currently, there are 20 certifications for Parks and Recreation staff and 4 certification for Stormwater/Public Services staff.

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

Accomplishments:
Stormwater staff and the Public Services Safety Specialist review employee training annually through our online courses and in house training regarding preventing spills and small spill cleanup for Fleet Maintenance staff and the Spill Response Team per the City's SPPP and SPCC plan. This training will be an annual requirement for these employees. In addition, on site hands-on training for employees is being discussed and planned by Stormwater staff and The PS Safety Specialist regarding spill control/cleanup at the Fleet Maintenance site. In-house training was postponed this year due to Hurricane Florence and its major impact on the City

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.

Small engine repair (line trimmers, blowers, chain saws, compacters, etc.) and cleaning for various City activities occurs in individual departments maintenance garages. In the event of an accidental discharge, the garages have drains located within the floor that connect to an oil water separator located on each site within the Operations Complex. Other locations across the City's operations facilities are planned to be reviewed in 2020. Site recommendation plans will be determined as needed.

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 two years.

Staff Training for City field crews will re-evaluated for content in the next reporting year.

The City will be conducting further inventories of all its facilities (outside of the current known locations) to determine where small engine repair and vehicle maintenance (outside of the Fleet Maintenance Facility) may be occurring. The City will be developing SOPs or other plans to address these locations for SCMs that reduce potential sources to the stormwater system.

SECTION H: TOTAL MAXIMUM DAILY LOADS (TMDLs)

1. Objective

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

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

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

2. TMDL Plans

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

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

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

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

3. Best Management Practices (BMPs):

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

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

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

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

Bradley & Hewletts Creeks Watershed Restoration Plan Accomplishments:

The Bradley and Hewletts Creeks Watershed Restoration Plan has continued to make progress installing and promoting volume-reducing best management practices (BMPs) to the public. Heal Our Waterways (HOW), which is the branded name of the restoration plan, is becoming more widely known within the watersheds. This is being accomplished through the use of strategically implemented education and outreach efforts and successful networking and promotion among stakeholders, community groups, and partner organizations.

As with previous years, two educational postcards were created and mailed, this time in the winter and spring, to 20,000+ residents and businesses within the Bradley and Hewletts Creek watersheds, as well as areas adjacent to the watersheds that drain directly into the Intracoastal Waterway. The winter 2019 postcard educated recipients about how to reroute downspouts at home. The spring 2019 postcard announced the 2019 Earth Day event and provided directions to an online survey for the HOW program, which included a Lowe's $50 gift card giveaway.

Following the success of 2016's downspout disconnection public service announcement, starring local news anchor Jon Evans, the PSA was used again as part of the overall "Downspout Disconnection" spring 2019 marketing campaign. This PSA 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 733,000 unique visitors per month and has 177,000 followers. HOW had over 463,000 ads served through WECT.

In addition to the PSAs, HOW utilized new online marketing features offered by WECT. One HOW-related Facebook posted was sponsored to related zip codes and users throughout the month, and one specific post announcing the local rain barrel sale was posted on rain barrel sale day. The rain barrel sale post received the most engagements (1,230 total) which contributed towards the overall engagement rate being 4x higher than what WECT normally sees. The campaign also involved two "Homepage Takeovers" on WECT's website, one announcing the rain barrel sale date and one featuring details for Earth Day and HOW's rain barrel raffle.

To continue the "Downspout Disconnection" messaging, a digital billboard campaign promoting a similar message also aired. Contracting with Lamar (formerly Fairway Outdoor), billboard locations were chosen based on their proximity to Bradley and Hewletts Creeks. One billboard ran for a total of 28 days and two billboards ran for a total of 14 days each, all with 8 seconds of air time per minute, 24 hours a day.

HOW also renewed its presence as an underwriting partner with local National Public Radio affiliate, WHQR. This year, the campaign focused on benefits of rerouting downspouts at home and the availability of HOW for presentations. Due to a financial system overhaul in February, the campaign was broken into two sessions. The first ran in January 2019 and included 20 total announcements over 3 weeks. The second ran in late spring for 8 weeks, with 4 announcements during drivetime each week. Each week, WHQR reached about 40,000 listeners in the Wilmington Designated Market Area.

HOW staff continued its presence this year at Wilmington's Earth Day Festival. As with years past, the event was well-attended, attracting 5,000+ visitors. Promotional items and program materials were distributed at the event, and a drawing for a rain barrel giveaway was conducted. Along with providing educational opportunities, these events also help gage outreach and advertising effectiveness. During the Earth Day Festival, several individuals stated that they had heard about the rain barrel raffle, likely due to WECT's homepage takeover. Additionally, 21 people joined the mailing list at the Earth Day event in order to receive more information about how to get involved.

City Communications and HOW staff continue to maintain a visually appealing website. The "Take Action" page and homepage were revamped to be more user friendly and motivational. In 2019, the Heal Our Waterways home page has received 3,004 unique views. This is up from 1,620 the previous year. The Heal Our Waterways social media presence has also increased, with Twitter and Facebook followers of 224 and 198, respectively.

Heal Our Waterways ended one grant this year and continued two more. The EPA 319 Bradley & Hewletts grant with the North Carolina Coastal Federation ended in March 2019. The Green Infrastructure Center Tree grant and the EPA 319 grant in partnership with the North Carolina Coastal Federation and the University of North Carolina at Wilmington both continued.

The NCCF Hewletts & Bradley Creek 319 Grant ended in FY 18-19. Grant team partners met to discuss the status of implementation and volume reduction summaries. Through the grant, permeable pavement was installed at both the New Hanover County Arboretum and Waterman's Brewing. The Wrightsville Beach Animal Hospital also received an infiltration basin and several homeowners in the Palmetto Point neighborhood received rain barrels.

City Planning, Stormwater, and Parks Divisions met several times in FY 18-19 to discuss the results of the Green Infrastructure Center (GIC) Tree grant. The citywide study looked at tree canopy and opportunities to use trees for stormwater management in the city. Heal Our Waterways and Stormwater education examined each of the recommendations and supplied brief summaries for how they could be implemented into current programs. The City Arborist will be presenting the summaries, as well as input from other Divisions, to City Council in the near future.

The Lynnwood/Glen Meade EEG grant is complete, but a new sign was placed at the site in winter 2019. The sign discusses the project scope, design, and partners and provides an educational resource to the neighborhood about stormwater.

In January 2019, the North Carolina Coastal Federation and University of North Carolina-Wilmington EPA 319 grant got underway. As a part of grant match and to bring awareness to the grant, Heal Our Waterways provided funding for additional rain gardens on campus. Two rain gardens were installed in front of DePaolo Hall, and one segmented garden was installed near the DeLoach Hall parking lot. Over 20 volunteers helped to plant the rain gardens with native plants in June 2019. HOW also purchased five cisterns that will be used around the greenhouses and other applicable areas on campus for water reuse. The total volume reduction for the 319 UNCW grant this year was 5,425 cubic feet in Bradley Creek.

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 six total installations this year, and identified interested potential participants for next year. Of this year's participants in the program, all homeowners were in the Hewletts Creek Watershed. Two of the homeowners had two projects installed on their properties. The total volume reduction from the HOWBMP program this year was 337.5 cubic feet.

HOW 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 of the 319 and NCCF grant projects, HOWBMP projects, and city-wide rain barrel sale data was recorded for the 18-19 FY.

HOW also dedicated time towards stakeholder outreach this year. To gage perceptions regarding water quality, stormwater solutions, and potential barriers, staff distributed a survey to watershed residents via a postcard mailer. During the month of March, HOW was also present at several breweries and local businesses in the area to conduct in-person surveys. The in-person surveys generated more conversation, while the online survey provided more room to write in the comment fields. To encourage participation, rain barrels and a $50 Lowe's gift card were provided as prizes.

Finally, HOW established collaborative relationships with the NHC Arboretum, Airlie Gardens, and the Wilmington Farmer's Market at Tidal Creek. HOW has been able to visit their events with raffles and educational displays. These partnerships are a great avenue for continuous community outreach and for keeping interest in doing work with partners.

Annual Assessment & Evaluation of Plan Implementation:

This year the HOW program implemented multiple successful projects, despite several hurdles and shortened timelines. The HOW program went without a dedicated watershed coordinator during fall of 2018. An interim coordinator was hired in December to resume implementation of the program. Hurricane Florence also caused multiple setbacks for finalizing contracts and setting up projects. The City also switched financial systems during February and March, which prohibited city spending for several weeks.

Despite these hurdles, the HOW program accomplished several large projects. The survey and outreach events engaged the community and local businesses. Several rain gardens were put into the ground at UNCW, which will help reduce pollution entering Bradley Creek, improve drainage problems at UNCW, and act as examples for UNCW and the local community. HOWBMP also had a large number of participants and is already geared up for multiple new applicant site visits to kick off the new fiscal year.

This was a year of growth and reflection through community engagement. The feedback from residents will be extremely helpful for guiding educational materials and outreach strategies in the coming year. Continuing the grant with UNCW and NCCF will also provide more opportunities for collaboration and potential volume reductions for the target watersheds.

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 winter and spring watershed mailers again this year to support Action 1-2 and 1-4. The winter mailer provided directions for rerouting downspouts and the spring mailer announced the Earth Day event and an online survey. Both were mailed to over 20,000 residents within the target watersheds.

All of the media partnerships also continued this year for educational messaging to support Action 1-4. HOW partnered with WECT, WHQR, and Lamar Billboards to advertise how to reroute downspouts at home and bring awareness to the Heal Our Waterways program. Several residents mentioned they had heard the advertisements on WHQR, and multiple residents came to the Earth Day event because they had heard about the rain barrel raffle. 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 contractual partnership with New Hanover Soil and Water Conservation District (NHSWCD), called the HOWBMP Program, to support Action 1-2. There were a total of 6 projects this summer between 4 homeowners. The volume reductions were smaller than in previous years, but the number of installations were greater. The program continues to spread through word-of-mouth and conversations at local events throughout the year. HOWBMP is already looking forward to 9 site visits in the coming year and potentially more through continued outreach.

Outreach throughout the year not only raised awareness for HOW programs, but also promoted the use of Low Impact Development on private properties, also in support of Action 1-2. Each HOW outreach event 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. Homeowners gladly take the booklets to find out what they can do at home. 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.

To support Action 1-6, the City of Wilmington "Canines for Clean Water" program was present at several events and continued its campaign to encourage homeowners to pick up after their pets to reduce bacteria amounts in stormwater. The City's Code Enforcement Officer also continued to put out educational signage and followed up on pet waste complaints from residents.

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	Year 2	WB, NCCF, NC DWQ

		Shellfish Harvest due to marinas, and have been polluted since 1947.		
	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. In his 2018/2019 report, Dr. Mallin wrote that at four stations on Hewletts Creek, all stations "well exceeded 200 CFU/100mL for a poor rating for this pollutant parameter [fecal coliform]".

This plan objective concentrates heavily on the classification of local waters and the appropriateness of current classifications considering today's conditions. Ongoing issues regarding the proper classification of some waters and the possibility of a reassessment and overhaul of the classification criteria by the State of North Carolina have delayed staff in addressing this objective for the last several years. As with years past, there has been no change in classification this year. 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 had progress this year at record levels. The total number of installations in both watersheds was the most it has been since the program's inception in 2012. 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 an

open opportunity for additional grant match projects. HOW was able to fund three additional rain gardens, totaling 5,271 cubic feet of reduced stormwater volume into Bradley Creek. These projects, with the addition of 5 305-gallon cisterns funded by HOW for UNCW, and projects installed by NCCF as part of the 319 Grant "Implementing the Bradley and Hewletts Creek Watershed Plan", pushed the program almost three-fold past its internal performance measure in the strategic plan of 0.15 ac ft. of stormwater volume reduction at a final total of 0.41 acre feet.

HOWBMP installed retrofits in the Hewletts Creek Watershed this year. There were six total projects between four homeowners. For one cistern, four rain garden, and one wetland installations, the volume reduction was 337.5 cubic feet. However, the total number of installations in the Hewletts Creek watershed was far greater due in part to the NCCF 319 grant dedicated to the implementation of the watershed restoration plan. The final results for Hewletts Creek in the 18-19 FY are 21 total installations and a final stormwater volume reduction of 470.5 cubic feet.

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 18-19 FY, the Bradley and Hewletts Creek watersheds has recorded a record number of total installations within a given year since HOW was established in 2012. Part of this success is attributed to establishing stronger communication with partner agencies doing similar work within the watersheds and sharing volume reductions to include in the City's GIS Atlas, which was finalized the previous year. This tool has been instrumental in tracking locations of projects, contact information, and has even helped partner agencies with their grant reporting. The Atlas tool will continue to play a vital role in the HOW program's progress and Action 4-1 will be continued in the coming year.

Action 4-9, 4-10, and 4-2 all played a role during the design and implementation of stormwater retrofits at UNCW this year. HOW and the Chief Sustainability Officer at UNCW worked together to identify suitable areas for rain gardens and cisterns to support the UNCW Master Plan. There has been progress on the plan this year, with stormwater as a heavy focus area, but the final details of the plan are still not readily accessible to HOW staff. However, HOW was a presence at the UNCW Sustainability Council meetings and provided a brief summary of the watershed restoration plan for Bradley Creek to a core group of decision-makers. Stormwater was referenced multiple times as an area of high concern and, overall, the reception to potential retrofits has been received well. Several professors and staff have even participated in the brainstorming sessions for which areas on campus needed attention. Not all of the locations were addressed this year, but the ideas are prepared for the coming year of grant work and the UNCW community is highly interested in seeing the work move forward.

HOW has also participated in several workgroups this year, two of which support Action 4-4. The Green Infrastructure Center (GIC) recently wrapped up its grant for the City of Wilmington and a City staff workgroup (including HOW) has reviewed the feasibility of the recommendations. The grant focused on the natural stormwater treatment trees can provide and identified locations within city limits that could benefit from more tree canopy. They also reviewed city codes and ordinances and recommended actions that could help to promote tree retention. This year also involved conversations about how to replace trees lost during Hurricane Florence, as the hurricane caused a significant amount of tree damage. Several of the recommendations supported the mission of the HOW program and will be summarized for City Council to review. In addition to the City's efforts, New Hanover County also began a tree workgroup to examine tree policies county-wide. This group has a greater variety of participants from several local environmental and government organizations. The workgroup just began this year and is narrowing down its mission statement and goals. More actions will be identified this coming year as the group transitions from planning to implementation.

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 City of Wilmington - Stormwater Services; UNCW, NCCF

Partnerships are one of the greatest strengths of the HOW program and contributed to the record number of installations since the inception of the program. HOW continued its partnerships with local news media outlets (WECT, WHQR, and Lamar Billboards), the New Hanover County Soil and Water Conservation District, North Carolina Coastal Federation, University of North Carolina-Wilmington, NC State University – Cooperative Extension, and members of the Wilmington Tree Commission. A multitude of new partners were identified through the spring outreach campaigns within the watersheds. The Wilmington Farmer's Market at Tidal Creek Co-op, New Hanover County Arboretum, and Airlie Gardens have all been vital partners for reaching local citizens. Several breweries in the area also expressed interest in the program, including Wrightsville Beach Brewery and Waterman's Brewing, and allowed educational tables during service hours.

In accordance with Action 5-1, HOW ran an intensive outreach campaign in spring 2019 using partners within the watersheds to establish locations for educational booths. In-person surveys are typically difficult to implement, but HOW had a total of 61 in-person survey participants thanks to the help of local businesses and organizations offering space at their events. There was also an online version of the survey which had 207 participants.

The ongoing partnership with the NC Coastal Federation continues to fulfil Action 5-2, securing 319 grants for retrofits within both target watersheds. The 319 grant for UNCW has already seen tremendous success for Action 5-6 with the installation of three rain gardens and five cisterns. More work is planned this coming year for parking lots on campus.

The UNCW 319 grant also provided opportunities to implement Action 5-1. HOW participated on UNCW's sustainability council, provided a presentation to decision-makers about the mission of the grant, and led a volunteer planting date that gave volunteers hands-on experience with implementing stormwater solutions.

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

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

Water quality is still being closely monitored by UNCW, in accordance with Action 6-2. The most recent report, published in April 2019, shows that fecal bacteria are still a concern in both creeks. Though one station in Hewletts Creek was below state standards for recreation, it still exceeded the shellfish standard. However, this year still had the most work completed of any year to date, so there is potential the results will reflect improvements in the coming years if the program continues its upward progress.

To highlight the program's progress through Action 6-1, the internal performance measure for Bradley Creek was exceeded by 276%. Hewletts Creek did not meet its internal performance measure this year, but still had 21 total projects implemented. For private homeowners, larger stormwater retrofits are not always feasible so volume reductions are often smaller in residential zones.

Awareness about the program continues to grow and participation is at an all-time high. Having achievable goals will help to encourage continued expansion, more funding, and new innovative city programs to champion the restoration of Bradley and Hewletts Creeks and push the City of Wilmington forward as a leader in the mission to "Heal Our Waterways".

5. Information regarding North Carolina TMDLs

Information regarding North Carolina TMDLs is available at:

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

APPENDICES

APPENDIX A: PROGRAM IMPLEMENTATION INCLUDING MODIFICATIONS AND JUSTIFICATION

None for this reporting year.

APPENDIX B: PUBLIC EDUCATION AND OUTREACH

Included in this section:

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

DATE OF EVENT/ ACTIVITY	EVENT/ACTIVITY	AUDIENCE	DELIVERED BY (AGENCY)	METHOD OF DELIVERY / MESSAGE	ATTENDANCE/ PARTICIPATION
BMP a. Define outreach/education program goals including a description of the target pollutants, sources, and target audiences					
Outreach and education program goals, as well as a description of the target pollutants, sources, and target audiences, why they were selected and key outreach messages are thoroughly identified in the city's Outreach/Education/Involvement Plan. This plan is updated as necessary to reflect changes in target audience characteristics, awareness, etc.					
BMP b. 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 CFRW NHSWCD	Classroom presentation about watersheds, water quality, nonpoint source pollution, BMPs and stewardship	70 classes 2300 students
10/10/2018	Presentation: UNCW Environmental Policy Class	Undergraduate students	Stormwater Services	PowerPoint presentation and discussion about stormwater and Hurricane Florence	20 students, 1 professor
10/19/2019	Tour & Talk at Wade Wetland to UNCW Environmental Policy Class	Undergraduate students	Stormwater Services	Presentation about site, then tour of wetland	20 students, 1 professor
10/20/2018	Pawz in Park	Pet owner participants	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 wilmingtonnc.gov/canines	100 pledges signed
1/23/2019	New Hanover Public Library Public	General public	NHSWCD	PowerPoint presentation about stormwater pollution, solutions, and BMPs	32 in attendance
2/19/2019	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.

