CITY OF WILMINGTON STORMWATER SERVICES

City of Wilmington, North Carolina

STORMWATER MANAGEMENT PLAN & 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, 2016 – June 30, 2017

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.

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Derek R. Pielech, P.E. Date

Manager, Stormwater Services

Table of Contents

INTRODUCTION

Stormwater Management Plan Overview

The North Carolina Division of Water Quality issued NPDES Phase II Permit NCS000406 to the City of Wilmington effective November 12, 2012. 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, 2016 to June 30, 2017.

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 5 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 within areas where data is absent.
- Continuation of Public Outreach and Public Participation efforts.
- Continued dry weather flow monitoring.
- Implementation of several key actions of the Bradley and Hewletts Creek Watershed Restoration Plan, including the installation of a large bioretention area through the collaborative efforts of plan partners and stakeholders.

Wilmington continues to move forward with implementing the necessary goals and objectives as outlined in their permit. Progress was made this year related to dry weather flow monitoring

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

CITY OF WILMINGTON STORMWATER SERVICES OVERVIEW

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 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. Stormwater Services also provides semi-annual inspections for privately permitted stormwater retention facilities. These inspections are performed in order to ensure compliance with city maintenance standards. Compliance with NPDES Phase II stormwater regulations also fall into this category.

Capital Improvements

The stormwater utility provides dedicated funding and staff resources for planning, designing, and constructing capital projects. These 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 possible, capital projects incorporate innovative design or best management practices (BMPs) to improve water quality and reduce the quantity of stormwater runoff.

Operations and Maintenance

The City of Wilmington's Maintenance Division is responsible for maintaining the public drainage system. Maintenance activities consist of open drainage, closed drainage, street sweeping, and best management practices (BMPs). The open drainage system consists of roadside swales, ditches, channels, creeks, and ponds. The closed drainage system consists of pipes, culverts, catch basins, and manholes. Both of these systems are maintained using manual and mechanical techniques to insure that they remain open for proper drainage. Street sweeping provides preventative maintenance to minimize the amount of trash, debris,

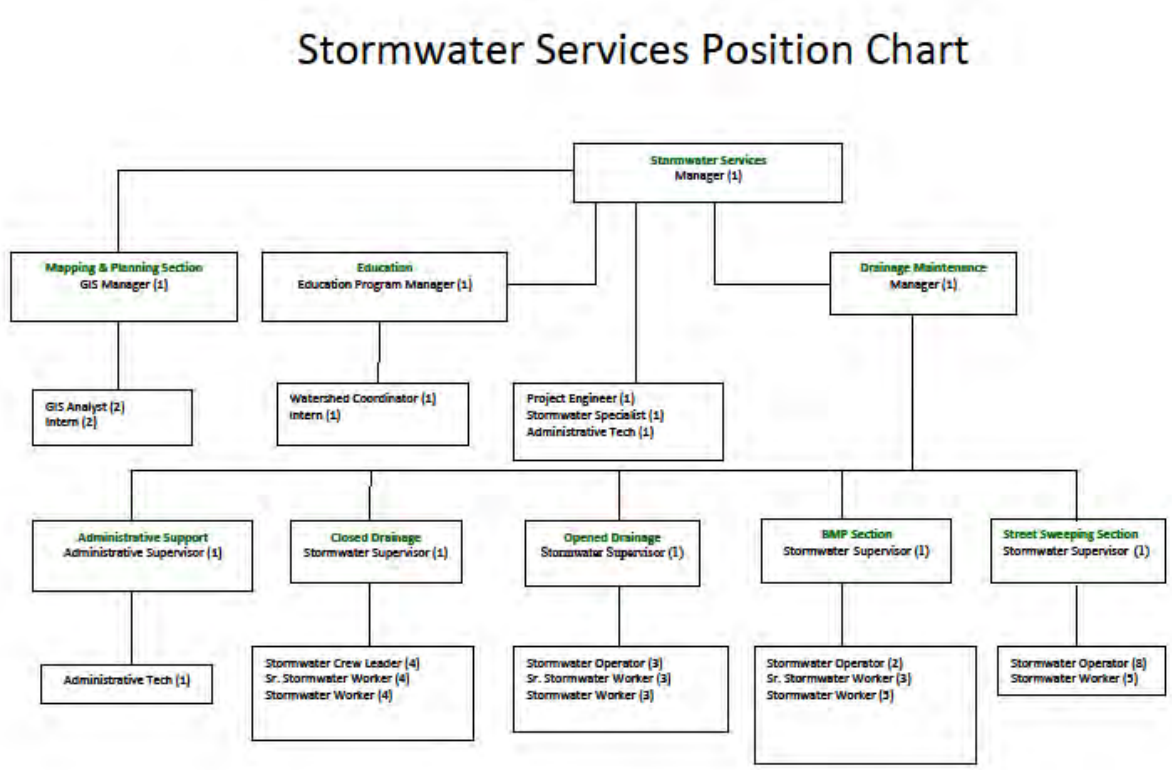
sediment, and other pollutants entering open or closed drainage routes. BMP maintenance consists of activities necessary to keep over 62 BMP sites including ponds, wetlands, and bio-retention areas in fully-functioning condition.

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 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 grant funding. In addition, Stormwater Services implements an extensive outreach, education, and public involvement program that serves the citizens of Wilmington and includes a wide array of water quality education programming and materials. These programs include school presentations, homeowner association outreach, stormwater publications and giveaways, mass media advertising, special event exhibits, workshops, volunteer cleanups and storm drain marking, and collaborative efforts such as grant projects. 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 16-17 Stormwater Management Fund Budget for NPDES

	FY 16-17 Adopted	FY 17-18 Adopted	
REVENUES			
Storm Water Utility Fees	7,730,986	8,487,789	
City Streets Storm Water Fees	2,441,004	2,649,015	
Storm Water Discharge permits	47,000	47,000	
NCDOT Drainage Maintenance	37,000	37,000	
Interest Earnings	44,231	61,758	
Miscellaneous	-	-	
Appropriated Fund Balance	-	-	
TOTAL REVENUES	10,300,221	11,282,562	
EXPENDITURES			
Public Services	5,202,047	5,350,632	
Non-Departmental	1,160,853	1,017,425	
Debt Service	1,837,321	1,840,783	
Contingency	100,000	100,000	
Transfer to Capital Project Fund	2,000,000	7,088,045	
TOTAL EXPENDITURES	10,300,221	15,396,885	[1]

[1] The FY 2017 budget was adopted by the Wilmington City Council on June 20, 2017

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 new ordinance.

Compliance through Public Education

The stormwater code enforcement program strives to maximize voluntary compliance through public education and 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 2016-17, 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 and the city's expectations as well as the ordinance and penalty amounts for any violations. Pet waste message flags are used and distributed with ordinance information in parks and public places, and in specific neighborhoods in response to complaints. The pet waste flyer is also available in poster size for display when needed in parks and common areas.

Illicit Discharges

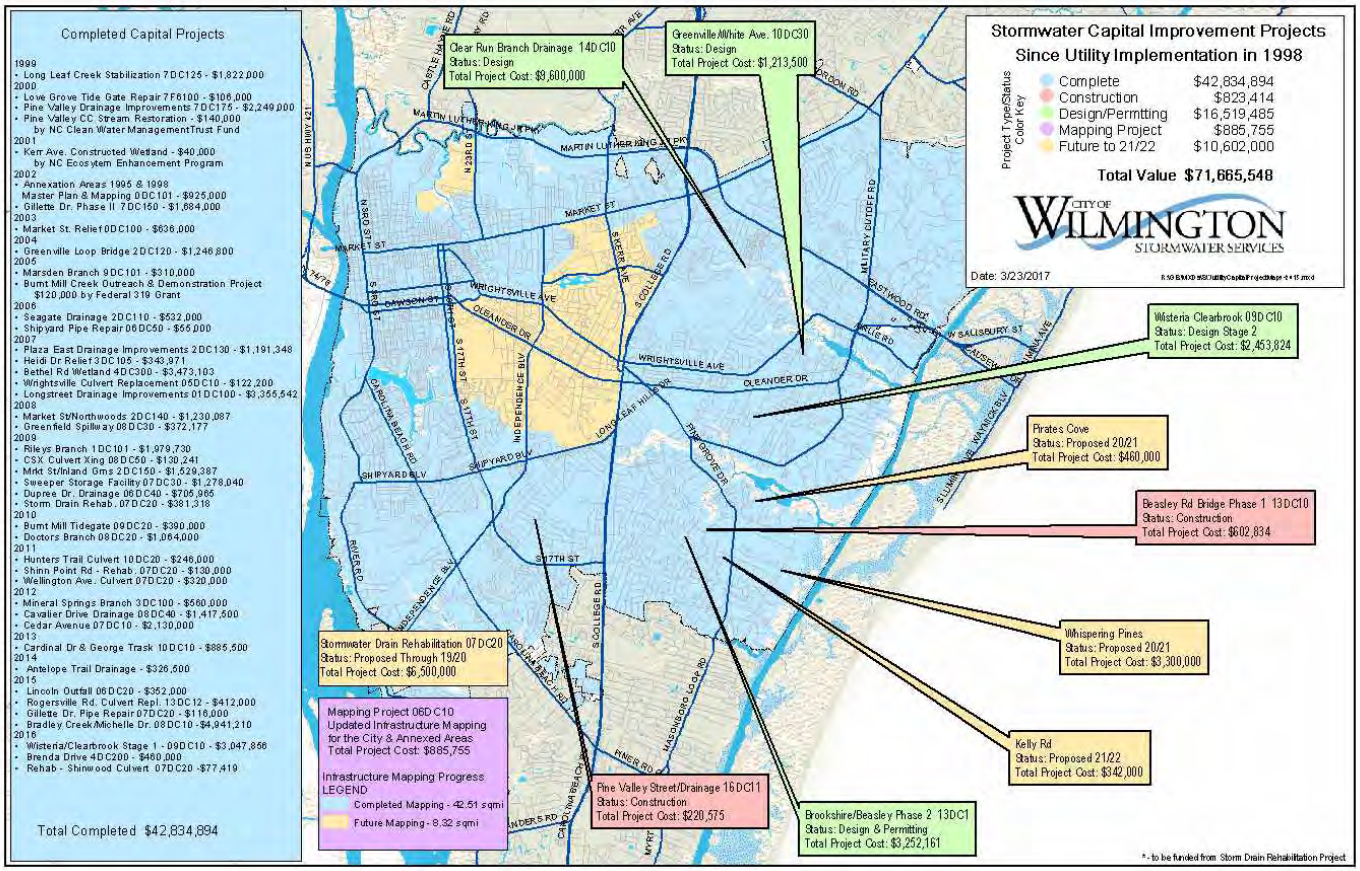
Reports of illicit discharges are addressed on a case by case basis. Informational posters and brochures for general use have been developed for distribution targeting the general public as well as specific source types that are typical in any urban area. These posters are kept on hand and distributed to businesses on an as needed basis to inform and educate them and their employees in restaurants, vehicle maintenance facilities, construction sites, on industry specific issues and best management practices specific to their businesses on how to avoid and prevent stormwater pollution. For issues that require investigation, assessment, and enforcement the process detailed in the Illicit Discharge Detection and Elimination Manual is followed.

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 that 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	
901 Fanning St								1	BMP	$ 9,611.09	$ 9,611.09
City Golf Course BMP								1	BMP	$ 543.50	$ 543.50
Hewletts Creek Infilration Ditch								1	Infiltration Ditch	$ 4,709.38	$ 4,709.38
Lancaster Infiltration Swale								0	Infiltration Swale	$ 5,936.76	$ 5,936.76
Lynnwood Ave Pond								1	Pond	$ 10,087.21	$ 10,087.21
Operation Center Infiltration Ditch								1	Infiltration Ditch	$ 7,384.70	$ 7,384.70
Shipyard Bio Swales								2	Bio Swale	$ 5,846.36	$ 5,846.36
212 S. 14th St.	14 12	6" 6"	PVC C900 corrugated subdrain	$ 3,841.30	1	Casting, frame/grate 24 x 36	$ 1,236.55				$ 5,077.85
839 Kerr Ave. N	16	18"	RCP	$ 1,054.25	1	Casting, frame/grate 24 x 36	$ 1,658.21				$ 2,712.46
6102 Oleander Dr.	20	12"	Ductile Iron	$ 1,378.11	1 1	Speciality slab, 40" x 40" Casting, Inlet complete 24 x 24	$ 2,487.93				$ 3,866.04
2230 Charles Paine Dr	26	15"	ADS	$ 1,292.69							$ 1,292.69
6500 Towles Rd	75	15"	ADS	$ 3,761.33							$ 3,761.33
Total				**$ 11,327.68**			**$ 5,382.69**			**$ 44,119.00**	**$ 60,829.37**

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	95.50	$	5,382.69
C-1 Construction - Pipe	165.00	ft.	214.50	$	11,327.68
C-2 Construction - Flume					
C-3 Construction - Ditch		each			
C-3 Construction - BMP	7.00	each	892.50	$	44,119.00
C-0 Construction - Stock pile material	103.00	load	168.50	$	8,411.50
C-0 Construction - Plan work			51.00	$	1,335.08
			1,422.00	**$**	**70,575.95**
SECTION 2: INSPECTION					
I-1 Inspection - Closed			4,952.75	$	149,984.59
I-1 Inpection - Video	99,458.00	ft.	1,713.50	$	43,057.70
I-1 Inspection-Video data management					
I-1 Inspection-new system			6.00	$	195.75
I-1 Inspection-Survey					
I-2 Inspection-Open			740.50	$	20,361.47
I-3 Inspection-BMP	364.00	each	300.50	$	7,817.07
I-3 Inspection-Lake					
I-4 Inspection-Tide gate					
I-0 Inspection-Miscellaneous					
I-0 Inspection-Plan work			4.00	$	122.73
			7,717.25	**$**	**221,539.31**
SECTION 3: MAINTENANCE					
M-1 Maintenance-BMP	477.00	each	2,668.25	$	88,316.24
M-1 Maintenance-Right of Way			2,245.50	$	71,126.87
M-2 Maintenance-Ditching manual	197,658.00	ft.	3,543.00	$	100,661.20
M-3 Maintenance-Ditching mechanical	13,966.00	ft.	1,638.50	$	66,189.87
M-4 Maintenance-Culvert	653.00	each	245.00	$	6,746.38
M-5 Maintenance-Pipe	105,643.00	ft.	2,699.50	$	145,041.72
M-5 Maintenance-Structure	14,302.00	each	3,849.75	$	156,427.12
M-5 Maintenance-Reset cover	255.00	each	346.00	$	9,660.57
M-6 Maintenance-Lake	26.00	each	231.50	$	9,098.77
M-7 Maintenance-Mowing	580,906.00	ft.	2,179.00	$	86,922.00
M-7 Maintenance-Mowing right of way	68.07	acre	459.50	$	23,188.17
M-8 Maintenance-Tide gate	6.00	each	31.00	$	862.34
M-9 Maintenance-Sweep streets	10,573.56	mile	5,983.25	$	396,241.82
M-9 Maintenance-Sweep support			2,709.00	$	89,192.21
M-10 Maintenance-Haul waste	486.00	load	900.00	$	43,021.02
M-10 Maintenance-Screen material					
M-11 Maintenance-Vehicle			1,874.25	$	91,242.43
M-0 Maintenance-Yard			772.00	$	21,699.27
M-0 Maintenance- Ditching (creek walk thru)			3,838.50	$	101,052.89
M-0 Maintenance-Plan work			8.00	$	230.42
			36,221.50	**$**	**1,506,921.31**
SECTION 4: REPAIR					
R-1 Repair-Pipe failure	182.00	each	4,392.00	$	175,041.79
R-2 Repair Pipe work	2,787.00	ft.	4,292.25	$	244,595.25
R-2 Repair-Convert structure	13.00	each	365.75	$	16,462.64
R-3 Repair Structure	63.00	each	1,522.00	$	61,944.13
R-4 Repair Erosion	2,559.00	ft.	653.50	$	34,568.80
R-5 Repair Replace cover	119.00	each	147.00	$	15,873.84
R-5 Repair Tidegate	-	each			
R-0 Repair- Plan work			96.50	$	4,070.11
			11,469.00	**$**	**552,556.56**

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.

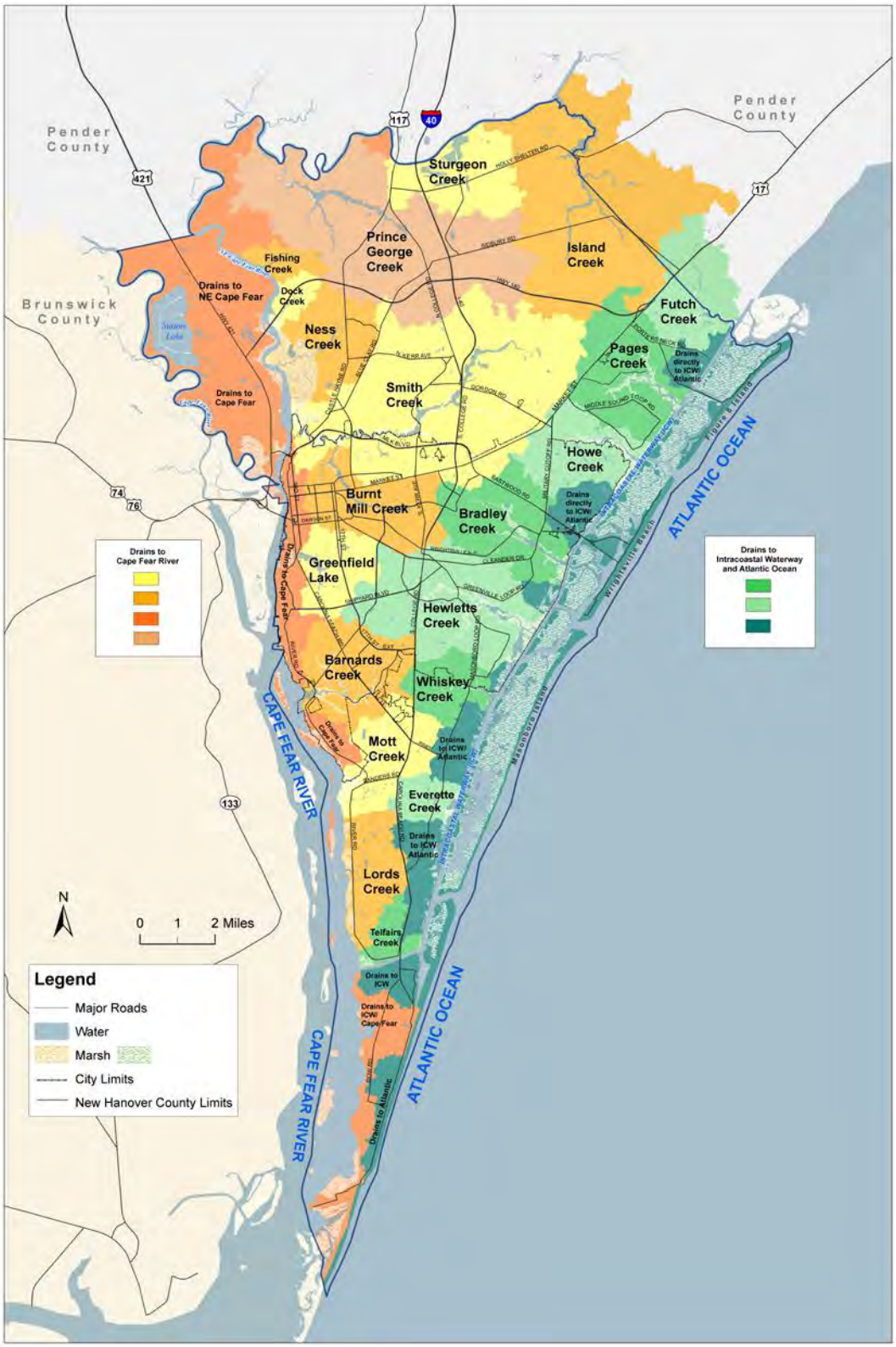
The analytical method used to measure chlorophyll *a* is described in Welschmeyer (1994) and US EPA (1997). Chlorophyll *a* concentrations were determined from the 1.0 micrometer glass fiber filters used for filtering samples for nitrate+nitrite and orthophosphate analyses. All filters were wrapped individually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



Wilmington Watersheds Yearly Monitoring Report (UNCW)

ENVIRONMENTAL QUALITY OF WILMINGTON AND NEW HANOVER COUNTY WATERSHEDS, 2016

by

Michael A. Mallin, Matthew R. McIver and Nicholas Iraola

CMS Report 17-01
Center for Marine Science
University of North Carolina Wilmington
Wilmington, N.C. 28409

June 2017

http://www.uncw.edu/cms/aelab/

Funded by:

The City of Wilmington through the Water Resources Research Institute of the University of North Carolina, NCSU No. 2010-1651-01

Executive Summary

This report represents combined results of Year 19 of the Wilmington Watersheds Project. Water quality data are presented from a watershed perspective, regardless of political boundaries. The 2016 program involved 7 watersheds and 22 sampling stations. In this summary we first present brief water quality overviews for each watershed from data collected between January and December 2016.

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 population of approximately 12,200. Water column sampling was not funded during 2016.

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 2016 there was only one significant algal bloom recorded (at the Bradley Creek south branch site BC-SB), and some minor low dissolved oxygen problems at two sites. All three sites sampled were rated poor due to high fecal coliform bacteria, with the south branch site BC-SB and the College Acres station BC-CA both 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 2016. This creek had very poor water quality, with high fecal coliform counts occurring at two of the three sites exceeding the human contact standard 67% of occasions sampled. Three major and several minor algal blooms occurred in 2016. Dissolved oxygen concentrations were good in the upper creek and poor in the lower creek in 2016.

The effectiveness of Ann McCrary wet detention pond on Randall Parkway as a pollution control device for upper Burnt Mill Creek was mixed for 2016. Comparing inflows to outflows, there were significant increases in dissolved oxygen and pH, but also a significant increase in chlorophyll *a*. However, there were significant decreases in fecal coliform counts, ammonium and nitrate. 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 and nitrate.

Futch Creek – Futch Creek is situated on the New Hanover-Pender County line and drains a 3,813 acre watershed (12.3% impervious coverage) into the ICW. UNC Wilmington was not funded to regularly sample this creek in 2016. New Hanover County employed a consulting firm to sample this creek and data are available on the County website.

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 (near Lake Branch Drive, 17th Street, Jumping Run Branch, and Lakeshore Commons Apartments), three suffered from low dissolved oxygen problems, although main lake oxygen problems were only minor.

Algal blooms are periodically problematic in Greenfield Lake, and have occurred during all seasons, but are primarily a problem in spring and summer. In 2016 algal blooms continued to occur in the lake, especially a massive summer blue-green algal bloom of *Anabaena spiroides*. In the period 2007-2013 there was a statistically significant relationship within the lake between chlorophyll *a* and BOD5, meaning that the algal blooms are an important cause of low dissolved oxygen in this lake, and high BOD occurred congruent with the blooms in 2016. Stormwater runoff into the streams also contributes BOD materials into the lake. In 2016 all tributary stations and all of the in-lake stations exceeded the fecal coliform State standard on 33% or more of occasions sampled.

Beginning in 2005 several steps were taken by the City of Wilmington to restore viability to the lake. Sterile grass carp were introduced to the lake to control (by grazing) the overabundant aquatic macrophytes, and four SolarBee water circulation systems were installed in the lake to improve circulation and force dissolved oxygen from the surface downward toward the bottom. Also, on several occasions a contract firm and City staff applied herbicides to further reduce the amount of aquatic macrophytes. These actions led to a major reduction in aquatic macrophytes lake-wide, and improved in-lake dissolved oxygen content. However, the times that chlorophyll *a* concentrations exceeded the state standard have tripled since the installation of the mixers, addition of herbicides, and grass carp introductions. This led to the lake being included on the 2014 NC 303(d) list for impaired waters.

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 2016 the creek was sampled at four tidal sites and one non-tidal freshwater site.

Incidents of low dissolved oxygen were rare at Hewletts Creek in 2016. Turbidity was low, and only one algal bloom was documented in 2016. Fecal coliform bacteria counts exceeded State standards 100% of the time at NB-GLR, 83% of the time at MB-PGR, 67% of the time at PVGC-9, and 33% of the time at SB-PGR. The geometric means at PVGC-9, MB-PGR, and NB-GLR all well exceeded 200 CFU/100 mL for a poor rating for this pollutant parameter, but the geometric mean of fecal bacteria counts at SB-PGR and HC-3 were well under the state standard.

