CITY OF WILMINGTON, NORTH CAROLINA

STORMWATER MANAGEMENT PLAN

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

NPDES Permit No.: NCS000406

Reporting Year: March 1, 2011 – February 29, 2012

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.

_____ _____

David B. Mayes, P.E. Date
Manager, Stormwater Services

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 March 1, 2007. 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 March 1, 2011 to February 29, 2012.

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 and revised ordinances 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

STATUS OF IMPLEMENTATION

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.
- Finalization of the stormwater infrastructure mapping for selected portions of the City where mapping priorities are highest. Concurrent with this effort, major outfalls were located and verified according to standards for industrial or non-industrial source areas as required.
- Continuation of Public Outreach and Public Participation efforts.
- Finalization of Standard Operating Procedures Field Manual for stormwater maintenance activities for municipal operations.

Wilmington continues to move forward with implementing the necessary goals and objectives as outlined in their permit. Considerable progress related to Illicit Discharge Detection and Elimination has been made during the past two years and will continue to improve during the following years. We continue to have success with our public outreach and participation program and education to the public. The City remains focused on improving the water quality for the areas surrounding water bodies as indicated by UNCW's Center for Marine Science ambient monitoring of water quality on creeks within the City.

CHANGES/JUSTIFICATION

None during this time.

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 the Wilmington's Stormwater Services program:

MANAGEMENT AND 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 two 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

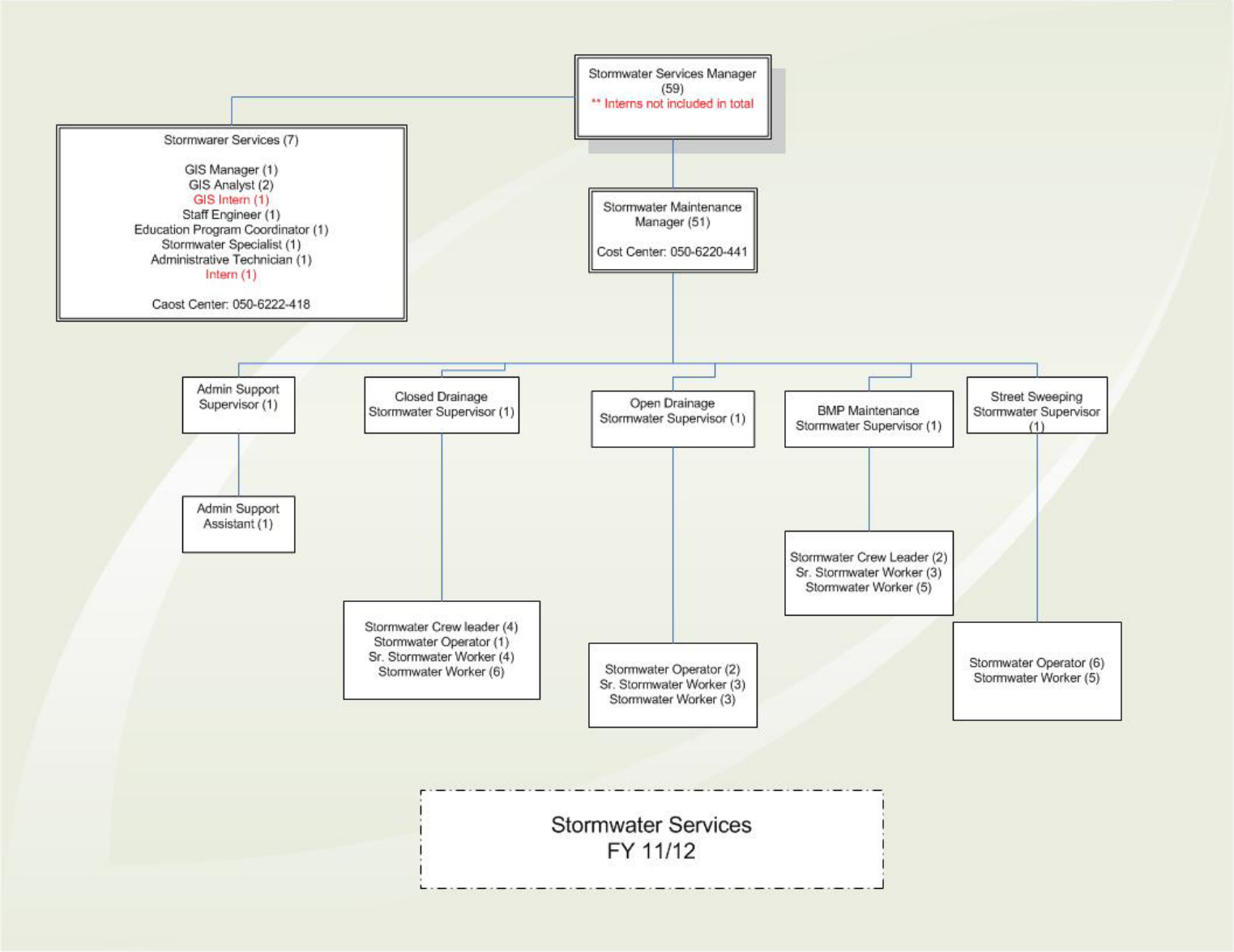
routes. BMP maintenance consists of activities necessary to keep over 40 ponds, wetlands, and bio-retention areas in fully-functioning condition.

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 12-13 Storm Water Management Fund Budget for NPDES

	FY 11-12 Adopted	FY 12-13 Estimated
REVENUES		
Storm Water Utility Fees	5,919,738	6,328,200
City Streets Storm Water Fees	1,627,935	1,764,682
Storm Water Discharge permits	20,000	20,000
NCDOT Drainage Maintenance	37,000	37,000
Transfer from Payment in Lieu	30,000	-
Interest Earnings	28,397	25,443
Miscellaneous	-	-
Appropriated Fund Balance	-	-
TOTAL REVENUES	7,663,070	8,175,325
EXPENDITURES		
Public Services	4,515,282	4,463,390
Nondepartmental	687,947	653,439
Debt Service	1,521,341	2,458,496
Contingency	75,000	100,000
Transfer to Capital Project Fund	863,500	500,000
TOTAL EXPENDITURES	7,663,070	8,175,325 [1]

NOTE: The FY 2013 Estimate is a preliminary draft budget and has not been presented to the Wilmington City Council.

*Source: HTE System Application

Regulatory and Enforcement

Public Services Code Enforcement

The City's new stormwater ordinance required by this permit is complete and has been effective beginning November 1, 2009. We continue to receive calls to the Stormwater Hotline and the webpage reporting form, and have had an increase in stormwater reports. All complaints received by the Stormwater Division either from the public or from City staff is investigated; corrective action is prescribed, and followed up to ensure resolution and documentation. A Penalty /Enforcement Guidance Matrix has been used to help with consistency and to guide through the decision making process for NOV 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, we have, and continue to, develop and distribute educational material to targeted populations in an aggressive manner. Consequently all complaints provide the opportunity to educate the public on the issues which threaten stormwater, the best management practices for prevention, the awareness of our city's stormwater program, and the new ordinance.