2/25/2019	UNCW EVS 495 Class	Undergraduate students	NHSWCD	PowerPoint presentation about stormwater pollution, solutions, and BMPs	32 in attendance
3/3/2019	Cape Fear Museum	General public	NHSWCD	PowerPoint presentation about stormwater pollution, solutions, and BMPs	11 in attendance
1/23/2019	Presentation: Cape Fear Academy	1st Graders	Stormwater Services	Presentation about stormwater pollution, litter, and plastic pollution. Stormwater giveaways for students	30 students
2/5/2019	Pet Waste Education	Direct distribution and outreach to Multi-Family Apartment Complex Managers within 1 mile radius of the UNCW campus	Stormwater Services Compliance Officer	Pet Waste Toolkits & Signage	37 multi-family apartment complex managers received Toolkits and Signage. Many managers requested additional signage and information.
3/23/2019	Pawz 4 People @ Greenfield Lake Park	Pet owner participants	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 wilmingtonnc.gov/canines	38 pledges signed
3/23/2019	Walk & Dog Dash @ Hugh MacRae Park	Pet owner participants	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 wilmingtonnc.gov/canines	39 pledges signed
3/30/2019	StriperFest Education Day	General public	Stormwater Services	Display booth on stormwater pollution education and interactive Stormwater SuperFan educational game with prizes. Distributed 15 watershed maps, 8 Stormwater is a Dirty Word Brochures, 2 Pet Waste brochres, 2 Greenfield Lake brochures	140 in attendance
4/27/2019	Lower Cape Fear Earth Day Celebration at Hugh MacRae Park	Festival attendees, general public	Stormwater Services (SWS is an annual sponsor of Lower Cape Fear Earth Day Festival)	Display booth on stormwater pollution education and interactive Stormwater SuperFan educational game with prizes. See separate sheet of items distributed.	5000 attendees
6/1/2019	Martin Luther King Center	At risk youth in summer camps	Storrmwater Services	Different stormwater educational activities each week all summer	30 participants

BMP c. Informational Web Site (www.wilmingtonnc.gov/stormwater)					
Ongoing/Regular Updates	Stormwater Services website	General public, website viewers	Stormwater Services	Dedicated stormwater website	www.wilmingtonnc.gov/stormwater
8/3/18	City of Wilmington website homepage and Facebook news	General public Web Viewers	Communications Div.	News article - Stormwater crews in the news (WECT story)	COW web viewers and Facebook fans
10/3/18	City of Wilmington website homepage and Facebook news	General public Web Viewers	Communications Div.	News article - Federal storm damage assessments begin	COW web viewers and Facebook fans
11/5/18	City of Wilmington website homepage and Facebook news	General public Web Viewers	Communications Div.	News article - Don't Get Stinkeye PSA	COW web viewers and Facebook fans
12/21/18	City of Wilmington website homepage and Facebook news	General public Web Viewers	Communications Div.	News article - Living Shoreline permitting to be made easier	COW web viewers and Facebook fans
1/14/2019	City of Wilmington website homepage and Facebook news	General public Web Viewers	Communications Div.	News article - Upcoming River Road project	COW web viewers and Facebook fans
1/28/19	City of Wilmington website homepage and Facebook news	General public Web Viewers	Communications Div.	News article - TreeFest 2019 is underway	COW web viewers and Facebook fans
4/15/19	City of Wilmington website homepage and Facebook news	General public Web Viewers	Communications Div.	News article - City to get 17.5 million from FEMA	COW web viewers and Facebook fans
4/23/19	City of Wilmington website homepage and Facebook news	General public Web Viewers	Communications Div.	News article - Stormwater a Drain on the System (WECT story)	COW web viewers and Facebook fans
4/24/19	City of Wilmington website homepage and Facebook news	General public Web Viewers	Communications Div.	News article -Earth Day Festival	COW web viewers and Facebook fans

BMP d. 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 address is **www.wilmingtonnc.gov/reportstormwaterpollution.** 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 including the number and nature of hotline phone/web reports.

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 e. Extent of Exposure/Reporting Requirements

Media Advertising Campaigns

9/5/18 - 11/30/18	Mass Media - WECT-6 website, digital, mobile and targeted ad campaign	General public Mobile, digital, and web viewers	Stormwater Services	Ads on media Click thrus to website or 30 second Don't Blow It' Yard Waste PSA on TV (72 spots total)	Target Audience: General public Ads Served: 341,568 on website and news/weather app Ads Clicked: 2440 Engagement Rate: .71% (7x the national average) Total cost: $4750

10/1/18 - 10/31/18	Fairway Outdoor Billboard Advertising	Motorists Pedestrians	Stormwater Services	Yard Waste pollution digital billboards - two locations. Messages alternating in English and Spanish.	Target Audience: General public Reach: Motorists Frequency: Rotating billboard shown for 8 seconds every minute 24/7 using rotating billboard locations Ads Served: 864,000 Total cost: $2000
Ongoing	Cape Fear Public Utility Authority (CFPUA)	General public CFPUA customer service visitors	Stormwater Services	Provided CFPUA with stormwater education slides for their TV stations at CFPUA customer service locations	CFPUA visitors
Ongoing	City Offices	Visitors to city offices	Stormwater Services	Stormwater education slides for city office's Marlin Board streaming TVs	City office employees and visitor
4/1/19 - 5/31/19	Mass Media - WECT-6 website, digital, mobile and targeted ad campaign	General public Mobile, digital, and web viewers	Stormwater Services	Ads on media Click thrus to website or 30 second 'Pet Waste' PSA on TV (72 spots total)	Target Audience: General public Ads Served: 312,806 on website and news/weather app Ads Clicked: 525 Engagement Rate: .17% Livestream Views: 17,348 Total cost: $4725
4/8/19 - 6/2/19	Lamar Outdoor Billboard Advertising	Motorists Pedestrians	Stormwater Services	Pet Waste pollution digital billboards - two locations for two months.	Target Audience: General public Reach: Motorists Frequency: Rotating billboard shown for 8 seconds every minute 24/7 using rotating billboard locations Ads Served: 1,728,000 Total cost: $3000
4/1/19 - 5/31/19	Local Voice Wilmington	Radio & Digital viewers	Stormwater Services	98.3, 93.7, and 106.3 radio stations Digital "print" advertising on portcitydaily.com	Radio: 180 :30 second ads per month (90 paid ads in primetime) 90 matching BTAs Digital Advertising: 60 total 300x250 Banner Ads 120,000 unique readers per month
Spring 2018	Going Green Magazine	Magazine and web viewers	Going Green Publications	Magazine Ad - Scoop the Poop ad	Target Audience: Adutls, General public, Environmental groups Reach & Frequency: 8000 printed .

Cumulus Media is no longer purchasing Arbitron or Nielson ratings systems. This is a cost-cutting measure on their part, but it means they no longer have the ability to provide us with reach and frequency data for the campaigns that run on their stations. The data provided references prior years available reach and frequency data for these stormwater outreach campaigns. Approved per M. Randall, NCDEQ.

News Coverage

7/10/2018	Port City Daily	Online newspaper readers Radio listeners	Port City Daily reporter, Johanna Ferebee	Print and online newspaper article - City to consider striking stormwater regulations to incentivize development	Stats: -160,000 digital and print readers -140,000 weekly radio listeners -50% male, 50% female
8/5/2018	WECT-TV6	TV News Online website	WECT News reporter, Ben Smart	TV News, website, social media outlets - It's pretty bad: Lab testing of NC stormwater positive for fecal bacteria, WECT investigation reveals	Stats: -160,000 digital and print readers -140,000 weekly radio listeners -50% male, 50% female
9/4/2018	Port City Daily	Online newspaper readers Radio listeners	Port City Daily reporter, Johanna Ferebee	Print and online newspaper article - Redevelopment policy back on the table, city to reconsider weakening stormwater requirements	Stats: -160,000 digital and print readers -140,000 weekly radio listeners -50% male, 50% female
9/11/2018	NC Environmental Quality	General Public	Public Press Release issued by state	Excessive rains, flooding form Hurricane Florence may cause high bacteria levels in coastal waters	No stats available for readership
10/15/2018	Port City Daily	Online newspaper readers Radio listeners	Port City Daily reporter, Michael Pratts	Print and online newspaper article - Wilmington City Council to vote on weakening stormwater restrictions to encourage development	Stats: -160,000 digital and print readers -140,000 weekly radio listeners -50% male, 50% female
10/18/2018	Port City Daily	Online newspaper readers Radio listeners	Port City Daily staff	Print and online newspaper article - Wilmington City Council postpones vote on stormwater de-regulation indefinitely	Stats: -160,000 digital and print readers -140,000 weekly radio listeners -50% male, 50% female
1/1/2019	Port City Daily	Online newspaper readers Radio listeners	Port City Daily reporter, Johanna Ferebee	Print and online newspaper article - New lameduck law, overriding Cooper's vote	Stats: -160,000 digital and print readers -140,000 weekly radio listeners -50% male, 50% female
4/23/2019	WECT-TV6	TV News Online website	WECT News reporter, Emily Featherston	TV News, website, social media outlets - Drain on the System: Stormwater Infrastructure in focus in wake of Florence	Stats: -160,000 digital and print readers -140,000 weekly radio listeners -50% male, 50% female

Social Media

Ongoing	Posts on City of Wilmington, NC Facebook page	Facebook viewers	City Communications	Facebook posts about stormwater runoff, water pollution, capital projects, etc.	28,584 likes 29,478 follows

Distributing promos/giveaways

Ongoing	Public Meetings, events, displays, city buildings	General public	Stormwater Services	Distribute items or leave in strategic locations where citizens will pick them up	Promote stormwater messages via freebies/promos at events such as Earth Day, Canines for Clean Water, etc.
Ongoing	Canines for Clean Water program at community pet events (ie Rabies Clinics, Pawz in the Park, etc)	Pet owners	Stormwater Services NHSWCD	Pet owners sign a pledge to clean up after their pet and submit a photo of their pet to be featured on our website wilmingtonnc.gov/canines	Goodie bag includes Canines for Clean Water pet bandana, pet waste pick up bags, pet waste brochure, pens, notepads
10/10/2018	Presentation: UNCW Environmental Policy Class	Undergraduate students	Stormwater Services	PowerPoint presentation and discussion about stormwater and Hurricane Florence	20 students, 1 professor
10/19/2019	Tour & Talk at Wade Wetland to UNCW Environmental Policy Class	Undergraduate students	Stormwater Services	Presentation about site, then tour of wetland	20 students, 1 professor
10/20/2018	Pawz in Park	Pet owner participants	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 wilmingtonnc.gov/canines	100 pledges signed
11/2/2018	Interview with Isaac Bear Student	Madison S.	Stormwater Services	Participated in interview by student for class project.	1 pre-college student
1/11/2019	Lower Cape Fear Stewardship Awards Program - sponsorship	Realtors, Developers, Environmental Agencies, Politicians	Stormwater Services	Sponsorship with the Planning Department to further program goals	No banquet this year due to hurricane
1/23/2019	New Hanover Public Library Public	General public	NHSWCD	PowerPoint presentation about stormwater pollution, solutions, and BMPs	32 in attendance
1/23/2019	Presentation: Cape Fear Academy	1st Graders	Stormwater Services	Presentation about stormwater pollution, litter, and plastic pollution. Stormwater giveaways for students	30 students

2/19/2019	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.
2/25/2019	UNCW EVS 495 Class	Undergraduate students	NHSWCD	PowerPoint presentation about stormwater pollution, solutions, and BMPs	32 in attendance
3/3/2019	Cape Fear Museum	General public	NHSWCD	PowerPoint presentation about stormwater pollution, solutions, and BMPs	11 in attendance
3/23/2019	Pawz 4 People @ Greenfield Lake Park	Pet owner participants	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 wilmingtonnc.gov/canines	38 pledges signed
3/23/2019	Walk & Dog Dash @ Hugh MacRae Park	Pet owner participants	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 wilmingtonnc.gov/canines	39 pledges signed
3/30/2019	StriperFest Education Day	General public	Stormwater Services	Display booth on stormwater pollution education and interactive Stormwater SuperFan educational game with prizes. Distributed 15 watershed maps, 8 Stormwater is a Dirty Word Brochures, 2 Pet Waste brochures, 2 Greenfield Lake brochures	140 in attendance
4/27/2019	Lower Cape Fear Earth Day Celebration at Hugh MacRae Park	Festival attendees, general public	Stormwater Services (SWS is an annual sponsor of Lower Cape Fear Earth Day Festival)	Display booth on stormwater pollution education and interactive Stormwater SuperFan educational game with prizes. See separate sheet of items distributed.	5000 attendees

Local Cable Access (GTV-8)

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 program changes)	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	UNCW Buffers 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	Grasshopper Litter 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	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 2010
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	Johnny Fishpatrick PSA - NC DENR
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	Keep America Beautiful Grasshopper 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 (documentary)	Cable access TV viewers	Stormwater Services GTV-8	Documentary	Puget Sound Scuba Urban Pollution documentary
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	Shortnose Sturgeon Documentary

CCTV & Marlin Information Boards

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

Brochures, Displays, Signs, Welcome Packets, Pamphlets

Ongoing Enforcement Activity	Pet Waste Signage Pilot Program	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
7/10/2018	Stormwater Services brochures delivered to CFPUA	CFPUA / Stormwater customers	Stormwater Services	Two CFPUA Offices received updated Stormwater Services brochures to distribute to customers	2500 brochures

Newsletters

Fall 2018	Citywide Public Information Report Newsletter	City residents Public library Special events	Stormwater Services Communications Div.	Hurricane Florence impacts and storm debris updates	40,000+ newsletters mailed to city residents
Spring 2019	Stormwater Watch Newsletter Insert included in Citywide Public Information Report Newsletter	City residents Public library Special events	Stormwater Services Communications Div.	UNCW Annual Water Quality Report including articles about pet waste, Heal Our Waterways, and Canines for Clean Water.	40,000+ newsletters mailed to city residents

Grant Projects

Began Jan 2015 (1st year of 2.5 year grant). Closed out March 2019	319 Hewletts Creek Watershed BMP Installations Grant (A collaborative approach to voluntary watershed restoration)	Hewletts Creek	NCSU Stormwater Services	Stormwater improvement projects on private and city property	Collaboration with NCSU to implement projects that align with the Bradley & Hewletts Creek Watershed Restoration plan
Began April 2017. Closed out in March of 2019	EPA 319 NCCF Grant for Bradley & Hewletts Creeks	Hewletts Creek Bradley Creek	Stormwater Services NC Coastal Federation	Grant to install BMPs in Hewletts and Bradley Creek Watersheds	Collaboration with NCCF to implement projects that align with the Bradley & Hewletts Creek Watershed Restoration plan
EPA 319 NCCF Grant for UNCW BMP installations in Bradley Creek	Bradley Creek	Stormwater Services 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 in Summer 2019
Ongoing	Watershed restoration plan for Hewletts and Bradley Creeks, now being implemented by Watershed Coordinator	Hewletts & Bradley Creek watershed residents and businesses	Partners: Stormwater Services NC Coastal Federation Town of Wrightsville Beach Withers and Ravenal 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	3-year term

Quarterly Meetings	New Hanover County Watershed Roundtable	Local water quality agencies, government, NGOs	Stormwater Education Program Manager	Participation in collaborative meeting	Ongoing

Employee Trainings

7/10/2017	IDDE/Stormwater Presentation for Engineering Staff	Engineering Staff	Compliance Officer	Illicit Discharge Detection & Elimination	5 attendees

Weekly Update Articles for City Council / City Staff / Media

Weekly	Weekly Email Update	City Council Employees Media	Various city staff	Weekly update of city news, events, projects, etc.	Stormwater information was included in 5 Weekly Updates

Citizen Contacts

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

CITY OF WILMINGTON
STORMWATER SERVICES

NPDES
Public Outreach & Education
&
Public Involvement & Participation

Updated 2019

Table of Contents

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.

BMP	Measurable Goals
a. Goals and Objectives	Define 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.
e. Informational Web Site	The permittee shall promote and maintain, an internet web site designed to convey the program's message.
f. Distribute public education materials to identified target audiences and user groups.	The permittee shall distribute stormwater educational material to appropriate target groups (ex.: schools, homeowners, and/or businesses). Instead of developing its own materials, the permittee may rely on Public Education and Outreach materials supplied by the state, and/or other entities through a cooperative agreement, as available, when implementing its own program.
g. Maintain Hotline/Help line	The permittee shall promote and maintain a stormwater hotline/helpline for the purpose of public education and outreach.
h. Implement a Public Education and Outreach Program.	The permittee's outreach program, including those elements implemented locally or through a cooperative agreement, shall include a combination of approaches designed to reach the target audiences. For each media, event or activity, including those elements implemented locally or through a cooperative agreement the permittee shall estimate and record the extent of exposure.

GOALS & OBJECTIVES FOR PUBLIC EDUCATION & OUTREACH:

BMP (a, b, c, d)	Define program goals, and describe target pollutants and/or stressors, target audiences, and residential and industrial/commercial issues.
Goal	▪ Define goals and objectives of the Local Public Education and Outreach Program based on community wide issues. ▪ 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, ▪ Describe issues, such as pollutants, likely sources of those pollutants, impacts, and the physical attributes of stormwater runoff, in their education/outreach program.
Implementation Responsibility	▪ City of Wilmington Stormwater Services – Education Program Manager ▪ Heal Our Waterways Program – Watershed Coordinator
Implementation Schedule	▪ 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.
Measurement	▪ Update each year, if necessary.

BMP (e)	Informational Stormwater Website
Goal	▪ 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. ▪ www.wilmingtonnc.gov ▪ www.healourwaterways.org
Implementation Responsibility	▪ City of Wilmington Stormwater Services – Education Program Mgr. ▪ Heal Our Waterways Program – Watershed Coordinator
Implementation Schedule	▪ Updates to News Section – Bi-Monthly ▪ Review and update every page on website – every 90 days
Measurement	▪ News section updated every other month. ▪ Content updated and/or reviewed on each website page every 90 days. ▪ Working with the city's Public Information Office, Stormwater Services will obtain stats for the dedicated website pages including specific Outreach/Education pages.

BMP (f, h)	Enviroscape Watershed Education Program (school presentations)
Goal	▪ Deliver presentations to every 8th grade middle school science class in New Hanover County Schools each school year – approximately 69-75 classes per year serving 2,200 students
Implementation Responsibility	▪ City of Wilmington Stormwater Services – Education Program Mgr. coordinates program and city delivers 1/3 of total presentations annually ▪ Cape Fear River Watch - delivers 1/3 of total presentations annually (under contract) ▪ New Hanover Soil & Water Conservation District - delivers 1/3 of total presentations annually (under contract)
Implementation Schedule	▪ Deliver presentations in coordination with NHCS Science Coordinator and fulfilling the schedule established by the school system.
Measurement	▪ At the end of each school year, tally: - Number of middle schools visited - Number of classroom presentations given - Number of students served - Number of educational materials distributed to teachers and/or students in support of the program.