During 2007 the 7.6 acre JEL Wade wetland (located at the end of Bethel Road) was constructed to treat stormwater runoff from a 589 acre watershed within the Hewletts Creek drainage. Drainage for this wetland enters the south branch of the creek, upstream of the SB-PGR sampling site. This constructed wetland has continued to function well in reduction of nutrients and fecal bacteria from stormwater inputs. Additionally, sampling data collected downstream of the wetland at Station SB-PGR showed a statistically significant decline in ammonium and nitrate and near-significant decrease in fecal coliform bacteria after completion of the wetland, demonstrating the wetland's benefits to the creek system as a whole.

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 2016. Both stations sampled had one minor algal bloom in the 2016 sampling. Both the uppermost station HW-DT and the mid-creek station HW-GP were rated poor for high fecal coliform bacteria counts, exceeding the state standard on 67% of the times sampled. There were occasions low dissolved oxygen concentrations at both sites in 2016.

Motts Creek – Motts Creek drains a watershed of 3,342 acres into the Cape Fear River Estuary with a population of about 9,530; impervious surface coverage 23.4%. This creek was not sampled for water quality by UNCW in 2016.

Pages Creek – Pages Creek drains a 5,025 acre watershed with 17.8% impervious surface coverage into the ICW. UNC Wilmington was not funded to sample this creek from 2008-2016. New Hanover County employed a private firm to sample this creek and data are available on the County website.

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 25% of occasions sampled in our 2016 samples. The North Carolina turbidity standard for estuarine waters (25 NTU) was not exceeded. There were no algal blooms present upon any of our 2016 sampling occasions. Fecal coliform bacterial concentrations exceeded 200 CFU/100 mL on 42% of samples in 2016, for a Poor rating.

Whiskey Creek – Whiskey Creek is the southernmost large tidal creek in New Hanover County that drains into the AICW. It has a watershed of 2,078 acres, a population of about 8,000, and is covered by approximately 25.1% impervious surface area. One station, on Masonboro Loop Road, was sampled from shore along this creek in 2016. 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, whereas fecal coliform bacteria counts were above standard on 33% 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 2016 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 (22 sites sampled for fecal coliforms) showed 5% (i.e. one) to be in fair condition and **95%** in poor condition, higher than in all previous years. Dissolved oxygen conditions system-wide (22 sites) showed 32% of the sites were in good condition, 41% were in fair condition, and 27% were in poor condition, an improvement from 2015. For algal bloom presence, measured as chlorophyll *a*, 73% of the 22 stations sampled were rated as good, 14% as fair and 14% as poor. For turbidity, all 22 of the 22 sites sampled were rated as good. It is important to note that the water bodies with the worst water quality in the system also have the most developed watersheds with the highest impervious surface coverage; Burnt Mill Creek – 39% impervious coverage; Greenfield Lake – 37% impervious coverage; Bradley Creek – 28% impervious coverage.

2016-2017 NPDES PROGRAM HIGHLIGHTS & ANNUAL REPORTING

Public Education & Outreach

- The DREAMS Bioretention Area and the Stormwater Demonstration Site won the "outstanding" level award from the Lower Cape Fear Stewardship Development Awards Coalition.
- Stormwater Watch annual newsletter mailed to 40,000+ city residents highlighting UNCW water quality testing and State 303(d) list status of local creek and focus on outreach programs and the Lynnwood bioretention area.
- 68 Enviroscape watershed education presentations delivered to 8th grade science classes in New Hanover County Schools serving over 2,100 students.

Public Involvement & Participation

- 47 storm drain markers were placed by volunteers in the Holly Glen, Brookwood, and Colonial Drive areas this year.
- 12 watershed cleanups were held involving 235 volunteers contributing 492 volunteer hours and collecting over 8.5 (96 gallon bins) and 56 (30 gallon bags) of trash, and 8 (96-gallon bins) and 63 (30 gallon bags) of recycling.
- Stormwater Services conducted a public meeting with residents in the fall of 2016 for the Beasley Road Bridge Replacement project and distributed doorhangers and/or mailings to residents affected by drainage projects for Orange Street, 14th Street, Englewood Drive, Beasley Road Bridge Replacement, Clear Run Branch, Beech Street, and Pine Valley Street Rehab and Drainage Improvement project.

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 81% of the City has been mapped.
- Stormwater field staff went through IDDE training to identify potential sources while out conducting routine maintenance.
- The City conducted 8 dry weather flow investigation segments in the Burnt Mill Creek, Greenfield Lake and Smith Creek watersheds.

Post-Construction Site Runoff Controls

- Continued implementing the City's Land Development Code to provide post construction controls to meet the requirements of the City's Phase II permit and to bring the ordinance into compliance with the recent Coastal Stormwater Legislation.
- Continued 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.
- City staff completed re-certification for the Stormwater BMP Inspection and Maintenance Certificate offered through NC State's Biological and Agricultural Engineering Department.

Pollution Prevention and Good Housekeeping for Municipal Operations

- Continued implementation of BMPs in SPPP for Fleet Maintenance Facility.

- Reviewed several stormwater maintenance activity SOPs to determine if further water quality improvement efforts can be added to current procedures.
- Continued water quality improvements for City operations facilities.

Voluntary Watershed Restoration Plan

- The Raintree Wetland won an “outstanding” level award from the Lower Cape Fear Stewardship Development Awards Coalition.
- Installed a large Bioretention Area at 2124 Lynnwood Drive in the Glen Meade neighborhood. Conducted an associated outreach/education campaign and pre and post-test surveys.
- Developed and mailed postcards in the fall and spring focused on vehicle fluids and pesticides to approximately 17,500 watershed residents and businesses in the Hewletts and Bradley Creek Watersheds.
- Began a 319 grant in collaboration with the NC Coastal Federation to install BMPs in the Bradley and Hewletts Creek Watersheds. Held initial partner meeting and investigated potential sites.

PUBLIC EDUCATION AND OUTREACH

1. Objectives for Public Education and Outreach

a. Implement a public outreach and education program, locally or through cooperative or contractual agreement, which includes a combination of approaches designed to reach the public and target audiences with stormwater pollution prevention messages.

b. Distribute educational materials and information and conduct outreach/education activities for the community, which address the impacts of stormwater discharges on water bodies and the steps the public can take to reduce stormwater pollution.

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.

BMP	Measurable Goals
a. Define outreach/education program goals including a description of the target pollutants, sources, and target audiences	Define goals and objectives of the outreach/education program to include a description of target pollutants or stressors, likely residential and/or industrial and commercial sources of these pollutants, target audiences for each pollutant and why they were selected, and key outreach messages. Update this section as necessary to reflect changes in the target audience, public awareness, etc.

Accomplishments:

A comprehensive plan including our outreach/education program goals and objectives and target pollutants, sources and audiences is included in the Public Education and Outreach Appendix. The plan defines the origin and sources of each pollutant, target audience(s), and includes suggested outreach strategies and key outreach messages. 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.

b. Distribute public education materials and information to identified target audiences and user groups. For example, schools, homeowners, and/or businesses.	The permittee shall distribute stormwater educational materials and information to appropriate target groups. 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 or contractual agreement, as available, when implementing its own program.

Accomplishments:

The Enviroscape Watershed Education Program has been integrated into the 8th grade curriculum for 12 years. As a result, the program reaches all 8th grade science classes in New Hanover County Schools, this year serving 68 classes and 2,100 students. The interactive presentation discusses topics including watersheds, water quality, nonpoint 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 instructors in Fall 2016. The City of Wilmington Stormwater Services coordinates and manages the Enviroscape Program.


CITY OF WILMINGTON
Stormwater Watch
HOW Program installs neighborhood rain garden
Click to read
HEAL OUR WATERWAYS
healourwaterways.org
Find us on Facebook and Twitter

Stormwater education staff also presented to UNCW classes including an Environmental Policy class and Film Studies class, as well as Cape Fear Community College Landscape Architecture class and Cape Fear Academy first graders.

The Stormwater Education Manager was interviewed by several media outlets this past year, including:

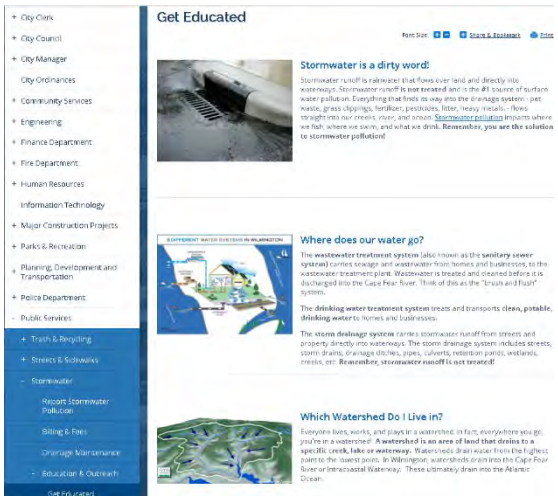
- Spectrum TV News – Oysters and Water Quality
- New Hanover County Schools TV – Enviroscape Program
- Sunny 103.7 Radio – Canines for Clean Water
- UNCW Website Feature Story – collaboration with Film Studies class and stormwater public service announcement (PSA) creation

This year's annual Stormwater Watch newsletter was mailed to 40,000+ city residents and focused on the Lynnwood Bioretention Area project, outreach programs, and the UNCW water quality report of creeks and lakes that lie within the city limits.

Targeted media campaigns ran on all rotating digital billboards throughout the city, as well as radio and television standard and digital formats. Events such as the annual Earth Day Festival and Cape Fear Community College Sustainability Festival, enabled staff to engage with citizens and distribute stormwater education materials. A stormwater animation PSA was also created and aired on television and in digital formats.
https://www.youtube.com/watch?v=jNs28UcjNbk&feature=youtu.be

In addition, the Stormwater Education Manager completed renewal of the North Carolina Environmental Education Certification, totaling 50 hours of continuing education credit. She was also appointed by the NC Department of Cultural & Natural Resources to the NC Aquarium at Fort Fisher Advisory Committee.

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



Stormwater education staff developed a brand new, robust and more user-friendly website for Stormwater Services using the city's new platform thru vendor, Vision Internet. Staff held internal meetings to determine page content and website architecture prior to development. Staff also attended several training sessions for content managers to learn the new system. The new website allows for a better end-user experience, as well as a better content management experience.

www.wilmingtonnc.gov/stormwater

Maintain Hotline/Help line	The permittee shall promote and maintain a hotline for citizens and businesses to report suspected stormwater pollution and illicit discharges occurring within the City.

Accomplishments:

The Stormwater Pollution Prevention hotline was established in January 2010 to field calls from citizens, businesses and employees to report illicit discharges and instances of potential or definitive 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 fleet vehicles, and promotional outreach items including cups, pens, refrigerator magnets, and post-it note giveaways to the public.

To summarize hotline activity this past year: 10 calls were placed to the City's Stormwater hotline, 8 online webform reports were submitted, and 130 emails and 54 calls were received by

the Compliance Officer related to stormwater violations. The nature of the hotline reports are found in the Enforcement section of the Appendix.

d. Extent of Exposure/Reporting Requirements	For each event, activity, or media, including those elements implemented locally or through a cooperative or contractual agreement, the permittee shall estimate and record the extent of exposure.

Accomplishments:

The extent of exposure requirement is extensively 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 novel activities and programs that meet or exceed the minimum requirements of our NPDES permit, educate the community about stormwater runoff pollution/solutions, and inspire action and behavior change.

Objectives for Next Year

- Comprehensively update outreach and education plan including goals and objectives and target pollutants, sources, and audiences and evaluate messages.
- Develop content for the citywide Annual Spring Stormwater Watch public newsletter, to include UNCW's annual water quality data and the State's 303(d) list data.
- Coordinate the Enviroscape Watershed Program to serve all 8th grade science classes in NHC Public Schools.

PUBLIC INVOLVEMENT AND PARTICIPATION

1. Objectives for Public Involvement and Participation

Involve the community in the development and implementation of the stormwater program by implementing a public involvement and participation program locally or through cooperative or contractual agreement.

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.

BMP	Measurable Goals
a. Volunteer community involvement program	The permittee shall include and promote volunteer opportunities designed to promote ongoing citizen participation, implemented locally or through cooperative or contractual agreement.

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 services and deliverables that enable Stormwater Services to meet many of its NPDES public education and public participation requirements. In addition to full time staff, each agency taps into a volunteer base and encourages citizens to become involved in stormwater outreach, education and volunteer efforts.

Services performed by CFRW & NHSWCD include activities such as volunteer watershed clean-ups, volunteer creek monitoring, wetland monitoring including cleanups and plantings, educational workshops for the schools and the community at large, participation in the Lower Cape Fear Stewardship Awards program, a monthly rain barrel sale, LID consultation, volunteer storm drain marking, public eco-tours, high school Envirothons and elementary 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 report for each agency is included in the Public Involvement and Participation Appendix of this annual report.

This year, CFRW and NHSWCD continued their efforts to engage volunteers through the Storm Drain Marking Program. These efforts include adhering metal markers with pollution messages next to storm drains and distributing educational doorhangers to nearby residents and businesses. In addition, the city created a GIS webmap that allows education staff to track and record the number and locations of marked drains in the city, as well as volunteer and outreach data.

The Lower Cape Fear Stewardship Award Coalition (LCFSDAC) honors residential, commercial and public development projects in Brunswick, Pender and New Hanover Counties that demonstrate outstanding environmental stewardship through the protection, conservation, improvement, and awareness of our natural resources. The City of Wilmington recently received three “Outstanding” awards for the following projects:

- Stormwater Demonstration Site in Anne McCrary Park, in collaboration with the Parks Division
- DREAMS Bioretention Area & Pervious Pavement, in collaboration with the Stormwater & Streets Divisions, NCSU, and DREAMS
- Raintree Stormwater Wetland in the Raintree Neighborhood

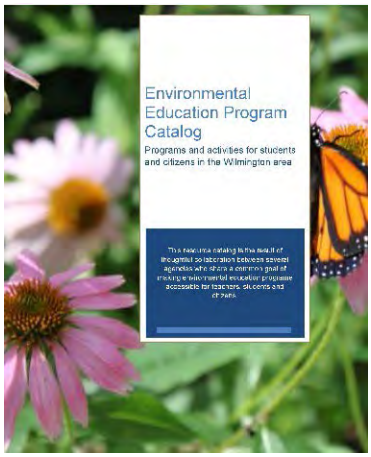
Stormwater Services completed collaboration and installation of bioretention area and pervious pavement BMPs at the DREAMS after-school arts program in the Burnt Mill Creek Watershed. Students participated in installing plants in the bioretention area and performing light maintenance and irrigation of the site.

Stormwater Services jointly participates in a monthly rain barrel sale which is organized by the New Hanover Soil & Water Conservation District. Rain Barrel USA, a North Carolina company, is the current vendor, enabling us to offer 60 and 80 gallon rain barrels, made with recycled materials, at a discounted price to the public. The sale is publicized through a variety of media

outlets including city and county public TV and websites, press releases, garden shows, and special events. This year, 39 rain barrels were sold to the public.

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, implemented locally or through cooperative or contractual agreement. These mechanisms could include public meetings, citizen/business surveys, citizen portal website feedback, public event participation, one-on-one citizen contact, etc.

Accomplishments:

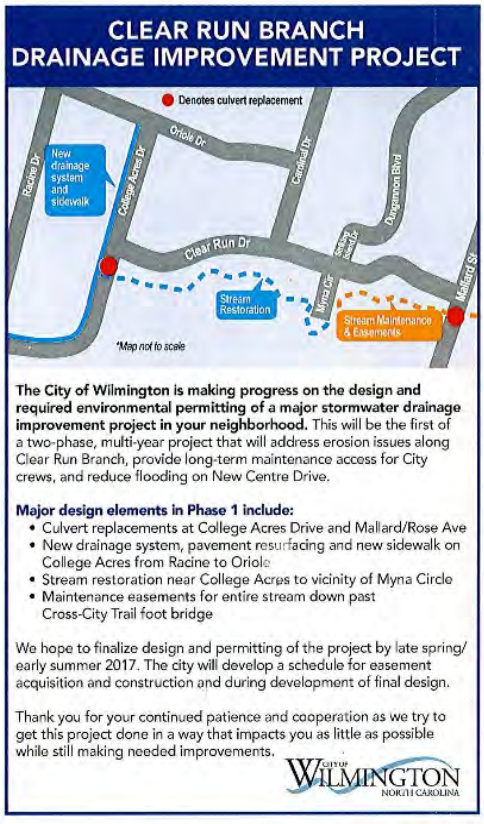


Stormwater Services compiled an Environmental Education Program Catalog of agencies offering environmentally-focused school and community programs in the Wilmington-area.

The City of Wilmington Stormwater Services was a major sponsor of the area's annual Earth Day Festival. The March for Science ended at the festival and resulted in record attendance this year. We had several event booths and provided direct stormwater education in the form of a watershed awareness activity, one-on-one interaction, promotional giveaways and literature distribution. As part of our watershed awareness activity, we raffled off a rain barrel and native plants.

Doorhangers and/or mailings were also distributed to residents affected by drainage projects for Orange Street, 14th Street, Englewood Drive, Beasley Road Bridge Replacement, Clear Run Branch, Beech Street, and Pine Valley Street Rehab and Drainage Improvement project.

Stormwater Services conducted a public meeting with residents in the fall of 2016 for the Beasley Road Bridge Replacement project.



Hotline/Help line	The permittee shall promote and maintain a hotline for citizens and businesses to report suspected stormwater pollution and illicit discharges occurring within the City.

Accomplishments:
The Stormwater Pollution Prevention hotline was established in January 2010 to field calls from citizens, businesses and employees to report illicit discharges and instances of potential or definitive 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, large educational magnets on stormwater fleet vehicles, and promotional outreach items including cups, pens, refrigerator magnets, and post-it note giveaways to the public.

To summarize hotline activity this past year: 10 calls were placed to the City's Stormwater hotline, 8 online webform reports were submitted, and 130 emails and 54 calls were received by the Compliance Officer related to stormwater violations. The nature of the hotline reports are found in the Enforcement section of the Appendix.

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 numerous public and action-oriented activities including watershed cleanups, storm drain marking, community workshops, grant partnerships, monthly rain barrel sale, eco-tours, and more.

This past year, the city also conducted efforts to reach out to the public regarding the implementation of drainage projects including the Clear Run Branch drainage project and other capital and in-house projects.

Objectives for Next Year

- Participate in community events to engage citizens in pollution prevention education.
- Utilize partner agency contracts to implement volunteer and community-focused activities.
- Conduct public outreach and meetings for upcoming stormwater drainage projects.

ILLICIT DISCHARGE DETECTION AND ELIMINATION (IDDE)

1. Objectives for Illicit Discharge Detection and Elimination

a. Implement and enforce a program to address the detection and elimination of 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, how to recognize illicit discharges and improper disposal of waste; and

f. Address non-storm water discharges or flows as identified in Part I, Paragraph (8).

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 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

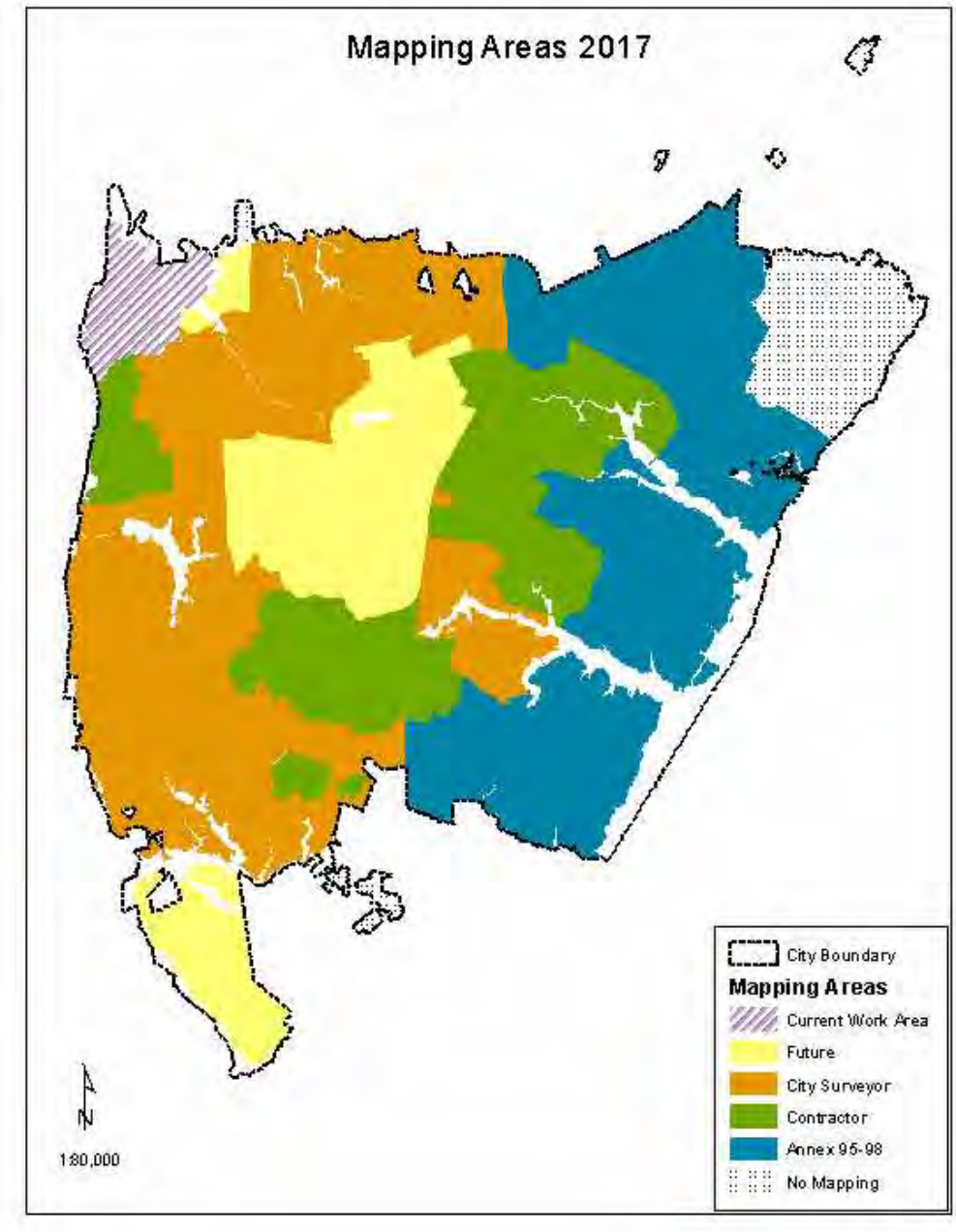
Major Outfall Map

Accomplishments:

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 81% of the City has been mapped as part of its stormwater inventory. This percentage slightly decreased from last year's total of 83% due to a large incorporated area brought into the City that is being developed and remains unmapped.

Stormwater Inventory Mapping was completed this past reporting year in the Greenfield Lake Watershed. Greenfield Lake 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. The City has already begun mapping portions of the downtown area where no inventory exists. This will help to identify pipes and structures in the oldest part of the City that may need repairing, replacement or have cross connections.

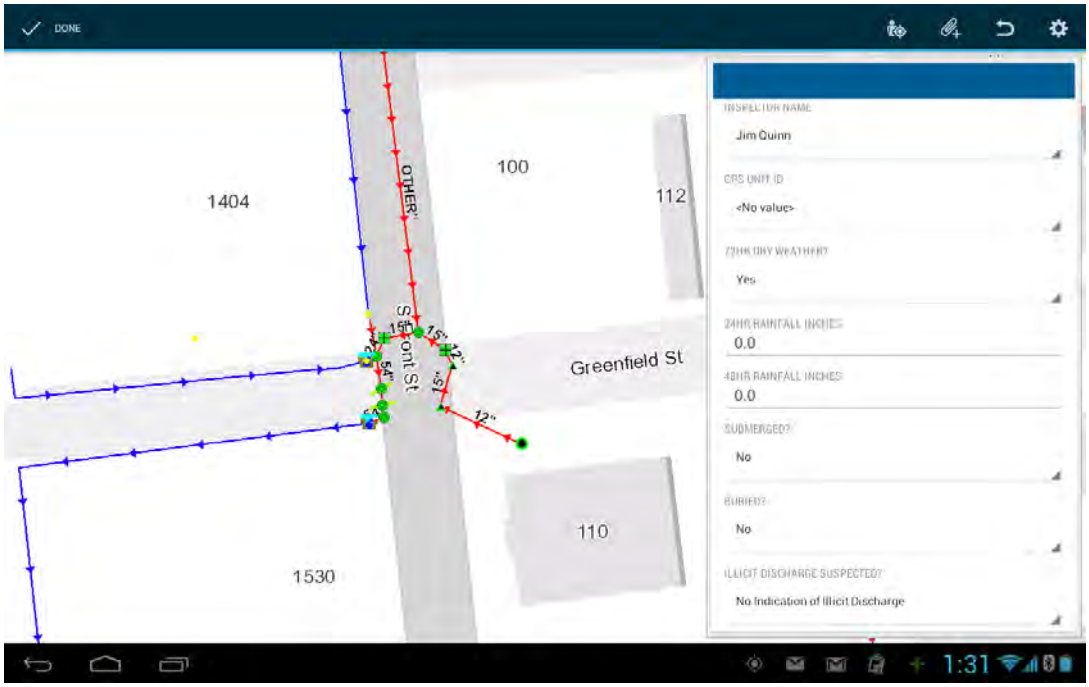


c. Detect dry weather flows	The permittee shall develop and implement a program for conducting dry weather flow field observations in accordance with a written procedure for detecting and removing the sources of illicit discharges.