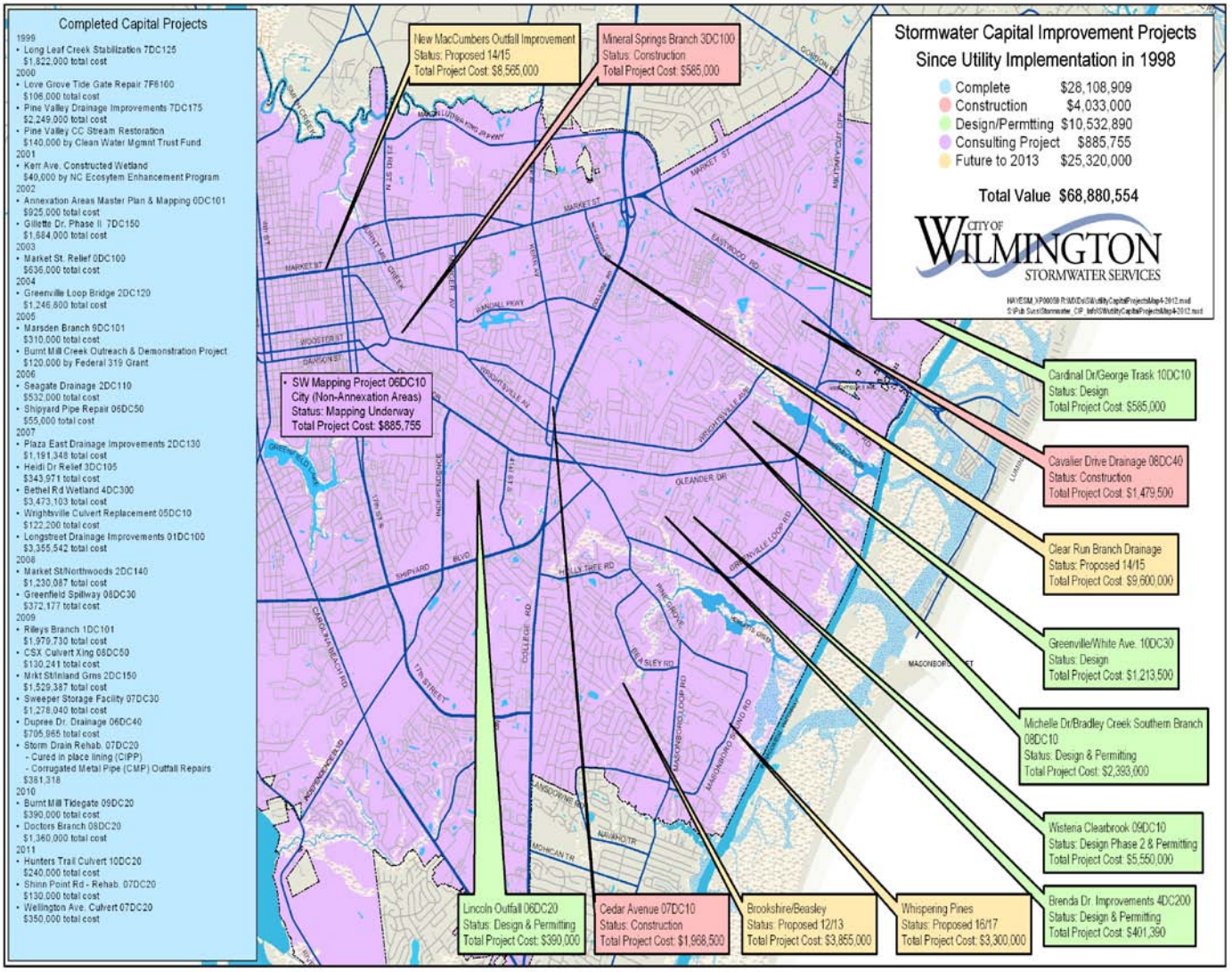
Cape Fear Public Utility

The Cape Fear Public Utility Authority currently employs 6 Environmental Compliance Officers that's duty it is to implement and enforce elements of the City's NPDES Wastewater Discharge Permit, 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. We are working together with them to keep open lines of communication, continue to build relationships and combine resources in a continued effort to locate chronic leaks and minimize release to MS4.

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

Capital Improvement Projects

Capital Projects Summary Map



In House Projects

Location	**Installed/Constructed**	**Description**	**Total Cost**
Pine Grove Dr.	Installed pipe, structures	1468 ft. pipe, 6 manholes, 5 drop inlets, 6 junction boxes	$344,651.58
12th & Dock St.	Installed pipe, structures	26 ft. pipe, set 2 filters boxes	$3,241.07
141 Cliffside Dr.	Installed pipe, structures	232 ft. pipe, 2 combination inlet, 1 yard inlet	$38,003.32
6904 Greenville Lp. Rd.	Installed pipe	13 ft. pipe	$2,539.93
4801 Park Ave.	Installed pipe	8 ft. pipe	$877.29
Water & Ann St.	Installed pipe, structures	24 ft. pipe, 1 manhole	$10,170.95
611 Wellington Ave.	Installed pipe, structures	212 ft. pipe, 3 manholes, 1 drop inlet	$30,905.34
1103 Windsor Dr.	Structure	1 drop inlet	$3,136.53
813 Wood Cove	Structure	1 drop inlet	$2,128.42
500 Blk 25th St.	Structure	2 manholes	$10,034.58
5th & Campbell St.	Structure	1 combination inlet	$2,051.41
5447 Overbrook Rd.	Structure	1 drop inlet	$1,414.84
300 Parkway Dr.	Structure	1 drop inlet	$355.37
			$441,510.63

Operations and Maintenance

Yearly Maintenance Activities Chart

Activity	Amount	Unit of Measure	Labor Hours	Total Cost
Repair				
Pipe failure	2,273	Ft.	573	$27,187.01
Erosion	142	Ea.	3,962.75	$127,701.91
				$154,888.92
Inspection				
BMP	230	Ea.	235	$4,912.36
Closed	10,355	Ft.	3,831	$97,811.43
Open	560		798.5	$17,937.30
Tide gate			43	$1,475.96
				$122,137.05
Maintenance				
BMP	669	Ea.	4,113.75	$118,238.22
Culvert	896	Ea.	450.5	$11,177.38
Ditch (manual)	323,621	Ft.	6,937	$157,832.16
Ditch (mech.)	14,081	Ft.	1,464	$74,517.79
Structure	11,026	Ea.	4,302.25	$111,817.85
Haul waste	645	Load	451.5	$17,692.51
Mowing	453,436.50	Ft.	2,120.25	$72,866.79
Pipe	148,605	Ft.	3,059	$83,231.55
Lake	36	Ea.	431.5	$13,279.91
Tide gate	20	Ea.	118.5	$2,797.92
Sweeping	11,925.65	Mile	6,510.50	$405,283.39
				$1,068,735.47

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 Kjeldahl 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 Watersheds Yearly Monitoring Report

ENVIRONMENTAL QUALITY OF WILMINGTON AND NEW HANOVER COUNTY WATERSHEDS, 2011

by

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CMS Report 12-01
Center for Marine Science
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http://www.uncw.edu/cms/aelab/

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Executive Summary

This report represents combined results of Year 13 of the Wilmington Watersheds Project. Water quality data are presented from a watershed perspective, regardless of political boundaries. The 2011 program involved 8 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 2011.

Barnards Creek – Barnards Creek drains into the Cape Fear River Estuary. It drains a 4,161 acre watershed that consists of about 17% impervious surface coverage, and a population of approximately 12,200. Water column sampling was not funded during 2011. However, Barnards Creek sediments were sampled for metals and toxic compounds at three sites on June 16. Metals were not problematic in the sediments of this creek. However, at one site a toxic compound, the polycyclic aromatic hydrocarbon (PAH) Benzo(a)pyrene, was elevated to levels known to impact the health of benthic aquatic organisms.

Bradley Creek – Bradley Creek drains a watershed of 4,631 acres, including much of the UNCW campus, into the Atlantic Intracoastal Waterway (ICW). The watershed contains about 23% impervious surface coverage, with a population of about 16,470. Three sites were sampled, all from shore. In 2011 there were two significant algal blooms recorded in the south branch of the creek on Wrightsville Avenue (BC-SB). Average dissolved oxygen was fair to poor at the three 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.