BMP (f, h)	Pet Waste (Fecal Coliform) Education / Canines for Clean Water
Goal	▪ 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.
Implementation Responsibility	▪ City of Wilmington Stormwater Services – Education Program Mgr. ▪ Heal Our Waterways Program – Watershed Coordinator ▪ New Hanover Soil & Water Conservation District (under contract)
Implementation Schedule	▪ Events occur throughout the year and largely depend on community organizations that schedule each community event and venue.
Measurement	▪ Each fiscal year, tally: - Name, date, location of each pet-related event - Number of people in attendance at each event - Number of pet owners that signed the Pet Waste Pledge - How many attendees received educational materials or promo items (ie pet waste goodie bags

BMP (f, h)	Stormwater 101 Outreach Presentations
Goal	▪ 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.
Implementation Responsibility	▪ City of Wilmington Stormwater Services – Education Program Mgr. ▪ Heal Our Waterways Program – Watershed Coordinator ▪ New Hanover Soil & Water Conservation District (under contract)
Implementation Schedule	▪ Staff markets and schedules presentations throughout the year, dependent on the group served and their available schedule.
Measurement	▪ Each fiscal year, tally: - Name, date, location of each event/presentation - Number of people in attendance at each presentation - How many attendees viewed or received educational materials - Number of promo/giveaway items distributed to attendees

BMP (f, h)	Stormwater Events & Promotional Giveaways
Goal	▪ Participate in community events to engage and provide stormwater education and promo/giveaway items to citizens & businesses.
Implementation Responsibility	▪ City of Wilmington Stormwater Services – Education Program Manager ▪ Heal Our Waterways Program – Watershed Coordinator ▪ Cape Fear River Watch ▪ New Hanover Soil & Water Conservation District
Implementation Schedule	▪ Ongoing, events occur throughout the year
Measurement	▪ Each fiscal year, tally: - Name & Date of each event attended - Number of events attended in the fiscal year - Number of people in attendance at each event - How many attendees viewed or received educational materials at each event - Number of promo/giveaway items distributed at each event

BMP (f, h)	Paid Stormwater Media Campaigns
Goal	▪ Conduct a fall and spring paid media campaign on WECT-TV (NBC) focused on a stormwater pollutant (ie pet waste, litter, lawn care, general

	stormwater overview, etc) aiming for 200,000 ads served on mobile and digital platforms (campaign dependent)
Implementation Responsibility	▪ City of Wilmington Stormwater Services – Education Program Manager ▪ Heal Our Waterways Program – Watershed Coordinator
Implementation Schedule	▪ Meet with WECT media reps to design campaigns and associated ads for each campaign. Use each campaigns stats to improve on the next campaign.
Measurement	▪ At the end of the fiscal year, obtain data from WECT showing: - Number of ads served on digital/mobile platforms - Engagement rate at or above the national average (if applicable) - Reach and frequency (if airing specifically on TV)

BMP (f, h)	**Environmental Field Day Events**
Goal	▪ Organize and facilitate at least 2 Environmental Field Days a year serving an entire grade at a New Hanover County School.
Implementation Responsibility	▪ New Hanover Soil & Water Conservation District (under contract)
Implementation Schedule	▪ Work with individual school teachers and administration to schedule each field day
Measurement	▪ For each field day: - School served - Grade served - Number of students involved in field day

BMP (g)	**Hotline**
Goal	▪ Maintain, promote, and respond to the city's "Report Stormwater Pollution" hotline and web reporting form.
Implementation Responsibility	▪ Stormwater Compliance Officer (tracks & responds) ▪ Stormwater Specialist (responds to reports in Compliance Officer's absence) ▪ City of Wilmington Stormwater Services – Education Program Mgr. (ensure hotline & webform functionality and promotes)
Implementation Schedule	▪ Ongoing/Continuous promotion of hotline/webform
Measurement	▪ 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.

NPDES PERMIT: PUBLIC INVOLVEMENT & PARTICIPATION (SECTION C)

1. Objectives for Public Involvement and Participation

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

2. BMPs for Public Involvement and Participation

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

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

GOALS & OBJECTIVES FOR PUBLIC INVOLVEMENT & PARTICIPATION:

BMP (a)	Storm Drain Marking Program
Goal	▪ 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).
Implementation Responsibility	▪ City of Wilmington Stormwater Services – Education Program Mgr. ▪ Cape Fear River Watch (under contract) ▪ New Hanover Soil & Water Conservation District (under contract)
Implementation Schedule	▪ During the fiscal year, as groups are recruited and weather conditions permit
Measurement	▪ At the end of the year, tally: - Date - Number of drains marked - Indicate drain specific marker (Drains to River OR Drains to Waterway) - Name of volunteer organization that participated - Number of volunteers at each event - Number of educational doorhangers distributed to community

BMP (a)	Stream / Watershed Cleanups
Goal	▪ Coordinate 10 annual volunteer cleanups of city watersheds/creeks (1 per month with the exception of July and December).
Implementation Responsibility	▪ Cape Fear River Watch (under contract)
Implementation Schedule	▪ Monthly, except July & December
Measurement	▪ Each cleanup, report on: - Specific creek/watershed and area cleaned - Number of bins or bags of trash collected - Number of bins or bags of recycling collected - Number of volunteers - Number of volunteer hours contributed - Number of stream miles cleaned

BMP (a)	Rain Barrel Sale
Goal	▪ 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.
Implementation Responsibility	▪ City of Wilmington Stormwater Services ▪ New Hanover Soil & Water Conservation District (under contract)
Implementation Schedule	▪ Currently, the sale is held monthly, although the frequency may change in the future.
Measurement	▪ At the end of the fiscal year, tally: - Number of rain barrels sold - Type of rain barrels sold (ie 60-gallon, 80 gallon)

BMP (a)	CreekWatchers Volunteer Monitoring Program
Goal	▪ 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.
Implementation Responsibility	▪ Cape Fear River Watch (under contract)
Implementation Schedule	▪ Two volunteer reports submitted every August, October, December, February, April & June. Compliance Officer will respond as necessary to problem areas
Measurement	▪ Every other month, review volunteer CreekWatcher reports for: - Creek Appearance - Odor - Algae Presence: Color, Texture, Amount - Bank Stability - Turbidity - Creek Flow - Creek Shade - Biodiversity - Litter Presence - Surrounding Land Use - Other noted observations or issues - Photo documentation

BMP (b)	Public Notice/Input/Meetings
Goal	▪ 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.
Implementation Responsibility	▪ Stormwater Services Manager ▪ Stormwater Engineer
Implementation Schedule	▪ As stormwater projects come to fruition or as community stormwater issues dictate.
Measurement	▪ At the end of the fiscal year, tally: - Number of public notices distributed and distribution method - Topic of notice - Number of public meetings held - Meeting topic - Number of attendees - Number of materials/promotional items distributed & what they were - Actions taken as a result of a stakeholder meeting

BMP (c)	Hotline
Goal	▪ Maintain, promote, and respond to the city's "Report Stormwater Pollution" hotline and web reporting form.
Implementation Responsibility	▪ Stormwater Compliance Officer (tracks & responds) ▪ Stormwater Specialist (responds to reports in Compliance Officer's absence) ▪ City of Wilmington Stormwater Services – Education Program Mgr. (ensure hotline & webform functionality and promotes)
Implementation Schedule	▪ Ongoing/Continuous promotion of hotline/webform
Measurement	▪ 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.

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, 3rd Edition:

1) Identify Driving Forces, Establish Goals, and (SMART) Objectives
2) Identify the Target Audience(s)
3) Create your Message
4) Package your Message (format)
5) Distribute your Message
6) Evaluate your 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** (Residential & Commercial/Industrial)
Fecal Coliform Bacteria	⌖ Domestic Pets (dogs, cats) ⌖ Sewer Spills	▪ Pet owners ▪ Veterinarians ▪ Boarding kennels ▪ Pet-related businesses (ie petsitters, dog walkers) ▪ Pet adoption fairs ▪ Rabies clinics ▪ City parks ▪ Pooper scooper businesses ▪ School students (8th grade water quality program integrated into New Hanover County Schools) ▪ Apartment complex onsite management, management companies, and residents ▪ Local sewer utility - Cape Fear Public Utility Authority (CFPUA)
Nutrients (nitrogen, phosphorous)	⌖ Fertilizers ⌖ Yard debris/waste	▪ Homeowners / HOAs ▪ Businesses ▪ Gardeners / Nurseries ▪ HOAs ▪ Landscaping companies ▪ Turf Maintenance Professionals ▪ Golf courses ▪ School students (8th grade water quality program integrated into New Hanover County Schools) ▪ Multi-family complex management companies ▪ Realty management companies ▪ City of Wilmington Parks management
Sediment (sand, soil, etc)	⌖ Construction sites ⌖ Eroding stream banks	▪ Construction sites/land-disturbing activities ▪ Landscapers/landscaping companies ▪ Homeowners

	⌖ Exposed soil	▪ Farming operations ▪ School students (8th grade water quality program integrated into New Hanover County Schools)
Chemicals	⌖ Pesticides ⌖ Pressure washing chemicals ⌖ Vehicle and boat washing soaps ⌖ Illicit Discharge ⌖ Household Hazardous Waste	▪ Homeowners ▪ Pressure washing businesses ▪ Mobile detailers ▪ Pressure washers ▪ Turf/landscape professionals ▪ Restaurants ▪ School students (8th grade water quality program integrated into New Hanover County Schools)
Litter	⌖ Plastics ⌖ Paper ⌖ Cigarette butts	▪ Homeowners ▪ Motorists ▪ Smokers ▪ Restaurants ▪ Retail centers ▪ Construction sites ▪ School students (8th grade water quality program integrated into New Hanover County Schools)
Vehicle Pollution	⌖ Vehicle fluids (motor oil, antifreeze, etc) ⌖ Vehicle washing soaps/detergents	⌖ Homeowners ⌖ Motorists' vehicles ⌖ Backyard mechanics ⌖ Vehicle maintenance repair shops ⌖ Mobile detailers ⌖ Dealership lots ⌖ School students (8th grade water quality program integrated into New Hanover County Schools)

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.	• Educate citizens about the City's pet waste ordinance via the stormwater website, social media outlets, GTV • Canines for Clean Water outreach program for pet owners • Host Super Pooper Scooper photo booth to educate pet owners in a fun and interactive way • Participate in local pet-related events to provide direct education to pet owners • Post educational signs on pet waste stations • Media campaigns to air PSAs and ads and on media digital and mobile platforms in paid campaigns • Include information in the citywide newsletter • Distribute pet waste education brochures and flyers during special events • Enviroscape 8th Grade watershed education program Utilize enforcement actions when necessary for violators of the pet waste ordinance (ie fines) • Encourage community participation in storm drain marking program • Outreach via the Heal Our Waterways Program • Promote pet waste ordinance & fines • Compliance Officer direct contact and outreach with public • Direct mail enforcement letter to neighborhoods with complaints or problem areas • Utilize enforcement actions when necessary for violators of pet waste ordinance • Compliance Officer rotating signage program for problem areas and customer driven complaints • Stormwater pollution hotline promotion
Pet-Related Businesses	Targeting pet-related businesses will educate those in the profession about best	• Encourage businesses to be models for environmental stewardship (i.e. install pet waste receptacles in parking lot

	practices for pet waste management and also serve as a conduit to deliver outreach messages to the public. Businesses include: - Veterinarians - Animal hospitals - Kennels - Pet stores - Groomers - Trainers - Petsitters - Doggie day care - Pooper Scooper Companies - Local pet magazines - Local adoption agencies - NHC Animal Control - NH Humane Society	islands or properly design kennel runs for waste removal, DNA testing, etc.) • Encourage businesses to post the pet waste educational poster and/or materials for customers to view
Management/ Residents of Multi-Family Apartment Complexes	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.	• Provide materials to educate the management of apartment complexes on how to institute a pet waste policy, as well as provide a consistent policy for enforcement • Encourage management to be make it easy for their residents to manage pet waste by installing pet waste receptacles around the property • Encourage apartment complex management to educate their residents by distributing the City's pet waste management packet to apartment complexes • Encourage management to post the pet waste education poster and/or brochure in common areas for their residents to view • Encourage DNA Testing Services for multi-family complexes

Assessment & Evaluation

- Assess and evaluate local water quality utilizing UNCW Center for Marine Science annual water quality monitoring, specifically Fecal Coliform counts in local waters
- Periodically assess the habits of pet owners and pet industry professionals by:
  - Direct observation of habits *(collects vs. doesn't collect, where dispose, etc.)*
  - Surveys of pet owners
  - Count of reported complaints to Stormwater Hotline regarding pet waste violations
- Track Stormwater Pollution Prevention Hotline calls

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, pinestraw) are often improperly blown or directed into streets, storm drains, and ditches leading to clogged stormwater conveyances resulting in flooding of streets and property. 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/ 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.	• Educate citizens about nutrient pollution and the City's yard waste ordinance via the stormwater website, social media outlets, GTV • Distribute fertilizer and yard waste education brochures and soil test kits to Wilmington residents during HOA presentations or special events like Earth Day • Mass media campaigns to inform residents about proper disposal methods for yard waste including grasscycling, composting, and collecting yard waste for pick-up • Include information in the citywide newsletter • Media campaigns to air PSAs and ads and on media digital and mobile platforms in paid campaigns • Distribute pet waste education brochures and flyers during special events • Enviroscape 8th Grade watershed education program • Encourage community participation in storm drain marking program • Utilize enforcement actions when necessary for violators of the pet waste ordinance (ie fines) • Outreach via the Heal Our Waterways Program • Compliance Officer direct contact and outreach with public • Utilize enforcement actions when necessary for violators of yard waste ordinance • Promote stormwater pollution prevention hotline

Landscapers, Turf Maintenance Professionals, Golf Courses	Landscaping and turf maintenance companies frequently use fertilizers and produce a large amount of yard waste on a regular basis. Employees in this field of work are often male.	• Distribute large format education poster about yard waste disposal to landscapers and lawn maintenance companies, available in both English and Spanish • Emphasize proper staff training on practices like fertilization application and yard waste disposal • Distribute fertilizer education info to golf course management • Post outreach materials in English and Spanish on stormwater website and GTV • Provide companies with the yard waste poster that addresses sediment/debris to post in employee gathering areas • Utilize enforcement actions when necessary for violators of yard waste ordinance
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/ 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.	• Encourage homeowners to plant vegetation or apply mulch to anchor soil in place and prevent erosion during HOA or community presentations • Post outreach materials on stormwater website and GTV • Lack of vegetation along waterfront property and streambanks can produce significant erosion. These types of property owners should be encouraged to plant vegetative buffers. • The public should be made aware of the City's yard waste ordinance via GTV and paid spots on mass media • Educate citizens about the City's debris/yard waste ordinance and fines via the stormwater website, social media outlets, GTV • Media campaigns to air PSAs and ads and on media digital and mobile platforms in paid campaigns • Include information in the citywide newsletter • Distribute educational info during special events • Enviroscape 8th Grade watershed education program • Encourage community participation in storm drain marking program • Outreach via the Heal Our Waterways Program • Utilize enforcement actions when necessary for violators of yard waste ordinance (ie fines) • Promote stormwater pollution prevention hotline • Promote NHCounty Sedimentation & Erosion Control program and the State Hotline: 1-866-STOP-MUD
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.	• Promote compliance with the land development code and sedimentation and erosion control laws • Encourage proper staff training with construction, landscaping, and related businesses • Post outreach materials on stormwater website and GTV

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

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.	• Educate citizens about the City's Illicit Discharge ordinance and fines via the stormwater website, social media outlets, GTV • Distribute educational materials to residents about practicing environmentally safe gardening/lawn maintenance and washing of materials outdoors • Emphasize compliance with the City's Illicit Discharge ordinance • Promote the stormwater hotline to report illicit discharges • Promote Household Hazardous Waste Collection Days • Media campaigns to air PSAs and ads and on media digital and mobile platforms in paid campaigns • Post outreach materials on stormwater website and GTV • Include information in the citywide newsletter • Distribute educational info during special events • Enviroscape 8th Grade watershed education program • Encourage community participation in storm drain marking program • Outreach via the Heal Our Waterways Program • Utilize enforcement actions when necessary for violators of Illicit Discharge ordinance (ie fines)
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.	• Mail educational info to pressure washing businesses and mobile detailers • Post outreach materials on stormwater website and GTV

Landscape/Turf Maintenance Professionals	Landscape/turf maintenance professionals frequently use pesticides. Employees in this field are often male.	• Promote training of workers for proper application of pesticides • Emphasize use of pesticides as a last resort; promote alternatives • Promote BMP & Rain Garden certification programs
Restaurants	Restaurants often clean equipment or dump mop wash water outdoors. The discharge of any type of wastewater into the storm drainage system is unlawful.	• Distribute educational info and posters to local restaurants • Disseminate business checklist to ensure stormwater-friendly practices • Encourage employee training on wastewater practices, proper chemical use and disposal, grease traps, etc. • Mark storm drains near restaurants • Give presentation to restaurant association
Assessment & Evaluation		
• Periodically assess the pesticide application habits of homeowners and landscape professionals by: - Direct observation of pesticide application habits of homeowners and landscape professionals - Surveys of pesticide application habits of homeowners and landscape professionals • Conduct a survey of restaurants to gauge compliance with local stormwater ordinances and stormwater-friendly practices • Assess and evaluate local water quality utilizing UNCW Center for Marine Science annual water quality reporting, specifically focusing on illicit discharge tested locations		

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 8th graders during annual school presentations should be a priority, since they are in the developmental stage of thinking and forming opinions.	• Promote awareness of the impact of littering and the toxicity and wildlife impacts of many littered items. • 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 • Promote the 5 R's: Reduce, Reuse, Recycle, Refuse, Repurpose • Promote plastic return programs (ie for plastic bags) • Promote North Carolina's Swat-a-Litterbug Program • Media campaigns to air PSAs and ads and on media digital and mobile platforms in paid campaigns • Post outreach materials on stormwater website and GTV • Include information in the citywide newsletter • Distribute educational info during special events • Enviroscape 8th Grade watershed education program • Promote the stormwater hotline to report illicit discharges • Encourage community participation in storm drain marking program • Outreach via the Heal Our Waterways Program
Smokers	Cigarette butts are one of the largest environmental litter problems, both locally and worldwide. Target both male and female smokers.	• Display signs encouraging proper disposal of cigarette butts in public areas (i.e. Wave Transit buses) • Media campaigns to air PSAs and ads and on media digital and mobile platforms in paid campaigns • Post outreach materials on stormwater website and GTV • Encourage use of ashtrays for smokers • Distribute pocket ashtrays at public events
Motorists and Pedestrians	Along roadways, motorists (52%) and pedestrians (23%) are the largest contributors of litter. Target males and females.	• Educate citizens about North Carolina's Swat-A-Litterbug • Remind motorists about the proper disposal of trash by displaying educational signs on public transportation vehicles (i.e. Wave Transit buses) • Encourage use of car litterbags for proper trash disposal