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 were trained on the field procedures this past reporting year in order to provide additional assistance and scheduling flexibility throughout the next year.

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 City managed to investigate 8 trunk line investigations from major outfall locations across its jurisdictional area, which continues to be an increase from previous years. These totals were defined for dry weather flows by Public Services Strategic Plan performance measures. The locations were found within the Burnt Mill Creek, Greenfield Lake and Smith Creek watersheds. Maps of the 8 locations and associated table are found in Appendix D.

d. Investigations into the source of all 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 is currently looking to upgrade all data management systems throughout the organization. City Information Technology has conducted staff meetings to gather input on all needs, working with consultants to create programs, hold presentations, and provide employees information on the various phases of the project and when roll out may occur.

e. Track investigations and document 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 has continued to utilize its improved 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 conducted training for Stormwater Services Field Maintenance Staff and Public Services Staff during this reporting year (See Appendix D). Refresher training and education for existing staff will be updated as necessary and implemented every 2 years.

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 for 12 years. As a result, the program reaches all 8th grade science classes in New Hanover County Schools, this year serving 68 classes and 2,100 students

This year's annual Stormwater Watch newsletter was mailed to 40,000+ city residents with focus centered on the problematic issue of litter, which is impacting crew maintenance activities, as well as wildlife, habitat, and aesthetics in the city.

Targeted media campaigns included digital billboards throughout the city, radio and television standard and digital formats, events such as the annual Earth Day Festival and Cape Fear Community College Sustainability Festival, and distributed stormwater education materials.

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 was established in January 2010 to field calls from citizens, businesses and employees to report illicit discharges and instances of potential or definitive 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, large educational magnets on stormwater fleet vehicles, and promotional outreach items including pens, refrigerator magnets, and post-it notes giveaways to the public.

To summarize hotline activity this past year: 8 calls were placed to the City's Stormwater hotline, 10 online webform reports were submitted, and 130 emails and 54 calls were received by the Compliance Officer related to stormwater violations. The nature of the hotline reports are found in Appendix I.

i. Enforcement	The permittee shall implement a system to track the issuance of notices of violation and enforcement actions as administered by the permittee. The data maintained in this system shall enable permittee 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 2016-2017 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 implement and enforce its IDDE program to address the detection and elimination of illicit discharges. The City continues implementing its dry weather flow monitoring program with field training for additional staff this year. Dry weather flow locations will continually be updated and added through outfall investigations that are scheduled throughout the year and also through investigations initiated by City field crews and citizen complaints.

The City has documented another year of *Intelligov data*, our data management system. The City is currently reevaluating its data management system throughout the whole organization for replacements and upgrades. These replacement programs could lead to increased efficiency and documentation to help further meet NPDES Phase II requirements.

The City continues to utilize the existing ordinances in place to address illicit discharges to its system. To date, no changes to the ordinance have been necessary as it provides the adequate legal authority to prohibit illicit connections and discharges and enforce the approved IDDE Program at this time.

Public education regarding illicit discharges continues to be one of the major goals for the City and its employees.

Dry weather flow methods and field procedures continue to be assessed through investigations and data collection.

Objectives for Next Year

- Continue to research and update locations for dry weather flow monitoring. Develop schedule as new locations are identified.
- Continue with the goal of completing 8 dry weather flow drainage segments per year as identified in the City's Public Services Strategic Plan.

- Continue to evaluate the effectiveness of the *Intelligov* reporting practices. Assess locations of offenders to determine repeat violations and make recommendations to address those sites.
- Evaluate recently initiated NC statutes as needed to ensure that the City's MS4 is not impacted.
- Continue with public education efforts to help reduce illicit discharges and illicit connections to the City's MS4.
- Implement training sessions for other City field departments regarding IDDE.
- Continue Inventory Mapping of areas identified in the downtown area. Reassess next mapping area.

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.

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 require a CAMA major development permit or a Sedimentation and Erosion Control Plan. 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 and/or non-structural best management practices (BMPs) 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. Adequate long-term operation and maintenance of BMPs.

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 N.C. Division of Water Quality, the post-construction ordinances shall apply with regard to permit compliance.

BMP	Measurable Goals
a. Adequate legal authorities	Maintain through an ordinance, or other regulatory mechanism, adequate legal authorities to meet the objectives of the Post-Construction Site Runoff Controls 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 the purpose of inspecting 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 new Coastal Stormwater Legislation.

b. Strategies which include BMPs appropriate for the MS4	The permittee shall adopt the DWQ BMP Design Manual or certify that the local BMP Design Manual meets or exceeds the requirements in the DWQ BMP Design Manual.

Accomplishments:
The DWQ BMP 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 BMPs 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.

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 BMPs 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.

e. City Code, Permitting Regulations, Easement, and/or Deed Restrictions and Protective Covenants	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 easement 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 easement 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 new 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 operation and maintenance of structural BMPs.	The permittee shall implement or require an operation and maintenance plan for the long-term operation of the structural BMPs required by the program.

Accomplishments:
The DWQ BMP 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 BMPs 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 of Structural Stormwater Control Measures	To ensure that all stormwater control measures meet the permittee's performance standards and are being maintained pursuant to the maintenance agreement, the permittee shall develop and implement a written inspection program for structural stormwater controls installed pursuant to the permittee's post-construction program. The permittee shall document and maintain records of inspections, 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 BMPs are required to properly maintain their stormwater management systems to ensure long term operation. The City conducted biannual compliance inspections for privately owned stormwater BMPs 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 BMP 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. In addition, sample inspection reports are provided.

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

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, BMP 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 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 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 BMPs.

Assessment of Program Implementation
The City has continued to maintain adequate legal authorities to meet the objectives of the Post-Construction Site Runoff Controls program through its Land Development Code. In addition, 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.

The City's Plan Review Engineers continue to their update their database in order to track projects with stormwater control measures installed. This spreadsheet provides relevant information regarding new development and redevelopment projects. This spreadsheet will continue to be used for future permits issued and evaluated or modified if data extraction is warranted.

Objectives for Next Year
- Review ordinances to determine if any changes are needed to improve the post-construction requirements.
- Continue to update and evaluate database of new or redeveloped projects to determine if information can be improved, if documentation is adequate, and if modification for data extraction is needed.
- Continue with inspections of privately owned BMP to ensure compliance with City and State maintenance requirements.
- Review new State statutes that may affect City's NPDES permit. Review appropriate local ordinances to determine if they are effective regarding new NC Statutes.

3. Post-construction Stormwater Runoff Controls for New Development

a. In order 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 Department's Stormwater Best Management Practices Manual on scientific and engineering standards, 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)(l July 2003 Edition).

b. The permittee shall meet the State's stormwater requirements for projects that are performed by, or under contract for, the permittee.

c. Adoption of the Universal Stormwater Management Program (USMP) meets the requirement to develop and implement a Post-Construction Program by the local government adopting an ordinance that complies with the requirements of l5A NCAC 02H .1020 and the requirements of 15A NCAC 02B .0104(f). Adoption of the USMP may not satisfy water quality requirements associated with the protection of threatened or endangered species or those requirements associated with a Total Maximum Daily Load (TMDL).

d. Compliance with the stormwater management and water quality protection promulgated in Rules 15A NCAC 2H .1000 and Session Law 2008-211 effectively meets the Post- construction Stormwater Runoff control requirements within the 20 coastal counties.

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 ultimate 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.

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.

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 BMP recommendations were implemented at some of the locations this reporting year such as the City's Operations Complex Coleman Sweeper Complex. Additional structural and non-structural BMP implementation will continue at the other identified locations.

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. Operation and Maintenance (O&M) for municipally owned or operated facilities	The permittee shall maintain and implement, evaluate annually and update as necessary an Operation and Maintenance (O&M) program for municipally owned and operated facilities with the potential for generating polluted stormwater runoff. The O&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.

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.

d. Streets, roads, and public parking lots maintenance	The permittee shall evaluate BMPs to reduce polluted stormwater runoff from municipally-owned streets, roads, and public parking lots within the corporate limits. Within 12 months, the permittee must update its Stormwater Plan to include the BMPs selected.

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 2016/17, street sweepers swept 10,576 curb miles while collecting 1,998 tons debris, sediment, vegetation and trash potentially diverted from the stormwater sewer system. This number is lower than in previous years due to the City's scale house being inoperable in the first quarter of the fiscal year and quantities not being recorded.

In fiscal year 2016/17, hand maintenance and vacuum trucks cleaned 105,643 linear feet of pipe and removed blockages and cleaned 14,302 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 implemented its improved procedures for decanting operations of vacuum trucks after pipe or structural maintenance/cleaning occurs. The City began utilizing its own wet pond facilities located throughout the City as potential decanting sites for maintenance crews while conducting their jobs in these areas. The intent of this measure is to improve water quality to the decanting methods that were previously being conducted in the field. This implementation was met well with field crews and appears to be successful at this time.

e. Streets, roads, and public parking lots maintenance	Within 24 months, the permitee must implement BMPs selected to reduce polluted stormwater runoff from municipally-owned streets, roads, and public parking lots.

Accomplishments:
See above 2.(d).

f. Operation and Maintenance (O&M) for municipally - owned or maintained catch basins and conveyance systems	Within 12 months, the permittee shall develop and implement an O&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 11.

g. 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 BMP Manual for all of 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.

h. O&M for municipally-owned or maintained structural stormwater controls	The permittee shall maintain and implement an O&M program for municipally-owned or maintained structural stormwater controls installed for compliance with the permittee's post-construction ordinance. The O&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.

i. Pesticide, Herbicide and Fertilizer Application Management.	The permittee shall ensure municipal employees and contractors are properly trained and all permits, certifications, and other measures for applicators are followed.

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

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

Accomplishments:
The City documents staff training for site supervisors involved with the SPCC and SPPP. Sites are reviewed at scheduled times during the reporting period to ensure that implemented BMPs are working and being utilized and that staff is documenting their respective plans as necessary. A supervisor training record for Fleet Maintenance is found in Appendix G.

Stormwater staff and the Public Services Safety Specialist review online employee training annually through *Otis Safety* 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.

The City has also begun evaluating where improvements can be made regarding water quality during other field maintenance activities. In addition to the improved decanting procedures the City has implemented, other field activities will be evaluated throughout the year in order to determine if changes can be made. If changes occur, the staff will be trained on how to conduct the new procedures. Seven (7) Stormwater Maintenance SOPs were evaluated this past year although no changes were necessary.

k. 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 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 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.

During the previous reporting year, Stormwater staff along with the Fleet Maintenance Manager, began to evaluate the need for annual maintenance of the interior trench drains located along the perimeter of the garage facility. Although no vehicle or equipment cleaning occurs at this location, sediment and grit accumulates in the trench drains from the everyday maintenance of vehicles pulled in and out of the building along with wind swept debris. Maintenance of the trench drains

will be now be conducted annually at the site to help eliminate any gross solids from entering the surrounding stormwater system. This maintenance is to be determined for fall 2017.

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.

Assessment of Program Implementation
The City was successful in implementing its SPCC and SPPP for designated City owned facilities with the potential to pollute receiving waters. Site BMPs continue to be implemented and documentation has been addressed with building supervisors.

The City continues to evaluate implementing BMPs at other City facilities identified with the potential to pollute based on the type of activities that occur there.

Procedures for improving water quality from the decanting of vacuum trucks has been implemented with success. Other stormwater maintenance SOPs will be re-evaluated to determine if additional water quality improvement procedures can be improved.

The City reviewed and compiled current herbicide, pesticide and fertilizer licenses to determine if personnel are current in their training.

Stormwater Staff and the Public Services Safety Specialist have designated appropriate city employees to complete required training for spill prevention and spill cleanup.

The City continues to conduct street sweeping efforts across the City with increased activity in its downtown area in order to help reduce the amount of gross solids from entering the stormwater drainage system.

Objectives for Next Year

- The City will continue to evaluate and implement any necessary BMPs at its facilities.
- Continue require spill control training for appropriate employees per SPPP and SPCC plan.
- Conduct training for Fleet Maintenance staff regarding Pollution Prevention/Good Housekeeping.
- Evaluate other maintenance activities in order to determine if water quality improvements can be implemented.
- Ensure documentation for SPCC and SPPP are being completed for various site locations.
- Discuss proper procedures and plans for oil/water separator maintenance.
- Conduct Good Housekeeping/Pollution Prevention training for appropriate staff.

TOTAL MAXIMUM DAILY LOADS (TMDLs)

1. Objective

a. Determine whether a TMDL has been developed and approved or established by EPA for the receiving water(s) of the MS4 stormwater discharge and/or downstream waters into which the receiving water directly flows.

b. Develop and implement BMPs to reduce non-point source pollutant loading to the maximum extent practicable (MEP) if the permittee is or becomes subject to an approved TMDL with an approved Waste Load Allocation (WLAs) assigned to stormwater.

c. If subject to an approved TMDL, the permittee is in compliance with the TMDL if the permittee complies with the conditions of this permit, including developing and implementing appropriate BMPs to reduce non-point source pollutant loading to the maximum extent practicable (MEP). While improved water quality is the expected outcome, the NPDES MS4 permit obligation is to reduce non-point source pollutant loading to the maximum extent practicable (MEP). The MS4 permittee is not responsible for attaining water quality standards (WQS) at the ambient monitoring stations. The Division expects attaining WQS will only be achieved through reduction from the MS4, along with reductions from other nonpoint source contributors.

2. Best Management Practices (BMPs)

At any time during the effective dates of this permit, if the permittee is or becomes subject to an approved TMDL with an approved Waste Load Allocation (WLAs) assigned to stormwater, the permittee shall implement the following BMPs to reduce non-point source pollutant loading to the maximum extent practicable (MEP):

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 stormwater, • Includes a description of the watershed(s), • 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 to discover and locate other major outfalls within its corporate limits that may be

BMP	Measurable Goals
	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. Existing measures	Within 24 months the permittee's plan: • Shall describe existing measures being implemented by the permittee to enhance water quality in the watershed to which the TMDL applies; and • Provide an explanation as to how those measures are designed to enhance water quality.

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 36 months the permittee shall develop and submit to the Division a Monitoring Plan for each pollutant of concern or cause of impairment 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 enhance water quality and reduce non-point source pollutant loading to the maximum extent practicable (MEP).

e. Additional Measures	Within 36 months the permittee's plan: • Shall describe additional measures to be implemented by the permittee to enhance water quality in the watershed to which the TMDL applies; and • Provide an explanation as to how those measures are designed to enhance water quality.

f. Implementation Plan	Within 48 months the permittee's plan shall: • Describe the measures to be implemented within the remainder of the permit term to enhance water quality in the watershed to which the TMDL applies and • Identify a schedule for completing the activities.

g. Incremental Success	The permittee's plan must outline ways to track and report successes designed to reduce non-point source pollutant loading to MEP. Successes could include increased inspections, expanded and/or tailored BMPs within the scope of the six minimum measures, structural and non-structural BMP installed and/or implemented, including retrofits, and strategies developed and implemented for development and redevelopment that include green infrastructure and LID practices.

h. Reporting	The permittee shall conduct an annual assessment of the program to enhance water quality in the watershed to which the TMDL applies and submit a report of the assessment to the Division. Any monitoring data and information generated from the previous year are to be submitted with each annual report.

3. If no stormwater waste load allocation is specified in the TMDL

If there was no stormwater waste load allocation in the TMDL, in lieu of developing a Water Quality Recovery Plan, the permittee shall evaluate strategies and tailor and/or expand BMPs within the scope of the six minimum measures to enhance water quality recovery strategies in the watershed(s) to which the TMDL applies. The permittee shall describe the strategies and tailored and/or expanded BMPs in their Stormwater Management Plan and annual reports.

4. Watershed Restoration Plan approved by the Division

Voluntary implementation of a Watershed Restoration Plan approved by the Division constitutes compliance with this requirement and will allow deferment of TMDL development if tracking and monitoring are provided that demonstrate progress in implementing stormwater BMPs and/or enhancing water quality.

Bradley & Hewletts Creeks Watershed Restoration Plan Accomplishments:

The Bradley and Hewletts Creeks Watershed Restoration Plan has continued to make progress in promoting volume-reducing best management practices (BMPs) to the public over the 2016-2017 year. Heal Our Waterways (HOW), which is the informal 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, educational postcards were created and mailed in the fall and spring to 16,500+ residents and businesses within the Bradley and Hewletts Creek watersheds, as well as areas adjacent to the watersheds that drain directly into the Intracoastal Waterway. The Fall 2016 postcard educated recipients about the environmental concerns related to leaking vehicle and boat fluids. The postcard addressed why these fluids are problematic for waterways and provided simple solutions and practical guidelines to empower citizens to prevent this pollution. The spring 2017 postcard addressed the detrimental effects of pesticides on Wilmington's waterways. The postcard equipped citizens with the knowledge pesticides impacts on waterways and inhabitants, as well as how to use them less, use alternatives, or how to stop using pesticides altogether.

Due to the success of last year's media advertising efforts, this year similarly focused on digital and radio platforms. Last year's public service announcement (PSA), starring local NBC affiliate and WECT nightly news anchor, Jon Evans, was aired again this year to educate property owners about the benefits of rerouting downspouts. This PSA played via the City of Wilmington YouTube channel 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 advertising campaign.

To fortify the message to reroute downspouts put forth by WECT, a billboard campaign with a similar message was also created. Contracting with Fairway Outdoor, two billboard locations were chosen based on their proximity to Bradley and Hewletts Creeks, appealing to the viewer's sense of place. The billboards ran for the entire month of April, 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 decision was an easy one, as there were many locals who approached the Heal Our Waterways staff that had heard about the program on WHQR during the first

underwriting campaign. A 15-second PSA aired 10 times per week for 13 weeks. Each week, WHQR reached about 40,000 listeners in the Wilmington Designated Market Area.

Educational presentations were given to Sierra Club and Cape Fear Sierra Club, the Stewardship judging panel, and university students and faculty. The Lower Cape Fear Stewardship Development Award was granted to Heal Our Waterways in recognition of the Raintree Neighborhood wetland site as a result of this presentation.

HOW staff participated in the annual Wilmington Earth Day Festival. This was a resounding success, attracting 5,000+ visitors and was held in conjunction with the Wilmington March for Science. Promotional items and program materials were distributed at the Earth Day event, and a raffle for native plant and a rain barrel were done as part of an educational watershed activity. Along with providing educational opportunities, these events also served to gauge outreach and advertising success. During the Earth Day Festival, several individuals stated that they had heard about the HOW program before. Additionally, 29 people joined the e-newsletter mailing list in order to receive more information about how to get involved.

HOW staff also attended the Sustainability Fair held at Cape Fear Community College. Similarly to Earth Day, the HOW set up an educational display table and engaged with the public to discuss the Watershed Restoration Plan, stormwater pollution and solutions, and BMPs. Promotional materials were distributed and contacts were made with several like-minded, local organizations to help the HOW program gain some steam in the environmental community. Roughly one to two hundred college students, professors and community members attended the Fair, and several stopped in specifically to learn more about HOW or collect informational and promotional material.

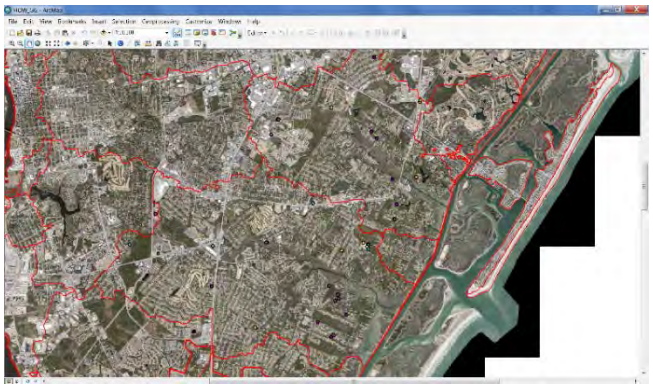
This year, the HOW website recovered from the difficulties of last year. In response to last year's hacking attempts, the HOW website was moved from external hosting to internal hosting. While there were some understandable difficulties in the transition, these were fixed through regular meetings and persistent work on the part of the city's Communications Department and a Vision representative working with the Watershed Coordinator. The new Heal Our Waterways site was launched in late February 2016. Since relaunching, the Heal Our waterways home page has received 1,044 unique views. Despite website challenges, Twitter and Facebook have maintained a steady and increasing following with 203 and 149 followers, respectively.

Heal Our Waterways was involved in three grants this year: two EPA 319 grants and one EEG grant. The EPA 319 with NC State (NCSU) University partnered involved city crews installing an infiltration trench adjacent to Hewletts Creek off Greenville Loop Road (pictured). The same grant also produced bioswales that were installed off of Shipyard Blvd, and a bioretention area in the Longleaf Mall parking lot that reduces 2,236 cubic feet of runoff. The other 319 grant, in partnership with the North Carolina Coastal Federation (NCCF) was awaiting state and federal contracts, which were finally received in early 2017. The grant officially began in April 2017 and several sites were identified and earmarked for installation in the coming fiscal year. Grant partners including NCCF, a local project engineer, and city education staff met in April to kick off the grant and identify priority BMP sites. A field trip to check out preliminary sites was conducted. Ultimately, this grant will produce at least 12, small to medium scale BMP installations on residential and commercial properties.

The Lynnwood EEG grant, which saw city stormwater crews constructing a large bioretention area was completed in early Summer 2017. The installation itself captures runoff from 33.4 acres, reducing the volume of polluted runoff flowing into Hewletts Creek by 12,106 cubic feet. A complex, multi-tiered outreach campaign was implemented in tandem with the project. This involved citizen contacts, door hangers, direct mail, pre and post-test surveys, site signage (pictured), and two volunteer planting days.

The first planting day consisted of volunteers from the grant partner, the North Carolina Coastal Federation, as well as neighborhood residents. Four of the residents who attended the planting were randomly awarded one rain barrel each, as an incentive to participate. Pre- and post-outreach surveys were sent to homeowners within the neighborhood to gauge the effectiveness of the campaign. Results from the survey indicated that, overall, the HOW neighborhood outreach campaign was successful in improving watershed residents knowledge of stormwater-related topics and the HOW Program. Specifically, the proportion of survey respondents able to correctly identify the watershed they live in increased by 34%. 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 four installations this year, and

identified additional interested participants for upcoming years. Of this year's participants in the program, one was a University of North Carolina at Wilmington student group property in the Bradley Creek watershed, and the other three were homeowners in Hewletts and Bradley Creek watersheds. Total volume reduction of these 4 projects was 763 cu ft. Photos of the installations can be viewed on our website at healourwaterways.org.



All volume reduction projects that are in the ground are now being tracked using the GIS Atlas, which was revamped and updated this year. Staff has been working to identify and rectify entries that may have incorrect numbers in the atlas for past projects.

Nevertheless, this GIS tracking tool allows HOW to analyze current impacts and assess stormwater volume reduction numbers from BMPs within the two target watersheds. Currently, there are 40+ projects in the GIS Atlas, each representing a BMP installation in Bradley or Hewletts Creek watershed. Each atlas entry should include attribute data for location, BMP area, total volume reduction, total nutrient and sediment reductions, and more.