We collected sediment samples on May 31 throughout Bradley Creek for analysis of sediment metals and toxic compounds including polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs). Two tributary sites, BC-NBU (upper north branch) and BC-CA (creek passing under College Acres Ave.) had excessive concentrations of total PAHs, consisting mainly of Fluoranthene, Phenanthrene, Pyrene, Benzo(a)anthracene, and Chrysene. Metals were not at high concentrations in Bradley Creek sediments except for the marina site BC-76, where arsenic and copper were both at levels known to potentially cause problems to benthic organisms.

Burnt Mill Creek – Burnt Mill Creek drains a 4,252 acre watershed which is extensively urbanized (36% impervious surface coverage) into Smith Creek. Three locations were sampled during 2011. This creek had very poor water quality, with algal blooms occurring on several occasions at two of the three sites sampled, and high fecal coliform counts, with two of the three sites exceeding the human contact standard > 60% of occasions sampled. These levels of pollution have characterized the system for the past several years. Dissolved oxygen concentrations were fair in 2011.

The effectiveness of Ann McCrary wet detention pond on Randall Parkway as a pollution control device for upper Burnt Mill Creek was mixed for 2011. Comparing inflows to outflows, there was a significant increase in dissolved oxygen and pH, and significant decreases in conductivity and nitrate concentrations. Several water quality parameters showed a worsening in pollutant levels along the creek from where it exited the detention pond to the downstream Princess Place sampling station, including dissolved oxygen, fecal coliform bacteria, nitrogen and phosphorus.

Greenfield Lake – This lake drains a watershed of 2,551 acres, covered by about 36% impervious surface area with a population of about 10,630. This urban lake has, over the years, suffered from low dissolved oxygen, algal blooms, periodic fish kills and high fecal bacteria counts. The lake was sampled for physical parameters at three tributary sites and for all parameters at three in-lake sites. The three tributaries of Greenfield Lake (near Lake Branch Drive, Jumping Run Branch, and Lakeshore Commons Apartments) all suffered from low dissolved oxygen problems.

From 2005 to 2011, 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 many 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. In 2011 there was good to fair dissolved oxygen at two of the lake stations (especially nearest the SolarBees), but low dissolved oxygen concentrations were common at GL-2340, in the upper lake.

Algal blooms are periodically problematic in Greenfield Lake, and have occurred during all seasons, but are primarily a problem in spring and summer. In 2011 algal blooms did occur in the lake and increased over 2010, with a large blue-green algal bloom persisting for a number of weeks in mid-summer.

In the period 2007-2011 there was a statistically significant relationship within the lake between chlorophyll *a* and BOD5, meaning that the algal blooms are likely an important cause of low dissolved oxygen in this lake, along with stormwater runoff of BOD materials into the streams feeding the lake. Thus, a challenge for Greenfield Lake is to continue to reduce the frequency and magnitude of the algal blooms, which will lead to continuing dissolved oxygen improvements. High fecal coliform counts continue to periodically impact the lake, although average fecal coliform counts in 2010 were lower than in the previous two years. Non-point source pollution control should be targeted to reduce nitrogen, suspended materials and fecal bacteria to the lake.

Hewletts Creek – Hewletts Creek drains a large (7,435 acre) watershed into the Intracoastal Waterway. This watershed has about 19% impervious surface coverage with a population of about 20,210. In recent years this system has been plagued by a number of sewage spills. In 2011 the creek was sampled at four tidal sites and one non-tidal freshwater site. Incidents of severe hypoxia did not occur in 2011 as no concentrations sampled were below 4.0 mg/L. Turbidity was low and only one major algal bloom was seen in 2011 (at NB-GLR, the north branch at Greenville Loop Rd.). In 2011 fecal coliform bacteria counts were high in all areas of the creek. Counts exceeded State standards 29% of the time at SB-PGR (south branch at Pine Grove Rd.), 57% of the time sampled at MB-PGR (middle branch at Pine Grove Rd.), 71% of the time at NB-GLR and 100% of the time at PVGC-9, draining the Pine Valley Golf Club. The geometric mean at PVGC-9 doubled over 2010. There was a large rain event in April that led to NB-GLR, SB-PGR and PVGC-9 all having excessive counts that month.

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. A rain event sampling program was carried out in 2009-2010 to evaluate the efficacy of the wetland in reducing pollutant loads from the stormwater runoff passing through the wetland. High removal rates of fecal coliform bacteria were achieved (based on "first flush"), with an average load reduction of 99% and overall concentration reduction of > 90%. Particularly high (>90%) load reductions of ammonium and orthophosphate loads also occurred, and lesser but still substantial reductions of total phosphorus (89%) and TSS loads (88%) were achieved. Removal of nitrate was seasonally dependent, with lower removal occurring in cold weather and high percentage (90%+) nitrate load removal occurring in the growing season when water temperatures exceeded 15^{o}C. Since the principal source of impairment in Hewletts Creek is fecal bacteria contamination, and a secondary source is algal blooms (caused by nitrogen loading), this constructed wetland appears to be very successful in reducing both concentrations and loads of polluting substances to the receiving waters. Additionally, sampling data collected downstream of the wetland at Station SB-PGR showed a statistically significant decline in ammonium, nitrate and 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 3,518 acre watershed into the ICW. This watershed hosts a population of approximately 6,460 with about 19% impervious surface coverage. Three stations were sampled in Howe Creek in 2011. Only one major algal bloom was seen, at the uppermost station HW-DT. Both upper stations, HW-DT and HW-GP were rated poor for high fecal coliform bacteria counts, exceeding the state standard on 71% and 29% of the times sampled, respectively. The lower station HW-FP was rated good, not exceeding the standard in 2011. Dissolved oxygen concentrations were fair on average in Howe Creek in 2011. Since wetland enhancement was performed in 1998 above Graham Pond the creek below the pond at Station HW-GP has had fewer and smaller algal blooms than before the enhancement.

Motts Creek – Motts Creek drains a watershed of 3,328 acres into the Cape Fear River Estuary with a population of about 9,530. This creek was not sampled by UNCW in 2011.

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 13,896 acres that has about 28% impervious surface coverage, with a population of about 26,000. One estuarine site on Smith Creek, SC-CH, was sampled by UNCW under the auspices of the Lower Cape Fear River Program (LCFRP) 2011. Water quality at this site was poor in 2011, with the dissolved oxygen standard of 4.0 mg/L and the turbidity standard of 25 NTU both violated on 29% of occasions sampled. Fecal bacteria pollution worsened over 2010, violating the contact standard 57% of occasions sampled in 2011.