Assessment & Evaluation
• Conduct an informal poll before 8th 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 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.	• Emphasize vehicle maintenance is the #1 priority (i.e. tune ups) • Post outreach materials on stormwater website and GTV • Promote alternative methods of transportation (i.e. public transportation, carpooling, bikes, walking, bio-fuels) • 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 • Mark storm drains in visible areas to prevent illegal dumping • Promote the stormwater hotline to report illicit discharges • Media campaigns to air PSAs and ads and on media digital and mobile platforms in paid campaigns • Post outreach materials on stormwater website and GTV • Include information in the citywide newsletter • Distribute educational info during special events • Enviroscape 8th Grade watershed education program

		• Encourage community participation in storm drain marking program • Outreach via the Heal Our Waterways Program • Utilize enforcement actions when necessary for violators of yard waste ordinance (ie fines)
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.	• 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 • Promote the stormwater hotline to report illicit discharges • Post outreach materials on stormwater website and GTV
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.	• Distribute educational flyer to businesses • 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 • Post outreach materials on stormwater website and GTV
Assessment & Evaluation		
• Periodically assess vehicle fluid disposal habits of Wilmington residents and businesses - Direct observation of habits - Surveys of habits - Count of reported violations pertaining to chemical leaks or disposal habits to Stormwater Hotline • Periodically assess vehicle washing and exterior home washing habits of Wilmington residents by: - Direct observation of habits - Surveys of habits • Assess and evaluate local water quality utilizing UNCW Center for Marine Science annual water quality monitoring		

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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/ ACTIVITY	EVENT/ACTIVITY	AUDIENCE	DELIVERED BY (AGENCY)	METHOD OF DELIVERY / MESSAGE	ATTENDANCE/ PARTICIPATION
BMP a. Volunteer community involvement program					
Community Events / Programs for the Public					
10/10/2018	Presentation: UNCW Environmental Policy Class	Undergraduate students	Stormwater Services	PowerPoint presentation and discussion about stormwater and Hurricane Florence	20 students, 1 professor
10/19/2019	Tour & Talk at Wade Wetland to UNCW Environmental Policy Class	Undergraduate students	Stormwater Services	Presentation about site, then tour of wetland	20 students, 1 professor
10/20/2018	Pawz in Park	Pet owner participants	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 wilmingtonnc.gov/canines	100 pledges signed
11/2/2018	Interview with Isaac Bear Student	Madison S.	Stormwater Services	Participated in interview by student for class project.	1 pre-college student
1/11/2019	Lower Cape Fear Stewardship Awards Program - sponsorship	Realtors, Developers, Environmental Agencies, Politicians	Stormwater Services	Sponsorship with the Planning Department to further program goals	No banquet this year due to hurricane
1/23/2019	New Hanover Public Library Public	General public	NHSWCD	PowerPoint presentation about stormwater pollution, solutions, and BMPs	32 in attendance
1/23/2019	Presentation: Cape Fear Academy	1st Graders	Stormwater Services	Presentation about stormwater pollution, litter, and plastic pollution. Stormwater giveaways for students	30 students
2/5/2019	Pet Waste Education	Direct distribution and outreach to Multi-Family Apartment Complex Managers within 1 mile	Stormwater ServicesCompliance Officer	Pet Waste Toolkits & Signage	37 multi-family apartment complex managers received Toolkits and Signage. Many managers requested additional signage and information.

		radius of the UNCW campus			
2/19/2019	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.
2/25/2019	UNCW EVS 495 Class	Undergraduate students	NHSWCD	PowerPoint presentation about stormwater pollution, solutions, and BMPs	32 in attendance
3/3/2019	Cape Fear Museum	General public	NHSWCD	PowerPoint presentation about stormwater pollution, solutions, and BMPs	11 in attendance
3/23/2019	Pawz 4 People @ Greenfield Lake Park	Pet owner participants	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 wilmingtonnc.gov/ canines	38 pledges signed
3/23/2019	Walk & Dog Dash @ Hugh MacRae Park	Pet owner participants	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 wilmingtonnc.gov/ canines	39 pledges signed
3/30/2019	StriperFest Education Day	General public	Stormwater Services	Display booth on stormwater pollution education and interactive Stormwater SuperFan educational game with prizes. Distributed 15 watershed maps, 8 Stormwater is a Dirty Word Brochures, 2 Pet Waste brochres, 2 Greenfield Lake brochures	140 in attendance
4/27/2019	Lower Cape Fear Earth Day Celebration at Hugh MacRae Park	Festival attendees, general public	Stormwater Services (SWS is an annual sponsor of Lower Cape Fear Earth Day Festival)	Display booth on stormwater pollution education and interactive Stormwater SuperFan educational game with prizes. See separate sheet of items distributed.	5000 attendees
June - July 2019	Martin Luther King Center Summer Camps	At risk youth	Stormwater Services	Different stormwater activities each week of camp	30 participants, ranging from 6-8 grade.

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	45 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	41 storm drain markers were placed in the Haberline Drive/Steeplechase Rd. neighborhoods off 17th Street this year

Stream & Litter Clean-ups

Ongoing	Watershed cleanups including the Annual Big Sweep event	Volunteers	CFRW volunteers	10 watershed cleanups were held. Areas cleaned included Greenfield Lake, Smith Creek, Cape Fear River, Burnt Mill Creek, Randall Pond	10 cleanup events including annual International Coastal Cleanup event 305 volunteers contributed a total of 610 volunteer hours Collected: 15.5 96-gallon bins of trash 14.75 96-gallon bins of recycling 22 (13 gallon) bags of trash 10 (13 gallon) bags of trash 33 (10 gallon) bags of trash 16 (5 gallon) bags of trash

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 monitoring report and photos to Stormwater Services	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 contract 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

Sept 12-Oct5	Hotline for Stormwater issues post hurricane	Residents, businesses impacted by Hurricane Florence	Stormwater Services	Call center with triage to respond to stormwater issues	250+ calls
Post Hurricane Florence - after Sept 2018	Direct citizen meetings	City infrastructure and residents impacted by Hurricane Florence	Stormwater Services	City engineers and stormwater staff visited locations to assess hurricane damage via citizen reports	70+ locations throughout the city
4/1/2019	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.	http://wilmingtonnc.maps.arcgis.com/apps/View/index.html?appid=601c640f01c840f5a274f0987f5956fa

BMP c. 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 address is **www.wilmingtonnc.gov/reportstormwaterpollution.** 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 including the number and nature of hotline phone/web reports.

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 "Compliance Enforcement" section of the report.

Cumulative Year End Contract Agency Reports

FY 1819

CAPE FEAR RIVER WATCH
617 Surry Street

Wilmington, NC 28401
(910) 762-5606
www.capefearriverwatch.org

Quarterly Progress Report #4: April 1 – June 30, 2019

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, 2018** through **June 30, 2019** for the agreed amount of **$15,510**. These contracted services, should be implemented as equitably as possible throughout the fiscal year, to assist the City in meeting requirements of its federal NPDES Stormwater Permit.

Public Education/Outreach

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

January 1- March 31, 2019

8th Grade Enviroscape Presentations				
Date	**School**	**Grade**	**# of presentations**	**# of students**
3/4/2019	Murray	8	2	50
3/25/2019	Holly Shelter	8	1	30
Other Enviroscape Presentations				
Date	**School / Group / Event**	**Grade**	**# of presentations**	**# of attendees**
2/27/2019	Cape Fear Academy	8	1	37

April 1- June 30, 2019

8th Grade Enviroscape Presentations				
Date	**School**	**Grade**	**# of presentations**	**# of students**
4/3/2019	Myrtle Grove	8	1	31
4/8/2019	Noble	8	1	28
5/2/2019	Murray	8	2	52
5/6/2019	Williston	8	4	119
5/7/2019	Williston	8	4	114
5/8/2019	Williston	8	1	33
5/13/2019	Trask	8	2	58
5/16/2019	Murray	8	3	82
5/20/2019	Roland Grise	8	1	29
5/23/2019	Roland Grise	8	1	29
Other Enviroscape Presentations				
Date	**School / Group / Event**	**Grade**	**# of presentations**	**# of attendees**
5/2/2019	Girl Scout Troops	7th	1	10

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, 2018

First Saturday Seminars			
Date	**Topic**	**Speaker**	**Attendance**
7/7/2018	The Ancient Bald Cypress of the Black River	Charles Robbins	44
8/4/2018	Update on CAFOs and GenX	Kemp Burdette	69
9/1/2018	Water Quality of Greenfield Lake	Mike Mallin	52
Other Presentations by CFRW Staff			
Date	**Organization/Audience**	**Topic / Speaker**	**Attendance**
7/16/2018	CFRW Summer Campers	Careers to help our Planet/Madi Polera	20
7/23/2018	CFRW Summer Campers	Careers to help our Planet/Kay Lynn Hernandez	24
7/30/2018	CFRW Summer Campers	Careers to help our Planet/Madi Polera	23
Greenfield Lake Tours & Creek Paddle Tours			
Date	**Group Served/Audience**	**Type of Tour /Topic / Location / Speaker**	**Attendance**
7/2/2018	YWCA/K - 2nd graders	GFL eco-tour/Stormwater, flora & fauna ID/CFRW intern	30
7/3/2018	YWCA/2nd – 5th graders	GFL eco-tour/Stormwater, flora & fauna ID/CFRW intern	35
7/5/2018	Childcare Network/pre-K	GFL eco-tour/Stormwater, flora & fauna ID/CFRW intern	12

7/9/2018	YWCA/ 4th – 7th Graders	GFL eco-tour/Stormwater, flora & fauna ID/CFRW intern	30
7/10/2018	Childcare Network/pre-K	GFL eco-tour/Stormwater, flora & fauna ID/CFRW intern	6
7/17/2018	CFRW Summer Campers	GFL eco-tour/Stormwater, flora & fauna ID/Madi Polera	20
7/18/2018	CFRW Summer Campers	GFL eco-tour/Stormwater, flora & fauna ID/Madi Polera	24
8/1/2018	CFRW Summer Campers	GFL eco-tour/Stormwater, flora & fauna ID/Kay Lynn Hernandez	23
8/7/2018	YMCA/Water Adventures Program	GFL eco tour + paddleboat/Stormwater, flora and fauna ID/Kay Lynn Hernandez	15

October 1 – December 31, 2018

First Saturday Seminars			
Date	**Topic**	**Speaker**	**Attendance**
10/6/18	Search for the Rock Spring	Dr. Chris Fonieville	62
11/3/18	Tips for Recycling and Intro to NHC Composting	Dick Brightman and Kendal Welsh	48
12/1/18	Alligators, Stripe Bass and Gen X	Dr. Scott Belcher	51
Other presentations by CFRW staff			
Date	**Organization/Audience**	**Topic/Speaker**	**Attendance**
10/8/18	UNCW students	Plastic impact on Wildlife/Kay Lynn Hernandez	25
11/7/18	NC Kayak Fishing Association	CFRW Anadromous Fish Passage in CFR/Frank Yelverton	10
11/11/18	CFRW Membership	Overview of CFRW/Kemp Burdette	70
11/15/18	CFCC Marine Tech students	Overview of CFRW/Kay Lynn Hernandez	20
11/30/18	Wilmington community members	GenX film screening/Kemp Burdette	100
12/16/18	Love2Act/students and family	CFRW, Env. Ed and Water Quality/Kay Lynn Hernandez	140
12/17/18	Love2Act/students	CFRW, Env.Ed and Water Quality/Kay Lynn Hernandez	40
Greenfield Lake Tours & Creek Paddle Tours			
Date	**Group Served/Audience**	**Type of Tour/Topic/Location/Speaker**	**Attendance**
10/29/18	Peace Rose Montesorri/Grades 1 – 5	Eco Tour/Stormwater, Flora & Fauna/GFL/Kay Lynn Hernandez	27

January 1 – March 31, 2019

First Saturday Seminars			
Date	**Topic**	**Speaker**	**Attendance**
2/2/2019	Consequences of wood pellet production in NC & Europe	Andy Wood, Bob Parr, Priss Endo	70
3/2/2019	Growing Healthy People	Evan Folds	75
Other presentations by CFRW staff			
Date	**Organization/Audience**	**Topic/Speaker**	**Attendance**
2/6/2019	Sonic Sea Event	Sonic impacts/Dana Sargent	130
2/12/2019	NC Environmental Justice Board/Community at Large	CAFO & GenX Impacts to Water Quality and EJ Communities/Dana Sargent	50
2/28/2019	Douglas Academy/4th Graders	Stormwater impacts and BMPs/Madi Polera	20
2/28/2019	Brightmore/Senior Citizens	Water Quality and Environmental Issues/Kemp Burdette	35
3/5/2019	New Horizons/4th Graders	Stomwater impacts and BMPs/Kay Lynn Hernandez	12
3/9/2019	Our State Magazine/Marriot Hotel Downtown Wilmington	Water Quality and Environmental Issues/Kemp Burdette	50

3/30/2019	CFRW Fisheries Science Forum/Community at Large	SAFEWater-NC Fish & Alligator Study/Madi Polera	20
Greenfield Lake Tours & Creek Paddle Tours			
Date	**Group Served/Audience**	**Type of Tour/Topic/Location/Speaker**	**Attendance**
3/1/2019	Douglas Academy/4th Graders	Raindrop Journey/Stormwater/Greenfield Lake	21
3/7/2019	New Horizons/4th Graders	Raindrop Journey/Stormwater/Greenfield Lake	12

April 1 – June 30, 2019

First Saturday Seminars			
Date	**Topic**	**Speaker**	**Attendance**
4/6/2019	Creating More Resilient Community with Stormwater Management	Kat Pohlman, UNCW Chief Sustainability Officer	55
5/4/2019	Inspiring Conservation Action at NC Aquariums	Brian Dorn, Associate Director, Fort Fisher Aquarium	63
6/1/2019	A Snapshot into Navassa	Barns Sutton, Director of Planning & Development, Navassa	47
Other presentations by CFRW staff			
Date	**Organization/Audience**	**Topic/Speaker**	**Attendance**
5/24/2019	Government leaders and engineers on board Wilmington Water Tours	Resilience after the Storm/Dana Sargent	25
6/27/2019	Rotary Club Wilmington	Water Quality and CFRW mission/Dana Sargent	75
Greenfield Lake Tours & Creek Paddle Tours			
Date	**Group Served/Audience**	**Type of Tour/Topic/Location/Speaker**	**Attendance**
4/4/2019	CFCI 4th graders	Raindrop Journey/Stormwater/Greenfield Lake	48
4/23/2019	Bellamy Elementary 4th Graders	Raindrop Journey/Stormwater/Greenfield Lake	90
4/25/2019	Gregory Elementary 4th Graders	Raindrop Journey/Stormwater/Greenfield Lake	36
4/26/2019	Myrtle Grove Christian 3rd Graders	Paddle boating and eco-tour/stormwater, plants and animals of GFL, history of GFL/Greenfield Lake	14
5/2/2019	Murrayville Elementary 4th Graders	Raindrop Journey/Stormwater/Greenfield Lake	55
5/3/2019	Murrayville Elementary 4th Graders	Raindrop Journey/Stormwater/Greenfield Lake	62
5/23/2019	COW Parks & Rec/community members	Eco-Tour-Clean-up combo/Stormwater, invasive species, history of GFL/Greenfield Lake	8
5/30/2019	COW Parks & Rec/community members	Eco-Tour-Clean-up combo/Stormwater, invasive species, history of GFL/Greenfield Lake	13
6/4/2019	Blair Elementary 2nd graders	Paddle boating, eco tour/Greenfield Lake	80
6/7/2019	Homeschool Group 4th-11th graders	Paddle boating, ecotour/stormwater, plants and animals of GFL/history of GFL/Greenfield Lake	8
6/24/2019	YMCA/summer campers	Eco Tour/ stormwater, plants and animals of GFL/history of GFL/Greenfield Lake	40
6/26/2019	YWCA/summer campers	Eco Tour/ stormwater, plants and animals of GFL/history of GFL/Greenfield Lake	35
6/28/2019	The Learning Center/ages 6-11	Eco Tour/ stormwater, plants and animals of GFL/history of GFL/Greenfield Lake	14

Public Involvement/Volunteer Efforts

Total Allocated Cost: $7953

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

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

April 1 – June 30, 2019

Storm Drain Marking			
Date	**Name of Volunteer Organization, Business, Etc.**	**# of Volunteers**	**Specific Area Marked / # of Storm Drains Marked**
5/10/2019	Young Scientist Academy	4	Carriage Hills /14 drains
6/15/2019	Girl Scouts	6	Habberline Street /12 drains

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, 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, 2018

Watershed Clean-ups				
Date	**Watershed**	**Specific Area Cleaned** *(List map # and specific location cleaned)*	**Amount of Trash Collected** *(ie. # of 96 gallon bins of trash or recycling, # of 30 gallon bags, type of trash collected, etc.)*	**# of Volunteers/ Total Volunteer Hours Contributed**
8/11/2018	Greenfield Lake	GFL#3 – Jumping Run to lower Willard pond	Trash: Two 96-gal bins of Trash Recycling: 1.25 96-gal bins of Recycling Scrap Metal 2 Needles	13 volunteers for a 26 total of volunteer hours
9/8/2018	Greenfield Lake	GFL #2- Creek arm under Lion's Bridge all the way up to Everybody's grocery	Trash: 3-- 96-gallon bins filled. Recycling: 3.5-- 96-gallon bins filled.	46 volunteers for a total of 92 volunteer hours

October 1 – December 31, 2018

Watershed Clean-ups				
Date	**Watershed**	**Specific Area Cleaned** *(List map # and specific location cleaned)*	**Amount of Trash Collected** *(ie. # of 96 gallon bins of trash or recycling, # of 30 gallon bags, type of trash collected, etc.)*	**# of Volunteers/ Total Volunteer Hours Contributed**
11/10/2018	Burnt Mill Creek	BMC #9- McCumbers Ditch (from Rankin St. to Graveyard Bridge)	Trash: 22 Thirteen-gallon trash bags Recycling: 10-Thirteen-gallon trash bags Misc: Bicycle, miscellaneous construction items	20 Volunteers/40 volunteer hours
12/10/2018	Smith Creek	The wooded areas near Hurst & Evans St. (Smith Creek #2)	Trash: 3 Full 96-gal Bins, 5 bags (Est 200 lbs) Recycling: 3 Full 96-gal Bins (Est 120 lbs)	35 Volunteers/70 volunteer hours

January 1 – March 31, 2019

Watershed Clean-ups				
Date	**Watershed**	**Specific Area Cleaned** *(List map # and specific location cleaned)*	**Amount of Trash Collected** *(ie. # of 96 gallon bins of trash or recycling, # of 30 gallon bags, type of trash collected, etc.)*	**# of Volunteers/ Total Volunteer Hours Contributed**
1/12/2019	Burnt Mill Creek	Ditch behind Atlantic Hardware and Jacksons BBQ- BMC #6	Trash: 2.5 Full 96-gal Bins (Est 125 lbs) Recycling: 1 Full 96-gal Bins (Est 40 lbs) Plastic Chair, Building sign	35 Volunteers/70 volunteer hours
2/9/2019	Burnt Mill Creek	Dead end at Shirley Rd / BMC #8	Trash: 3 Full 96-gal Bins (Est 180 lbs) Recycling: 4 Full 96-gal Bins (Est 160 lbs) Misc: 1 Metal Trash Bin, 2 Tires, 10 Syringes 0.6 Stream Miles	37 Volunteers/74 volunteer hours
3/9/2019	Burnt Mill Creek	McCumbers Ditch / BMC #9	Trash: 27 Bags (Est 10 lb/bag) Recycling: 10 Bags (Est 5lb/bag) Misc: 2 Bicycles, 1 Tires, 3 Syringes	37 Volunteers/74 volunteer hours