Annual Assessment & Evaluation of Plan Implementation:

Last year, the HOW program was largely focused on stormwater pollution awareness, in part because there were so many difficulties in implementation of other facets of the program. This year, many hurdles were overcome and the HOW program was able to make strides forward not only in stormwater volume reduction, but also in outreach, program awareness, and in technical capability. The issues surrounding the website and the GIS Atlas were resolved, and installations that were put on hold for various reasons last year moved forward this year or were altogether completed. In short, the HOW program did very well in its progress towards the Bradley and Hewletts Creeks Watershed Restoration Plan's 6 Objectives and 35 Actions. The information below outlines that progress.

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

Much like years past, the city has continued its environmental education and outreach efforts this year by sending out a fall and spring postcard mailing to watershed residents in FY16-17, focusing on vehicle fluids and pesticide pollution prevention, respectively.

Public service campaigns also carried over this year from previous years. Advertisements on both WECT TV and WHQR radio were so successful last year that the decision to continue advertising with those outlets was made without question.

Another existing program with continued success this year is the partnership with New Hanover Soil and Water Conservation District (NHSWCD), called the HOWBMP Program. With installations through this program, news of the program is spreading by word of mouth within the community, helping to raise awareness of water quality issues. There is now a small waiting list of individuals who are eager to receive an installation, which indicates program expansion and success, as well as an expanded collective knowledge of water quality impairments in both watersheds.

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

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. However, different from years past, knowledge of the HOW program at UNCW has prompted a separate group within the university to meet to discuss possible actions and research to pursue on the topic of water quality. Research faculty, the university sustainability captain, and HOW watersheds coordinator were all present at the meeting.

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 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. The timeline for this objective is reliant upon the State's progress in this process. 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:

Actions 3-1 and 3-2, regarding funding for retrofits in both of the target watersheds, have seen great progress this year. Funds have been secured through the newest 319 grant in partnership with the NC Coastal Federation to be used in installation of retrofits in the Bradley and Hewletts Creek

Watersheds. These funds should produce installations in the coming year, resulting in volume reduction. Funds from other sources are outlined below.

HOWBMP installed retrofits in both target watersheds this year. This resulted in a volume reduction in the Bradley Creek Watershed of 340 cubic feet. In the Hewletts Creek Watershed, the volume reduction from the HOWBMP installation is at least 180 cubic feet, with additional project reductions still being calculated.

EEG grant funding for the bioretention area off Lynnwood Drive in the the Hewletts Creek Watershed produced measurable results this year, reducing 12,106 cubic feet of polluted runoff.

The Hewletts Creek 319 grant, in partnership with NC State University, also produced several installations this year including Shipyard Bioswales, an infiltration trench on Clearbrook Drive and a rain garden at Long Leaf Mall.

Objective 4: Promote stormwater reduction efforts:

The HOW program has seen many gains in the promotion of stormwater reduction efforts in FY16-17. HOW is involved in many facets of volume reduction including social media, traditional media campaigns, events, public speaking engagements, and collaboration with UNCW.

Action 4-1 calls for the use of the GIS Atlas to aid homeowners and others in identifying cost-effective retrofit opportunities while quantifying the impact of decreased runoff volume. For the first time since the inception of this program, a working GIS Atlas has been created and is now usable to track and quantify the impacts of volume reduction. It is also a valuable tool in providing a visual representation of areas that are in greater need of retrofits and where progress has been made. This, combined with the water quality monitoring that is being done by UNCW, will prove to be an invaluable tool in upcoming years.

In collaboration with UNCW, a new program is in development for the Clear Run neighborhood in the Bradley Creek Watershed that assists in the completion of Actions 4-2 and 4-3, involving impervious surface disconnection and cost-effective LID retrofits for homeowners and existing development. UNCW Sustainability distributed a doorhanger to local residents to determine interest in installing BMPs. UNCW staff also reports an ongoing effort to consolidate stormwater management permits and are working with a consulting firm on a campus master plan.

Also with UNCW, Action 4-9 calls for the development of a campus-wide master plan. While this needs to take place through university channels at a higher level, staff is unclear where the progress of this stands. The HOW program will try to collaborate with the university on this effort.

In support of Action 4-4, HOW has developed a tree giveaway program. Unfortunately, this program has encountered several setbacks, due to legal requirements and also staffing constraints. This program will be assessed for feasibility once again in FY17-18. Fortunately, however, the

city was awarded a grant to work with the Green Infrastructure Center (GIC) to protect and restore urban tree canopy for stormwater management. The GIC is still assessing how best to help the city in its goal of urban tree promotion. A public meeting will be held in summer 2017.

While no strategy to include hydrograph-reducing plans has been pursued with NCDOT, as is outlined in Action 4-6, the Hewletts Creek 319 grant saw NCDOT collaboration in the construction of the bioswale along Shipyard Boulevard.

Objective 5: Form and maintain partnerships:

The partnerships that were strengthened in FY15-16 were further bolstered this past year. HOW maintained all of the partnerships from the past, including UNCW, NC Coastal Federation, NC State Cooperative Extension, New Hanover County Soil and Water Conservation District, Surfrider Foundation Cape Fear Chapter, WECT TV-6, WHQR Public Radio, and the Cape Fear Group of the Sierra Club. Notable new partnerships include Cape Fear Public Utility Authority, the Wilmington Tree Commission, and Fairway Outdoor Advertising.

In accordance with Action 5-1, HOW delivered an educational program to the Cape Fear Group of the Sierra Club that was attended by 30 people. HOW also delivered an educational program to the Environmental and Code Enforcement sections of the Cape Fear Public Utility Authority. The new grant partnership with the NC Coastal Federation continues to fulfil Action 5-2, securing the grant funds for retrofits within both target watersheds.

The partnership with UNCW has seen great development this year, in accordance with Action 5-6. Apart from the campus-wide master plan and the new program in development for the Clear Run neighborhood, HOW has partnered with UNCW to identify all runoff-reducing projects situated within the campus footprint for entry into the GIS Atlas.

While many Actions that were lacking from last year improved this year, there are still areas that require attention in years to come. Notably, those actions that require participation with other city departments were lacking, apart from a collaboration with the Parks Department on the tree grant. In the upcoming years, HOW will need to form a greater collaboration with city planners, engineers, and other staff in order for the plan to succeed.

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

Use of the GIS Atlas began in earnest (Action 6-1), tracking progress toward watershed volume reduction goals. While that progress still has a long way to go, the entry of projects into the map atlas began. There have been a questions that have arisen about calculations and valid numbers entered into the atlas, so work continues to sort out these discrepancies. Therefore, an overall volume reduction number of installed BMPs is not available at this time.

Water quality is still being closely monitored by UNCW, in accordance with Action 6-2. Broader areas have been identified as requiring more attention - namely, those areas up-stream in the watersheds. Consequently, additional monitoring has been added in those areas by UNCW.

Overall, the Plan is achieving greater success year after year. There still needs to be greater communication both within the city regarding the program, and between the city and developers and other entities that are still using more traditional approaches to stormwater mitigation. That said, more runoff is being captured through LID practices. However, all of these practices were not installed this year. However, this year is the first year in which they have been quantified in the GIS Atlas. In years to come, the perceived volume reduction may slow due to fewer installations being entered into the Atlas.

5. Information regarding North Carolina TMDLs

Information regarding North Carolina TMDLs is available at:
http://portal.ncdenr.org/web/wq/ps/mtu/trndlltmdls

APPENDICES

APPENDIX A: PROGRAM IMPLEMENTATION INCLUDING MODIFICATIONS AND JUSTIFICATION

None for this reporting period.

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 Appendix. This section 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 Appendix.					
Annually	8th Grade Enviroscape Watershed Presentations	All 8th Grade NHC Schools Science Classes	Stormwater Services CFRW NHSWCD	Classroom presentation about watersheds, water quality, nonpoint source pollution, BMPs and stewardship	68 classes 2100 students
9/13/2016	APWA NC Stormwater Conference	Engineers	Kimley Horn Stormwater Services	Conference session: Simultaneously improving drainage and water quality with really big culverts and natural resource restoration in Wilmington NC	150 in attendance
9/23/2016	Presentation: Cape Fear Community College - Landscape Construction Class	Community college students	Stormwater Services	Enviroscape presentation and PPT about stormwater BMPs. Students then toured campus to look at BMPs on site.	6 students 1 faculty
10/25/2016	Presentation: UNCW Environmental Policy class	Undergraduate students	Stormwater Services	Enviroscape demonstration, policy constraints discussion, PSA videos shown, educational giveaways - watershed maps, newsletters, zip wallets	30 students
11/7/2016	Presentation: Cape Fear Academy	1st Graders	Stormwater Services	Enviroscape and water pollution prevention	25 students
10/1/2016	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	25 additional signs printed

4/1/2017	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	500 tidy bag pet waste dispensers purchased.
2/14/2017	Striperfest	Striperfest participants	Stormwater Services	Interactive game for youth	300 in attendance
2/24/2016	Lower Cape Fear Stewardship Awards Program	Realtors, Developers, Environmental Agencies, Politicians	Stormwater Services	Stormwater Services received 3 "Outstanding" awards for Raintree Wetland, Stormwater Demonstration Site, and DREAMS project	100 in attendance
3/24/2017	Cape Fear Community College Sustainability Fest	Community college students	Stormwater Services	Display booth to promote stormwater pollution education and giveaways	40 students in attendance
3/24/2017	Community Outreach Pet Event	Residents at the Reserve at Forest Hills Apartment Complex	Stormwater Services	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	12 pet owners signed the pledge
3/28/2017	DC Virgo Middle School	Middle Schoolers	Stormwater Services maintenance staff	Stormwater equipment and education activity	160 students
4/22/2017	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 to promote stormwater pollution education with watershed education activity, rain barrel and native plant raffle]	6-7000 attendees in conjunction with March for Science
5/31/2017	UNCW Film Studies Class	UNCW students	Stormwater Services	Enviroscape presentation and discussion of what makes a good stormwater PSA	15 students 1 faculty
4/1/2017	Canines for Clean Water booth at New Hanover County Rabies Clinic	Pet owners	Stormwater Services	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	31 pet owners signed the pledge
4/29/2017	Pawz in the Park at Battleship Park	Pet owners	NHSWCD	Canines for Clean Water booth - interactive event where pet owners sign a pledge to clean up after their pet and submit a photo of their pet to be featured on our website wilmingtonnc.gov/canines	37 pet owners signed the pledge

BMP c. Informational Web Site (www.wilmingtonnc.gov/stormwater)					
Ongoing/Regular Updates	Stormwater Services website	General public, website viewers	Stormwater Services	Dedicated stormwater website	Stormwater Services developed a brand new website and content which debuted in Fall 2016
Ongoing	Stormwater Hotline info advertised on City website homepage and Facebook page	General public	Stormwater Services Communications Div.	Stormwater hotline and web reporting form for public; posted on website under What's New section and on City's Facebook page	Stormwater website, city website, Facebook fans, general public
7/7/2016	City of Wilmington website homepage and Facebook news	General public Web Viewers	Communications Div.	News article - Drainage projects wrapping up	COW web viewers and Facebook fans
9/1/2016	City of Wilmington website homepage and Facebook news	General public Web Viewers	Communications Div.	News article - Storm tips	COW web viewers and Facebook fans
10/24/2016	City of Wilmington website homepage and Facebook news	General public Web Viewers	Communications Div.	News article - Portion of Orange Street Closed for stormwater repairs	COW web viewers and Facebook fans
1/11/2017	City of Wilmington website homepage and Facebook news	General public Web Viewers	Communications Div.	News article - City's first green building keeps saving	COW web viewers and Facebook fans
2/15/2017	City of Wilmington website homepage and Facebook news	General public Web Viewers	Communications Div.	News article - Drainage Improvements on Englewood Drive	COW web viewers and Facebook fans
3/22/2017	City of Wilmington website homepage and Facebook news	General public Web Viewers	Communications Div.	News article - City of Wilmington receives 3 sustainability awards	COW web viewers and Facebook fans
5/25/2017	City of Wilmington website homepage and Facebook news	General public Web Viewers	Communications Div.	News article - Spring Newsletter out with Stormwater Watch insert	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 report.

BMP e. Extent of Exposure/Reporting Requirements

Media Advertising Campaigns

September - October 2016	Mass Media - Cumulus Radio Broadcasting - 94.5 Hawk & 101.3 WWQQ	General public	Stormwater Services	Blink ads focused on Pet Waste. -198 ads each week on each station 94.5 Hawk & 101.3 WWQQ -990 ads total for campaign	Target Audience: Pet owners, Male-focused, General public Reach: 67,507 adults Frequency: 5.0 times Total cost: $2195
October - December 2016	Mass Media - WECT-6 TV and website campaign (including Top Story wrap on website)	General public TV and web viewers	Stormwater Services	30 second UNCW-created "Rain Goes Home" Stormwater PSA -WECT.com online digital campaign for 3 months Each month consists of: -2,000 video pre-roll mobile & desktop ads -30,000 expandable mobile & desktop video ads -80,000 mobile banner ads -3,500 mobile interstitial ads -40,000 targeted in banner video ads & mobile banners	Target Audience: General public TV Reach: 76.7% for viewers age 35-64 TV Frequency: 3.4 WECT.com Web Reach: 250,000 unique visitors per month 1.9 million average page views per month Total cost: $4755
Spring 2017	CoastWatch NC SeaGrant publication	CoastWatch readers	NC SeaGrant Coastwatch staff	Article: Awards Highlight NC Water Stewardship. Photo of stormwater outreach field trip activity with DREAMS students.	Coastwatch Magazine readers
March 2017	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
March - April 2017	Mass Media - Cumulus Radio Broadcasting - Coast 97.3 & 101.3 WWQQ	General public	Stormwater Services	:30 second Litter PSAs -30 ads each week on each station 97.3 Hawk & 101.3 WWQQ -90 ads total for campaign	Target Audience: General public Reach: 67,507 adults Frequency: 5.0 times Total cost: $1830
March - May 2017	Mass Media - WECT-6 TV and website campaign (including Top Story wrap on website)	General public TV and web viewers	Stormwater Services	30 second 'Rain Goes Home' PSA on TV (72 spots total) 81 spots total	Target Audience: General public, males TV Reach: 73% for viewers age 35-64 TV Frequency: 2.7 WECT.com Web Reach: 250,000 unique visitors per month 1.9 million average page views per month Total cost: $4750

March - May 2017	Fairway Outdoor Billboard Advertising	Motorists Pedestrians	Stormwater Services	Litter Pollution digital billboard	Target Audience: General public Reach: Motorists Frequency: Rotating - shown for 8 seconds every minute 24/7 using rotating billboard locations Total cost: $2000
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

8/11/2016	WECT-TV6 news story	Station viewers Website viewers	WECT reporter	TV news coverage - City of Wilmington installs new rain garden at DREAMS	Stats: -WECT-TV6 reaches 176,000 homes/per wk -WECT.com has 250,000 average unique visitors per month and 1,200,000 average page views per month
9/30/2016	UNCW Website News	Website viewers	UNCW Office of University Relations	Online web news article on university's website	Stats: -Online website viewers
8/11/2016	Press Release about Greenfield Lake and DREAMS Project	Local Media	City Communications Division	GFL restocked with grass carp New rain garden installed at DREAMS	Local Media Outlets
9/30/2016	Star News Article	Newspaper and online readers	Star News reporter	Print and online newspaper article - Beasley Road work will cause 6-month closure	Stats: -Daily print newspaper and online website -94,492 print readers -921,600 monthly online unique visitors -13.1 million monthly online page views
10/3/2016	Star News Article	Newspaper and online readers	Star News reporter	Print and online newspaper article - Water Street to close Tuesday for pipe repairs	Stats: -Daily print newspaper and online website -94,492 print readers -921,600 monthly online unique visitors -13.1 million monthly online page views

10/3/2016	Star News Article	Newspaper and online readers	Star News reporter	Print and online newspaper article - One block of Water Street to close	Stats: -Daily print newspaper and online website -94,492 print readers -921,600 monthly online unique visitors -13.1 million monthly online page views
2/1/2017	Spectrum TV interview	Spectrum TV Channel 14 viewers	Stormwater Services	Interview about stormwater, water quality, and oysters	Channel 14 viewers
3/17/2017	Coastal Society blog interview	Blog readers	Stormwater Services	Blog - High school teacher leads water quality testing before and after Hurricane Matthew	Blog readers. Stormwater staff gave input to teacher/blog
4/4/2017	New Hanover County Schools "The Forum" TV interview	TLN / NHCS TV viewers	Stormwater Services	Interview about the Enviroscape 8th Grade program	The Forum viewers
4/20/2017	Port City Daily	Newspaper and online readers	Port City Daily reporter	Print and online - Inland Greens Gold Course - stormwater improvements installed	Newspaper readers
5/22/2017	Sunny 103.7 Radio interview	Sunny 103.7 radio listeners	Stormwater Services	On air interview about Canines for Clean Water program	Radio listeners
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.	22,063 page likes
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	Spread 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
10/25/2016	Promos distributed at presentation to UNCW Environmental Policy class	Undergraduate students	Stormwater Services	Stormwater educational giveaways - brochures, zip wallets, tote bags, watershed posters	30 students
2/24/2017	Lower Cape Fear Stewardship Awards Program	Realtors, Developers, Environmental Agencies, Politicians	Stormwater Services	Speeches to attendees about Raintree, Stormwater Demonstration Site, and DREAMS	100 in attendance

4/7/2017	City of Wilmington Citizen's Fire Academy	Citizen's Fire Academy	Stormwater Services	Stormwater educational giveaways	Promos included bags, pens, magnets, literature
4/22/2017	Lower Cape Fear Earth Day Celebration at Hugh MacRae Park	Festival attendees, general public	Stormwater Services (SWS is an annual sponsor of Earth Day)	Display booth, interactive Stormwater game and educational giveaways	Approx. 5,000 attendees
5/31/2017	UNCW Film Studies Class	College students	Stormwater Services	Watershed maps Reusable bags Magnets Educational brochures HOW bumper stickers	15 students 1 faculty

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 version)
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

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	30 additional signs printed
7/1/2016	Stormwater Services brochures delivered to CFPUA	CFPUA / Stormwater customers	Stormwater Stormwater Services	Two CFPUA Offices received updated Stormwater Services brochures to deliver to customers	2500 brochures
8/31/2016	Wildlife Feeding signs	City Park patrons	Stormwater Services Parks Division	Wildlife feeding signage kiosks constructed by City Parks Division for signs stationed at Wade Wetland, Greenfield Lake, Halyburton Park and Anne McCrary Park	20 redesigned signs installed

Newsletters

Summer 2016	Citywide Public Information Report Newsletter	City residents Public library Special events	Stormwater Services Communications Div.	Brief highlights about stormwater projects - Brenda/Clearbrook, Pine Grove Road, Shinnwood, & JEL Wade	40,000+ newsletters mailed to city residents
Fall 2016	Citywide Public Information Report Newsletter	City residents Public library Special events	Stormwater Services Communications Div.	Brief highlights about Stormwater Drainage Projects - Beasley Rd Bridge Replacement	40,000+ newsletters mailed to city residents

Winter 2017	Citywide Public Information Report Newsletter	City residents Public library Special events	Stormwater Services Communications Div.	Stormwater Projects article - Glen Mead Bioretention area, Bradley Creek and Wisteria/Clearbrook projects	40,000+ newsletters mailed to city residents
Spring 2017	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 Lynnwood bioretention area and Stormwater Education Programs	40,000+ newsletters mailed to city residents

Grant Projects

Began Jan 2015 (1st year of 2.5 year grant)	EPA 319 NCSU Hewletts Creek Watershed 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 August 2015	Lynnwood EEG Grant	Hewletts Creek	NCCF NCSU Stormwater Services	Bioretention Area designed and constructed Winter/Spring 2017. Will reduce runoff volume for Heal Our Waterways program	Collaboration with NC Coastal Federation, NC State, and City of Wilmington Stormwater Services to design and construct project
Began December 2016	Green Infrastructure Center Tree Grant	Citywide	GIC City Planning, Stormwater, Parks	Citywide study to look at tree canopy and opportunities to use trees to mitigate stormwater	Collaboration with the Green Infrastructure Center, and City Planning, Stormwater, and Parks Divisions
Began April 2017	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
Completed Spring 2017	319 DREAMS Grant with NCSU	Burnt Mill Creek	NCSU Stormwater Services	Stormwater improvement project on city property housing DREAMS After-School Program in downtown area of BMC Watershed	Collaboration with DREAMS to design and install BMPs which include large bioretention area and pervious pavement to replace impervious
Ongoing	Developed 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

Employee Trainings

7/1/2016	NC of Natural & Cultural Resources appointment	NC Aquarium at Fort Fisher	Stormwater Education Program Manager	Advisory Committee Appointment	3-year term
Fall 2016	NC Office of Environmental Education	Stormwater Education Program Manager	Various programs and courses	Completion of 50 hours of CEU	Recertification through 2019
2/1/2017	Stormwater Presentation for Maintenance Field Crew	Stormwater Services crews Administration staff	Compliance Officer	Illicit Discharge Enviroscape presentation	50 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 16 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

CFRW = =Cape Fear River Watch

WECT-TV6 = NBC station

CUMULUS = radio stations

NCSU = NC State University

FB = Facebook

HOW = Heal Our Waterways program

CITY OF WILMINGTON
STORMWATER SERVICES

Public Outreach & Education, Public Involvement & Participation Plan

Compiled
August 2012
Updated as Needed

Table of Contents

Introduction

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, auto fluids, fertilizers, pesticides, litter, and yard waste and carries them through the stormwater drainage system, directly into our 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:

- 9,000 catch basins and manholes
- 220 miles of pipe
- 200 miles of open drainage (ditches, creeks, and channels)
- 145 acres of retention ponds including Randall Pond and Silver Stream Pond
- 12 miles of culverts under roads
- Greenfield Lake, Love Grove Tidegates
- Stormwater BMPs such as Kerr Avenue Wetland, Park Avenue Bioretention Area, Wade Wetland, etc.

This plan for Public Education and Outreach and Public Participation and Involvement is a segment 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. The permit authorizes the City of Wilmington to discharge stormwater from their municipal separate storm sewer system (MS4) to the receiving waters of the State within the Cape Fear and White Oak River Basins, under Environmental Protection Agency's National Pollutant Discharge Elimination System (NPDES) Program.

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

Since 1993, scientists at the UNC Wilmington Center for Marine Science Research have been assessing the water quality of Wilmington's major waterways. Approximately 70 sampling sites assess the water quality of 10 of Wilmington's tidal 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.

Public education, outreach, and participation are essential tools to develop stewardship and awareness of stormwater pollution issues in Wilmington. By successfully reaching out to citizens

and businesses, we can reduce the pollution in our local surface waters preserving them as a healthy, beautiful resource for our area.

Mission of Stormwater Services

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

Goals & Objectives ~ Outreach, Education, Involvement Program

The City of Wilmington Stormwater Services strives to improve local water quality by creating awareness of stormwater runoff issues through public education and outreach and public participation and involvement.

Through education, outreach, and involvement we educate citizens, businesses and employees about the stormwater drainage system, sources of stormwater pollution, the direct impacts of stormwater pollution on local waterways, and what we can do as a community to prevent and reduce stormwater pollution. The program complies with the City's NPDES stormwater permit.

The education program addresses the following facts as a basis for education efforts:

- Storm drains and drainage conveyances (i.e. ditches) 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.

- Polluted stormwater runoff flows directly into local waterways where it impacts water quality, aquatic habitat, shellfish harvest areas, and drinking water supplies.

- Plants, shrubs, trees, and other vegetation greatly reduce stormwater pollution by absorbing and filtering stormwater runoff and preventing soil from washing away.

- Reduce the amount of polluted stormwater runoff entering local waterways by utilizing 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, and re-routing downspouts to grassy areas allow stormwater runoff to soak into the ground and be cleaned and filtered naturally.

The program also addresses the six major pollutants that impact Wilmington's waterways:

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

Target Pollutants, Sources, and Audiences

The following pollutants have been identified as significant sources of pollution in Wilmington's waterways. Many of these pollutants also negatively impact the proper functioning of the stormwater drainage system. These particular pollutants were chosen based on several sources including UNCW's water quality monitoring data, New Hanover Animal Control statistics, and the 2006 NC 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 water quality data and trends.