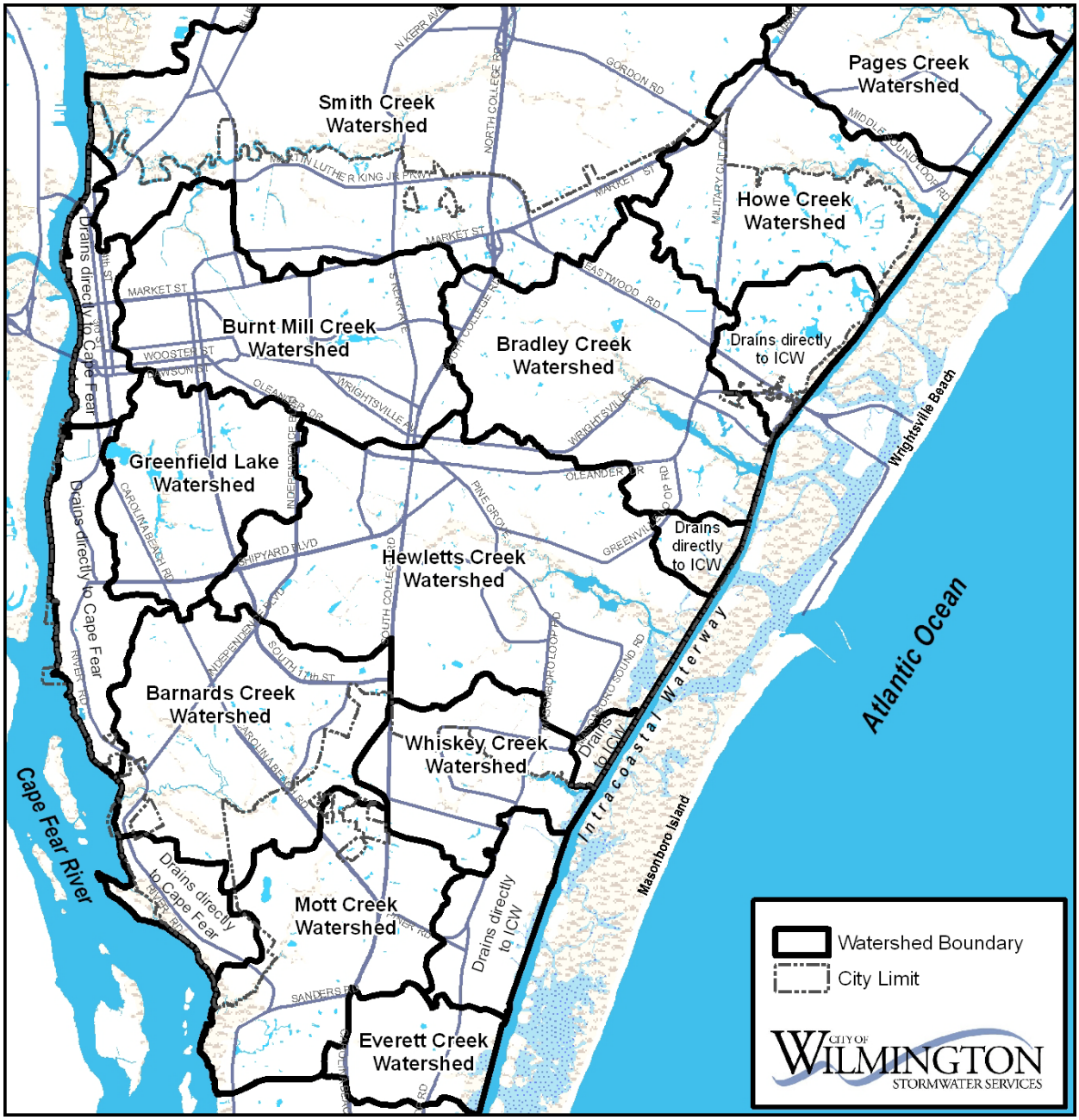
Whiskey Creek – Whiskey Creek is the southernmost large tidal creek in New Hanover County that drains into the ICW. It has a watershed of 2,095 acres, a population of about 8,000, and is covered by approximately 19% impervious surface area. One station, on Masonboro Loop Road, was sampled from shore along this creek in 2011. This site had low to moderate nutrient concentrations and no algal bloom problems. Dissolved oxygen was substandard (below 5.0

mg/L) on two of seven occasions sampled, whereas fecal coliform bacteria counts were below standard only once out of seven occasions in 2011.

Water Quality Station Ratings – The UNC Wilmington Aquatic Ecology Laboratory utilizes a quantitative system with four parameters (dissolved oxygen, chlorophyll *a*, turbidity, and fecal coliform bacteria) to rate water quality at our sampling sites. If a site exceeds the North Carolina water quality standard for a parameter less than 10% of the time sampled, it is rated Good; if it exceeds the standard 10-25% of the time it is rated Fair, and if it exceeds the standard > 25% of the time it is rated Poor for that parameter. We applied these numerical standards to the water bodies described in this report, based on 2011 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 (19 sites sampled for fecal coliforms) showed 11% to be in good condition, 16% in fair condition, but **73%** in poor condition, considerably worse than in 2010. Dissolved oxygen conditions system-wide (22 sites) showed 23% of the sites were in good condition, 32% were in fair condition, and 45% were in poor condition, a worse showing than in 2010. For algal bloom presence, measured as chlorophyll *a*, 56% of the 18 stations sampled were rated as good, 17% as fair and 28% as poor (mainly sites in Greenfield Lake, Burnt Mill Creek, and Bradley Creek). In terms of turbidity all 100% of the 22 sites sampled were rated as good. It is important to note that the two 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 – 36% impervious coverage; Greenfield Lake – 36% impervious coverage.

Wilmington Watersheds Map



NPDES STORWMATER PERMIT BMPs & 11/12 REPORTING

2011-2012 PROGRAM HIGHLIGHTS

Public Education & Outreach

- Targeted public outreach was conducted for specific audiences including painters, construction workers, and auto/vehicle professionals to inform them of the city's illicit discharge ordinance and proper business practices.
- 69 school presentations were conducted in 8th grade science classes serving approximately 2,040 students in New Hanover County Schools.

Public Involvement & Participation

- 8 watershed clean-ups and invasive species removal events were held utilizing 186 volunteers donating 355 hours of volunteer time, and netting 230 (30-gallon) bags of trash from March 2011-December 2011
- 16 calls were placed to the Stormwater Hotline (910-341-1020). See appendix C.
- 1 public meeting was held to involve citizens in the process to implement capital projects

Illicit Discharge Detection and Elimination

- Stormwater infrastructure mapping has continued with the goal of mapping the public drainage system throughout the City. Concurrent with this effort, major outfalls and receiving waterbodies have been mapped according to guidance for industrial or non-industrial source areas as required. The stormwater infrastructure data model accommodates multiple inspection records for any given outfall.
- Continued cooperative efforts with reporting and communication procedures with the Cape Fear Public Utilities Authority regarding sanitary sewer overflows to the City's stormwater system.
- Coordinated efforts with New Hanover County Health Dept. and the Cape Fear Public Utility Authority for identifying areas/properties where failed septic systems have been reported.

Post Construction Site Runoff Control

- Conducted bi-annual inspections on privately owned BMPs located within the City limits in order to ensure that maintenance requirements were being met by property owners. In August - September 2011, 315 sites were inspected with 38 requiring corrective action. In December -January 2011/12, 317 sites were inspected with 35 requiring corrective action.
- Continued implementing the City's amended 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 new Coastal Stormwater Legislation. City Council adopted new ordinance on September 15, 2009 (Sec. 18-737)

Pollution Prevention and Good Housekeeping

- Finalized Standard Operations Procedures for City Stormwater Maintenance Operations and created pocket field manual for stormwater field crews to begin utilizing.

- Received final Stormwater Pollution Prevention Plans for City Fleet Maintenance building and began implementing plans for site.

PUBLIC EDUCATION AND OUTREACH

1. Objectives for Public Education and Outreach

(a) Distribute educational materials to the community.
(b) Conduct public outreach activities.
(c) Raise public awareness on the causes and impacts of stormwater pollution.
(d) Inform the public on steps they can take to reduce or prevent 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 and shall notify the Division prior to modification of any goals.

BMP	Measurable Goals	YR 1	YR 2	YR 3	YR 4	YR 5
(a) Identify target pollutants and target pollutant sources	Identify the target pollutant and target pollutant sources the permittee's public education program is designed to address and why they are an issue.	X				

11-12 Accomplishments

A comprehensive summary of target pollutants, sources, and target audience is included in the Public Education & Outreach Appendix section. This summary identifies the non- point source pollutants that our public education program addresses, an explanation of why these particular pollutants were chosen, the target audience(s) for each pollutant, and suggested strategies for educating the public about each pollutant. Staff regularly uses the information as a guide for planning outreach and education efforts in the community.

12-13 Proposed Objectives

The target pollutant summary will continue to guide education and outreach efforts and will be modified and updated as audience demographics and other variables change over time.