April 1 – June 30, 2019

Watershed Clean-ups				
Date	**Watershed**	**Specific Area Cleaned** *(List map # and specific location cleaned)*	**Amount of Trash Collected** *(ie. # of 96 gallon bins of trash or recycling, # of 30 gallon bags, type of trash collected, etc.)*	**# of Volunteers/ Total Volunteer Hours Contributed**
4/13/2019	Burnt Mill Creek	Randall Pond/BMC #1	Trash: 2 96 gallon bins Recycling: 2 96 gallon bins Assorted including bikes, traffic drums and syringes	46 volunteers/92 volunteer hours
5/11/2019	Greenfield Lake	Lower Willard Pond/GFL #3	Trash: 16 10lb bags – assorted trash Recycling: 12 5lb bags – assorted recycling	23 volunteers/46 volunteer hours
6/15/2019	Drains Directly to Cape Fear River (DDCRF)	Intersection of Greenfield St. & Front/DDCFR #1	Trash: 17 10lb bags – assorted Recycling: 16 5lb bags – assorted	13 volunteers/26 volunteer hours

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

July 1 - September 30, 2018

CreekWatchers Reports			
Date of Report	**Observer Name(s)**	**Watershed**	**Specific Creek Location Observed** *(reference the list provided)*
8/1/2018	MM Vaught	Smith Creek	Maides Park/Hurst Branch
8/5/2018	Taylor Beard	Burnt Mill Creek	Wilshire at Downey Branch

October 1 – December 31, 2018

CreekWatchers Reports			
Date of Report	**Observer Name(s)**	**Watershed**	**Specific Creek Location Observed** *(reference the list provided)*
10/29/2018	Taylor Beard	Burnt Mill Creek	Downey Branch
10/30/2018	MM Vaught	Smith Creek	Hurst Branch/Maides Park
12/18/2018	Elizabeth Eqan & Zan Steward	Burnt Mill Creek	Kerr at Emerson
12/24/2018	Taylor Beard	Burnt Mill Creek	Downey Branch

January 1 – March 31, 2019

CreekWatchers Reports

Date of Report	Observer Name(s)	Watershed	Specific Creek Location Observed *(reference the list provided)*
2/23/2019	MM Vaught	Smith Creek	Hurst Branch/Maides Park
2/23/2019	Taylor Beard	Burnt Mill Creek	Downey Branch

April 1 – June 30, 2019

CreekWatchers Reports			
Date of Report	**Observer Name(s)**	**Watershed**	**Specific Creek Location Observed** *(reference the list provided)*
4/27/2019	Michael Belmonte	Greenfield Lake	South 17th and New Hanover Medical Park
4/27/2019	MM Vaught	Smith Creek	Hurst Branch/Maides Park
6/29/2019	Deanna Bertino, Jim Depree	Barnards Creek	Appleton Way
6/28/2019	Amy McLane, Kevin McLane	Burnt Mill Creek	Shirley/Klein

Contract Administration

Total Allocated Cost: $1342

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

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

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

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

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

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

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

CFRW will maintain all records and reports related to this contract on a fiscal year (FY) basis (July 1-June 30). These records should be retained for a period of at least 5 years. These files are public record and should be accessible at the contracted agency location. In addition, an annual compilation of all contract documents, records, reports, invoices, and pertinent educational

materials or related materials will be provided to the City of Wilmington Stormwater Services on a USB Flash Drive, CD, or DVD for the entire contract year ***within 12 calendar days of the 4th quarter end date.***

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

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:** 7/10/2019

FY 1819

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

Quarterly Progress Report #4: April 1 – June 30, 2019

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, 2018** through **June 30, 2019** for the agreed amount of **$26,600.** These contracted services, implemented as equitably as possible throughout the fiscal year, assist the City in meeting requirements of its federal NPDES Stormwater Permit.

Public Education/Outreach

Total Allocated Cost: $18,268

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

January 1 – March 31, 2019

8th Grade Enviroscape Presentations				
Date	**School**	**Grade**	**# of presentations**	**# of students**
3/4/2019	Murray MS	8	2	62
3/25/2019	Holly Shelter MS	8	1	27
3/26/2019	Holly Shelter MS	8	1	28
Other Enviroscape Presentations				
Date	**School / Group / Event**	**Grade**	**# of presentations**	**# of attendees**

1-11-19 attended and completed scheduling for spring semester of 2019 school year.

April 1 – June 30, 2019

8th Grade Enviroscape Presentations				
Date	**School**	**Grade**	**# of presentations**	**# of students**
4/2/2019	Myrtle Grove MS	8	2	65
4/3/2019	Myrtle Grove MS	8	2	64
4/4/2019	Noble MS	8	1	33
4/8/2019	Noble MS	8	1	31
4/9/2019	Noble MS	8	2	64
5/2/2019	Murray MS	8	2	60
5/13/2019	Trask MS	8	2	58
5/14/2019	Trask MS	8	1	30
5/21/2019	Roland Grise MS	8	2	65
5/23/2019	Roland Grise MS	8	2	64
Other Enviroscape Presentations				
Date	**School / Group / Event**	**Grade**	**# of presentations**	**# of attendees**
5/22/2019	Cape Fear Academy	8	3	38

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)**

October 1 – December 31, 2018

Pet Events / Pet Waste Ordinance Education				
Date	**Event**	**Location**	**Method of Delivery / Materials Distributed / Etc.**	**# of signed Pet Waste Pledges**
10/20/2018	Pawz in Park	Hugh MacRae Park	C4CW display table and pledge signatures acquired	100

January 1 – March 31, 2019

Pet Events / Pet Waste Ordinance Education				
Date	**Event**	**Location**	**Method of Delivery / Materials Distributed / Etc.**	**# of signed Pet Waste Pledges**
3/23/2019	Paws4People	Greenfield Lake Park	C4CW display table and pledge signatures acquired	38
3/23/2019	Walk and Dog Dash	Hugh MacRae Park	C4CW display table and pledge signatures acquired	39

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)**

October 1 – December 31, 2018

Scheduled two presentations in partnership with NHC Library & Cape Fear Museum. Presentations are advertised through agency/department mailing list and media. Library presentation scheduled for 1-23-19 and museum presentation scheduled for 3-3-19.

January 1 – March 31, 2019

Stormwater 101 Presentations			
Date	**Organization / Audience**	**Method of Delivery / Materials Distributed / Etc.**	**Attendance**
1/23/19	New Hanover Public Library Public	Info was advertised on NHC TV & Library FB page	0
2/25/19	UNCW EVS 495	Power point presentation	32
3/3/19	Cape Fear Museum Public	Power point & $25 Lowes gift card, covered by WWAY news	11

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

October 1 – December 31, 2018

Hewletts Creek Educational Contact				
Date	**Audience Name or School/Grade**	**Topic(s) and/or Activity**	**# presentations**	**# of attendees**
10/19/18	UNCW EVS Politics Class	Water quality presentation with tour of park.	1	17

April 1 – June 30, 2019

Hewletts Creek Educational Contact				
Date	**Audience Name or School/Grade**	**Topic(s) and/or Activity**	**# presentations**	**# of attendees**
6/28/2019	Hewletts Creek area residents	Annual newsletter mailed out	0	212

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, 2018

Environmental Education Presentations				
Date	**Audience Name or School / Grade**	**Topic(s) and/or Activity**	**# presentations**	**# of attendees**
9/7/2018	UNCW EVS	BMP tour	1	15

October 1 – December 31, 2018

Environmental Education Presentations				
Date	**Audience Name or School / Grade**	**Topic(s) and/or Activity**	**# presentations**	**# of attendees**
11/1/2018	NCFA Forestry and Environmental Camp	Led 'ecosystem' station	5	160
11/16/2018	Bradley Creek Fall Festival	Set up educational booth re: soil, water, and wildlife	1	500
11/19/18	UNCW EVS 495	Soil & water history with how politics influences laws and ordnances pertaining to water quality.	1	50

January 1 – March 31, 2019

Environmental Education Presentations				
Date	**Audience Name or School / Grade**	**Topic(s) and/or Activity**	**# presentations**	**# of attendees**
1/17/2019	Pine Valley ES, 3-5th	Soil and Water Education contest presentation	1	300
1/23/2019	Murray MS, 8th	Soil and Water Education contest presentation	2	52
1/25/2019	Bellamy ES, 3rd	Soil and plants	1	20
1/30/2019	SeaTech, 9th	Soils	2	40
1/31/2019	Bradley Creek ES, 1st	Worms and soil	1	120
2/13/2019	Gregory ES, 4th	Weathering and Erosion	2	54
2/15/2019	Anderson ES, 4th	Weathering and Erosion	2	60
2/28/2019	Alderman ES, 4th	Rocks and minerals	2	50
3/6/2019	Holly Tree ES, 3rd	Soil and plants	2	56
3/22/19	Environmental Educators	Aldo Leopold Project	1	11

April 1 – June 30, 2019

Environmental Education Presentations				
Date	**Audience Name or School / Grade**	**Topic(s) and/or Activity**	**# presentations**	**# of attendees**
4/11/2019	Blair ES, 5th	Ecosystems	4	105
4/26/2019	Murrayville ES, 4th	Weathering and Erosion	1	27

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

July 1 - September 30, 2018

Were scheduled for International Coastal Cleanup on 9/15, Native Plant Festival 9/15, and PARKing Day on 9/21. All were cancelled as a result of Hurricane Florence

October 1 – December 31, 2018

Community Outreach Events				
Date	**Event**	**Location**	**Method of Delivery/Materials Distributed/Etc.**	**Attendance**
10/13/2018	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	1500
10/26/2018-11/4/2018	Cape Fear Fair and Expo	Airport Fair Grounds	Set up a display to inform attendees about BMP cost share programs and rain barrel sales. Included flyer for citizens to take. Won first place for display	10,000

January 1 – March 31, 2019

Community Outreach Events				
Date	**Event**	**Location**	**Method of Delivery/Materials Distributed/Etc.**	**Attendance**
1/18-1/19/2019	TreeFest	Independence Mall	Assisted with tree handouts and customer service	850
2/21/2019	WWAY Health Fair	Independence Mall	Provided information to attendees on ways to reduce stormwater runoff pollution	300
3/30/2019	CFRW StriperFest	Coastline Convention Center	Assisted in activities geared toward children to help learn about water quality and local water issues. Had booth at the event where stormwater related materials	150

			and natural resource materials were distributed.	

April 1 – June 30, 2019

Community Outreach Events				
Date	**Event**	**Location**	**Method of Delivery/Materials Distributed/Etc.**	**Attendance**
4/6/2019	Post-Azalea "Stop the Violence" Festival	MLK Center	Set up a display table and spoke with attendees about local environmental efforts	50
4/27/2019	Earth Day Festival	Hugh MacRae Park	Set up a display table to inform attendees about District roles/programs and potential volunteer opportunities	5000

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, 2018

Completed 3 plans for New Hanover County Planning regarding soil types found on proposed building sites. Recommended LID within the means of the development and recommended using the county LID ordinance rules.

October 1 – December 31, 2018

Zero plans for NHC Planning were completed during this time. This could be due to hurricane Florence slowing down new construction during this period.

January 1 – March 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.

April 1 – June 30, 2019

Completed 3 plans for New Hanover County Planning regarding soil types found on proposed building sites. Recommended LID within the means of the development and recommended using the county LID ordinance rules.

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, 2018

Environmental Field Days				
Date	**School / Grade**	**Topic(s) and/or Activity**	**# presentations**	**# of attendees**
11/2/2018	Pine Valley ES, 4th grade	Water Cycle/Soils/Forestry/Wildlife	4	300

January 1 – March 31, 2019

Environmental Field Days

Date	School / Grade	Topic(s) and/or Activity	# presentations	# of attendees
3/28/2019	Snipes Academy, 4th	Water Cycle/Soils/Forestry/Wildlife	4	72

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, 2018
Participated in WECT television interview on importance of rain barrels on July 31.

October 1 – December 31, 2018
Promote rain barrel sales on social media (District page, NHC page) monthly; share event information (Fire in Pines Festival, Canines for Clean Water events); shared information on reducing stormwater runoff and water quality issues (October following Hurricane Florence); update District staff/supervisor contacts.

January 1 – March 31, 2019
Promote rain barrel sales on social media (District page, NHC page) monthly and NHC monthly event banner; share event information (Canines for Clean Water events) on social media and website; update District staff/supervisor contacts.

April 1 – June 30, 2019
Promote rain barrel sales on social media (District page, NHC page) monthly and NHC monthly event banner; share event information on social media and website; added annual newsletter to site.

Public Involvment/Volunteer Efforts

Total Allocated Cost: $1,210

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

October 1 – December 31, 2018

Storm Drain Marking

Date	Name of Volunteer Organization, Business, Etc.	# of Volunteers	Specific Area Marked / # of Storm Drains Marked
12/9/2018	UNCW EVS/MPA students	6	Steeplechase Rd/Habberline. 15 drains.

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, 2018
July: 0-60 gallon; 3-80 gallon barrels sold
August: 3-60 gallon; 3-80 gallon barrels sold

October 1 – December 31, 2018
October: No rain barrels sold
November: 0-60 gallon; 1-80 gallon
December: 1-60 gallon; 4-80 gallon

January 1 – March 31, 2019
January: 2-60 gallon; 1-80 gallon
February: 3-60 gallon; 4-80 gallon
March: 0-60 gallon; 2-80 gallon

April 1 – June 30, 2019
April: 1-60 gallon; 4-80 gallon
May: 0-60 gallon; 6-80 gallon
June: 4-60 gallon; 3-80 gallon

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, 2018
Stewardship Program not meet this quarter. As discussed in FY 17-18 contract this group cut down the number of meetings to approximately 6 a year with most meetings happening around the time of the event.

Distributed information to NHC engineering and City of Wilmington Stormwater Services regarding Emergency Watershed Protection (EWP) funds from federal partner. Funds can be used for stream debris removal in creeks caused by hurricane Florence. Potential projects were identified by both groups. Both organizations need to provide pictures, maps, and linear feet of stream to be cleaned. Additional federal staff is available to help complete paper work.

October 1 – December 31, 2018
SDC met 10/3/18 for their quarterly board meeting. The governing board voted to delay an awards program for 2019 program year due to Hurricane Florence and its impact on the development community. Instead the committee will be conducting site visits on previous project winners and conducting education and outreach to the community.

January 1 – March 31, 2019
Met 1-29-19 at River Bluffs development (and previous winner) site. Toured site and interviewed developer regarding how stormwater practices worked during Hurricane Florence. His report was they worked well and the development did not have any flooding. Email correspondence indicated a meeting in April where the group will discuss the possibility of a workshop later in the year, and who the target audience will be.

April 1 – June 30, 2019
Attended meeting coordinating grant funds used for stormwater retrofits on UNCW campus, provided by a 319 grant administered by NC Coastal Federation. Meeting was to coordinate where BMPs should be located.

Two meetings of the LCFSDC were scheduled for this quarter, however both were cancelled due to lack of a quorum.

Contract Administration

Total Allocated Cost: $2970

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

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

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

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

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

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

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

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

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

Other:

Do not assign a cost.

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

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

Report compiled by: Dru Harrison **Date:** 7-12-19

APPENDIX D: ILLICIT DISCHARGE DETECTION AND ELIMINATION (IDDE)

Dry Weather Flow Monitoring Locations

- Greenfield Lake – 30" outfall to lake (near boat rentals), northeastward through park to Lake Shore Dr., northeastward to Pinecrest Pkwy, northward along Pine Crest Pkwy.
- Metts Ave. – 42" outfall eastward on Metts to Borden Ave., Brookwood Ave., and Keaton Ave. (if necessary).
- Near 11th St./ Whistler Ave. – 42"outfall to tributary to Burnt Mill Creek
- 11th/Hanover St. – 36" RCP – outfall at tributary to BM Creek Westward to intersection
- Richard Bradley Dr. – 36" CMP – check for flow
- N. Kerr Ave. Constructed Wetland – 42" outfall to wetland.

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

Cape Fear Public Utility Authority and City of Wilmington

Purpose:

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

Reporting Requirements:

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

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

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

City of Wilmington Contact Information:

Spills less than 1,000 gallons

Use the Pollution Prevention Hotline: 910-341-1020

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

Spills greater than 1000 gallons or system leaks

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

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

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

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

Dry Weather Flow Inspection Program

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

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

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

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

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

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

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

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

APPENDIX E: CONSTRUCTION SITE RUNOFF CONTROLS

Included in this section:

New Hanover County Erosion & Sedimentation Control Ordinance

New Hanover County Ordinance:

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

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

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

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

General requirements of the permit include among others:

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

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

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

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

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

Mandatory Standards For Land Disturbing Activity

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

(1) *Buffer zone*.

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

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

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

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

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

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

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

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

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

Design and Performance Standards.

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

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

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

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

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

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

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

Responsibility For Maintenance.

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

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

APPENDIX F: POST-CONSTRUCTION SITE RUNOFF CONTROLS

Included in this section:

Inspection Reporting Summary
Stormwater Detention Facility Compliance Inspection Report

Dates of Inspections	**Dec./Jan. 2018-19***	**Oct./Nov. 2019**
Total # Sites Inspected	372	In Progress+
Response Letter Severity		
Level 1 (first letter)	50	TBD
Level 2 (second letter)*	0	TBD
Level 3 (third letter)**	0	TBD
# of Sites Requiring Maintenance	50	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
*Inspections delayed until Winter months due to effects of Hurricane Florence
+ Inspections are in progress and will be included in next year's report

TBD = To Be Determined

Stormwater Detention Facility

Compliance Inspection Report

SITE:

DATE:

LOCATION:

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

The results of this inspection are as follows:

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

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

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

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

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

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

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

Other
- ☐ _____
- ☐ _____

Additional comments and maintenance concerns:

_____
_____
_____
_____
_____
_____
_____

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

notified if the City chooses to pursue this action.