Target Pollutant	**Pollutant Origin**	**Likely Pollutant Sources / Target Audience** (Residential & Commercial/Industrial)
Fecal Coliform Bacteria	• Domestic & wild animal waste	- Pet owners and their pets - Stray dogs, feral cats - Boarding kennels - Veterinarian facilities - Pet-related businesses
Nutrients (nitrogen and phosphorous)	• Fertilizers • Yard waste	- Homeowners - Gardeners - Landscapers/Landscaping Companies - Turf maintenance professionals - Golf courses
Sediment (sand, soil, etc)	• Eroding stream banks • Exposed soil • Construction	- Construction sites/land-disturbing activities - Landscapers/landscaping companies - Homeowners
Chemicals	• Pesticides • Pressure washing chemicals • Vehicle and boat washing soaps	- Homeowners - Pressure washing businesses - Mobile detailers - Pressure washers - Turf/landscape professionals - Restaurants
Litter	• Plastics • Paper • Cigarette butts	- Motorists - Smokers - Restaurants - Retail centers - Construction sites
Vehicle Pollution	• Vehicle fluids (motor oil, antifreeze, etc) • Vehicle washing soaps/detergents	- Motorists' vehicles - Backyard mechanics - Vehicle maintenance repair shops - Mobile detailers - Dealership lots

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

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

Pollutant Source:

Likely Residential Sources: Domesticated Animals, Stray and Feral Animals
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 water quality monitoring. The primary source of this bacterial pollution is canine and outdoor cat waste.
- Stormwater runoff washes bacteria, parasites, viruses, and nutrients from animal waste directly into our waterways.
- There is a direct correlation between the amount of impervious surface coverage and fecal coliform bacteria counts in Wilmington's waterways.
- 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.
- High levels of fecal coliform bacteria can cause diseases and infections in humans upon contact such as roundworm, salmonellosis, toxoplasmosis, E. coli, and gastroenteritis.

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.
- Dogs 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 in humans and other animals.
- Pet owners have a responsibility to clean up after pets and dispose of the waste properly.
- Debunk barriers to cleaning up after pets (i.e. it's not fertilizer, it's okay to use a bag to pick it up with your hand, pet waste is still a problem even if it's in your own backyard, 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.
- 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
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 and GTV • Participate in local pet-related events (i.e. Paw Jam) • Continue Canines for Clean Water program (C4CW) • Post educational signs at pet waste stations • Distribute pet waste education brochures and flyers during special events • Air public service announcements in paid spots • Direct mail enforcement letter to neighborhoods with complaints • Include blurbs in the citywide newsletter • Utilize enforcement actions when necessary for violators of the pet waste ordinance
Pet-Related Businesses	Targeting pet-related businesses will educate those in the profession about best practices for pet waste management and also serve as a conduit to deliver outreach messages to the public. Businesses include: - Veterinarians - Animal hospitals - Kennels - Pet stores - Groomers - Trainers - Petsitters	• Encourage businesses to be models for environmental stewardship at their place of business (i.e. install pet waste receptacles in parking lot islands or properly design kennel runs for waste removal) • Encourage businesses to post the pet waste education poster and/or brochures for customers to view

	- Doggie day care - Local pet magazines - Local adoption agencies - NHC Animal Control - NH Humane Society	
Management/ Residents of 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 apartment complex management to educate their residents by distributing the City's pet waste education materials to each apartment • Encourage management to post the pet waste education poster and/or brochure in common areas for their residents to view • Encourage management to be make it easy for their residents to manage pet waste by installing pet waste receptacles around the property
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.)* - Count of citations issued for pet waste violations - Count of reported complaints to Stormwater Hotline regarding pet waste violations		

Target Pollutant: NUTRIENTS (fertilizers, yard waste)

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

Pollutant Source:
Likely Residential Sources: Homeowners, Gardeners, etc.
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 landscaping companies.
- Improper 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 organic matter can also flow through the drainage system introducing nutrients and pesticides into waterways.
- Fertilizers and yard waste that end up in local surface waters impact aquatic life 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 and poor water quality resulting in algal blooms, fish kills, and habitat degradation.
- Grass cycle! Leave grass clippings on the lawn to reduce or eliminate the need for fertilizer. Clippings conserve soil moisture and are a natural fertilizer.
- Compost yard waste and use the resulting material in your landscape or garden
- Contain yard waste for City pickup.
- Before fertilizing, get a 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, grass cycling, worm poop, etc.
- If fertilizer must be used, read the label and apply correctly. Improper application includes over-applying by frequency or volume, applying the wrong type, applying before rain, and failure to clean excess fertilizer from driveways and streets after application.
- 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.
- 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.

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.	• Distribute fertilizer and yard waste education brochures and soil test kits to Wilmington residents during HOA presentations and special events like Earth Day • Inform residents about proper disposal methods for yard waste including grass cycling, composting, and collecting yard waste for pick-up by posting info on GTV • Post educational lawn care poster on stormwater website • Air public service announcements on mass media outlets • Include blurbs in citywide newsletter • Submit periodic press releases to the media

Landscapers and Turf Maintenance Professionals	Landscaping and turf maintenance companies frequently use fertilizers and produce a large amount of yard waste on a regular basis. Employees are often male and of Hispanic background.	• 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 • 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		

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, etc.
Likely Commercial/Industrial Sources: Construction Sites, Landscapers, Clear-cut Land, 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. The waves created by boaters can also cause accelerated erosion near the banks.
- Excessive sedimentation can fill in a water body or clog the storm drainage system, leading to flooding. Sedimentation also impacts bottom-dwelling organism by smothering fish eggs, shellfish, coral and benthic (bottom-dwelling) plants.
- Sediment can also cause water to become cloudy, also known as turbidity. Turbidity impairs the photosynthesis of aquatic plants, as well as the ability of aquatic animals to breathe and see prey/predators.
- 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 sediment and poor water quality, in addition to impacts on aquatic life 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 drainage system.
- Lack of vegetation along waterfront property and streambanks can produce significant erosion. These types of property owners should be encouraged to plant vegetative buffers.
- Developers should follow all sedimentation and construction site laws and practices. Construction site violations can be reported to the State Hotline: 1-800-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. Homeowners may have exposed soil in lawns or landscape beds or poorly vegetated areas on their property. 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
Construction/ Landscape Professionals	Construction, landscape, and related industries significantly contribute to sediment loading in waterways. Employees in this field 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

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

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 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, 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 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 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 insects, humans and other wildlife, 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) 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. 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 Days.
- Pressure washing surfaces and washing cars/boats using soaps or cleaning agents of any toxicity level can negatively affect water quality. These surfaces can only be washed legally with plain, clear water.
- Wash on grassy areas that can absorb and filter the chemicals and wastewater naturally.
- Businesses are required to capture and discharge the wastewater legally in a treatment system.
- The City's Illicit Discharge ordinance specifies that it is unlawful to dispose of or discharge any substance other than stormwater into the storm drainage system. Fines are up to $10,000 per offense.
- 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 around their property. Target a higher % of males.	• 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 • Post outreach materials on stormwater website and GTV • Promote Household Hazardous Waste Collection Days
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 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 • Post outreach materials on stormwater website and GTV
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 poster to local restaurants • Disseminate business checklist to ensure stormwater-friendly practices • Encourage employee training on wastewater practices, proper chemical use and disposal, etc. • Promote compliance with the illicit discharge ordinance via GTV and website

Assessment & Evaluation

- Conduct a survey of restaurants to gauge compliance with local stormwater ordinances and stormwater-friendly

practices

- 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
- 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 discarded plastics, food wrappers, cigarette butts, etc. that can wash into waterways via the storm drainage system and impact habitat, wildlife, and water quality.

Pollutant Source:
Likely Residential Sources: Motorists, Smokers, General public, Trash pickup incidental litter, 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 is often produced as a result of being dropped during trash pickup.
- Litter introduces chemical pollutants into waterways, such as plastics and cigarette butts.
- Cigarette butts are a major source of litter and contain many dangerous toxins that can leach into waterways.
- Littered areas beget litter; areas that are clean tend to repel litter.

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

Key Outreach Messages:

- Flooding of streets/property is sometimes attributed to the accumulation of litter in the drainage system.
- A direct link exists between animal impacts, habitat destruction, and water quality as a result of littering.
- Cigarette butts leach chemicals such as cadmium, lead, and arsenic into the aquatic environment within one hour of contact with water.
- The 2011 Ocean Conservancy International Coastal Cleanup identified cigarette butts as the #1 most littered item.
- Litter attracts wildlife to the side of the road where they are likely to get hit by oncoming vehicles.
- 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.

Target Audience	Audience Description (Why Selected?)	Suggested Outreach Strategies
Youth (8th grade presentations)	Litter habits cannot be confined to a particular demographic in most cases. However, targeting 8th graders during yearly presentations should be a priority since they are in the developmental stage of thinking and forming opinions.	• Make students aware of the impact of littering and the toxicity of many littered items • Emphasize easy solutions to littering - using trash or recycling receptacles • Promote the 5 R's: Reduce, Reuse, Recycle, Refuse, Repurpose • Explain the negative impacts on wildlife species (i.e. plastic bags look like jellyfish to sea turtles)
Smokers	Cigarette butts are the largest environmental litter problem both locally and worldwide. Target both male and female smokers.	• Display signs encouraging proper disposal of cigarette butts in public areas (i.e. Wave Transit buses) • Post outreach materials on stormwater website and GTV • 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 program via website and GTV • 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 habits
  - 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, etc.)

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. 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 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 emptying into our waterways.
- Commonly, it is the backyard mechanic that is illegally dumping or draining vehicle fluids.
- 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 toxic for 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 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, and/or use a commercial car wash which recycles and treats wash water. 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/ Backyard Mechanics	All citizens of driving age have the potential to contribute to vehicle pollution by nature of driving the 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 the utilization of the stormwater hotline to report illegal fluid dumping • 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
Vehicle Maintenance	Businesses in auto parts or maintenance/repair-related	• Distribute Auto Care educational poster to businesses for employees to learn about proper vehicle maintenance, fluid

Repair, and Auto Parts Businesses	fields deal with vehicle fluids on a regular basis. Most employees are male.	storage and disposal methods, and the City's Illicit Discharge ordinance • Post outreach materials on stormwater website and GTV
Pressure Washers, Vehicle Washing Businesses, Dealership Lots	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:
  - Cape Fear River Watch
  - New Hanover Soil & Water Conservation District

DATE OF EVENT/ ACTIVITY	EVENT/ACTIVITY	AUDIENCE	DELIVERED BY (AGENCY)	METHOD OF DELIVERY / MESSAGE	ATTENDANCE/ PARTICIPATION
BMP a. Volunteer community involvement program					
Community Events / Participation					
1/14/2017	Striperfest	CFRW members Public Youth	Stormwater Services	Stormwater educational booth Rice/Bioaccumulation pollution game	300 attendees
2/24/2017	Lower Cape Fear Stewardship Awards Program	Realtors, Developers, Environmental Agencies, Politicians	Stormwater Services	Staff gave speeches about the award winning projects: Raintree Wetland, Stormwater Demonstration Site and Dreams project	100 in attendance
3/24/2017	Cape Fear Community College Sustainability Fest	Community college students	Stormwater Services	Display booth to promote stormwater pollution education and giveaways	40 students in attendance
3/24/2017	Community Outreach Pet Event	Residents at the Reserve at Forest Hills Apartment Complex	Stormwater Services	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	12 pet owners signed the pledge
4/1/2017	Canines for Clean Water booth at New Hanover County Rabies Clinic	Pet owners	NHSWCD	Canines for Clean Water booth - interactive event where pet owners sign a pledge to clean up after their pet. They can then submit a photo of their pet to be featured on our Canine's website and receive a dog bandana, treats, related literature	31 pet owners signed the pledge
4/29/2017	Pawz in the Park at Battleship Park	Pet owners	NHSWCD	Canines for Clean Water booth - interactive event where pet owners sign a pledge to clean up after their pet. They can then submit a photo of their pet to be featured on our Canine's website and receive a dog bandana, treats, related literature	37 pet owners signed the pledge

4/22/2016	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 to promote stormwater pollution education with an interactive game/quiz and stormwater prizes, literature and educational giveaways.	5,000+ attendees

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	39 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. Place educational markers on storm drains and distribute educational doorhangers to residents in neighborhoods where markers are installed	47 markers were placed in the Independence South, Holly Glen, Brookwood, and Colonial Drive areas this year

Stream & Litter Clean-ups

Ongoing	Watershed cleanups including the Annual Big Sweep event	Volunteers	CFRW volunteers	Watershed cleanup and/or invasive species vegetation removal Areas cleaned include Greenfield Lake, Smith Creek, Cape Fear River, Burnt Mill Creek, Randall Pond, Kerr Avenue Wetland	12 cleanup events including annual Big Sweep event 235 volunteers contributed a total of 492 hours Trash: Collected 8.5 96-gallon bins of trash and 56 (30-gallon) bags of trash. Recycling: Collected 8 96-gallon bins of recycling and 63 30-gallon bags of recycling. .

Watershed Watch Creek Observation Monitoring

Every other month	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, local water quality initiatives, Greenfield Lake & Kerr Ave. education/monitoring, support for NPDES public meetings and education efforts, quarterly reporting/invoicing.

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

BMP b. Mechanism for Public involvement

Public Notices, Public Meetings & Community Input

9/1/2016	Targeted mail	Residents and businesses affected by Brookshire / Beasley Road Project	Stormwater Services	Project info notice distributed to local residents in advance of project work and about project meeting	264 notices mailed to residents
10/1/2016	Targeted doorhangers	Residents and businesses affected Orange Street Pipe Replacement	Stormwater Services	Project info notice distributed to local residents in advance of project work	100 doorhangers distributed to residents and businesses
10/3/2016	Public Meeting	Residents and businesses affected by Brookshire Bridge Replacement	Stormwater Services	Clear Run Branch meeting with residents to discuss upcoming bridge / drainage improvement project	30 residents in attendance
11/1/2016	Targeted doorhangers	Residents and businesses affected by 14th Street Project	Stormwater Services	Project info notice distributed to local residents in advance of project work	100 doorhangers distributed to residents and businesses
11/5/2016	Individual meetings with property owners	Residents and businesses affected by Clear Run Branch Project	Stormwater Services	Project info notice distributed to local residents in advance of project work	2 individual meetings with property owners
11/30/2016	Targeted mail	Residents and businesses affected by the Clear Run Branch Project	Stormwater Services	Project info notice distributed to local residents in advance of project work	100 doorhangers distributed to residents
1/1/2017	Targeted doorhangers	Residents and businesses affected by Englewood Drive	Stormwater Services	Project info notice distributed to local residents in advance of project work	50 doorhangers distributed to residents and businesses
3/1/2017	Targeted doorhangers	Residents and businesses affected by Pine Valley Street Rehab	Stormwater Services	Project info notice distributed to local residents in advance of project work	100 doorhangers distributed to residents and businesses
3/1/2017	Targeted mail	Residents and businesses affected by Beech Street Project	Stormwater Services	Project info notice distributed to local residents in advance of Beech Street project work	35 notices mailed to residents
4/1/2017	Targeted doorhangers	Residents and businesses affected by Beasley Road Bridge Project	Stormwater Services	Project info notice distributed to local residents in advance of project work and about project meeting	100 doorhangers distributed to residents and businesses

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 "Enforcement" section of the report.

Cumulative Year End Contract Agency Reports

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

Quarterly Progress Report #4: April 1 – June 30, 2017

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, 2016** through **June 30, 2017** for the agreed amount of **$24,182.** These contracted services, implemented as equitably as possible throughout the fiscal year, assist the City in meeting requirements of the federal NPDES Stormwater Permit.

Public Education/Outreach

Total Allocated Cost: $16,607

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 environmental agencies and will focus on the specific NC Essential Standard and Objectives for the Hydrosphere unit. Enviroscape instructors will be trained, certified, and follow all applicable Enviroscape 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 instructors are trained and certified accordingly and kept up to date on the script, props and other pertinent presentation information. Additional presentations should not conflict or duplicate the 8th grade presentations in any fashion. A summary will 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 instructors. **($2200)**

July 1 – September 30, 2016

8th Grade Enviroscape Presentations				
Date	**School**	**Grade**	**# of presentations**	**# of students**
9/9/16	Virgo MS	8th	2	60
9/19/16	Roland Grise MS	8th	3	90
9/28/2016	Lake Forest Academy	8th	1	6
Other Enviroscape Presentations				
Date	**School/Group/Event**	**Grade**	**# of presentations**	**# of attendees**
7/6/16	WB Surf Camp	K	1	10

October 1 – December 31, 2016

8th Grade Enviroscape Presentations				
Date	**School**	**Grade**	**# of presentations**	**# of students**
11/16/2016	Holly Shelter Middle School	8th	1	32
11/21/2016	Trask MS	8th	2	62
11/29/2016	Trask MS	8th	1	26

January 1 – March 31, 2017

8th Grade Enviroscape Presentations				
Date	**School**	**Grade**	**# of presentations**	**# of students**
2/6/2017	Noble MS	8th	2	61
2/7/2017	Noble MS	8th	2	58
3/1/2017	Williston MS	8th	1	32
3/3/2017	Williston MS	8th	2	59

April 1 – June 30, 2017

8th Grade Enviroscape Presentations				
Date	**School**	**Grade**	**# of presentations**	**# of students**
4/26/2017	Myrtle Grove MS	8th	2	53
5/1/2017	Murray MS	8th	1	28
5/3/2017	Murray MS	8th	2	62

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 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 present at a minimum of 2 events). The expectation is to target well-attended events. **($1550)**

October 1 – December 31, 2016

*Secured NHSWCD participation in the Pawz in Park event in April.

January 1 – March 31, 2017

Pet Events				
Date	**Event**	**Location**	**Method of Delivery / Materials Distributed / Etc.**	**# of signed Pet Waste pledges**
3/24/2017	Community Outreach Pet Event	The Reserve at Forest Hills	C4CW display table and pledge signatures acquired	12

April 1 – June 30, 2017

Pet Events				
Date	**Event**	**Location**	**Method of Delivery / Materials Distributed / Etc.**	**# of signed Pet Waste pledges**
4/1/2017	Free Rabies Shot Clinic	NHC Animal Services	C4CW display table and pledge signatures acquired	40
4/29/2017	Pawz in Park	Battleship Park	C4CW display table and pledge signatures acquired	36
5/30/2017	Community Outreach Pet Event/Adoption Fair	Avalon Apartments	C4CW display table and pledge signatures acquired	5

Conduct at least 2 "Stormwater 101" education presentations to HOAs, garden clubs, community/civic groups, developers, or during watershed-wide meetings. A maximum of 1 presentation may target university or college classes/students. Initiate direct contact with potential audiences, promote program, and schedule presentations. **($1000)**

July 1 – September 30, 2016

Stormwater 101 Presentations			
Date	**Organization / Audience**	**Method of Delivery / Materials Distributed / Etc.**	**Attendance**
9/14/16	NHC Employees and Citizens	Power point, links to citizens guide	5
9/20/16	UNCW Graduate Earth Science Class	Power point, links to citizens guide, state stormwater manual, BMP calculator	29

October 1 – December 31, 2016

Stormwater 101 Presentations			
Date	**Organization / Audience**	**Method of Delivery / Materials Distributed / Etc.**	**Attendance**
11/9/16	Backyard Naturalist Class	Power point, links to citizens guide	6

January 1 – March 31, 2017

Stormwater 101 Presentations			
Date	**Organization / Audience**	**Method of Delivery / Materials Distributed / Etc.**	**Attendance**
3/8/17	NHC employees and Citizens	Power point, links to citizens guide	3

April 1 – June 30, 2017

Stormwater 101 Presentations			
Date	**Organization / Audience**	**Method of Delivery / Materials Distributed / Etc.**	**Attendance**
6/14/17	NHC employees and Citizens	Power point, links to citizens guide	27

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 camp presentations, easement education, etc. In addition, NHSWCD will provide stormwater education programs at the J.E.L. Wade Stormwater Wetland, as the need arises. **($1350)**

April 1 – June 30, 2017

Hewletts Creek Educational Contact				
Date	**Audience Name OR School & Grade**	**Topic and/or Activity**	**# presentations**	**# of attendees**
6/22/17	Easement Check	Walked outer edges of easement		
6/30/2017	Hewletts Creek	Annual newsletter mailed		211

Facilitate additional environmental education presentations in the city that highlight stormwater issues for local residents, students, teachers, camps, business owners, etc. Presentation topics will tie into water quality, BMPs, and water conservation issues. **($2650)**

July 1 – September 30, 2016

Environmental Education Presentations

Date	Audience Name OR School & Grade	Topic and/or Activity	# presentations	# of attendees
9/1/16	Rachel Freeman ES, 4th	Weathering and Erosion	2	70

October 1 – December 31, 2016

Environmental Education Presentations				
Date	**Audience Name OR School & Grade**	**Topic and/or Activity**	**# presentations**	**# of attendees**
10/6/2016	Murray MS, 7th	Water Quality	1	30
10/14/2016	Williston MS, 6th	Education contest presentation; protecting soil & water	1	35
10/16/2016	Roland Grise MS, 6th	Education contest presentation; protecting soil & water	3	100
10/21/2016	Anderson ES, 4th	Education contest presentation; protecting soil & water	3	78
11/18/2016	WAAS, 4-8th	Education contest presentation; protecting soil & water	1	60
12/2/2016	Ashley HS, 9th	Coastal geology/education contest	3	79
12/12/2016	Snipes Academy, 4th	Weathering and Erosion	2	45
12/13/2016	Pine Valley ES, 3-5th	Education contest presentation; protecting soil & water	1	300
12/13/2016	GLOW Academy, 6th	Education contest presentation; protecting soil & water	2	120

January 1 – March 31, 2017

Environmental Education Presentations				
Date	**Audience Name OR School & Grade**	**Topic and/or Activity**	**# presentations**	**# of attendees**
1/17/2017	Forest Hills ES, 4th	Education contest presentation; protecting soil & water	2	46
1/25/2017	Snipes Academy, 4th	Rocks and Minerals	2	90
3/2 & 3/16/2017	UNCW	Leopold Education Project	1	7
3/31/2017	UNCW	Project Food, Land, and People workshop	1	6

April 1 – June 30, 2017

Environmental Education Presentations				
Date	**Audience Name OR School & Grade**	**Topic and/or Activity**	**# presentations**	**# of attendees**
5/2/2017	Rachel Freeman ES, 2nd	Pollution and recycling; how to protect water quality	2	90
5/9/2017	Codington ES, 3rd	OELC installation	4 classes assisted	100

Organize/facilitate at least 2 Environmental Field Days a year serving an entire grade at a New Hanover County School within the City limits. ($2400)

July 1 – September 30, 2016

Environmental Education Presentations				
Date	**School & Grade**	**Topic and/or Activity**	**# presentations**	**# of attendees**

October 1 – December 31, 2016

Environmental Education Presentations				
Date	**School & Grade**	**Topic and/or Activity**	**# presentations**	**# of attendees**
10/12/2016	Pine Valley ES, 4th	Soils/Water Cycle/Wildlife/Forestry	4 of each	100
10/25/2016-10/26/2016	Noble MS, 6th	Soils/Water Quality/Wildlife/Eco-Tour/Stewardship	5 of each	300
11/1/2016	Virgo MS, 6th	Soils/Water Quality/Wildlife/Eco-Tour/Stewardship	5 of each	75
11/18/2016	Mary C. Williams ES	Soils/Water Cycle/Wildlife/Forestry	4 of each	80

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 two community outreach events (such as the Bellamy Going Green, LakeFest, StriperFest, Girl Scouts World Water Day). **($3000)**

July 1 – September 30, 2016

Community Outreach Events				
Date	**Event**	**Location**	**Method of Delivery / Materials Distributed / Etc.**	**Attendance**
8/26/16	NHCS Vendor Fair	Ashley HS	Had booth at event to notify teachers of programming available, rain barrel sales, etc	3000
9/17/16	Medication Disposal Event	Medical Mall	Coordinated recycling of all plastics (bottles and lids) and all paper products (boxes and inserts).	746: 687 lbs of medicine collected; 300 lbs recyclables

October 1 – December 31, 2016

Community Outreach Events				
Date	**Event**	**Location**	**Method of Delivery / Materials Distributed / Etc.**	**Attendance**
10/28-11/6/2016	Cape Fear Fair and Expo	Fairgrounds at ILM airport	Display/Booth regarding District programs as it relates to Agriculture. Reducing non-point source water pollution as it relates to all programs was also displayed. Display won 6th place	10,000+

January 1 – March 31, 2017

Community Outreach Events				
Date	**Event**	**Location**	**Method of Delivery / Materials Distributed / Etc.**	**Attendance**
1/14/2017	CFRW StriperFest	Coastline Convention Center	Assisted in activities geared toward children to help learn about water quality and local water issues.	200
2/2/2017	NHC Health Fair	Independence Mall	Talked with citizens on ways to reduce runoff and distributed educational flyers on ways to reduce pollution and protect waterways/your health.	302
2/24/2017	LCFSDC Awards Luncheon	Terraces at Sir Tyler	Staff set up a display table to inform attendees of District roles/programs and Heal our Waterways program. Also spoke to tour attendees about CCAP.	115

3/18/2017	NHC Career Fair	NHC Government Center	Set up a display table to inform attendees about District roles/programs and potential volunteer/job opportunities	400
3/21/2017	Coastal Envirothon	Cool Springs Education Center	Staff provided support for participating teams. Three local teams from Hoggard High School attended, participated and all advanced to the state level.	300

April 1 – June 30, 2017

Community Outreach Events				
Date	**Event**	**Location**	**Method of Delivery / Materials Distributed / Etc.**	**Attendance**
4/1/2017	Medication Disposal Event	NHRMC Medical Mall	Coordinated recycling of all plastics (bottles and lids) and all paper products (boxes and inserts).	180 lbs recycling
4/22/2017	Wilmington Earth Day Festival	Hugh MacRae Park	Set up a display table to inform attendees about District roles/programs and potential volunteer opportunities	~6,500

Promote/consult on Low Impact Development (LID) including stormwater Best Management Practices (BMPs) to developers, engineers, architects, private property owners, HOAs, etc, in the city. Promote BMPs, LID, and the local LID manual, provide input to City Technical Review Committee, as well as provide education and technical assistance as the need arises for property owners. **($1057)**

July 1 – September 30, 2016

Met with County Manager along with County Planning Director and Engineering Director to discuss the current status of NHC LID ordinances. Currently working toward promoting the ordinance more throughout county.