(a) Identify target audiences	Identify the target audiences likely to have significant stormwater impacts and why they were selected.	X				

11-12 Accomplishments

A comprehensive summary of target pollutants, sources, and audiences is included in the Public Education & Outreach appendix. This section is updated as the target audience for each pollutant evolves and changes in our community. Technology is changing rapidly and the internet and social media continue to play a role in the evolution and demographics of the target audiences.

12-13 Proposed Objectives
Modify target audiences as they change over time. Monitor and adapt outreach strategies to access target audiences through the internet and social media outlets.

(b) Informational Web Site	Promote and maintain internet web site. Examples include, but are not limited to: Post newsletter articles on stormwater, information on water quality, stormwater projects and activities, and ways to contact stormwater management program staff.	X				

11-12 Accomplishments
The internet is a powerful tool for disseminating stormwater education and information. Stormwater staff continues to maintain and update our well-developed website on a regular basis. The website features stormwater education information, current news and events, capital project notices and descriptions, best management practices (BMPs), school programs, storm drain marking information, UNCW monitoring data, maintenance activities, educational print materials and videos (brochures, newsletters, local watershed map, posters, documentaries, PSAs, etc).

On the main webpage, the "What's New?" section has enabled staff to add pertinent and timely news. The "Capital Project Notices" section includes notifications and the status of current capital projects. The "Contact Us" page was updated to include the "Stormwater Calling Card" of helpful contact numbers within the city.

Promotion of the online pollution prevention reporting form and hotline was a priority this year. Staff distributed promotional items and gave presentations to staff in other departments and citizens highlighting the online form and hotline #. wilmingtonnc.gov/reportstormwaterpollution.

Teachers in 8th grade science classes can visit the dedicated Enviroscape website that has been established to provide them with resources related to the Enviroscape presentation. This web address is wilmingtonnc.gov/enviroscape

We will continue to promote and drive citizens to our website. The shorter web address (wilmingtonnc.gov/stormwater) has proven invaluable and easier for citizens to find our website. The address is included on all educational materials and media promotions.

12-13 Proposed Objectives
Continue to add relevant content to the website and work with the City's webmaster to provide better site navigation and content.

Staff would still like to roll out an online contest in which citizens would visit the Stormwater Services website to answer education questions. Staff would like to work with IT staff to refine the contest and modify website page navigation first.

(c) Develop and distribute public education materials to identified user groups. For example, schools, homeowners, and/or businesses.	Develop general stormwater educational material to appropriate target groups as likely to have a significant stormwater impact. Instead of developing its own materials, the permittee may rely on state-supplied Public Education and Outreach materials, as available, when implementing its own program.		X			

11-12 Accomplishments

Staff worked in coordination with Code Enforcement to develop targeted educational materials and direct mailings for distribution to painters, construction workers, and additional auto/vehicle professionals. A database was created and this information was mailed to these target audiences.

Staff worked in coordination with the Community Services Department, Parks Division, and Cape Fear River Watch (CFRW) to develop signage about not feeding alligators and waterfowl at Greenfield Lake. The signage was installed at various locations around Greenfield Lake and flyers were developed to distribute to lake patrons by CFRW.

The Homeowner and Structural BMP brochure was combined into one publication and was printed in late spring of 2011. A copy of the brochure was also posted on our website.

Cape Fear River Watch, a contracted agency, distributed brochures about Burnt Mill Creek and the Kerr Avenue Wetland, to businesses whose runoff drains into the wetland and creek.

12-13 Proposed Objectives

Continue to send targeted mailings in response to neighborhood and citizen complaints and code enforcement requests, as well as to target audiences identified by our education program.

(d) Media Campaign	Document campaign reach and frequency to public for each broadcast media like radio and TV, (including those elements implemented locally or through a cooperative agreement).			X		

11-12 Accomplishments

Stormwater Services funds an annual media outreach campaign focusing on major network and broadcast outlets including television, radio, and print media. Utilizing mass media outlets has proven to be an effective tool for targeting specific audiences with tailored stormwater messages. Stormwater Services has established valuable partnerships with media outlets which have enabled us to extend our dollars by receiving “buy one, get one free” ads or “comped” ads.

All stormwater videos (PSAs, slide shows, documentaries) are also posted on the Stormwater Services website for online viewing at any time.

This past year, Stormwater Services partnered with Wave Transit to post 2 stormwater posters inside 22 public transit buses. The ads featured a general message about where stormwater goes and an ad about cigarette butt litter.

Stormwater Services continues to partner with Going Green magazine on the "Stormwater 101" series. In 3 separate issues, we featured an article about Yard Waste, a Prevent Stormwater Pollution advertisement, and the Canines for Clean Water, a program encouraging pet owners to be responsible for cleaning up their pet's waste. In addition, a stormwater ad was featured in WECT's Cape Fear Lifestyles magazine.

Visit the Appendix to view media campaign information, including documented reach and frequency of each campaign.

12-13 Proposed Objectives

Work with Keep America Beautiful of New Hanover County to purchase an exterior bus advertisement featuring an anti-litter message on a WAVE Transit public transportation bus.

Utilize the City's Facebook page to submit stormwater content.

Continue to partner with Going Green magazine on the Stormwater 101 series.

Continue to purchase ad time on local television and radio stations to air stormwater PSAs.

Establish Hotline/Help line	Maintain a stormwater hotline/helpline.			X		

11-12 Accomplishments

The Stormwater Pollution Prevention hotline was established in January 2010 to field calls from the public reporting illicit discharges and 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 hotline reports from citizens. The hotline and online reporting form are advertised on the City's cable TV channel and through newsletters, public presentations, and educational promotion items. Fifteen calls were placed to the City's Stormwater hotline for this reporting year. The results of those calls are found in Appendix C.

12-13 Proposed Objectives

The hotline will continue to be advertised to the public and code enforcement staff will respond to phone and web reports.

Establish a Public Education and Outreach Program and implement within 12 months of the permit issue date.	The permittee's outreach program, including those elements implemented locally or through a cooperative agreement, must include at least two of the following:	X	X	X	X	X

	Newspaper articles, press releases and/or paid advertisements (i.e., inserts) Kiosks and signage Targeted direct mail Displays at the point-of purchase Utility bill inserts The permittee's outreach program, including those elements implemented locally or through a cooperative agreement, must include at least two of the following: Public meetings Community events Contest Storm drain marking Stream and Litter cleanups Group presentation and/or speeches The permittee's outreach program, including those elements implemented locally or through a cooperative agreement, must include at least three of the following: News coverage Workshops and class room outreach Distributing promotional giveaways and specialty items Brochures, displays, signs, welcome packets, and pamphlets Local cable access Newsletters For each media, event or activity, including those elements implemented locally or through a cooperative agreement, measure and record the extent of exposure.					

11-12 Accomplishments

Stormwater Services implements a variety of educational activities, above and beyond the required minimum guidelines established by our NPDES permit. These activities are listed in detail in the Public Education and Outreach Appendix.

12-13 Proposed Objectives

Continue to deliver Enviroscape watershed presentations to all 8th grade science classes in New Hanover County Schools through a partnership with outside agencies.

Take part in annual events like Earth Day and Paw Jam.

Utilize partner agencies to implement storm drain marking initiatives, staff trainings, stream and litter cleanups, and community pet waste education.

Publish the annual Stormwater Watch Newsletter in the spring edition of the citywide public information report.

PUBLIC INVOLVEMENT AND PARTICIPATION

1. Objectives for Public Involvement and Participation

Provide opportunities for the public, including major economic and ethnic groups, to participate in program development and implementation.
(b) Comply with applicable state and local public notice requirements.