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

Inspected by: ____ Title:

Summary of Plan Review Activities

Project Name	Project Type	Permit #	Permit Issue Date	Type of New BMP	Pervious (Y or N)	# of new BMPs Onsite	Notes
Windemere Park	Drain Plan	2018028	7/9/2018	None	N	0	No SCM's Required
Pier 33	Revision	2015013R1	12/10/2018	Proprietary	N	1	StormFilter (redesign of existing permit)
Cape Fear Smiles	SWP HD	2018026	7/6/2018	None	N	0	Offsite Permit
Woodlands at Echo Farms Tract 3C	SWP HD	2018029	7/12/2018	Wet Pond	N	2	2 wet ponds
Apostolic Tabernacle	SWP HD	2019016	3/15/2019	Wet Pond	N	1	1 wet pond
Woodlands at Echo Farms Tract 3B Phase 1	SWP HD	2018027	7/5/2018	Wet Pond	N	4	4 Wet Ponds
Bradley Creek Station	SWP HD	2019014	3/12/2019	Infiltration	Y	3	2 Underground Infiltration, 15,552 sf PC
Riverlights AQ Ph 4 & 5	SWP HD	2019013	3/18/2019	Wet Pond, wetland, inf.	N	7	4 Wet Ponds, 2 Infiltration basins, natural wetland
Hourglass Studios	SWP HD	2018056	12/20/2018	Infiltration	Y	3	2 underground infiltration, 6,765 sf PC
Courtyard at Midtown Village	SWP HD	2018058R1	2/14/2019	None	N	0	Offsite Permit
Aloft Coastline Hotel	Redevelopment	2019002	1/11/2019	None	N	0	No SCM's Required
Brittany Del Flex Space	SWP HD	2018032	7/24/2018	Wet Pond	N	1	1 Wet Pond
GLOW NC School	SWP HD	2018037	8/23/2018	SW Wetland,	N	4	4 SW Wetlands
Parkway Volvo	SWP HD	2019015	3/11/2019	None	N	0	Offsite Permit
AAA Car Wash - South College Road	SWP HD	2018025	6/28/2018	Infiltration, PC	Y	2	Underground Infiltration, 6,900 sf PC
Studio 17 Apartments	Drain Plan	2018033	8/6/2018	None	N	0	No SCM's Required
Burnt Mill Business Park Lot 21	SWP HD	2018035	8/21/2018	None	N	0	Offsite Permit
Parkway Automotive Parking	SWP HD	2018049	11/7/2018	Infiltration	N	1	1 Underground Infiltrtaion
Friends School of Wilmington	SWP HD	2019028	5/15/2019	Wet Pond	N	1	1 Wet Pond
Atlantic Spas and Billiards	Drain Plan	2018048	11/6/2018	None	N	0	No SCM's Required
LaRue Townhomes	Drain Plan	2018038	8/29/2018	None	N	0	No SCM's Required
Fairfield Mixed Use Buildings 3 & 4	Revision	2018043	10/10/2018	None	N	0	Offsite Permit
Amberleigh Shores Ph II	SWP HD	2018045	1/4/2019	Infiltration, Wet Pond, PC	Y	4	2 Wet Ponds, 1 Inf Basin, 5,848 sf PC
New Hanover County Health and Human Services	SWP HD	2018042	9/27/2018	Infiltration, PC	Y	4	3 Underground Infiltration, 4,920 sf PC
Circle K Market St.	SWP HD	2018051	11/27/2018	Infiltration	N	1	1 Infiltration Basin
Jordan Lane Duplexes	SWP HD	2018050	11/27/2018	Infiltration, PC	N	2	1 Infiltration Basin, 1,229 sf PC
Robert High Offices	Drain Plan	2018034	8/15/2018	None	N	0	No SCM's Required (basin to improve outfall)
Barclay Centre	Revision	2018033	8/3/2018	None	N	0	Offsite Permit
NHC ABC 17th & Castle St Parking Lot Plan	Drain Plan	2018039	9/5/2018	PC	Y	1	5,457 sf PC
Peregrine Way (Osprey Landing)	SWP HD	2018060	12/27/2018	Infiltration	N	5	5 Infiltration Basins
Wilmington Pawville	SWP HD	2018057	12/19/2018	Wet Pond	N	1	1 Wet Pond
Riverlights Conv Ph 9	Revision	2018009R1	1/17/2019	None	N	0	No new SCM's
Wilmington Municipal Golf Course	SWP HD	2019004	4/4/2019	Dry Detention	N	1	1 Dry basin (pre/post only)
Wilmington Tire & Auto	Revision	2015029R1	7/20/2018	None	N	0	No new SCM's
Calibration Station Offices	Drain Plan	2018054	12/6/2018	None	N	0	No SCM's Required
Bluewater Motorsports	SWP HD	2018055	1/9/2019	Infiltration	N	1	1 Underground Infiltration
Conway Peiffer Ave Minor Subdivision	Drain Plan	2018036	8/23/2018	None	N	0	No SCM's Required
615 N Front Street Parking Lot	Redevelopment	2018044	10/1/2018	None	N	0	No SCM's Required
Hurst Hamilton Parking Lots	SWP HD	2018040	9/7/2018	None	N	0	Offsite Permit
Grey Commons (aka Forest Hills Apartments)	Drain Plan	2019019	4/8/2019	None	N	0	No SCM's Required
Wilmington Wash House	Drain Plan	2018046	10/9/2018	PC	Y	1	10,956 sf PC
Kerr Station Lofts	SWP HD	2019001	1/7/2019	Wet Pond	N	1	1 Wet Pond
Atlantic Packaging	SWP HD	2019012	3/4/2019	Wet Pond	N	1	1 Wet Pond
Walk-On's	Redevelopment	2019006	1/30/2019	None	N	0	No SCM's Required
Dollar General Pine Grove	SWP HD	2018053	12/6/2018	Infiltration	N	2	1 Infiltration Basin, 1 Underground Infiltration
CLOS Parking	Drain Plan	2018047	10/9/2018	None	N	0	No SCM's Required
Four Seasons Site & Demo	Revision	2018030/031/2017001R2	7/16/2018	None	N	0	No new SCM's
Pine Valley Branch Library	Revision	2017051R1	8/16/2018	None	N	0	Offsite Permit
Shipyard Village Apts	Revision	2016042R1	7/11/2018	None	N	0	No new SCM's
Woodlands at Echo Farms Tract 3A	SWP HD	2019036	6/27/2019	Wet Pond	N	3	3 Wet Ponds
Airlie at Wrightsville Sound	Revision	2017038R2	9/10/2018	None	N	0	No new SCM's
Kiddie Academy	SWP HD	2019009	2/20/2019	None	N	0	No SCM's Required
Greenlawn Funeral Home	SWP HD	2019008	3/15/2019	Infiltration	N	2	2 infiltration Basins
The Flats on Front	SWP HD	2019023	4/23/2019	Infiltration, Proprietary	N	5	1 Underground Infiltration, 2 StormFilter, 2 Filterra
St Mark Mayfaire Entrance	SWP HD	2019020	4/8/2019	Low Density Swales	N	0	Low Density Swales w weir
COW Fire Station 5 Shipyard	Revision	2017018R1	12/19/2018	None	N	0	No new SCM's
Arboretum West	SWP HD	2019022	4/16/2019	Infiltration, Wet Pond, PC	Y	4	1 Wet Pond, 2 Underground Infiltration, 41,098 sf PC
The Pointe at Barclay , Bldg 7	SWP HD	2016004R4	6/20/2019	None	N	1	1 Filterra, Offsite Permit
National Gypsum Cooler Enclosure Addition	Drain Plan	2018041	10/3/2018	None	N	0	No SCM's Required
Porsche Wilmington	Revision	1999032R2	1/17/2019	None	N	0	No new SCM's
Pinnacle 3rd St	SWP HD	2019024	4/23/2019	Infiltration	N	1	1 Underground Infiltration
Smith & Gsell Design Studio	Drain Plan	2018006R1	8/21/2018	None	N	0	No SCM's Required
Wilmington Area Rebuilding Ministry	Drain Plan	2017034R1	9/5/2018	None	N	0	No SCM's Required
NHRMC Central Plant Expansion	Revision	2006014R3	10/3/2018	None	N	0	Offsite Permit
Four Seasons Site & Demo	SWP HD	2018031R3	11/1/2018	None	N	0	No new SCM's
Lakeside Reserve (aka Good Shepherd)	SWP HD	2016014R1	11/27/2018	None	N	0	No new SCM's
Robert High Offices	Drain Plan	2018034R1	10/3/2018	None	N	0	No new SCM's
Trolley Station	Drain Plan	2019017	3/29/2019	PC	Y	1	4,486 sf PC
Landfall Realty	Revision	2019034	6/20/2019	Infiltration	Y	2	Infiltration (pre/post only), 665 sff PC
NHRMC Emergency Well House	Drain Plan	2019003	2/7/2019	None	N	0	Offsite Permit
Kinder Morgan Terminals	Redevelopment	2019007	2/11/2019	None	N	0	No SCM's Required
Trusthouse (311 Bladen Street)	Drain Plan	2019021	4/8/2019	None	N	0	No SCM's Required
Take 5 Oil Change	Drain Plan	2019018	3/28/2019	None	N	0	No SCM's Required
Panda Express	Revision	2019032	5/31/2019	None	N	0	Offsite Permit
CFPUA Pump Station 36	Drain Plan	2018059	1/3/2019	None	N	0	No SCM's Required
Baker BMW of Wilmington	SWP HD	2019005	1/17/2019	None	N	0	Offsite Permit
YMCA Market St Exp	Revision	1996014R2	1/9/2019	None	N	0	No new SCM's
Evermore Apartment Expansion	SWP HD	2013018R2	5/24/2019	PC	Y	1	14,747 sf of new PC
CFPUA Pump Station #10 Replacement	SWP HD	2019011	2/19/2109	None	N	0	No SCM's Required
Three 10 Seafood and Raw Bar	Drain Plan	2019033	6/14/2019	None	N	0	No SCM's Required
NHC Juvenile Justice Facility	Redevelopment	2019031	5/28/2019	None	N	0	No SCM's Required
The Pointe at Barclay Buildings 5 & 6	Revision	2016004R3	6/20/2019	None	N	0	Offsite Permit
Corning Incorporated	Revision	2000008R3	3/1/2019	None	N	0	No new SCM's
Market Plaza Center Access Plan	Drain Plan	2019025	5/9/2019	None	N	0	No new SCM's
St. Mark's Gymnasium Expansion	Revision	2011026R2	4/8/2019	None	N	0	No new SCM's
Contractor Storage Yard One Tree Hill Way	SWP HD	2019011A	3/1/2019	None	N	0	No SCM's Required
Flow Acura	Revision	2002043R1	6/19/2019	None	N	0	No new SCM's
Birchwood Drive Access Plan	SWP HD	2019026	5/10/2019	Wet Pond	N	1	1 Wet Pond
Sweeney Water Treatment Plant Expansion	Revision	2008035R2	6/20/2019	Infiltration	N	1	1 Expanded Infiltration basin
Creekside	SWP HD	2019030	6/11/2019	Wet Pond	N	1	1 Wet Pond
Rainbow Square	Revision	2013018R2	5/24/2019	None	N	0	No new SCM's
Woodlands at Echo Farms Tract 3B Phase 1	Revision	2018027R1	5/10/2019	None	N	0	No new SCM's
Whitebrook Farms	Redevelopment	2019035	6/24/2019	None	N	0	No SCM's Required

APPENDIX G: POLLUTION PREVENTION & GOOD HOUSEKEEPING FOR MUNICIPAL OPERATIONS

No Employee training was conducted this reporting year due to the impact of Hurricane Florence. Training is scheduled for Spring of 2020.

Bradley & Hewletts Creek Watershed Restoration Plan

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

DATE OF EVENT/ ACTIVITY	EVENT/ACTIVITY	AUDIENCE	DELIVERED BY (AGENCY)	METHOD OF DELIVERY / MESSAGE	ATTENDANCE/ PARTICIPATION
Events					
3/7/2019	Display at Waterman's Brewery	Waterman's patrons; Bradley Creek Residents	Heal Our Waterways	A table display that offered educational pieces about various BMPs, the danger of stormwater, and the HOW coordinator as a resource. Also brought a survey asking about public perceptions of stormwater solutions and hurdles to overcome. Raffled off one rain barrel for survey participants.	~10 participants Table Exposure to all brewery attendees from 4-9 PM
3/8/2019	Display at Waterman's Brewery	Waterman's patrons; Bradley Creek Residents	Heal Our Waterways	A table display that offered educational pieces about various BMPs, the danger of stormwater, and the HOW coordinator as a resource. Also brought a survey asking about public perceptions of stormwater solutions and hurdles to overcome. Raffled off one rain barrel for survey participants.	~10 participants Table Exposure to all brewery attendees from 4-9 PM
3/9/2019	Display at the Wilmington Farmer's Market	Bradley Creek & Hewletts Creek residents; farmers; Tidal Creek Co-op customers	Heal Our Waterways	A table display that offered educational pieces about various BMPs, the danger of stormwater, and the HOW coordinator as a resource. Also brought a survey asking about public perceptions of stormwater solutions and hurdles to overcome. Raffled off one rain barrel for survey participants.	~35 Total participants Table exposure to all Farmer's Market attendees 8AM - 1 PM
3/22/2019	Display @ Airlie Gardens for World Water Day	New Hanover County residents	Heal Our Waterways	A table display that offered educational pieces about various BMPs, the danger of stormwater, and the HOW coordinator as a resource. Also brought a survey asking about public perceptions of stormwater solutions and hurdles to overcome. Raffled off one rain barrel for survey participants.	~10 Total participants Table Exposure to all Airlie Gardens visitors 10AM - 3 PM
3/28/2019	Display at Wrightsville Beach Brewing	WB Brewery patrons; Bradley Creek residents	Heal Our Waterways	A table display that offered educational pieces about various BMPs, the danger of stormwater, and the HOW coordinator as a resource. Also brought a survey asking about public perceptions of stormwater solutions and hurdles to overcome. Raffled off one	~15 participants Table Exposure to all brewery attendees from 4-9 PM

				rain barrel for survey participants.	
3/30/2019	Display at Tidal Creek Farmer's Market	Bradley Creek & Hewletts Creek residents; farmers; Tidal Creek Co-op customers	Heal Our Waterways	A table display that offered educational pieces about various BMPs, the danger of stormwater, and the HOW coordinator as a resource. Also brought a survey asking about public perceptions of stormwater solutions and hurdles to overcome. Raffled off one rain barrel for survey participants.	~20 Total participants Table exposure to all Farmer's Market attendees 8AM - 1 PM
4/27/2019	Display at Wilmington Earth Day Festival	Bradley Creek & Hewletts Creek residents; NHC residents	Heal Our Waterways	A table display that offered educational pieces about various BMPs, the danger of stormwater, and the HOW coordinator as a resource. Also brought a survey asking about public perceptions of stormwater solutions and hurdles to overcome. For younger (and older) audiences, provided a blank sheet of paper to draw "What do Wilmington's Waterways Mean to You?" Raffled off one rain barrel for survey participants.	5,000+ Wilmington area residents in attendance
5/15/2019	Display at Airlie Gardens for National Gardens Day	New Hanover County residents	Heal Our Waterways	A table display that offered educational pieces about various BMPs, the danger of stormwater, and the HOW coordinator as a resource. Also brought a survey asking about public perceptions of stormwater solutions and hurdles to overcome.	~7 Total participants Table Exposure to all Airlie Gardens visitors 10AM - 3 PM
6/29/2019	Display at Tidal Creek Farmer's Market	Bradley Creek & Hewletts Creek residents; farmers; Tidal Creek Co-op customers	Heal Our Waterways	A table display that offered educational pieces about various BMPs, the danger of stormwater, and the HOW coordinator as a resource. Also brought a survey asking about public perceptions of stormwater solutions and hurdles to overcome. Raffled off one rain barrel for survey participants.	~30 Total participants Table exposure to all Farmer's Market attendees 8AM - 1 PM
6/17/2019	UNCW, NCCF, & HOW Joint Rain Garden Planting @ DePaolo & DeLoach Halls, UNCW	UNCW staff members, project partners, local community members	Heal Our Waterways, UNCW, NCCF	Planting event for the two rain gardens in front of DePaolo Hall, and segmented rain garden near DeLoach Hall. Began with a brief discussion about stormwater management and the purpose of the grant projects. Hands-on event.	21 volunteers; UNCW passerby
6/27/2019	NHC Arboretum Bioretention Area Planting	Arboretum staff; local community members	NCCF & NHC Arboretum	Hands-on event for planting the bioretention area & brief discussion about stormwater management and Bradley Creek restoration efforts.	~25 total participants

Presentations

2/25/2018	UNCW Grant presentation & discussion	UNCW staff members, project partners	Heal Our Waterways; UNCW	PowerPoint presentation discussing Bradley Creek history, water quality goals, and HOW mission. Also maps showing prospective projects on UNCW campus.	10 UNCW Staff members, 1 NHSWCD, 2 COW, 1 contractor, 1 NCCF
3/12/2019	Presentation to Meredith college Students @ City Hall	Meredith undergraduate students	Stormwater Staff, City of Wilmington	Interactive presentation that dscussed the Heal Our Waterways program, general stormwater facts, and working as a woman in public policy/government.	Approximately 30 college students; 3 City staff; 1 teacher

Informational Website

Ongoing	Heal Our Waterways informational website healourwaterways.org	Watershed residents General public	Heal Our Waterways	Continuously updated, dedicated Heal Our Waterways website	3004 unique page views as of 6/27/19**.** 3558 total page views. Data as of 6/27/19**.**

Media Advertising Campaigns

Ongoing	City of Wilmington YouTube.com Channel	YouTube.com viewers	WECT staff	Two :15 rain barrel public service announcements with local celebrity news anchor, Jon Evans	Inform public about installation and use of rain barrels.
1/10/19 - 1/31/19	WHQR Radio PSAs during drive time	Watershed residents General public	WHQR	20 total announcements over 3 weeks: “Support for WHQR comes from our members and Heal Our Waterways, offering guidance for homeowners on how they can re-route their downspout to prevent bacteria and other pollutants from entering waterways. Learn more at Heal Our Waterways dog org” “Support for WHQR comes from our members and Heal Our Waterways, available for presentations to HOAs, businesses or groups interested in simple solutions to keep polluted runoff out of Bradley and Hewletts creeks. More at Heal Our Waterways dot org.”	All NPR/WHQR listeners during drivetime Total Cost: $600

4/8/19 - 5/31/19	WHQR Radio PSAs during drive time	Watershed residents General public	WHQR	4 announcements per week in Drive Time: "Support for WHQR comes from our members and Heal Our Waterways, offering guidance for homeowners on how they can re-route their downspout to prevent bacteria and other pollutants from entering waterways. Learn more at Heal Our Waterways dog org" "Support for WHQR comes from our members and Heal Our Waterways, available for presentations to HOAs, businesses or groups interested in simple solutions to keep polluted runoff out of Bradley and Hewletts creeks. More at Heal Our Waterways dot org."	All NPR/WHQR listeners during drivetime 8 week campaign, 4 announcements per week Total Cost: $960
4/1/19 - 5/31/19	WECT Spring Campaign	Watershed residents General public	WECT	Online ads on webpage for certain zipcodes, video PSAs for certain zipcodes, sponsored FB posts, and hompeage takeovers on April 27 & May 15	Total Ads Delivered: 463,865 Total Ad Engagements: 1,827 Engagement Rate: 0.39% Total Cost: $3900
4/22/19 - 6/02/19	Lamar Spring Billboard campaign	Watershed residents General public	Lamar	Billboards with a "Reroute your Downspout" image at two locations within the watersheds.	Target Audience: Watershed area motorists Reach: Advertisement aired for eight seconds every minute for 28 days in 1 busy locations; for 14 days in 2 other busy locations each Total cost: $2,000