Submitted 4 soils reports for Technical Review Committee (TRC) which included information about the county LID ordinance and suggested edits/changes to plan to use these practices.

October 1 – December 31, 2016

Submitted 2 soils reports for Technical Review Committee (TRC) which included information about the county LID ordinance and suggested edits/changes to plan to use these practices.

January 1 – March 31, 2017

Submitted 6 soils reports for Technical Review Committee (TRC) which included information about the county LID ordinance and suggested edits/changes to plan to use these practices.

April 1 – June 30, 2016

Submitted 5 soils reports for Technical Review Committee (TRC) which included information about the county LID ordinance and suggested edits/changes to plan to use these practices.

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 from the NHSWCD website. NC Community Conservation Assistance Program (CCAP) and Heal Our Waterways BMP project pictures will continue to be

labeled and updated and a local map showing CCAP and other BMP projects will be updated and available on the website. The website will be promoted on local government TV and social media outlets. **($1400)**

July 1 – September 30, 2016
Completed review/audit of website to assess what needs to be updated and changed. Will be working on updates next quarter.

October 1 – December 31, 2016
Promoted rain barrel sale on NHC monthly events calendar, banner, and Facebook pages. Made edits to website, i.e., staff and supervisor changes. Added pictures to photo albums of community outreach events, including previous C4CW events.

January 1 – March 31, 2017
Promote rain barrel sales on New Hanover County and NHSWCD social media pages; added Canines for Clean Water events to the District website; fixed broken links and redirection to City pages (i.e., "Stormwater is a Dirty Word"); added new BMP photos from HOW projects.

April 1 – June 30, 2017
Promote rain barrel sales on NHSWCD social media pages.

Public Involvement/Volunteer Efforts *Total Allocated Cost: $1,100*

Encourage public involvement by engaging city residents/businesses/civic groups in a volunteer Storm Drain Marking program in the city to educate the community about stormwater pollution. A minimum of 2 separate volunteer days is required.
For each outing day, a minimum of 7 markers will be applied per volunteer group and educational doorhangers will be distributed to surrounding residences/businesses. Staff will assist in identifying areas to mark drains, educate volunteers about stormwater and the purpose of the program, train volunteers in marking and safety, use supplied markers, and help provide oversight of the program. A trained NHSWCD staff member is required to be present during all storm drain marking activities and with each volunteer group. **($1100)**

October 1 – December 31, 2016
*Secured a stormdrain marking event for next quarter

April 1 – June 30, 2017

Storm Drain Marking			
Date	**Name of Volunteer Organization, Business, etc.**	**# of Volunteers**	**Specific Area Marked / # of Storm Drains Marked**
5/31/2017	NHC Employees/Surfrider	6	Tattersall and Lynnwood in Dramtree neighborhood. 14 drains marked
6/28/2017	Cape Fear Surfrider	3	Addies Lane and Tattersall in Dramtree neighborhood. 14 drains marked.

Programs/Partnerships *Total Allocated Cost: $3,775*

Administer and partner with the City of Wilmington Stormwater Services to hold a public rain barrel sale. NHSWCD will utilize local government television, local events including Earth

Day, agency website, outdoor signage (day of), and periodic press releases to the media to promote the sale. Rain barrel buyers will be asked to give their watershed location in order to educate them about watersheds and record volume reduction for the Heal Our Waterways Bradley/Hewletts Creek watershed restoration effort. **($1325)**

July 1 – September 30, 2016
July: 1-60 gallon; 4-80 gallon sold
August: 1-60 gallon; 2-80 gallon sold
September: 1-60 gallon barrel sold

October 1 – December 31, 2016
October 1-60 gallon; 3-80 gallon sold
November: 1-60 gallon; 0-80 gallon sold
December 2-80 gallon barrels sold

January 1 – March 31, 2017
January: No barrels sold
February: 0-60 gallon sold; 7-80 gallon barrels sold
March: 1-60 gallon sold; 1-80 gallon sold

April 1 – June 30, 2017
April: 1-60 gallon sold; 5-80 gallon sold
May: 1-60 gallon sold
June: 2-60 gallon sold; 5-80 gallon sold

Serve as an integral partner to facilitate the Lower Cape Fear Stewardship Development Awards Program. Also serve as an active partner organization on grant projects or initiatives that benefit local surface water quality and water resources within the city. 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 natural resources. **($2450)**

July 1 – September 30, 2016
Attended two monthly board meetings for Lower Cape Fear Stewardship Development Coalition (LCFSDC). Worked with Finance committee to conduct audit. Collected applications and fees of current year applicants. Staff still serves as Treasurer for the committee.

October 1 – December 31, 2016
Attended two monthly board meetings for Lower Cape Fear Stewardship Development Coalition (LCFSDC). Took photos during the LCFSDC application judging. Collected scholarship applications. Revised mailing list and sent out a Save the Date for the upcoming awards luncheon. Staff still serves as Treasurer for the committee.

January 1 – March 31, 2017
Attended two monthly board meetings for Lower Cape Fear Stewardship Development Coalition. Coordinated registration for the annual awards luncheon before and during the event.

April 1 – June 30, 2017
Attended monthly board meetings and board retreat. Created draft budget for FY17-18. Complied items for annual audit.

Contract Administration

Total Allocated Cost: $2,700

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

Quarterly reports and invoices are due within 10 days of the quarter end date and will follow templates and instructions set forth by Stormwater Services. 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.

Submit cumulative quarterly progress reports and invoices according to the following quarters: July 1 - Sept 30; October 1 - Dec. 31; January 1 -March 31; April 1 - June 30. 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.

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 quarterly progress report and invoice 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.

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. In addition, an annual compilation CD or DVD copy of all contract documents, records, reports, invoices, and pertinent educational materials will be provided to the City of Wilmington Stormwater Services by July 10th for the prior FY. These files are public record and should be accessible.

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. ($2700)**

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.

Report compiled by: Dru Harrison **Date:** 6/30/17

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

Quarterly Progress Report #4: April 1 – June 30, 2017

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, 2016** through **June 30, 2017** for the agreed amount of $**15,500**. These contracted services, implemented as equitably as possible throughout the fiscal year, assist the City in meeting requirements of the federal NPDES Stormwater Permit.

Public Education/Outreach *Total Allocated Cost: $5400*

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 presentation is an integral component of the 8th grade science curriculum in New Hanover County Schools. Presentations will be done in coordination with other environmental agencies and will focus on the specific NC Essential Standard and Objectives for the Hydrosphere unit. Enviroscape instructors will be trained, certified, and follow all applicable Enviroscape 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 instructors are trained and certified accordingly and kept up to date on the script, props and other pertinent presentation information. Supervisors should also present to 8th grade in both the fall and spring semesters, in order to stay current and up to date with the material. CFRW will also work cooperatively with Stormwater Services to provide other presentations in addition to the 8th grade program, as needed. Additional presentations should not conflict or duplicate the 8th grade presentations in any fashion. A summary will be provided in each quarterly report for any additional Enviroscape presentations given. CFRW was provided with city funds to purchase an Enviroscape for the express purpose of being available to conduct 8th grade presentations. **($2200)**

July 1 - September 30, 2016

8th Grade Enviroscape Presentations				
Date	**School**	**Grade**	**# of presentations**	**# of students**
9/16/16	Roland Grise	8	2	52
9/19/16	Roland Grise	8	1	27

October 1 - December 31, 2016

8th Grade Enviroscape Presentations				
Date	**School**	**Grade**	**# of presentations**	**# of students**

11/15/16	Holly Shelter	8	2	55
11/16/16	Holly Shelter	8	1	26
11/21/16	Trask	8	2	31
11/29/16	Trask	8	2	60

January 1 - March 31, 2017

8th Grade Enviroscape Presentations				
Date	**School**	**Grade**	**# of presentations**	**# of students**
2/7/17	Noble	8	2	55
2/10/17	JC Roe Center	8	1	4
3/1/17	Williston	8	2	59
3/2/17	Williston	8	2	56

April 1 - June 30, 2017

8th Grade Enviroscape Presentations				
Date	**School**	**Grade**	**# of presentations**	**# of students**
4/26/17	Myrtle Grove	8	1	26
4/27/17	Myrtle Grove	8	2	61
5/1/17	Murray	8	2	58
5/3/17	Murray	8	2	60
Other Enviroscape Presentations				
Date	**School/Group/Event**	**Grade**	**# of presentations**	**# of attendees**
4/29/17	GLOW/Greenfield Lake Fieldtrip	7th & 8th	1	18

Provide educational programs for Wilmington residents. 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 Smith 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 to inform the local media about educational programs. **($3200)**

July 1 - September 30, 2016

First Saturday Seminars			
Date	**Topic**	**Speaker**	**Attendance**
7/2/16	200 mile paddle down the Cape Fear River	Kemp Burdette	75
8/6/16	Environmental Treasures of SE NC	Roger Shew	60
9/3/16	Fall Migratory Birds	Jill Peleuses	65
Other Presentations by CFRW Staff			
Date	**Organization/Audience**	**Topic/Speaker**	**Attendance**
7/7/16	WHQR/Listeners	Environmental Education/Kay Lynn Hernandez	250+
8/1/16	CFRW/Summer Campers	Stormwater Pollution/Kay Lynn Hernandez	24
Greenfield Lake Tours & Smith Creek Paddle Tours			
Date	**Group Served/Audience**	**Type of Tour/Topic/Location**	**Attendance**
7/11/16	Friends School of Wilmington/2nd to 5th Graders	Paddle boat and walking eco-tour/stormwater, history, flora and fauna/GFL	30
7/12/16	YWCA/K-3rd Graders	Paddle boat and walking eco-tour/stormwater,	15

		history, flora and fauna/GFL	
7/13/16	Friends School of Wilmington/5th and 6th Graders	Paddle boat and walking eco-tour/stormwater, history, flora and fauna/GFL	15
8/2/16	9-13 yr-olds/CFRW Eco Camp	Raindrop Journey/Stormwater/GFL	24
9/21/16	Homeschool Group/4th to 6th Graders	Paddle boat and walking eco-tour/stormwater, history, flora and fauna/GFL	24

Oct 1 - Dec 31, 2016

First Saturday Seminars			
Date	**Topic**	**Speaker**	**Attendance**
10/1/16	Eye of Newt and Wart of Toad: Halloween Icons In Our Backyard	Andy Wood	56
11/5/16	Winter Birds	Jill Peleuses	49
12/3/16	Restoring Migratory Fish in the Cape Fear River	Dawn York	42
Other Presentations by CFRW Staff			
Date	**Organization/Audience**	**Topic/Speaker**	**Attendance**
10/19/16	UNCW/Parks & Rec Seniors	CFRW/Kay Lynn Hernandez	45
10/25/16	UNCW/Env.Science students	Water pollution/Kay Lynn Hernandez	60
11/2/16	Our State Magazine/EXPO 216	Water quality CFR/Kemp Burdette	75
Greenfield Lake Tours & Smith Creek Paddle Tours			
Date	**Group Served/Audience**	**Type of Tour/Topic/Location**	**Attendance**
10/5/16	Sunset Park Elementary/Third Graders	Walking eco tour, paddle boating/Flora, fauna, history, stormwater pollution of GFL/GFL	60
10/6/16	UNCW OLLIE/students	Walking eco tour/Flora,fauna,history,water quality of GFL/Greenfield Lake	15
10/27/16	Sunset Park Elementary/Fourth Graders	Raindrop Journey/Greenfield Lake	60
11/1/16	Virgo Middle School/6th Graders	Lakeside Learning/Greenfield Lake	45
11/8/16	Homeschool Group/children and adults	Walking eco tour/flora, fauna, history, stormwater pollution/Greenfield Lake	18
11/9/16	Castle Hayne Elementary/4th graders	Raindrop Journey/Greenfield Lake	100

January 1 - March 31, 2017

First Saturday Seminars			
Date	**Topic**	**Speaker**	**Attendance**
2/4/17	Striped Bass Tactics in the CFR	Jot Owens	37
3/4/17	Legacy of Tidewater Rice Farming Along the Lower Cape Fear River as a Cultural Heritage and as Extensive Fish and Shellfish Habitat.	Jim Kapetsky	57
Other Presentations by CFRW Staff			
Date	**Organization/Audience**	**Topic/Speaker**	**Attendance**
1/4/2017	Wilmington Civitan Club	Anadromous Fish Restoration, Cape Fear River/Frank Yelverton	34
1/16/17	StriperFest	Anadromous Fish Restoration/Kemp Burdette	330
1/17/17	StriperFest Community Education Day	Anadromous fish, water quality, watersheds/CFRW	420
2/21/2017	Cape Fear Angler's Club	CFRW Mission and Migratory Fish Restoration in the Cape Fear River/Frank Yelverton	36
3/9/17	Scene 3	Water Quality and Env Issues/Kemp Burdette	75
3/17/2017	Wilmington Senior Men's Club	Migratory Fish and Restoration/Frank Yelverton	110

3/21/17	Encore Magazine Readers	Drinking water, CFRW CreekWatchers Program, Clean-ups/Kemp Burdette	15,000
3/22/17	UNCW Ollie Class	Fish population decline and fish passage/Kay Lynn Hernandez	28
3/27/17	CFCI 4th Graders	Stormwater, litter solutions, fish restoration/Kay Lynn Hernandez	55
3/27/17	Girl Scout Troop	Environmental careers, stormwater, wildlife/Kay Lynn Hernandez	13
3/1/17	Wrightsville Beach Magazine, March 2017 readers	Stormwater, Sturgeon, CAFOs/Kemp Burdette	unknown
Greenfield Lake Tours & Smith Creek Paddle Tours			
Date	**Group Served/Audience**	**Type of Tour/Topic/Location**	**Attendance**
3/22/17	UNCW OLLIE Class	Walking eco tour/Stormwater, Flora & Fauna, History of Greenfield Lake/Kay Lynn Hernandez	30
3/28/17	CFCI 4th Graders	Raindrop Journey/stormwater, history, flora and fauna/Kay Lynn Hernandez	55

April 1 - June 30, 2017

First Saturday Seminars			
Date	**Topic**	**Speaker**	**Attendance**
4/1/17	Using native plants in our landscape to stem the decline of our migratory land birds	Charley Winterbauer	41
5/6/17	Fishers of the lower Cape Fear River – The Good, The Bad and The Ugly	Fritz Rhode and Peter Perschbacher	44
6/3/2017	Dirty Secrets of Water Pollution – What the Public Isn't Told	Dr. Larry Cahoon	47
Other Presentations by CFRW Staff			
Date	**Organization/Audience**	**Topic/Speaker**	**Attendance**
4/15/2017	LakeFest Attendees	Water quality of GFL/CFRW	440
6/1/2017	Wilmington West Rotary Club	The mission of Cape Fear River Watch/Frank Yelverton	36
6/14/2017	UNCW/Island Ecology	Fish Passage & The Mission of CFRW/Kay Lynn Hernandez	24
6/17/2017	Terra Sol Sanctuary	The Mission of CFRW/Frank Yelverton	10
6/21/2017	Community of Wilmington	Community Forum on GenX/Kemp Burdette	415
Greenfield Lake Tours & Smith Creek Paddle Tours			
Date	**Group Served/Audience**	**Type of Tour/Topic/Location**	**Attendance**
4/1/2017	Brownie Troop	Walking Eco-Tour/Stormwater, history, plants and animals of GFL/GFL	10
4/15/2017	LakeFest Attendees/Eco Tour Registrants	Walking Eco-Tour/Stormwater, history, plants and animals of GFL/GFL	45
4/25/2017	CFCI/4th Graders	Raindrop Journey/Stormwater/GFL	60
4/29/2017	GLOW/7th, 8th graders	Walking Eco-Tour, paddleboating, Enviroscape/Stormwater, history, plants and animals of GFL/GFL	18
6/9/2017	Sunset Park Elementary/2nd Graders	Walking Eco-Tour/Stormwater, history, plants and animals of GFL/GFL	65
6/12/2017	Noah's Ark/pre-K	Walking Eco-Tour/Stormwater, history, plants and animals of GFL/GFL	18
6/22/2017	Childcare Network/Ages 5 – 8	Walking Eco Tour and paddleboating/Stormwater, history, plants animals of GFL/GFL	22
6/23/2017	Childcare Network/Ages 9 – 12	Walking Eco Tour and paddleboating/Stormwater, history, plants animals of GFL/GFL	15

6/26/2017	Alcami Learning Center/Ages 5 – 12	Walking Eco Tour/Stormwater, history, plants animals of GFL/GFL	30

Public Involvement/Volunteer Efforts *Total Allocated Cost: $7230*

Encourage public involvement by engaging city residents/businesses/civic groups in a volunteer Storm Drain Marking program in the city to educate the community about stormwater pollution. A minimum of 2 separate volunteer days is required.
For each outing day, a minimum of 7 markers will be applied per volunteer group and educational doorhangers will be distributed to surrounding residences/businesses. Staff will assist in identifying areas to mark drains, educate volunteers about the purpose of the program, train volunteers in marking and safety, use supplied markers, and help provide oversight of the program. A trained CFRW staff member is required to be present during all storm drain marking activities and with each volunteer group. **($700)**

April 1 - June 30, 2017

Storm Drain Marking			
Date	**Name of Volunteer Organization, Business, etc.**	**# of Volunteers**	**Specific Area Marked / # of Storm Drains Marked**
6/12/2017	CFRW Members	5	14
6/12/2017	Camp Climb	7	5

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, and the Cape Fear River. 10 monthly clean-ups will be completed including at least one site for Big Sweep, an annual international clean-up. A field trip will be conducted by the city with CFRW, as necessary, to point out the specific tributaries/areas to focus cleanups.

In order to avoid duplication of cleanup activities, CFRW will provide a schedule to City Stormwater Services at least 2 months in advance of proposed cleanup event locations. CFRW will inspect these sites in advance to make sure the area is actually 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 cleanups by CFRW from the property owner. These "written permissions" should be included on the end of the year compilation CD.

Efforts should be made to inform the local media about upcoming cleanup events. In addition, significant water quality problems identified during cleanups will be reported *immediately* to the appropriate officials, including the city's Stormwater Compliance Officer.

A summary of each clean-up will be completed and submitted to Stormwater Services. *Reports will be submitted using the supplied template and within 10 days of the cleanup event.* Reports will include: the specific watershed, the location within the watershed that was cleaned, number of participants, hours worked, estimate of the quantity of waste materials removed, photographs to

document work completed including before and after of site, volunteer photos, and documentation of efforts to secure volunteers and contact the media. **($5430)**

July 1 - September 30, 2016

Watershed Clean-ups				
Date	**Watershed**	**Specific Area Cleaned (List map # and specific location cleaned)**	**Trash Collected (ie. # of 30 gallon bags, and type of trash collected)**	**# of Volunteers/ Total Volunteer Hours Contributed**
8/13/16	Burnt Mill Creek	McCumbers Ditch/Location #10	-Two 96 Gal. Trash Bins were filled with trash -One 96 Gal Bin was filled with recyclables Bags of various clothing items and a mattress cushion	9 Volunteers/18 volunteer hours
9/17/16	Greenfield Lake	Greenfield Lake in its entirety and nine other locations as part of The Big Sweep	(GFL ONLY) -Three 96-gallon trash bins were filled -Three 96-gallon recycle bins were filled -A suitcase was also pulled from the lake *Hundreds of pounds of trash/recyclables collected from all sites.	GFL - 22 Volunteers/ 66 volunteer hours. Big Sweep -Over 200 Volunteers/400 volunteer hours

October 1 - December 31, 2016

Watershed Clean-ups				
Date	**Watershed**	**Specific Area Cleaned (List map # and specific location cleaned)**	**Trash Collected (ie. # of 30 gallon bags, and type of trash collected)**	**# of Volunteers/ Total Volunteer Hours Contributed**
10/29/2016	Burnt Mill Creek	Burnt Mill Creek- Location #9- Dead end at Shirley Dr.	1 96-gallon trash bins were filled 1 96-gallon recycle bins were filled	10 Volunteers/20 volunteer hours.
11/12/2016	Greenfield Lake	Lower Willard Pond, intersection of 16th and Willard St/ Location #3	16 30-gallon bags, 10 13-gallon bags (recycling), 1 tire, 1 bucket, couch, wrappers, bottles	17 Volunteers/34 volunteer hours.
12/10/2016	Drains to CFR	Drain to CF #2— Burnet Blvd, across from Adams St, next to Cape Fear Outdoor Equipment	2 full 96-gallon bins of Recycling 1.5 full 96-gallon bins trash	6 volunteers/12 volunteer hours

January 1 - March 31, 2017

Watershed Clean-ups				
Date	**Watershed**	**Specific Area Cleaned (List map # and specific location cleaned)**	**Trash Collected (ie. # of 30 gallon bags, and type of trash collected)**	**# of Volunteers/ Total Volunteer Hours Contributed**
1/21/2017	Burnt Mill Creek	BMC #4— Drainage ditch that runs behind Jacksons BBQ	1 full 96-gallon bins of Recyclable materials 1 full 96-gallon bin of trash	10 Volunteers/20 volunteer hours
2/11/12017	Burnt Mill Creek	BMC#9 – Dead end at Shirley	45 bags of recycling, 40 bags of trash, 8 tires,1 cooler, Couch cushions, One City of Wilmington recycling bin	49 Volunteers/98 volunteer hours
3/11/2017	Burnt Mill Creek	BMC#10 - McCumbers	8 bags of recycling, 3 bags of	20 Volunteers/40

		Ditch	trash, 19 tires, Paint Bucket & Paint, 1 Plasma T.V, 1 Trash Can, 2 filled 96-gallon recycle bins, 3 filled 96-gallon trash bins	hours

April 1 - June 30, 2017

Watershed Clean-ups				
Date	**Watershed**	**Specific Area Cleaned (List map # and specific location cleaned)**	**Trash Collected (ie. # of 30 gallon bags, and type of trash collected)**	**# of Volunteers/ Total Volunteer Hours Contributed**
4/8/2017	Greenfield Lake	GFL Watershed #2 – 11th between Greenfield St. and Lakeshore Dr.	Five 96-gallon bins filled -3 Recycling -2 Trash	34 Volunteers/68 volunteer hours
5/13/2017	Greenfield Lake	GFL Watershed #5 -	Two- 96 Gallon Recycling bins filled Two- 96 Gallon Trash bins filled	13 Volunteers/26 volunteer hours
6/10/2017	Burnt Mill Creek	Location #3 & #6 - Kerr Ave Wetland area and dry ditch along McMillan Ave	Two 96-gallon bins of recycling Two 96-gallon bins full of trash 4 bags of miscellaneous trash	21 Volunteers/42 volunteer hours
6/24/2017	Greenfield Lake	Creek arm past Lion's Bridge and pavilion/playground area	Mostly cigarette butts. A cone and various trash. -4 96-gallon bins filled -2 Recycling -2 Trash	24 Volunteers/48 volunteer hours

Conduct a volunteer watershed monitoring program and alert Stormwater Services when volunteers find problem areas. Every other month Watershed Watch 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. Observation months are August, October, December, February, April, and June. The Creek Observation Monitoring Form with basic field observations and photo documentation will be submitted for review to Stormwater Services *within 10 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. In addition to CFRW staff and interns, Watershed Watch volunteers should include city residents to help satisfy public involvement objectives **($1100)**

July 1 - September 30, 2016

Watershed Watch Reports were submitted in August for Burnt Mill Creek/Downy Branch and also for Wrightsville/Dawson.