2. BMPs for Public Involvement and Participation

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

BMP	Measurable Goals	YR 1	YR 2	YR 3	YR 4	YR 5
Administer a Public Involvement Program	Develop and implement a Public Involvement and Participation Program, as outlined in (b) through (e) below.	X	X			
Allow the public an opportunity to review and comment on the Stormwater Plan	Conduct at least one public meeting in year 2 to allow the public an opportunity to review and comment on the Stormwater Plan.		X			

A public meeting was held in year 2. However, the city conducts meetings for the public when seeking input or providing notification of capital projects. The city also mails notices to the public which includes project specifics, timeline, area affected, detour route, etc.

Organize a volunteer community involvement program	Organize and implement a volunteer stormwater related program, locally or through a cooperative agreement, to promote ongoing citizen participation. Examples include, sponsoring and participating in Big Sweep, Forming partnerships with local businesses, Adopt a stream, Adopt a street, promoting volunteer presentations, Creek crawls, storm drain stenciling, and poster contest	X				

11-12 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 activities. Both organizations sign an annual contract with specified deliverables that enable the City to meet many of its NPDES public education and involvement requirements.

This particular BMP is accomplished by CFRW & NHSWCD through activities such as volunteer watershed clean-up events (i.e. Big Sweep, invasive species removals), volunteer creek monitoring, wetland monitoring and plantings, educational workshops for the schools and the public, participation in the local stewardship awards program, eco-tours and high school Envirothons, installing a BMP demonstration site at a local school, website updates, and the installation of stormwater BMPs on citizen property through NCCCAP Program (administered by NHSWCD) and more.

Annual service contracts and a quarterly progress report for each agency are included in the Public Involvement and Participation Appendix.

12-13 Proposed Objectives

Continue to contract with outside agencies that help the city to fulfill NPDES public involvement and public education BMPs.

(d) Establish a mechanism for Public involvement	Establish mechanism for public involvement, for example, a citizens' or stakeholders' group(s) that provide input on stormwater issues and the stormwater program.	X				

11-12 Accomplishments

This year, staff engaged citizens and businesses through public notices and/or meetings for capital stormwater improvement projects in Shinn Point, Cavalier Drive, Winter Park, Hunter's Trail, Greenville Avenue, Inland Greens, and the Green Street BMP Project on 12th & Dock Streets.

Cape Fear River Watch utilized volunteers for watershed cleanups, invasive species vegetation removals, and creek monitoring.

Staff continues to partner with New Hanover Soil & Water Conservation District to offer a monthly rain barrel sale to the public on the 2nd Thursday of every month. This fulfills both a stormwater reduction and water conservation objective. In addition, a newly designed rain barrel was added to the sale inventory to the public.

Staff continued the Canines for Clean Water program to engage pet owners in signing a public pledge to clean up after their pets. Owners and dogs received a clean water bandana, dog bones,

pet waste brochure, water bottle, and other freebies. As an incentive, pet owners can submit photos of their pets as a Canine for Clean Water to post on our website. Staff attended several pet related events including the Pet Expo, Aunt Kerry's Pet Stop event, and Paw Jam.

12-13 Proposed Objectives

Implement Canines for Clean Water, rain barrel sale, storm drain marking and other volunteer initiatives (i.e. cleanups) in-house and through outside agency contracts.

(e) Establish Hotline/Help line	Maintain a stormwater hotline/helpline.			X		

11-12 Accomplishments

The Stormwater Pollution Prevention hotline was established in January 2010 to field calls from the public reporting illicit discharges and 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 hotline reports from citizens. The hotline and online reporting form are advertised on the City's cable TV channel and through newsletters, public presentations, and educational promotion items. Fifteen calls were placed to the City's Stormwater hotline for this reporting year. The results of those calls are found in Appendix C.

12-13 Proposed Objectives

The hotline will continue to be advertised to the public and code enforcement staff will respond to phone and web reports.

ILLICIT DISCHARGE DETECTION AND ELIMINATION

1. Objectives for Illicit Discharge Detection and Elimination

Detect and eliminate illicit discharges, including spills and illegal dumping to the Permittee's MS4.
Address significant contributors of pollutants to the MS4. The permittee may require specific controls for a category of discharges, or prohibit that discharge completely, if one or more of these categories of sources are identified as a significant contributor of pollutants to the MS4.
Implement appropriate enforcement procedures and actions.
Develop a base map showing an inventory of major MS4 outfalls to receiving state waters.
Establish procedures to continue to identify, locate, and update map of drainage system.
Inform employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste.

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**	**YR 1**	**YR 2**	**YR 3**	**YR 4**	**YR 5**
(a) Develop/Implement Illicit Discharge Detection and Elimination Program	Develop and implement an Illicit Discharge Detection and Elimination Program including provisions for program assessment and evaluation.			X		

11-12 Accomplishments
The City continued to address illicit discharges to the stormwater system and to protect public water and sewer systems under its Ordinance. This Ordinance change went into effect on November 1, 2009.

The City has finalized edits to the Illicit Discharge Detection Elimination (IDDE) Policy and Procedures manual. The purpose of this document is to provide field guidance and information for the effective and efficient implementation of the Illicit Discharge Detection and Elimination (IDDE) Program within the City of Wilmington. Updates were added for procedures for entering data into the City's tracking database *Intelligov.*

12-13 Proposed Objectives
Continue to implement the IDDE policy.

Continue training of City personnel on the IDDE policy.

Continue to work with CFPUA to address and improve (if needed) the documentation of SSOs to the City's stormwater system and continue with follow up field visits to insure proper monitoring procedures and clean up measures have been restored to pre-existing conditions.

Continue to utilize the amended Stormwater Ordinance to address the investigation, identification and elimination of illicit discharges and illicit connections reported to the City, or discovered through proactive inspection of stormwater system.

Continue to exercise the data extraction capabilities of the *Intelligov* database for more detail in assessment of the program. The *Intelligov* capabilities, for example, can help to sort data based on the assessment, reporting, and corrective actions involved with an incident. The City will evaluate this data while looking for areas of program improvements if necessary.

(b) Establish and maintain appropriate legal authorities	Establish and maintain adequate ordinances or other legal authorities to prohibit illicit discharges and enforce the approved Illicit Discharge Detection and Elimination Program.			X		

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.