News Coverage

8/6/2018	Article on WWAY Webpage	Website viewers	WWAY News	Article titled "Free Rain Gardens to Help Reduce Pollution in Waterways"	WWAY Online News Readers
6/28/2019	UNCW Chancellor's Message	UNCW students, staff, & alumni	UNCW	Monthly newsletter that featured a highlight about the HOW rain gardens put in around DePaolo & DeLoach Hall.	Subscribed UNCW students, staff, & alumni

Social Media Campaigns

Ongoing	Twitter site campaign	Twitter followers Interested public	Heal Our Waterways	Dedicated Heal Our Waterways account handle	Currently have 225 followers
Ongoing	Facebook site campaign	Facebook followers Interested public	Heal Our Waterways	Dedicated Heal Our Waterways page	Currently have 197 page "likes", 206 followers

Distributing promos/giveaways

4/1/2019-5/10/2019	Spring 2019 Survey Online Raffle	Facebook followers, Twitter Followers, watershed residents	Heal Our Waterways	Online survey asking about perceptions of water quality and values related to Wilmington's waterways. Raffled off a $50 Lowe's gift card to survey participants.	207 Online Survey Responses
3/7/2019	Display at Waterman's Brewery	Waterman's patrons; Bradley Creek Residents	Heal Our Waterways	A table display that offered educational pieces about various BMPs, the danger of stormwater, and the HOW coordinator as a resource. Also brought a survey asking about public perceptions of stormwater solutions and hurdles to overcome. Raffled off one rain barrel for survey participants.	~10 stickers ~5 coozies ~7 Smart Yards booklets & HOW Brochures ~10 pens
3/8/2019	Display at Waterman's Brewery	Waterman's patrons; Bradley Creek Residents	Heal Our Waterways	A table display that offered educational pieces about various BMPs, the danger of stormwater, and the HOW coordinator as a resource. Also brought a survey asking about public perceptions of stormwater solutions and hurdles to overcome. Raffled off one rain barrel for survey participants.	~10 stickers ~10 coozies ~5 Smart Yards booklets & HOW brochures ~5 pens
3/9/2019	Display at the Wilmington Farmer's Market	Bradley Creek & Hewletts Creek residents; farmers; Tidal Creek Co-op customers	Heal Our Waterways	A table display that offered educational pieces about various BMPs, the danger of stormwater, and the HOW coordinator as a resource. Also brought a survey asking about public perceptions of stormwater solutions and hurdles to overcome. Raffled off one rain barrel for survey participants.	~10 grocery totes ~30 stickers ~15 Smart Yards booklets & How brochures ~15 pens ~20 cups
3/22/2019	Display @ Airlie Gardens for World Water Day	New Hanover County residents	Heal Our Waterways	A table display that offered educational pieces about various BMPs, the danger of stormwater, and the HOW coordinator as a resource. Also brought a	~10 stickers ~5 Smart Yards booklets & How brochures ~10 pens

				survey asking about public perceptions of stormwater solutions and hurdles to overcome. Raffled off one rain barrel for survey participants.	~5 cups
3/28/2019	Display at Wrightsville Beach Brewing	WB Brewery patrons; Bradley Creek residents	Heal Our Waterways	A table display that offered educational pieces about various BMPs, the danger of stormwater, and the HOW coordinator as a resource. Also brought a survey asking about public perceptions of stormwater solutions and hurdles to overcome. Raffled off one rain barrel for survey participants.	~20 stickers ~10 Smart Yards booklets & How brochures ~10 pens ~5 cups
3/30/2019	Display at Tidal Creek Farmer's Market	Bradley Creek & Hewletts Creek residents; farmers; Tidal Creek Co-op customers	Heal Our Waterways	A table display that offered educational pieces about various BMPs, the danger of stormwater, and the HOW coordinator as a resource. Also brought a survey asking about public perceptions of stormwater solutions and hurdles to overcome. Raffled off one rain barrel for survey participants.	~10 grocery totes ~20 stickers ~15 Smart Yards booklets & How brochures ~15 pens ~10 cups
4/27/2019	Display at Wilmington Earth Day Festival	Bradley Creek & Hewletts Creek residents; NHC residents	Heal Our Waterways	A table display that offered educational pieces about various BMPs, the danger of stormwater, and the HOW coordinator as a resource. Also brought a survey asking about public perceptions of stormwater solutions and hurdles to overcome. For younger (and older) audiences, provided a blank sheet of paper to draw "What do Wilmington's Waterways Mean to You?" Raffled off one rain barrel for survey participants.	~50 grocery totes ~200 stickers ~50 Smart Yards booklets & How brochures ~100 pens ~50 cups
5/15/2019	Display at Airlie Gardens for National Gardens Day	New Hanover County residents	Heal Our Waterways	A table display that offered educational pieces about various BMPs, the danger of stormwater, and the HOW coordinator as a resource. Also brought a survey asking about public perceptions of stormwater solutions and hurdles to overcome.	~5 stickers ~3 Smart Yards booklets & How brochures ~5 pens ~5 cups

6/29/2019	Display at Tidal Creek Farmer's Market	Bradley Creek & Hewletts Creek residents; farmers; Tidal Creek Co-op customers	Heal Our Waterways	A table display that offered educational pieces about various BMPs, the danger of stormwater, and the HOW coordinator as a resource. Also brought a survey asking about public perceptions of stormwater solutions and hurdles to overcome. Raffled off one rain barrel for survey participants.	~10 grocery totes ~30 stickers ~15 Smart Yards booklets & How brochures ~15 pens ~20 dry bags

Local Cable Access (GTV-8)

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

Watershed Resident Mailings, Displays, Signs, Pamphlets

1/1/2019	Winter Postcard Mailer	Bradley and Hewlett Creek Watersheds	Stormwater Staff	Downspout disconnection and reroute postcard	Instructs residents what is needed in order to successfully reroute their downspouts; 21,263 addresses
4/17/2019	Spring Postcard Mailer	Bradley and Hewlett Creek Watersheds	Stormwater Staff	Announcing Earth Day Festival and providing link to HOW Spring Online Survey	20,709 addresses

Newsletters and E-newsletters

1/18/2019	New Year, New Clean Water Goals	208 Active Constant Contact subscribers	Heal Our Waterways	Constant Contact e-newsletter	203 successful deliveries; 26% Open rate, 11% click rate Described various means that public could participate with the program, and highlighted recent news & events in the Wilmington area related to the environment
3/21/2019	Spring has Sprung!	221 Active Constant Contact subscribers	Heal Our Waterways	Constant Contact e-newsletter	214 successful deliveries; 29% Open rate, 27.4% click rate Advertised HOW survey, March schedule of events, and how to reroute a downspout.
4/24/2019	Celebrate Earth Day with us!	234 Active Constant Contact subscribers	Heal Our Waterways	Constant Contact e-newsletter	223 successful deliveries; 27.5% Open rate; 6.5% click rate Invitation to Earth

					Day 2019 event; described how to install a rain barrel
5/29/2019	Rain Garden Spot Checks Coming in June!	11 HOWBMP participants	Heal Our Waterways	Constant Contact e-newsletter	11 successful deliveries; 45.5% open rate; 40% click rate Reminder of rain garden spot checks for HOWBMP participants; link to other resources of how to maintain a rain garden
6/12/2019	June 17th Volunteer Opportunity!	253 Active Constant Contact subscribers	Heal Our Waterways	Constant Contact e-newsletter	245 successful deliveries; 31% open rate; 2.6% click rate Announced volunteer rain garden planting event @ UNCW.
6/13/2019	June 17th Event FULL!	251 Active Constant Contact subscribers	Heal Our Waterways	Constant Contact e-newsletter	242 successful deliveries; 29.3% open rate; N/A click rate Announced that the rain garden planting event was full.

Grant Projects

Began April 2017 – Ended March 2019	EPA 319 Grant NCCF	Hewlett and Bradley Creek Watersheds, White Oak River Basin	NCCF Stormwater Services Heal Our Waterways	NPS Pollutant Control Grant to install at least 12 retrofits, prioritized by volume reduction and cost-effectiveness	Collaboration with NCCF to implement projects that align with and expand upon the Bradley & Hewletts Creek Watershed Restoration plan
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

Watershed Coordinator Trainings

1/30/2019	LID Basics Workshop for Real Estate Professionals	Real Estate Professionals	DENR, NCCF, NCSU	PowerPoint presentations; discussed types of LID practices and their benefits for water quality; how to apply them in Wilmington area	HOW watershed coordinator participated in workshop training
2/8/2019	Wrightsville Beach Walk the Loop	HOW staff, UNCW student	NCCF contractor	Tour of Wrightsville Beach "Walk the Loop" projects to show types of retrofits that could be implemented on UNCW campus	HOW watershed coordinator; UNCW student

2/8/2019	WOTUS Rulemaking Webcast	Water Quality Professionals & Interested Parties	EPA	Webcast discussing proposed changes to the "Waters of the United States" definitions	HOW watershed coordinator
3/14/2019	NPDES Phase II MS4 Training in Jacksonville	MS4 stormwater staff	DEQ	PowerPoint presentations regarding various pieces of the MS4 stormwater permit, stormwater management plans, and audit schedules	HOW watershed coordinator & 2 stormwater staff
3/25/2019	Active Shooter Training	All City Employees	Wilmington Police Department	PowerPoint presentation & active simulation for how to respond to an active shooter situation.	HOW watershed coordinator
3/27/2019	EPA Research Webinar: M& M's: Developing Effluent Test Procedures Using a Mayfly and a Mussel	Water Quality Professionals & Interested Parties	EPA	Webcast discussing ongoing research of how to use	HOW watershed coordinator & webinar attendees
4/3/2019	Mindfulness in the Workplace Seminar	City employees	City of Wilmington training	PowerPoint and interactive presentation about how to incorporate mindfulness into the workplace and daily tasks	HOW watershed coordinator & city employees
4/25/2019	How to Write Effective Marketing Emails for Any Situation	Constant Contact users	Constant Contact	Webinar highlighting types of emails, available templates, scheduling emails, and how to organize content/messaging within the emails.	HOW watershed coordinator
4/29/2019-5/2/2019	Center for Watershed Protection National Conference	Watershed & Water Quality professionals	Center for Watershed Protection	Week-long conference with presentation tracks based on interest. Main topics included innovative stormwater management and public engagement/outreach.	HOW watershed coordinator & stormwater education manager
5/28/2019	Nutrient Management in Coastal Communities	Water Quality Professionals & Interested Parties	EPA	Case study on Cape Cod about excess nitrogen inputs from septic systems and tools used to try to address the problem.	HOW watershed coordinator & webinar attendees
5/29/2019	ASWM Hot Topics Webinar: Can We Keep Up with Changing Estuaries? Moving from Science to Action in San Francisco Bay	Water Quality Professionals & Interested Parties	Association of State Wetland Managers	Live webcast discussing how to protect the San Francisco Bay shoreline using mapping and nature-based approaches.	HOW watershed coordinator

6/11/2019	EOC Webmap Training & Operational Review	All essential city disaster staff	City of Wilmington Public Services	Interactive training discussing roles and responsibilities during hurricane response.	HOW watershed coordinator
6/12/2019	Using AQUATOX	Water Quality Professionals & Interested Parties	EPA	Webinar discussing the new tool AQUATOX, which is an environmental risk management model showing fates of pollutants within aquatic ecosystems. PFAs modeling was also briefly discussed.	HOW watershed coordinator
6/12/2019	EPA's Report on the Environment	Water Quality Professionals & Interested Parties	EPA	Webinar showing the location of EPA's Report on the Environment and brief discussion of the topics included within the report.	HOW watershed coordinator
6/25/2019	ASWM-EPA Region 10 Tribal Wetland Webinar: Economic Development & Resource Protection	Water Quality Professionals & Interested Parties	Association of State Wetland Managers	Webinar exploring three native tribes and their strategies for managing natural resources.	HOW watershed coordinator
6/26/2019	City of Wilmington SharePoint Training	All City Employees	City of Wilmington IT Department	Brief presentation showing the city's new IT homepage and document central.	HOW watershed coordinator
6/26/2019	Eleven Principles for Communicating Science to Get Results	Science communicators, scientists, advocates	Alan Alda Center for Communicating Science	Webinar given by Amy Aimes & Dr. Roger Aimes about how to "champion" scientific topics to policymakers and the general public. Provided principles to help improve science communication.	HOW watershed coordinator
1/29/2019	UNCW Sustainability Council Meeting	UNCW staff, community partners	UNCW Sustainability	Discussion-format meetings to discuss areas for improvement for UNCW regarding sustainability and environmental practices.	HOW watershed coordinator, UNCW staff, representatives from local groups
2/19/2019	UNCW Sustainability Council Meeting	UNCW staff, community partners	UNCW Sustainability	Discussion-format meetings to discuss areas for improvement for UNCW regarding sustainability and environmental practices.	HOW watershed coordinator, UNCW staff, representatives from local groups
2/26/2019	NHC Watershed Roundtable	Water Quality Professionals in New Hanover County	New Hanover County Government	Roundtable-style meetings discussing updates from the various agencies in NHC that deal with water quality.	HOW watershed coordinator & stormwater education manager
3/1/2019	NHC Tree Cover Workgroup	Local governments, environmental groups, & concerned citizens	New Hanover County Government	Technical Advisory style meetings to discuss tree preservation and restoration priorities for New Hanover County.	HOW watershed coordinator

3/26/2019	UNCW Sustainability Council Meeting	UNCW staff, community partners	UNCW Sustainability	Discussion-format meetings to discuss areas for improvement for UNCW regarding sustainability and environmental practices.	HOW watershed coordinator, UNCW staff, representatives from local groups
4/5/2019	NHC Tree Cover Workgroup	Local governments, environmental groups, & concerned citizens	New Hanover County Government	Technical Advisory style meetings to discuss tree preservation and restoration priorities for New Hanover County.	HOW watershed coordinator
5/16/2019	NHC Tree Cover Workgroup	Local governments, environmental groups, & concerned citizens	New Hanover County Government	Technical Advisory style meetings to discuss tree preservation and restoration priorities for New Hanover County.	HOW watershed coordinator
6/12/2019	NHC Watershed Roundtable	Water Quality Professionals in New Hanover County	New Hanover County Government	Roundtable-style meetings discussing updates from the various agencies in NHC that deal with water quality.	HOW watershed coordinator & stormwater education manager

Citizen Contacts- Site Visits

2/13/2019	Site Visit	1 Homeowner	NHSWCD; HOW; Rainstorm Solutions	Site visit at HOA property	NHSWCD; HOW; Rainstorm Solutions
2/15/2019	Site Visit	2 Homeowners	NHSWCD; HOW; Rainstorm Solutions	Site visit with citizen at property	NHSWCD; HOW; Rainstorm Solutions; 2 citizens
2/15/2019	Site Visit	2 Homeowners	NHSWCD; HOW; Rainstorm Solutions	Site visit with citizen at property	NHSWCD; HOW; Rainstorm Solutions; 2 citizens
3/1/2019	Site Visit	1 Homeowner	NHSWCD; HOW; Rainstorm Solutions	Site visit with citizen at property	NHSWCD; HOW; Rainstorm Solutions; citizen
3/1/2019	Site Visit	1 Homeowner	NHSWCD; HOW; Rainstorm Solutions	Site visit with citizen at property	NHSWCD; HOW; Rainstorm Solutions; citizen
3/5/2019	Site Visit	1 Homeowner	NHSWCD; HOW; Rainstorm Solutions	Site visit with citizen at property	NHSWCD; HOW; Rainstorm Solutions; citizen
5/20/2019	Site Visit/Citizen Follow-Up	2 Homeowners	Heal Our Waterways	Citizen was not in priority watersheds, but was still seeking advice for how to handle flooding in backyard	HOW; 2 citizens

BMP Projects Installed

6/27/2019	NHC Arboretum Bioretention Area	Bradley Creek residents & Arboretum visitors	NCCF contractor in accordance with 319 grant	Part of NCCF 319 grant; volunteer planting date; hands-on education about bioretention areas and Bradley Creek	~30 Volunteers & Arboretum Staff Total Volume Reduction: 12200 cu ft.
10/1/18 - 3/14/19	Wrightsville Beach Pet Hospital Infiltration Basin/Rain Garden	Bradley Creek residents & Pet Hospital Staff	NCCF contractor in accordance with 319 grant	Part of NCCF Grant for Palmetto Pointe & Hewletts Creek	Total Volume Reduction: 294 cu ft.
10/1/18 - 3/14/19	Sneeden Cistern (500 gal)	1 Homeowner	NCCF contractor in accordance with 319 grant	Part of NCCF Grant for Palmetto Pointe & Hewletts Creek	Total Volume Reduction: 66.7 cu ft.
8/9/2018	Carvaholo Rain Barrel (80 gal)	1 Homeowner	NHSWCD; Stormwater	NHSWCD Rain Barrel Sale	Total Volume Reduction: 10.7 cu ft.
12/14/2017	Wheatly Rain Barrel (80 gal)	1 Homeowner	NHSWCD; Stormwater	NHSWCD Rain Barrel Sale	Total Volume Reduction: 10.7 cu ft.
10/1/18 - 3/14/19	Mason Rain Barrel (80 gal)	1 Homeowner	NHSWCD; Stormwater	NHSWCD Rain Barrel Sale	Total Volume Reduction: 10.7 cu ft.
10/1/18 - 3/14/19	D'Erminio Pervious Pavement	1 Homeowner	NCCF contractor in accordance with 319 grant	Part of NCCF Grant for Palmetto Pointe & Hewletts Creek	Total Volume Reduction: 18.72 cu ft.
10/1/18 - 3/14/19	D'Erminio Rain Barrel (50 gal)	1 Homeowner	NCCF contractor in accordance with 319 grant	Part of NCCF Grant for Palmetto Pointe & Hewletts Creek	Total Volume Reduction: 6.68 cu ft.
10/1/18 - 3/14/19	Wilson Rain Barrel (50 gal)	1 Homeowner	NCCF contractor in accordance with 319 grant	Part of NCCF Grant for Palmetto Pointe & Hewletts Creek	Total Volume Reduction: 6.68 cu ft.
10/1/18 - 3/14/19	Pittman Rain Barrel (50 gal)	1 Homeowner	NCCF contractor in accordance with 319 grant	Part of NCCF Grant for Palmetto Pointe & Hewletts Creek	Total Volume Reduction: 6.68 cu ft.