October 1 - December 31, 2016

Watershed Watch Reports were submitted in October and December for Burnt Mill Creek/Downy Branch and also for Wrightsville/Dawson.

January 1 - March 31, 2017

Watershed Watch Reports were submitted in February for Barnards Creek/Chula Vista and also for Medical Center Dr.

April 1 - June 30, 2017

Watershed Watch Reports were submitted in April and June for Burnt Mill Creek/Shirley Rd. and also for Hurst Branch/Maides Park.

Programs/Partnerships

Total Allocated Cost: $700

Serve as an active partner organization on local grant projects and initiatives that benefit local surface water quality and water resources. Examples include local grant projects in the Burnt Mill Creek Watershed, removing trash and performing light maintenance for existing BMPs, and the Smith Creek paddle trail creation. **($700)**

July 1 - September 30, 2016

Local grant initiative with CFRW partnering with UNCW Department of Biology and Marine Biology and US Fish and Wildlife Service on project investigating the cause of harmful algal blooms within the Cape Fear River.

October 1 - December 31, 2016

Local grant initiative with CFRW partnering with UNCW Department of Biology and Marine Biology and US Fish and Wildlife Service on project investigating the cause of harmful algal blooms within the Cape Fear River.

January 1 - March 31, 2017

Local grant initiative with CFRW partnering with UNCW Department of Biology and Marine Biology and US Fish and Wildlife Service on project investigating the cause of harmful algal blooms within the Cape Fear River.

April 1 - June 30, 2017

Local grant initiative with CFRW partnering with UNCW Department of Biology and Marine Biology and US Fish and Wildlife Service on project investigating the cause of harmful algal blooms within the Cape Fear River.
Local grant initiative with CFRW partnering with NAACP, New Hanover County Health Department, Duke University and Wake Forest University on project investigating subsistence fishing in the NE Cape Fear River.

Monitoring Activities

Total Allocated Cost: $950

Monitor and evaluate the condition of the Kerr Avenue Stormwater Wetland in August and January. Provide outreach/education for groups and/or surrounding businesses. A brief monitoring report will be sent via e-mail to Stormwater Services for the months of August and January. *Observations will be conducted between the 15th – 25th of these months and reports will be submitted using supplied templates within 10 days of observation*. The monitoring report will include observations such as water clarity, invasive species, algae, wildlife, maintenance and restoration opportunities, and photographs.

In addition, significant water quality problems identified during monitoring will be reported immediately to the appropriate officials including the city's Stormwater Compliance Officer.

Outreach and education activities for the Kerr Avenue Wetland may include presentations to groups, group cleanups (*independent of the 10 cleanups service*), and periodic outreach/education

for business owners/operators and property owners in close proximity to the KA Wetland. **($537.50 of which $250 is allocated for education)**

July 1 - September 30, 2016
A monitoring report for August was completed and submitted.

January 1 - March 31, 2017
A monitoring report for January was completed and submitted.

April 1 - June 30, 2017
Outreach was conducted in June for business owners/operators in close proximity to KA Wetland. 13 businesses were visited and brochures distributed.

Monitor and evaluate the condition of Greenfield Lake in August and January.
A brief monitoring report will be sent via e-mail to Stormwater Services for the months of August and January. *Observations will be conducted between the 15th - 25th of each month and reports will be submitted using supplied templates within 10 days of observation.* The monitoring report will include observations from specified locations around the lake highlighting water clarity, invasive species, algae, wildlife, spillway depth, maintenance and restoration opportunities, and photographs. In addition, significant water quality problems identified during monitoring will be reported immediately to the appropriate officials including the city's Stormwater Compliance Officer. **($412.50)**

July 1 - September 30, 2016
A monitoring report for August was completed and submitted.

January 1 – March 31, 2017
A monitoring report for January was completed and submitted.

Contract Administration

Total Allocated Cost: $1220

Quarterly progress reports and invoices will be submitted in accordance with the following provisions: *Quarterly reports and invoices are due within 10 days of the quarter end date and will follow templates and instructions set forth by Stormwater Services.* 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.

Submit cumulative quarterly progress reports and invoices according to the following quarters: July 1 - Sept 30; October 1 - Dec. 31; January 1 -March 31; April 1 - June 30. 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.

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 are received and reviewed by the City for adequate progress. Non-performance or inadequate progress may result in non-payment or reduction in payment. No pre-payment of services will occur.

CFRW will maintain all records and reports *(ie. annual contract, quarterly reports, quarterly invoices, monitoring reports, cleanup reports, Watershed Watch reports, educational activities, educational print materials, permissions, media notices, etc)* related to this contract on a fiscal year basis (July 1-June 30). These records should be retained for a period of at least 5 years. In addition, an annual compilation CD or DVD copy will be provided to the City of Wilmington Stormwater Services by July 10th for the prior FY. These files are public record and should be made accessible.

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 ($1220)**

Other:

Do not assign a cost.

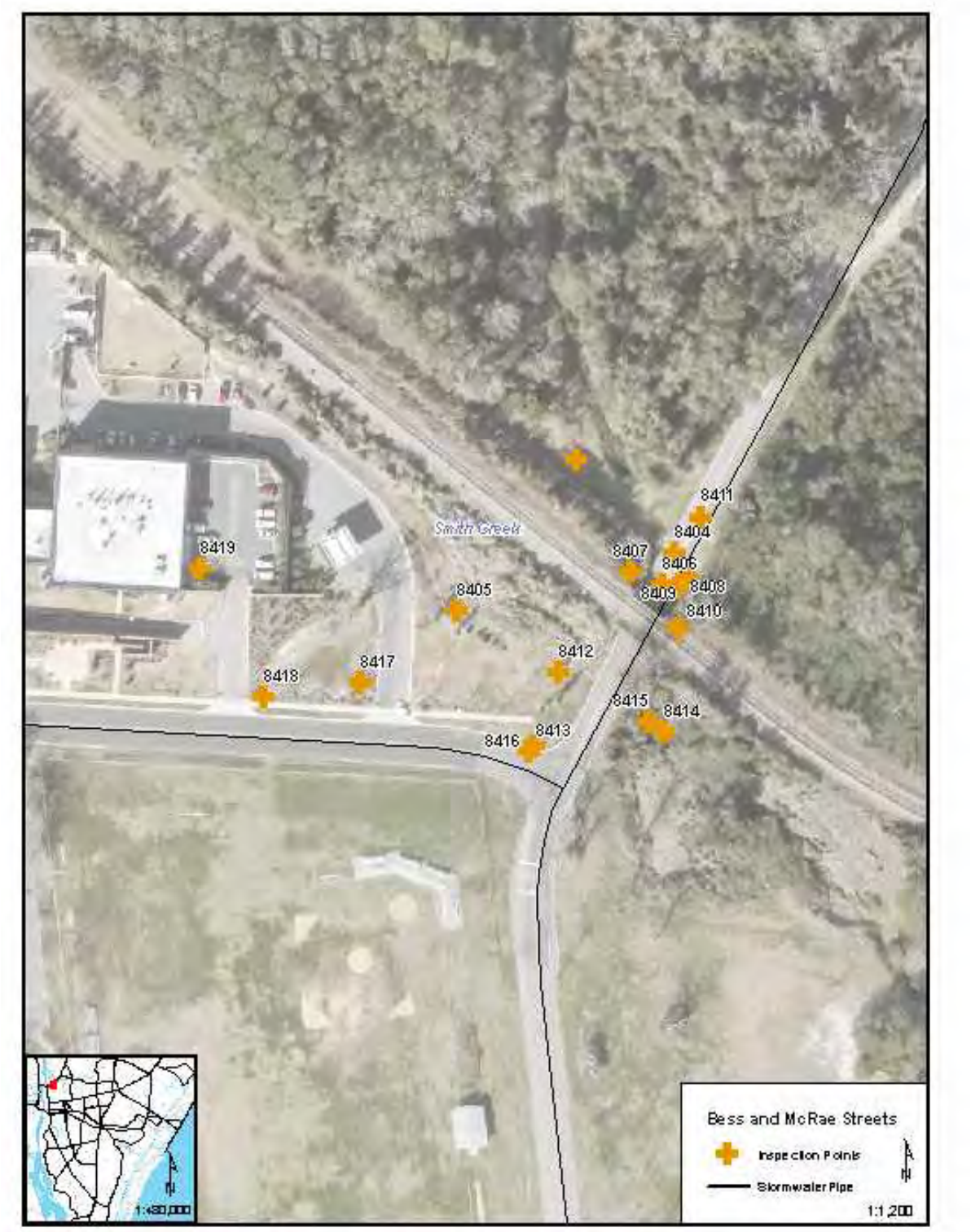
Assist Stormwater Services in implementing additional public outreach, education, involvement, and participation activities required by federal NPDES stormwater permit. Summary reports and information will be included in the City's NPDES yearly report to the State.

Report compiled by: Kay Lynn Hernandez **Date:** 06/30/2017

APPENDIX D: ILLICIT DISCHARGE DETECTION AND ELIMINATION (IDDE)

Dry Weather Flow Monitoring Location Maps

Drainage Segment Location *(description)*
Outfall (48") at MacRae Street, southward along MacRae St., then westward along Bess Street.



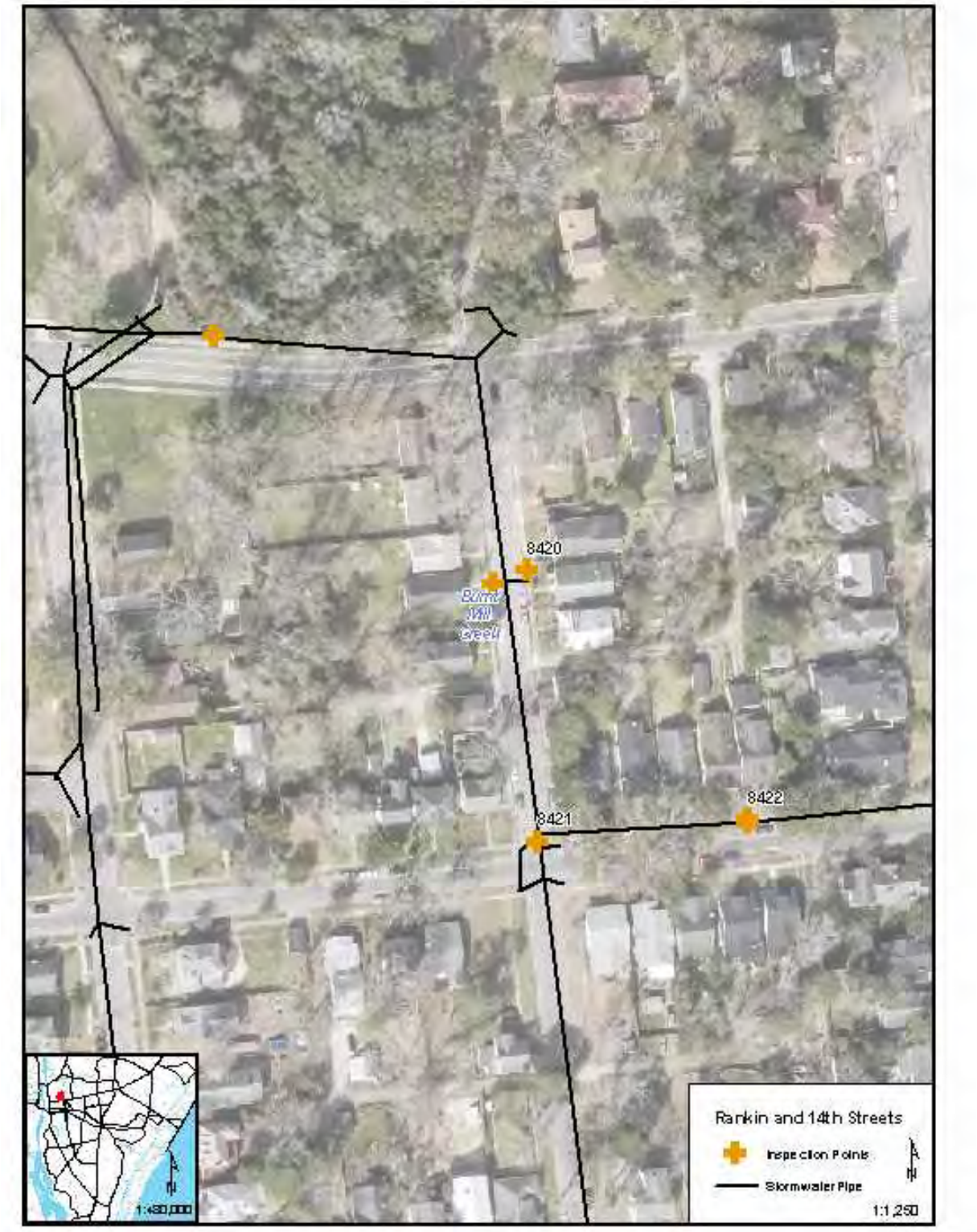
Drainage Segment Location *(description)*
42" RCP at Lake Shore Drive, westward to Legion Stadium.

Drainage Segment Location *(description)*
48” RCP at Lake Shore Drive, southward along open ditch.

Drainage Segment Location *(description)*
60” Outfall at Legion Stadium, eastward through property to ponds.

Drainage Segment Location *(description)*
30”RCP at West Lake Shore Drive, westward along Woodlawn Avenue.

Drainage Segment Location *(description)*
36” RCP pipe to Burnet Mill Creek, eastward along Rankin Street, southward along 14th Street, eastward along Grace Street.



Drainage Segment Location *(description)*
36” RCP at West Lake Shore Drive, southwestward along Hart Street to Carolina Beach Road.

Drainage Segment Location *(description)*
36” RCP on Carolina Beach Road, northward to Bordeaux Avenue, westward along Bordeaux Avenue.

Dry Weather Flow Inspection Point Table

OBJECTID	INSPECT_DA	INSPECTOR_	ILLICIT_DI	REFERRED	DESCRIPTIO
3981	4/10/2017	EP	NO INDICATION	NO	
3982	4/10/2017	CB	NO INDICATION	NO	
8004	4/11/2017	CB	NO INDICATION	NO	test1
8404	4/13/2017	EP	NO INDICATION	NO	
8405	4/13/2017	CB	NO INDICATION	NO	
8406	4/13/2017	CB	NO INDICATION	NO	
8407	4/13/2017	EP	NO INDICATION	NO	
8408	4/13/2017	CB	NO INDICATION	NO	
8409	4/13/2017	EP	NO INDICATION	NO	
8410	4/13/2017	EP	NO INDICATION	NO	
8411	4/13/2017	CB	NO INDICATION	NO	
8412	4/13/2017	EP	NO INDICATION	NO	
8413	4/13/2017	CB	NO INDICATION	NO	
8414	4/13/2017	EP	NO INDICATION	NO	
8415	4/13/2017	EP	NO INDICATION	NO	
8416	4/13/2017	EP	NO INDICATION	NO	
8417	4/13/2017	CB	NO INDICATION	NO	
8418	4/13/2017	EP	POSSIBLE DISCHARGE	YES	
8419	4/13/2017	CB	NO INDICATION	YES	
8420	4/13/2017	EP	NO INDICATION	NO	
8421	4/13/2017	EP	POSSIBLE DISCHARGE	NO	heavy flow
8422	4/13/2017	EP	NO INDICATION	NO	
3979	6/28/2017	CB	NO INDICATION	NO	
6947	4/13/2017	CB	NO INDICATION	NO	
7010	4/13/2017	CB	NO INDICATION	NO	
7019	4/13/2017	CB	NO INDICATION	NO	
22046	4/10/2017	CB	NO INDICATION	NO	
22244	4/10/2017	CB	NO INDICATION	NO	
22655	4/10/2017	EP	NO INDICATION	NO	heavy flow
22843	4/13/2017	CB	NO INDICATION	NO	
23243	6/28/2017	CB	NO INDICATION	NO	
23244	6/28/2017	CB	NO INDICATION	NO	
22543	6/28/2017	CB	NO INDICATION	NO	
21971	6/28/2017	CB	NO INDICATION	NO	has debris
22579	6/28/2017	CB	NO INDICATION	NO	lid needs to be reset
23643		CB	NO INDICATION	NO	
23644	6/28/2017	CB	NO INDICATION	NO	12in
23645	6/28/2017	cb	NO INDICATION	NO	
22391	6/28/2017	CB	NO INDICATION	NO	
21972		CB	NO INDICATION	NO	
22381	6/28/2017	CB	NO INDICATION	NO	
22646	6/28/2017	CB	NO INDICATION	NO	
22645	6/28/2017	CB	NO INDICATION	NO	
22438	6/28/2017	CB	NO INDICATION	NO	
22242	6/28/2017	CB	NO INDICATION	NO	
22741	6/28/2017	CB	NO INDICATION	NO	deep with flow
24043	6/29/2017	SC	NO INDICATION	YES	w to e flow
24045	6/29/2017	SC	NO INDICATION	NO	bolted manhole
24046	6/29/2017	SC	NO INDICATION	NO	ground water
24047	6/29/2017	SC	NO INDICATION	NO	strong indications of ground water verified by field crews
24443	6/29/2017	SC	NO INDICATION	NO	cross pipe present, also ground water indicated
24044	6/29/2017	SC	NO INDICATION	NO	dry

Employee Training

Employee training was conducted for Stormwater Services Field Staff and select Public Services Staff. Forty Four (44) individuals went through the training conducted on 2/23/17. Refresher training and education for existing staff will be updated as necessary and implemented every 1-2 years.

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) Derek Pielech
Stormwater Services Manager
910-341-5818
Derek.Pielech@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
Inspection Letter
Stormwater Detention Facility Compliance Inspection Report

Dates of Inspections	**December 2016**	**Jul./Aug. 2017**
Total # Sites Inspected	349	In Progress+
Response Letter Severity		
Level 1 (first letter)	40	TBD
Level 2 (second letter)*	0	TBD
Level 3 (third letter)**	0	TBD
# of Sites Requiring Maintenance	40	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 are in progress and will be included in next year's report

TBD = To Be Determined

SAMPLE LETTER

Date

«OWNER»
«CO_OWNER»
«OWN_ADDR»
«OWN_CITY», «OWN_STATE» «OWN_ZIP»

RE: Storm Water Maintenance Inspection - «SUBD_NAME»
(Parcel # «PIN»)

The City of Wilmington Storm Water Services Section has recently completed a routine inspection of the storm water management facilities at «SIT_ADDR» for the above referenced site. The facility was inspected for compliance with the operation and maintenance requirements as outlined in the City's Technical Standards Manual. The City will be conducting these inspections a minimum of twice a year. Our ---------- (date) inspection indicates that the storm water facilities at the above property does not comply with current maintenance standards as listed on the attached Compliance Inspection Report.

According to the storm water management specifications and standards and the inspection and maintenance agreement from the responsible entities, corrective action must be taken within a reasonable time period. The City will be reinspecting the above storm water facilities to track the progress of any corrective action. I will be happy to work with you toward a satisfactory resolution of this matter. If you have questions, please contact me at 341-4694. Your cooperation and assistance in the City's storm water management efforts is greatly appreciated.

Sincerely,

Jim Quinn
Stormwater Specialist
Stormwater Services

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: Jim Quinn Title: Stormwater Specialist

Summary of Plan Review Activities

Project Name	Project Type	Permit #	Permit Issue Date	Type of BMP	Perviou s (Y or N)	# of BMPs Onsite	Notes
AAI Pharma Headquarters	SWP HD	2016021	7/12/2016	Wet Pond	N	1	
NHRMC Additional Parking (Med Center Dr Lot)	Drain Plan	2016022	7/12/2016	PC Only	Y	0	5,917 sf PC
Hawthorne at the Station Exp	SWP HD	2013006R1	7/18/2016	None	N	0	No New SCM's
Matthews Motors	SWP HD	2016023	7/19/2016	Infiltration	N	1	Infiltration Trench
Summer Walk Ph I	SWP HD	2016025	8/5/2016	Infiltration	Y	6	6 Infiltration basins & 38,442 sf PC
Food and Beverage Complex Parking Lot	SWP HD	2016026	8/9/2016	Sand Filter	N	1	
Government Trade (aka Resource) Center	SWP HD	2016028	8/17/2016	Wet Pond	N	1	Upfit of existing NCDEQ Pond
Wells Insurance Office	Drain Plan	2016024	8/22/2016	PC Only	Y	0	10,076 sf PC
Port City Community Church Overflow Parking	SWP HD	2007004R1	8/23/2016	Wet Pond, Infiltration	N	2	1 WP, 1 Infiltration basin
Mayfaire Office IV	SWP offsite	2016027	8/23/2016	None	N	0	Mayfaire
Oleander Storage II	SWP HD	2016029	8/23/2016	Infiltration	N	3	3 Infiltration Basins
44 Darlington Storage Addition	Drain Plan	2016030	8/23/2016	None	N	0	
Paws and Claws	SWP HD	2016032	8/30/2016	Wet Pond	N	1	4,040 sf PC (unpermitted)
Element Barclay (aka Gallery Park Apts)	SWP offsite	2016033	9/1/2016	None	N	0	Barclay Pond
Government Center Apts	SWP offsite	2016034	9/8/2016	None	N	0	Racine Pond
Westprong Ph II	SWP HD	2003014R1	9/15/2016	SW Wetland, Wet Pond	N	2	Existing SW Wetland, New WDP
PNG Covered Storage Building	Drain Plan	2016035	9/28/2016	None	N	0	
Arbor Trace (aka Echo Farms Apartments)	SWP HD	2016010R1	10/4/2016	None	Y	0	No New SCM's
Embassy Suites Wilmington CC	SWP HD	2016036	10/5/2016	Proprietary	N	1	Contech Stormfilter
Carolina Bay at Autumn Hall	SWP HD	2012025R2	10/5/2016	None	N	0	Autumn Hall
Jacobs Ridge (Creek)	Drain Plan	2016038	10/11/2016	PC Only	Y	0	3,958 sf of Pervious Pavers
Ogden Market Place	SWP HD	2016039	10/20/2016	Wet Pond	Y	1	Wet Pond, 32,038 sf of PP
Square Two	Drain Plan	2016040	10/20/2016	None	Y	0	861 sf of PC
Med Express Parking	Drain Plan	2016041	10/24/2016	None	N	0	
Shipyard Village Apts	SWP HD	2016042	10/31/2016	Infiltration	N	4	3 Infiltration Basins, 1 Infiltration Trench
Carolina Oral & Facial Surgery	SWP offsite	2016037	11/14/2016	None	N	0	Silverstream (Upper Pond)
Matthews Motors	SWP HD	2016023R1	11/18/2016	None	N	0	No New SCM's
Masonboro Trace Subdivision	SWP HD	2016043	11/21/2016	Wet Pond	N	1	Wet Pond
Hawthorne at New Centre Clubhouse	Drain Plan	2016044	12/1/2016	None	N	0	Hawthorne at New Centre Pond
Masonboro Village Expansion	SWP HD	2005023R1	12/2/2016	None	N	0	No New SCM's
Arbor Trace (aka Echo Farms Apartments)	SWP HD	2016010R2	12/15/2016	None	N	0	No New SCM's
ALDI 98 College Waltmoor	SWP HD	2016045	12/16/2016	Wet Pond	N	1	Wet Pond
Ripley Oaks	Drain Plan	2016046	12/22/2016	None	N	0	
Wells Insurance Office	Drain Plan	2016024R1	12/22/2016	None	N	0	No New SCM's
Off the Hook Yachts Repair Garage	Drain Plan	2016047	12/30/2016	None	N	0	
Wilmington Treatment Center Expansion	SWP HD	2007064R1	1/13/2017	Infiltration	Y	1	New Infiltration Basin, 2,372 sf of PC
Sawmill Point (revision to clean up file)	SWP HD	2015007R1	1/13/2017	None	N	0	No New SCM's
Mayfaire Flats I (aka Westfall Park Apartments)	SWP offsite	2015030R2	1/13/2017	None	Y	0	Westfall Office Park Pond, 1,341 sf
							of additional PC (unpermitted)
Fortune Place Amenity	SWP HD	2014027R3	1/26/2017	None	N	0	No New SCM's
McDonald's 2702 S College	Drain Plan	2017002	1/26/2017	None	N	0	
Ocean Blue Pools & Spas	Drain Plan	2016005R1	1/26/2017	None	Y	0	1,476+/- sf of PC (unpermitted)
Gallery Park The Pointe at Barclay Phase II	SWP offsite	2016004R1	2/3/2017	None	N	0	Barclay West Pond
Four Seasons Site & Demo	SWP HD	2017001	2/10/2017	Wet Pond	N	1	
Riverlights Age Qualified Phase II & III	SWP HD	2017003	2/13/2017	Wet Pond, Infiltration	N	5	3 Wet Ponds, 2 Natural Infiltration Basins
Landfall Sports Ctr CC of Landfall	Drain Plan	2017004	2/13/2017	Infiltration	N	2	Infiltration Basins
TIME (aka North Third Infill)	Redev. Excl.	2017005	2/16/2017	PC Only	Y	0	1,400 sf of PC
Riverlights Age Qualified Ph 1	SWP HD	2016034R2	3/2/2017	None	N	0	No New SCM's
Riverlights Amenity Center (see AQ Ph 1 revision)	SWP HD	2016034R2	3/2/2017	None	N	0	No New SCM's
Neuwirth Annex	SWP offsite	2017007	3/2/2017	None	N	0	Racine Pond
Abbotts Run Clubhouse	Drain Plan	2017009	3/7/2017	None	N	0	
Lullwater Warehouse	Drain Plan	2017008	3/14/2017	None	N	0	
Flats at Main	SWP offsite	2017013	3/20/2017	None	Y	0	Westfall Office Park Pond, 25,305 sf of PC
							and 12,188 sf of Pervious SW (unpermitted)
H2 Turbo Wash	SWP HD	2017011	3/20/2017	Infiltration	Y	1	Infiltration Basin, 6,205 sf of PC
Spring Branch Parking Lot	Drain Plan	2017014	3/20/2017	None	N	0	
College Park Elementary	SWP HD	2017012	3/22/2017	Wet Pond	N	4	2 Wet Ponds (permitted) 2 Infiltration Basins (unpermitted)
Wells Insurance Office	Drain Plan	2016024R2	3/24/2017	None	Y	0	2 NCDOT Infiltration Basins
Square One Infill	SWP HD	2017015	3/28/2017	Infiltration	Y	1	20,573 sf of PC, Rain Garden
Burnt Mill Business Park, Lot 22	SWP offsite	2017016	3/28/2017	None	N	0	Burnt Mill Business Park Pond
Family Fare	SWP HD	2017017	4/4/2017	Wet Pond	Y	1	Wet Pond, 1,116 sf of PC (unpermitted)
COW Fire Station 5 Shipyard	SWP HD	2017018	4/4/2017	Infiltration	Y	1	Infiltration Basin, 2,596 sf of PC (unpermitted)
NHRMC Employee Deck Parking	SWP offsite	2017019	4/13/2017	None	N	0	Hospital Plaza Pond
Ogden Market Place	SWP HD	2016039R1	4/13/2017	None	N	0	No New SCM's
Matthews Motors	SWP HD	2016023R2	4/20/2017	None	N	0	No New SCM's
Masonboro Place (aka Blanchard Division)	Drain Plan	2017021	5/2/2017	None	N	0	
Dungannon Village-Autumn Hall	SWP offsite	2016015R1	5/2/2017	None	N	0	Autumn Hall Pond B
Mayfaire Office V & VI	SWP offsite	2017020	5/9/2017	None	N	0	Mayfaire Pond 6
Fortune Place II	SWP HD	2014027R3	5/31/2017	Wet Pond	N	1	new Wet Pond
LIDL - Arbor Commons	SWP offsite	2017022	6/14/2017	None	N	0	Preston Woods Pond
Rimel Warehouse	Drain Plan	2017025	6/22/2017	None	N	0	
The Vault on 17th (aka 17th Street Mini Storage)	SWP HD	2017023	6/22/2017	Infiltration	N	1	Infiltration trench
YMCA Market St Exp	SWP HD	1996041R1	6/27/2017	Infiltration	Y	1	Infiltration Basin, 7983 sf of PC
S&H Center Development	SWP offsite	2017026	6/29/2017	None	N	0	Stokely center (now S&H) pond
Ville Terrace	Drain Plan	2017024	6/30/2017	None	N	0	