12-13 Proposed Objectives

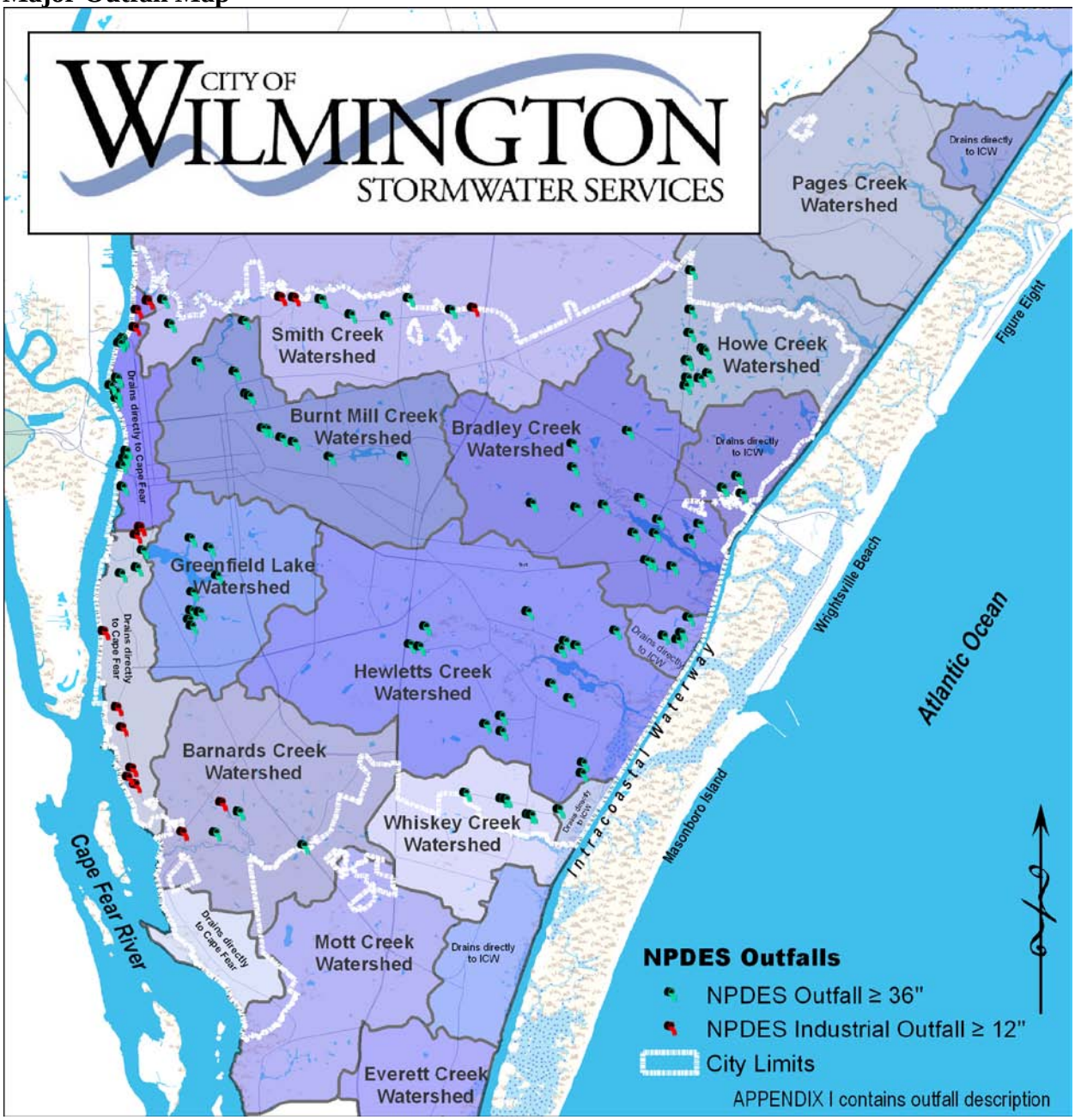
Educate City field crews and emergency responders on the use of the recently finalized IDDE Policies and Procedures Manual so that they may identify, report, and help eliminate illicit discharges.

Continue to address illicit discharges under the Chapter 12 Ordinance.

Continue to work with CFPUA addressing SSOs in the City stormwater system so that communication and documentation procedures between the two agencies remains priority.

(c) Develop a Storm Sewer System Base Map and Inventory of Major Outfall.	Map identifying major outfalls and stormwater drainage system components. At a minimum, components include major outfalls and receiving streams. Established procedures to continue to identify, locate, and update map of drainage system.					X

Major Outfall Map



11-12 Accomplishments

All major outfalls and receiving water bodies have been mapped (Appendix I). In-house GPS data collection routines are ongoing to provide updates to the stormwater system GIS database and enable tabular data collection resulting from dry weather outfall monitoring efforts.

Out of the total City area of 52.8 square miles, roughly 46.1 square miles requires stormwater mapping. Since the year 2000, mapping has been completed for 28.2 square miles and roughly 17 square miles remain to be mapped.

The diagram below shows the main structural elements of our stormwater infrastructure dataset and the relationship to NPDES outfall inspection records.

Geodatabase Structural Elements & Related Outfall Inspection Tables

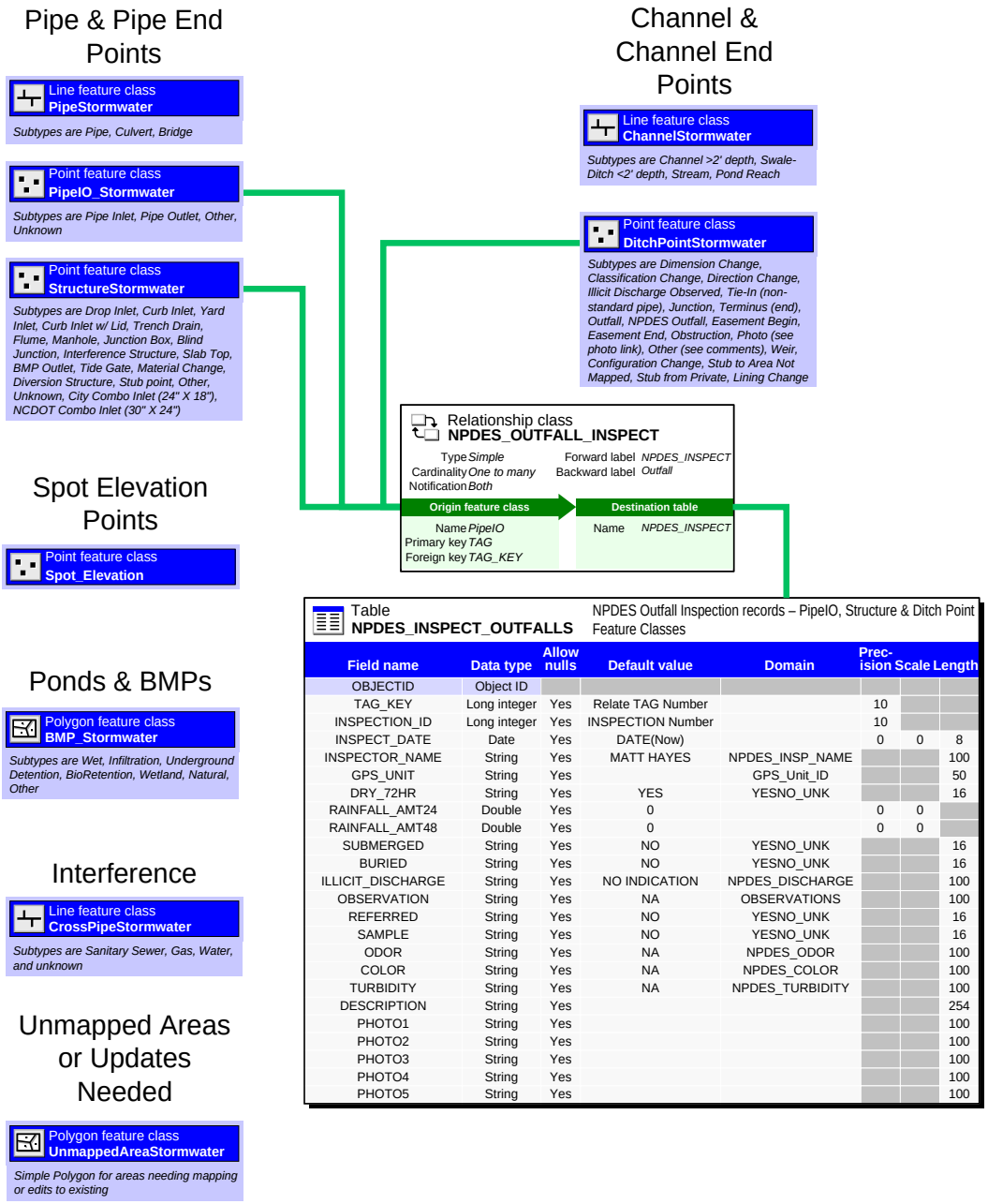


Table **NPDES_INSPECT_OUTFALLS** — NPDES Outfall Inspection records – PipeIO, Structure & Ditch Point Feature Classes