10/1/18 - 3/14/19	den Hartog Rain Barrel (50 gal)	1 Homeowner	NCCF contractor in accordance with 319 grant	Part of NCCF Grant for Palmetto Pointe & Hewletts Creek	Total Volume Reduction: 6.68 cu ft.
10/1/18 - 3/14/19	Gainer Rain Barrel (50 gal)	1 Homeowner	NCCF contractor in accordance with 319 grant	Part of NCCF Grant for Palmetto Pointe & Hewletts Creek	Total Volume Reduction: 6.68 cu ft.
10/1/18 - 3/14/19	Hoffman Rain Barrel (50 gal)	1 Homeowner	NCCF contractor in accordance with 319 grant	Part of NCCF Grant for Palmetto Pointe & Hewletts Creek	Total Volume Reduction: 6.68 cu ft.
10/1/18 - 3/14/19	Kline Rain Barrel (50 gal)	1 Homeowner	NCCF contractor in accordance with 319 grant	Part of NCCF Grant for Palmetto Pointe & Hewletts Creek	Total Volume Reduction: 6.68 cu ft.
10/1/18 - 3/14/19	Fowler Rain Barrel (85 gal)	1 Homeowner	NCCF contractor in accordance with 319 grant	Part of NCCF Grant for Palmetto Pointe & Hewletts Creek	Total Volume Reduction: 11.36 cu ft.
10/1/18 - 3/14/19	Parajon Rain Barrel (100 gal)	1 Homeowner	NCCF contractor in accordance with 319 grant	Part of NCCF Grant for Palmetto Pointe & Hewletts Creek	Total Volume Reduction: 13.37 cu ft.
7/13/2017	Gafsi Rain Barrel #2 (80 gal)	1 Homeowner	NHSWCD; Stormwater	NHSWCD Rain Barrel Sale	Total Volume Reduction: 10.69 cu ft.
7/13/2017	Gafsi Rain Barrel #3 (60 gal)	1 Homeowner	NHSWCD; Stormwater	NHSWCD Rain Barrel Sale	Total Volume Reduction: 8.02 cu ft.
8/9/2018	Carter Rain Barrel #1 (60 gal)	1 Homeowner	NHSWCD; Stormwater	NHSWCD Rain Barrel Sale	Total Volume Reduction: 8.02 cu ft.
8/9/2018	Carter Rain Barrel #2 (60 gal)	1 Homeowner	NHSWCD; Stormwater	NHSWCD Rain Barrel Sale	Total Volume Reduction: 8.02 cu ft.

12/14/2017	Carlin Rain Barrel (60 gal)	1 Homeowner	NHSWCD; Stormwater	NHSWCD Rain Barrel Sale	Total Volume Reduction: 8.02 cu ft.
06/01/2019-6/30/2019	Arita Rain Garden 1	2 Homeowners	NHSWCD; HOW; Rainstorm Solutions	Provide onsite stormwater infiltration and volume reduction; educate homeowners and visitors about BMP use	Total Volume Reduction: 80 cu ft.
06/01/2019-6/30/2020	Arita Rain Garden 2	2 Homeowners	NHSWCD; HOW; Rainstorm Solutions	Provide onsite stormwater infiltration and volume reduction; educate homeowners and visitors about BMP use	Total Volume Reduction: 60 cu ft.
06/01/2019-6/30/2021	Anderson Rain Garden & Cistern	2 Homeowners	NHSWCD; HOW; Rainstorm Solutions	Provide onsite stormwater infiltration and volume reduction; educate homeowners and visitors about BMP use	Total Volume Reduction: 98.5 cu ft.
06/01/2019-6/30/2022	Maughan Rain Garden	1 Homeowner	NHSWCD; HOW; Rainstorm Solutions	Provide onsite stormwater infiltration and volume reduction; educate homeowners and visitors about BMP use	Total Volume Reduction: 62 cu ft.
06/01/2019-6/30/2023	Wheeler Wetland	1 Homeowner	NHSWCD; HOW; Rainstorm Solutions	Provide onsite stormwater infiltration and volume reduction; educate homeowners and visitors about BMP use	Total Volume Reduction: 37 cu ft.
05/28/2019-6/17/2019	UNCW Cisterns	UNCW	UNCW, NCCF, HOW	Provide onsite stormwater infiltration and volume reduction; educate homeowners and visitors about BMP use	Total Volume Reduction: 203.86 cu ft.
05/28/2019-6/17/2020	UNCW DeLoach Gardens	UNCW	UNCW, NCCF, HOW	Provide onsite stormwater infiltration and volume reduction; educate homeowners and visitors about BMP use	Total Volume Reduction: 914.76 cu ft.
05/28/2019-6/17/2021	UNCW DePaolo Gardens	UNCW	UNCW, NCCF, HOW	Provide onsite stormwater infiltration and volume reduction; educate homeowners and visitors about BMP use	Total Volume Reduction: 2178 + 2178 = 4356 cu ft.

COW = City of Wilmington

HOW = Heal Our Waterways program

HOWBMP = Heal Our Waterways Best Management Program

NCCF = North Carolina Coastal Federation

NCSU = NC State University

NHSWCD = New Hanover Soil & Water Conservation District

FB = Facebook

UNCW = University of North Carolina at Wilmington

BMP Owner	BMP Type	Volume Reduction (cu ft)	Volume Reduction (ac ft)
Bradley Creek Watershed Volume Reduction Data			
New Hanover County Arboretum	Bioretention Area	12200	0.280073848
Wrightsville Beach Pet Hospital	Infiltration Basin/Rain Garden	294	0.006749321
Juanita Sneeden	Cistern (500 gal)	66.68403	0.001530857
UNCW DePaolo 1	Infiltration Basin/Rain Garden	2178	0.050000069
UNCW DePaolo 2	Infiltration Basin/Rain Garden	2178	0.050000069
UNCW DeLoach	Infiltration Basin/Rain Garden	914.76	0.021000029
Ariadne de Carvaholo	Rain Barrel (80 gal)	10.6944	0.00024551
Scott Wheatly	Rain Barrel (80 gal)	10.6944	0.00024551
Jem Mason	Rain Barrel (80 gal)	10.6944	0.00024551
UNCW Cisterns	Cistern (305 gal x 5)	203.86	0.004679988
TOTAL BRADLEY CREEK WATERSHED VOLUME REDUCTION:		**18067.38723**	**0.41477071**
Drains To ICW2 Volume Reduction Data			
TOTAL DRAINS TO ICW2 VOLUME REDUCTION:		**0**	**0**
Hewletts Creek Watershed Volume Reduction Data			
Kim & Danny D'Erminio	Pervious Pavement	18.72	0.000429753
Kim & Danny D'Erminio	Rain Barrel (50 gal)	6.68403	0.000153444
Mark Wilson	Rain Barrel (50 gal)	6.68403	0.000153444
Stewart Pittman	Rain Barrel (50 gal)	6.68403	0.000153444
Frits den Hartog	Rain Barrel (50 gal)	6.68403	0.000153444
Andy Gainer	Rain Barrel (50 gal)	6.68403	0.000153444
Jim & Teresa Hoffman	Rain Barrel (50 gal)	6.68403	0.000153444
Christina Kline	Rain Barrel (50 gal)	6.68403	0.000153444
Ivy Fowler	Rain Barrel (85 gal)	11.3628	0.000260854
Kim & Carlos Parajon	Rain Barrel (100 gal)	13.3681	0.00030689
Alan Anderson	Cistern (370 gal)	49.5	0.001136365
Alan Anderson	Rain Garden	49	0.001124887
Kristine Maughan	Rain Garden	62	0.001423326
Gail Arita	Rain Garden	80	0.00183655
Gail Arita	Rain Garden	60	0.001377412
Florence Wheeler	Backyard Wetland	37	0.000849404
Salem Gafsi	Rain Barrel #2 (80 gal)	10.6944	0.00024551
Salem Gafsi	Rain Barrel #3 (60 gal)	8.02083	0.000184133
Robert Carter	Rain Barrel #1 (60 gal)	8.02083	0.000184133
Robert Carter	Rain Barrel #2 (60 gal)	8.02083	0.000184133
Isabel Carlin	Rain Barrel (60 gal)	8.02083	0.000184133
TOTAL HEWLETTS CREEK WATERSHED VOLUME REDUCTION:		**470.51683**	**0.010801595**
Drains To ICW3 Volume Reduction Data			
TOTAL DRAINS TO ICW3 VOLUME REDUCTION:		**0**	**0**
TOTAL COMBINED VOLUME REDUCTION (All Watersheds):			
TOTAL COMBINED VOLUME REDUCTION (All Watersheds):		**18537.90406**	**0.425572305**

Volume Reduction Goals	Goal (ac.ft)	Actual (ac.ft.)	% Achieved
Bradley Creek FY 18	**0.15**	**0.41477071**	**276.5138065**
Hewletts Creek FY18	**1**	**0.00966523**	**0.96652298**

FY 1819

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

HOWBMP Quarterly Progress Report #4: April 1- June 30, 2019

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

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

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

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

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

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

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

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, 2018

Completed site visits at the following addresses: 418 Buccaneer on 8/2/18 (suggested a rain garden or wetland depending on soil type), 120 Grainger Pt Rd on 8/10/18 (suggested a rain garden), and 7039 Masonboro Sound Rd 9/24/18 (suggested a rain garden). Cancelled 2 site visits to be rescheduled in the spring due to hurricane Florence. Also helped complete education video to promote the program on GTV, NHC TV, and websites. Responded to interview request by WWAY to report on the HOW program. Article was featured on WWAY website and news cast. Currently working with Rainstorm Solutions to

install BMPs. Company has had staff turnover, so previous sites will be visited with new staff and NHSWCD staff in the spring.

October 1 - December 31, 2018
No activity.

Site visits were put on hold this quarter in anticipation of a new technician being hired and due to work load shift due to Hurricane Florence. All sites will be re-visited in the spring due to turnover with current contractor.

January 1 - March 31, 2019
Completed site visits at the following address: 1022 Headwater Cove on 2/13/19 (suggested a swale), 3608 Needle Sound Way on 2/15/19 (suggested multiple rain gardens), recheck with new contractor staff of 120 Grainer Pt on 2/15/19, recheck with new contractor staff of 418 Buccaneer on 3/1/19, 3106 Rensler Ct on 3/5/19 (suggested swale), and 6935 Masonboro Rd on 3/21/19 (suggested rain garden). Staff also promoted the program at an LID workshop sponsored by the Division of Coastal Management for local realtors. Workshop was held 1/30/19.

April 1 - June 30, 2019
Completed another site visit for Headwater Cove HOA. Based on this visit, the participants decided not to take advantage of the program due to logistics with other HOA issues. Completed construction of a 2 rain gardens at 3608 Needle Sound Way, completed a rain garden and cistern installation at 120 Grainger Point, completed a rain garden at 418 Buccaneer, and completed rain garden at 6935 Masonboro Sound Rd. Also completed site visits of all past participants of the program. A follow up email was sent to all participants stating if maintenance was needed. District staff will follow up with maintenance needs in the following months to try to reach compliance. Two participants (Rosov and Blue) were found to be out of compliance.

Report Compiled By: Dru Harrison **Date:** 7-12-19

APPENDIX I: REGULATORY ENFORCEMENT ACTIONS

In 18-19 the Public Services Department Compliance Officer provided stormwater education and investigated approximately 92 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 2018-2019

Reporting period (FY19) July 1, 2018- June 30, 2019

Nature of Complaint	Number of Reports	Resolved thru Public Educatic	NOVs Incidents	Referred to DWQ	# Civil Penalties
Pet Waste	9	100%	0	N/A	0
Outreach	5		0	N/A	N/A
Illicit Discharge/Sediment	78	92.3%	6	7	1
Illicit Connection	*8*	*100.0%*	*0*	*0*	*0*
Dry Weather Flow	*2*	*100.0%*	*0*	*0*	*0*
SSO	*15*	*86.7%*	*2*	*0*	*0*
Totals for 1,2 and 3	92	91%	8	7	1

CIVIL PENALTIES 2018-2019

Nature of Compliant	Responsible Party	Address of violation	Date of Violation	Total Penalty
Illicit Discharge	Downtown Detailing	Kenwood Ave at Market St.	8/27/18	$700.00

DEFINITIONS: Nature of Complaint

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

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

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

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

SSO (Part 1, Sec.12-24)

Sewer overflows from the CFPUA system, both reportable and not reportable. Process is

described in Illicit Discharge Section. Resolution of the incident also includes reviewing the DWQ SSO reporting form for cause and ensuring distribution of educational material pertaining to preventing grease related spills to residents near and contributing to the incident.

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

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

Blockages (Part 2, Sec. 12-29)

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

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

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

APPENDIX J: MAJOR OUTFALL LOCATIONS AND DESCRIPTION TABLE

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

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

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

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

Cape Fear River	34.24991	-77.95037	36	RCP	Single	NPDES outfall found	6/14/2011	Good
Cape Fear River	34.25033	-77.94992	36	RCP	Single	NPDES outfall found	6/14/2011	Good
Cape Fear River	34.25729	-77.94434	36	RCP	Single	NPDES Industrial outfall found	6/10/2011	Good
Cape Fear River	34.24314	-77.95131	30	CPP	Single	NPDES outfall found	6/10/2011	Good
Cape Fear River	34.24977	-77.95055	30	RCP	Single	NPDES outfall found	6/14/2011	Good
Cape Fear River	34.25050	-77.94980	30	RCP	Single	NPDES outfall found	6/14/2011	Good
Cape Fear River	34.22764	-77.95054	24	CMP	Single	NPDES outfall found	5/16/2011	Good
Cape Fear River	34.22889	-77.94994	24	CMP	Single	NPDES outfall found	9/28/2009	Fair
Cape Fear River	34.24200	-77.95272	24	RCP	Single	NPDES outfall found	6/10/2011	Good
Cape Fear River	34.24319	-77.95121	24	CMP	Single	NPDES outfall found	6/10/2011	Fair
Cape Fear River	34.24964	-77.95067	24	RCP	Single	NPDES outfall found	6/14/2011	Good
Cape Fear River	34.25245	-77.94726	24	RCP	Single	NPDES Industrial outfall found	6/14/2011	Good
Cape Fear River	34.25728	-77.94432	24	RCP	Single	NPDES Industrial outfall found	6/10/2011	Good
Cape Fear River	34.24335	-77.95138	12	RCP	Single	NPDES outfall found	6/10/2011	Poor
Cape Fear River	34.25565	-77.94679	12	VCP	Single	NPDES Industrial outfall found	6/14/2011	Poor
Cape Fear River	34.23014	-77.94946	Inaccessible - submerged	RCP	Single	NPDES outfall	5/25/2011	Inaccessible
Smith Creek	34.25505	-77.87846	6.8 X 8.0	RCP	Single	NPDES outfall found	2/21/2012	Good
Smith Creek	34.25536	-77.87357	9.0 X 11.0	RCP	Double	NPDES Industrial outfall found	2/21/2012	Good
Smith Creek	34.25739	-77.94108	Not Found	UNKNOWN	Single	NPDES outfall submerged	2/28/2012	Unknown
Smith Creek	34.25711	-77.90656	7.0 X 8.0	RCP	Single	NPDES outfall found	2/21/2012	Good
Smith Creek	34.25756	-77.91249	6.0 X 7.0	RCP	Single	NPDES Industrial outfall found	2/21/2012	Good
Smith Creek	34.25718	-77.90675	72	RCP	Triple	NPDES outfall found	2/21/2012	Good
Smith Creek	34.25403	-77.89263	66	RCP	Single	NPDES outfall found	2/21/2012	Good
Smith Creek	34.25297	-77.93964	48	RCP	Single	NPDES outfall found	2/28/2012	Good
Smith Creek	34.25437	-77.90027	48	RCP	Single	NPDES outfall found	2/21/2012	Good
Smith Creek	34.25718	-77.88761	42	RCP	Single	NPDES outfall found	2/21/2012	Fair
Smith Creek	34.25761	-77.91556	42	RCP	Single	NPDES Industrial outfall found	2/21/2012	Good

Whiskey Creek	34.16376	-77.86289	72	CMP	Single	NPDES outfall found	3/27/2001	Good
Whiskey Creek	34.16654	-77.86775	42	RCP	Single	NPDES outfall found	7/18/2011	Good
Whiskey Creek	34.16362	-77.86228	36	RCP	Single	NPDES outfall found	3/27/2001	Good
Whiskey Creek	34.16670	-77.86858	36	RCP	Single	NPDES outfall found	7/18/2011	Good
Whiskey Creek	34.16671	-77.86860	36	RCP	Single	NPDES outfall found	7/18/2011	Good
Whiskey Creek	34.16779	-77.87648	5.5 X 7.0	CMP	Single	NPDES outfall found	7/18/2011	Good

APPENDIX K: DEFINITIONS

Act
See Clean Water Act.

Best Management Practice (BMP)
Measures or practices used to reduce the amount of pollution entering surface waters. BMPs can be structural or non-structural and may take the form of a process, activity, physical structure or planning (see non-structural BMP).

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 BMP
Non-structural BMPs are preventive actions that involve management and source controls such as: (I) Policies and ordinances that provide requirements and standards to direct growth to identified areas, protect sensitive areas such as wetlands and riparian areas, maintain and/or increase open space, provide buffers along sensitive water bodies, minimize impervious surfaces, and/or minimize disturbance of soils and vegetation; (2) policies or ordinances that encourage infill development in higher density urban areas, and areas with existing storm sewer infrastructure; (3) education programs for developers and the public about minimizing water quality impacts; (4) other measures such as minimizing the percentage of impervious area after development, use of measures to minimize directly connected impervious areas, and source control measures often thought of as good housekeeping, preventive maintenance and spill prevention.

Outfall
Outfall means a point source as defined by 40 CFR 122.2 at the point where a municipal separate storm sewer discharges to waters of the United States and does not include open conveyances connecting two municipal separate storm sewers, or pipes, tunnels or other conveyances which connect segments of the same stream or other waters of the United States and are used to convey waters of the United States.

Permittee
The owner or operator issued this permit.

Point Source Discharge of Stormwater
Any discernible, confined and discrete conveyance including, but not specifically limited to, any pipe, ditch, channel, tunnel, conduit, well, or discrete fissure from which stormwater is or may be discharged to waters of the state.

Redevelopment
Means any rebuilding activity unless that rebuilding activity;
(a) Results in no net increase in built-upon area, and
(b) Provides equal or greater stormwater control than the previous development.

Representative Storm Event
A storm event that measures greater than 0.1 inches of rainfall and that is preceded by at least 72 hours in which no storm event measuring greater than 0.1 inches has occurred. A single storm event may contain up to 10 consecutive hours of no precipitation. For example, if it rains for 2 hours without producing any collectable discharge, and then stops, a sample may be collected if a rain producing a discharge begins again within the next 10 hours.

Storm Sewer System
Is a conveyance or system of conveyances which are designed or used to collect or convey stormwater runoff that is not part of a combined sewer system or treatment works. This can include, but is not limited to, streets, catch basins, curbs, gutters, ditches, man-made channels or storm drains that convey stormwater runoff.

Stormwater Associated with Industrial Activity
The discharge from any point source which is used for collecting and conveying stormwater and which is directly related to manufacturing, processing or raw material storage areas at an industrial site. Facilities considered to be engaged in "industrial activities" include those activities defined in 40 CFR 122.26(b)(l4). The term does not include discharges from facilities or activities excluded from the NPDES program

Stormwater 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.