APPENDIX G: POLLUTION PREVENTION & GOOD HOUSEKEEPING FOR MUNICIPAL OPERATIONS

Form G-7

Sheet 1 of 1

EMPLOYEE TRAINING CHECKLIST

TRAINING TOPIC	SCHEDULE	ATTENDEES
NPDES PERMIT REQUIREMENTS Purpose of NPDES Program Permit Conditions	Annually	Members of Pollution Prevention Team
STORMWATER POLLUTION PREVENTION PLAN Purpose of SPPP Identification of potential pollutant sources Methods to reduce pollutants in stormwater Best Management Practices	Annually	Members of Pollution Prevention Team
SPILL PREVENTION AND RESPONSE PLAN Identification of potential spill areas Location of potential pollutant sources Spill response team Spill response procedure Spill response equipment Spill reporting procedure	Annually	All employees (other than administrative)
PREVENTATIVE MAINTENANCE Identify equipment (if any) Facility inspection requirement and schedule Documentation	Annually	All employees (other than administrative)
GOOD HOUSEKEEPING PROGRAM Regular cleanup procedures Material storage practices Facility inspection requirement and schedule Documentation	Annually	All employees (other than administrative)

The employee signature below indicates completion of the Stormwater Pollution Prevention training program.

Employee Signature: _____

Type/Print Employee Name and Title: JOHN P. FORTUIN

Date Training Received: 8/12/16

Instructor: _____

APPENDIX H: TOTAL MAXIMUM DAILY LOADS (TMDL)

Bradley & Hewletts Creek Watershed Restoration Plan

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

DATE OF EVENT/ ACTIVITY	EVENT/ACTIVITY	AUDIENCE	DELIVERED BY (AGENCY)	METHOD OF DELIVERY / MESSAGE	ATTENDANCE/ PARTICIPATION
Events					
3/24/2017	CFCC Sustainability Festival	Cape Fear Community College students and area residents	Heal Our Waterways	BMP and HOW program discussion with students and citizens	100-200 Cape Fear Community College students and community members
4/22/2017	Earth Day Festival	General Public	Heal Our Waterways	BMP and HOW program display aligning with theme "Building a Better Word" through stormwater reduction	5,000+ Wilmington area residents in attendance
Presentations					
10/28/2016	Lower Cape Fear Stewardship Development Awards site judging presentation	Local environmental professionals	Heal Our Waterways	Site tour/presentation	15 individuals
11/21/2016	Heal Our Waterways BMP presentation to Sierra Club	Sierra Club members and general public	Heal Our Waterways	PowerPoint presentation	30 individuals
1/25/2017	Heal Our Waterways presentation to UNCW Office of Sustainability	UNCW faculty, staff, and student	Heal Our Waterways	Verbal presentation	4 individuals
1/31/2017	Heal Our Waterways presentation to Cape Fear Public Utility Authority	Cape Fear Public Utility Authority employees	Heal Our Waterways	Verbal presentation	17 individuals
2/24/2017	Lower Cape Fear Stewardship Development awards ceremony	Local environmental professionals and business people	Heal Our Waterways	Raintree subdivision wetland project granted recognition of excellence	76 people
Informational Website					
Relaunched July 2016 Completed Feb. 2017 Ongoing	Heal Our Waterways informational website healourwaterways.org	Watershed residents General public	Heal Our Waterways	Newly redesigned, dedicated Heal Our Waterways website	1,044 unique page views since City website re-launch in July 2016 1,299 total page views since re-launch
8/11/2016	City of Wilmington News Story	Online readers General public	Communications Div.	News article published online - New Rain Garden	City News viewers
12/05/2016	City of Wilmington News Story	Online readers General public	Communications Div.	News article published online - Stormwater Garden Installed	City News viewers

3/22/2017	City of Wilmington News Story	Online readers General public	Communications Div.	News article published online - City of Wilmington Receives 3 Sustainability Awards	City News viewers

Media Advertising Campaigns

Ongoing	City of Wilmington YouTube.com Channel	YouTube.com viewers	WECT staff	Downspout disconnection public service announcement with local celebrity news anchor, Jon Evans	Inform public about re-routing downspouts to let water soak in instead of run off
March - May 2017	WECT TV-6	WECT web and mobile viewers	WECT	Web and mobile digital platforms: Video ads Skyscraper ads Mobile ads Video pre-roll ads Media banner Weather Channel	Target Audience: General public, homeowners TV Reach: 74% for viewers age 35-64 Web & Mobile Reach: 250,000 unique visitors per month and 1.9 million average page views per month Total cost: $4,530
April 2017	Fairway Outdoor billboards, 2 locations	Wilmington area motorists, area residents	Fairway Outdoor	Downspout disconnection billboard directing viewers to access the HOW website	Target Audience: Watershed area motorists Reach: Advertisement aired for eight seconds every minute for 28 days in 2 busy locations Total cost: $2,438
November - January 2016/2017	WHQR Radio 91.3 FM	Radio listeners	WHQR	Local NPR affiliate underwriting message twice every weekday at peak drivetime hours 120 total ads	Target Audience: General public, homeowners Reach: 40,000 listeners per week Total cost: $1,680

News Coverage

July 2016	Article in "Changing Tides" newsletter	Home and property owners adjacent to New Hanover County easements	New Hanover Soil and Water Conservation District	Print article - Overview of Heal Our Waterways program and HOWBMP promotion	Approx. 230 readers per issue
11/21/2016	Promotion for Sierra Club presentation	WHQR Listeners	WHQR Radio host	Radio	5,714 listeners/day
2/28/2017	TWC News Story	Cable viewers Online readers General public	TWC News reporter	Cable news piece, also published online - Residents and City officials get down and dirty	TWC News viewers, online news readers
5/15/2017	NCCF Coastal Review Online	Online readers General public	NCCF Coastal Review reporter	News article published online - Wilmington Stormwater Efforts Recognized story	Coastal Review Online viewers

Social Media Campaigns

Ongoing	Twitter site campaign	Twitter followers Interested public	Heal Our Waterways	Dedicated Heal Our Waterways account handle	Currently have 203 followers
Ongoing	Facebook site campaign	Facebook followers Interested public	Heal Our Waterways	Dedicated Heal Our Waterways page	Currently have 148 page "likes", 149 followers

Distributing promos/giveaways

3/24/2017	CFCC Sustainability Festival giveaways	Cape Fear Community College students and area residents	Heal Our Waterways	Educational giveaways distributed with information about HOW, BMPs, and stormwater Additional giveaways distributed to raise program awareness	Cape Fear Community College students and community
4/22/2017	Earth Day Festival rain barrel and native plant giveaways, sponsorship	Earth Day festival attendants, community members	Heal Our Waterways	Four winners were drawn from entires collected at Heal Our Waterways display throughout the event. Winners received phone call notification to collect their plant or rain barrel	5,000+ Wilmington area residents in attendance Roughly 200 entries to giveaway drawing Sponsorship cost: $700

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 public service announcement with local celebrity news anchor Jon Evans	Inform public about re-routing downspouts to let water soak in instead of runoff

Watershed Resident Mailings, Displays, Signs, Pamphlets

10/20/2016	Targeted direct mail	Residents in Bradley & Hewletts Creek Watersheds and ICW direct drainage areas	Heal Our Waterways	Auto/boat fluids	17,390 mailings to inform residents of proper motor fluid disposal, impacts upon our waterways, and ways to prevent spills
5/19/2017	Targeted direct mail	Residents in Bradley & Hewletts Creek watersheds and ICW direct drainage areas	Heal Our Waterways	Pesticides	17,390 mailings to inform residents of the harms of pesticides in our waterways and less harmful alternatives

Newsletters and E-newsletters

12/22/2016	Constant Contact Newsletter	Glen Meade Neighborhood pre-test survey respondents	Heal Our Waterways	E-newsletter with upcoming project information Thank you for taking our survey message	10 residents
2/23/2017	Constant Contact Newsletter	Glen Meade Neighborhood Residents	Heal Our Waterways	E-newsletter invitation to attend and assist with bioretention plantings	11 residents
3/24/2017	Constant Contact Newsletter	Glen Meade Neighborhood pre and post-test survey respondents	Heal Our Waterways	E-newsletter with project completion update and giveaway winner announcement	13 residents

Spring 2017	City of Wilmington: Stormwater Watch Newsletter article	Wilmington area residents Stormwater Watch readers	Stormwater Services Communications Div.	Newsletter article featuring HOW program outreach and BMP installations	40,000+ newsletters mailed to city residents

Grant Projects

Began Jan 2015 (1st year of 2.5 year grant)	EPA 319 Grant NCSU Hewletts Creek Watershed BMP Installations (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 August 2015	EPA EEG Grant Lynnwood bioretention area	Hewletts Creek, Glen Meade residents residing within Hewletts Creek Watershed	NCCF NCSU Stormwater Services Heal Our Waterways	Bioinfiltration area installed to reduce runoff volume in Glen Meade Neighborhood **Outreach Campaign:** Educational doorhangers and postcards sent to residents about upcoming BMP installation Awareness visits conducted to discuss installation with four adjacent residents Signage posted at site of BMP about intended use and functionality Trifold mailer sent to encourage neighborhood attendance of planting day and advertising rain barrel giveaway Pre-test and post-test surveys collected and designed to assess effectiveness of HOW educational outreach campaign	Collaboration to design and construct project **Outreach Campaign Results:** 86 doorhangers distributed 86 postcards sent 86 trifold mailers sent 86 pre-test surveys sent, 9 undeliverable, 16 completed and returned 86 post-test surveys sent, 8 undeliverable, 19 completed and returned One randomly selected survey respondent won a gift card for each survey group (pre and post-test winners) Survey analysis of both surveys completed and final report compiled. Four randomly selected residents won rain barrels at planting day
Began December 2016	Green Infrastructure Center Tree Grant	Citywide	GIC City Planning, Stormwater, Parks	Citywide study to look at tree canopy and opportunities to use trees to mitigate stormwater	Collaboration with the Green Infrastructure Center, and City Planning, Stormwater, and Parks Divisions
Began April 2017	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

Watershed Coordinator Training and Networking Events

8/16/2016	What to Expect From Your Website Webinar	Watershed groups nationwide	Water Words that Work	Webinar	64 professionals
8/31/2016	Bacteria Monitoring Webcast	Water quality professionals nationwide	Center for Watershed Protection	Webinar	47 professionals
9/7/2016	Water Quality Task Force Meeting	Local water quality professionals	New Hanover County (Host)	Meeting to discuss recent local water quality work done	13 professionals
10/25/2016	Monitoring Stormwater Projects Webinar	Stormwater professionals nationwide	Watershed Stewardship Network	Webinar	52 professionals
10/26/2016	Trees in the City Webinar	Municipal entities	Water Words that Work	Webinar	55 professionals
11/15/2016	Building the Case for Green Infrastructure Webinar	Stormwater educators nationwide	US EPA	Webinar	73 professionals
2/17/2017	How Trees and Urban Forests Affect Stormwater Runoff	Professionals nationwide	USDA Forest Service	Webinar	267 professionals
3/16/2017	Website editor training	Interim HOW Watersheds Coordinator	City communications specialist	Orientation to web administration dashboard, tools, and materials for use on HOW page	Attended by Interim Watersheds Coordinator
4/6/2017	Property evaluation for BMP installation training	Interim HOW Watersheds Coordinator	Heal Our Waterways, HOWBMP (NHSWCD & Rainstorm Solutions)	Interim watersheds coordinator shadowed HOWBMP project managers on site assessment to learn procedure	Attended by Interim Watershed Coordinator

Weekly Update Articles for City Council / City Staff / Media

11/18/2016	Weekly Email Update	City Council Employees Media	City Manager's Office	Update alerting of upcoming BMP installation for Lynnwood EEG grant	All city staff, plus local media outlets
2/24/2017	Weekly Email Update	City Council Employees Media	City Manager's Office	Update on status of Lynnwood BMP installation - invitation to attend planting day	All city staff, plus local media outlets

Citizen Contacts- Site Visits

8/25/2016	Szmant HOWBMP Rain Garden site visit	Watershed resident	Heal Our Waterways NHSWCD	BMP and program discussion with homeowner	1 homeowner
8/31/2016	UNCW Catholic Campus Ministries HOWBMP Rain Garden site visit	UNCW students	Heal Our Waterways NHSWCD	BMP and program discussion with students at UNCW Catholic Campus Ministries	3 students
9/14/2016	HOWBMP Rain Garden preliminary site visit	Watershed resident	Heal Our Waterways NHSWCD	BMP and program discussion with homeowner	1 homeowner
10/25/2016	HOWBMP Rain Garden preliminary site visit	Watershed resident	Heal Our Waterways NHSWCD	BMP and program discussion with homeowner	1 homeowner

4/6/2017	3302 Kirby Smith Drive city-owned site visit	Kirby Smith Drive residents	Heal Our Waterways NHSWCD	Site visit to City-owned property adjacent to Cape Fear Public Utilities pump station and residences for BMP assessment	Kirby Smith Drive residents

BMP Projects Installed

Spring 2016	Longleaf Mall Bioretention area (NCSU EPA 319 grant)	Hewletts Creek Watershed	Heal Our Waterways, NC Cooperative Extension	Provide onsite stormwater infiltration and volume reduction	Total volume reduction: 2,236 cu ft.
8/15/2016	Greenville Loop Rd Infiltration Trench (NCSU EPA 319 grant)	Hewletts Creek Watershed	Heal Our Waterways, NC Cooperative Extension	Provide onsite stormwater infiltration and volume reduction	Total volume reduction: unknown at time of printing
8/25/2016	Szmant Residential Rain Garden (HOWBMP)	210 Braxlo Ln Hewletts Creek Watershed	HOWBMP (NHSWCD & Rainstorm Solutions)	Provide onsite stormwater infiltration and volume reduction; educate residents about BMP use	Total volume reduction: 186 cu ft.
8/31/2016	UNCW Catholic Campus Ministries Rain Garden (HOWBMP)	4802 College Acres Dr Bradley Creek Watershed	HOWBMP (NHSWCD & Rainstorm Solutions)	Provide onsite stormwater infiltration and volume reduction; educate University students about BMP use.	Total volume reduction: 64 cu ft. 147 cu ft.
Fall 2016	Shipyard Blvd Bioswale (NCSU EPA 319 grant)	Hewletts Creek Watershed	Heal Our Waterways, NC Cooperative Extension	Provide onsite stormwater infiltration and volume reduction	Total volume reduction: unknown at time of printing
2/28/2017	Lynnwood Bioretention Area (EPA EEG grant)	Hewletts Creek Watershed	Heal Our Waterways, NC Cooperative Extension, NC Coastal Federation	Provide onsite stormwater infiltration and volume reduction; educate public	Total volume reduction: 12,106 cu ft.
June 2017	Chappell Residential Rain Gardens (2) (HOWBMP)	3110 Scarborough Ln Hewletts Creek Watershed	HOWBMP (NHSWCD & Rainstorm Solutions)	Provide onsite stormwater infiltration and volume reduction; educate residents about BMP use	Total volume reduction: 145 cu ft. 79 cu ft.
June 2017	Richardson Residential Rain Garden (HOWBMP)	5091 Edinboro Ln Hewletts Creek Watershed	HOWBMP (NHSWCD & Rainstorm Solutions)	Provide onsite stormwater infiltration and volume reduction; educate residents about BMP use	Total volume reduction: 142 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

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

HOWBMP Quarterly Progress Report #4: April 1- June 30, 2017

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 contract 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 Program- Best Management Practice (BMP) Installations (HOWBMP) Program. The HOWBMP Program supports the Bradley & Hewletts Creek Watershed Restoration Plan with the goal of reducing polluted stormwater runoff into the creeks in order to improve water quality.

NHSWCD will provide project management and oversight for the installation of BMPs in conjunction with the Heal Our Waterways program. 'Project management' includes the execution of a BMP project from start to finish including 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 and monitoring.

BMPs will be identified in collaboration with the City and the GIS Atlas for the purpose of reducing runoff volume into Hewletts Creek, Bradley Creek, and the designated project areas draining directly into the Intracoastal Waterway. A potential BMP project's location, type, and proposed budget will require authorization from City Stormwater Services prior to any design or contracted work.

A recommended minimum of 2 volume-reduction BMPs and 8 downspout reroutes on private property will be installed during the contract period. However, collaboration and approval from the city would allow flexibility for unexpected project opportunities to deviate from the recommend minimum.

For each BMP project, NHSWCD will provide the city with the necessary project information to enter into the GIS Atlas to track volume reduction of stormwater runoff entering Hewletts and Bradley Creeks.

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 BMP sites.

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 contract period. NHSWCD will also reimburse the city for any returned funds from non-compliant property owners. NHSWCD will issue necessary 1099 tax forms to property owners that receive funded BMPs.

Reporting

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

Copies of invoices for BMP installations will be provided to the city with quarterly reports/invoices.

Quarterly reports and invoices for contract fees are due within 10 days of the quarter end date and will follow templates and instructions set forth by Stormwater Services. 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. Payment will be made within 30 days after receipt of an approved invoice.

Submit cumulative quarterly progress reports for work performed according to the following quarters: July 1 - Sept 30; October 1 - Dec. 31; January 1 -March 31; April 1 - June 30. The 4th quarter progress report will serve as a compiled year end summary report.

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 quarterly progress report and invoice are received and reviewed by the City for adequate progress. Non-performance or inadequate progress may result in non-payment. No pre-payment of services will occur.

NHSWCD will maintain all records, reports, and invoices 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. In addition, an annual compilation CD or DVD copy will be provided to the City of Wilmington Stormwater Services by July 10th for the prior FY. These files are public record and should be accessible.

Fee Schedule

Lump Sum: NHSWCD shall receive a lump sum of **$20,000** 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 quarterly reports/invoices.

Contract Fee: NHSWCD shall provide quarterly reports and invoices 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.

July 1 - September 30, 2016
Completed site visits for 5 sites total. Sites included 210 Braxlo Lane, 4802 College Acres Drive, 5091 Edinboro Drive, 3110 Scarorough Drive, and 3422 Tansey Close Drive. Rain gardens were installed at 210 Braxlo and 4802 College Acres Drive. Calculations of each project are attached. Rain gardens are planned for Edinboro and Scarorough Drive properties. After these projects are installed staff will assess the available funds left for a 5th project.

October 1 – December 31, 2016
Completed site visits for 4 sites. Sites included 5091 Edinboro Dr, 3110 Scarorough Dr, 3422 Tansey Dr, and 5087 Edinboro Ln. The contractor visited the first three sites and will develop plans for these sites.

January 1 – March 31, 2017
Communicated with contractor on status of projects visited last quarter. Waiting for designs to submit to city staff for approval.

April 1 – June 30, 2017
Completed 2nd visits with contractor to scope out next projects at 5087 Edinboro Ln and 3422 Tansey Dr. Also completed 2 sites total. Sites include 5091 Edinboro Lane and 3110 Scarborough Dr. Rain gardens were installed at each. Also completed annual spot checks for previously installed projects. Two needed maintenance, and will receive a letter giving the owners 30 days to complete the maintenance required. Remaining projects were not completed due to delay in installation due to rain and weather events.

Report compiled by: Dru Harrison **Date:** 6/30/17

APPENDIX I: REGULATORY ENFORCEMENT ACTIONS

In 16-17 the Public Services Department Compliance Officer provided stormwater education and investigated approximately 72 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 2016-2017

Reporting period (FY17) July 1, 2016- June 30, 2017

Nature of Complaint	Number of Reports	Resolved thru Public Educati	NOVs Incidents	Referred to DWQ	# Civil Penalties
Pet Waste	14	100%	0	N/A	0
Outreach	8		0	N/A	N/A
Illicit Discharge/Sediment	50	90.0%	5	3	0
Illicit Connection	*5*	*100.0%*	*0*	*0*	*0*
Dry Weather Flow	*1*	*100.0%*	*0*	*0*	
SSO	*7*	*100.0%*	*0*	*0*	*0*
Totals for 1,2 and 3	72	93%	5	3	0

CIVIL PENALTIES 2016-2017

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

DEFINITIONS: Nature of Complaint

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

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

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

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

SSO (Part 1, Sec.12-24)

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

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

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

Blockages (Part 2, Sec. 12-29)

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

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

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

APPENDIX J: MAJOR OUTFALL LOCATIONS AND DESCRIPTION TABLE

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.