Field name	Data type	Allow nulls	Default value	Domain	Precision	Scale	Length
OBJECTID	Object ID						
TAG_KEY	Long integer	Yes	Relate TAG Number		10		
INSPECTION_ID	Long integer	Yes	INSPECTION Number		10		
INSPECT_DATE	Date	Yes	DATE(Now)		0	0	8
INSPECTOR_NAME	String	Yes	MATT HAYES	NPDES_INSP_NAME			100
GPS_UNIT	String	Yes		GPS_Unit_ID			50
DRY_72HR	String	Yes	YES	YESNO_UNK			16
RAINFALL_AMT24	Double	Yes	0		0	0	
RAINFALL_AMT48	Double	Yes	0		0	0	
SUBMERGED	String	Yes	NO	YESNO_UNK			16
BURIED	String	Yes	NO	YESNO_UNK			16
ILLICIT_DISCHARGE	String	Yes	NO INDICATION	NPDES_DISCHARGE			100
OBSERVATION	String	Yes	NA	OBSERVATIONS			100
REFERRED	String	Yes	NO	YESNO_UNK			16
SAMPLE	String	Yes	NO	YESNO_UNK			16
ODOR	String	Yes	NA	NPDES_ODOR			100
COLOR	String	Yes	NA	NPDES_COLOR			100
TURBIDITY	String	Yes	NA	NPDES_TURBIDITY			100
DESCRIPTION	String	Yes					254
PHOTO1	String	Yes					100
PHOTO2	String	Yes					100
PHOTO3	String	Yes					100
PHOTO4	String	Yes					100
PHOTO5	String	Yes					100

12-13 Proposed Objectives

Continue GPS data collection and associated refinements to field data collection procedures and database design for mapping of the public stormwater system and continuation of the outfall location and inspection routines.

(d) Inspection/detection program to detect dry weather flows at MS4 outfalls	Establish written procedures for detecting and tracing the sources of illicit discharges and for removing the sources or reporting the sources to the State to be properly permitted.			X		

11-12 Accomplishments

The City has completed final edits on an Illicit Discharge Detection Elimination (IDDE) Policy and Procedures document. The purpose of this document is to provide 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 worked on finalizing reporting and documentation procedures and customized database setup through *Intelligov*, our data management system. All details reported are entered in at the time of the report and as the investigation progresses until it is closed. This documentation into *Intelligov* will allow for the extraction of data for evaluation and assessment for future needs.

Development of the data tables to store dry weather inspections that are related to associated outfalls is complete. The following diagram shows the fields contained in the table:

Table
NPDES_Outfall_Inspections

Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length
OBJECTID	Object ID						
TAG_KEY	Long integer	Yes			0		
InspectionID	Long integer	Yes			0		
INSPECTOR_NAME	String	Yes	Joe Inspector	NPDES_INSP_NAME			100
GPS_UNIT	String	Yes	GeoXH-4632491981				50
DRY_48HR	String	Yes	YES	YESNO_UNK			16
RAINFALL_AMT24	Double	Yes	0.0		0	0	
RAINFALL_AMT48	Double	Yes	0.0		0	0	
SUBMERGED	String	Yes	NO	YESNO_UNK			16
BURIED	String	Yes	NO	YESNO_UNK			16
ILLICIT_DISCHARGE	String	Yes	NO INDICATION	NPDES_DISCHARGE			100
REFERRED	String	Yes	NO	YESNO_UNK			16
SAMPLE	String	Yes	NO	YESNO_UNK			16
INSPECT_DATE	Date	Yes	%Date%		0	0	8
ODOR	String	Yes	NA	NPDES_ODOR			100
COLOR	String	Yes	NA	NPDES_COLOR			100
TURBIDITY	String	Yes	NA	NPDES_TURBIDITY			100
DEPOSITS	String	Yes	NA	NPDES_DEPOSITS			100
PIPE_GROWTH_COLOR	String	Yes	NA	NPDES_PIPE_GROWTH			100
DESCRIPTION	String	Yes	%String%				254

12-13 Proposed Objectives
Continue implementing the IDDE manual procedures. Use the regulatory and enforcement mechanisms as outlined in Chapter 12 of the amended stormwater ordinance to address identified illicit discharges.

Fully begin entering illicit discharge incidents into *Intelligov* for tracking, reporting and assessment needs.

Visit outfalls along the Cape Fear River and Smith Creek to verify outfall mapping location and description and/or map new points for outfalls that have not previously been mapped. Utilize the custom data entry forms in *ArcPad* to store records in the NPDES Outfall Inspections table that will relate to the mapped outfalls.

Develop schedule for outfall inspections/dry weather flow observations.

(e) Employee training	Conduct training for appropriate municipal staff on detecting and reporting illicit discharges.			X		

11-12 Accomplishments
The City conducted training sessions for the Code Enforcement Department on detecting and reporting Illicit Discharges. See Appendix A.

12-13 Proposed Objectives
Schedule illicit discharge training for detection and reporting with City's emergency responders. The City will continue to reinforce to the field crews the need to report any questionable flows into the City's MS4. Continue to educate City Staff on identifying illicit discharges and provide periodic training refresher sessions to meet year 3 requirements.

The City will educate the stormwater crews on the recently finalized IDDE Policy and Procedures Manual.

(f) Provide public education	Inform public employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste.				X	

11-12 Accomplishments
Staff worked in coordination with Code Enforcement to develop targeted educational materials and direct mailings for distribution to painters, construction workers, and additional auto/vehicle professionals. A database was created and this information was mailed to these target audiences.

Promotion of the online pollution prevention reporting form and hotline was a priority this year. Staff distributed promotional items and gave presentations to staff in other departments and citizens highlighting the online form and hotline #. wilmingtonnc.gov/reportstormwaterpollution.

12-13 Proposed Objectives

Continue to send targeted mailings in response to neighborhood and citizen complaints and code enforcement requests for stormwater pollutants - pet waste, yard waste, lawn care, illicit discharge, etc.

(g) Establish a public reporting mechanism	Establish and publicize reporting mechanism for the public to report illicit discharges. Establish citizen request response procedures.				X	

11-12 Accomplishments

The Stormwater Pollution Prevention hotline was established in January 2010 to field calls from the citizens, businesses, and city employees regarding illicit discharges and 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 hotline reports from citizens. The hotline and webform are advertised on the City's cable TV channel and through newsletters, media press releases, and educational giveaway items. Sixteen calls were placed to the City's Stormwater hotline for this reporting year. The results of those calls are found in Appendix C.

12-13 Proposed Objectives

The hotline will continue to be advertised to the public and code enforcement staff will respond to phone and web reports.

Established procedures to identify and eliminate failed septic system and sanitary sewer overflows.	Establish procedures to identify and report to the County health department failed septic systems located within the permittee's planning jurisdiction. Establish procedures to identify and report sanitary sewer overflows and sewer leaks to the system operator.				X	

11-12 Accomplishments

The City coordinated efforts with New Hanover County and CFPUA for the sharing of data and documentation of failed septic systems with the City's jurisdiction area. The data allowed the City to review areas of reported failures and to determine if existing services from CFPUA exist, are scheduled to be constructed within these areas, or need further review. This will allow the

City to focus our attention to those areas, especially where failures are adjacent to waterbodies. From the data provided by CFPUA and NHCo, 31 locations were identified as having a system failure (Appendix C). The majority of these locations were located in areas annexed in 2001 where sanitary sewer is proposed as a service to residents. The City is currently working with CFPUA to determine if properties with reported failures in the past have since been connected to sanitary sewer.

In addition, the City discussed reporting protocol with the County Health Dept. and the CFPUA in order to obtain copies of work order reports from the County on failed septic systems.

The City continues to work with CFPUA under the *Policy for Reporting and Documentation of Sanitary Sewer Overflows and System Leaks* adopted in 2011 for discharges to the City's stormwater system.

12-13 Proposed Objectives

The City will determine from data shared by CFPUA GIS Dept. those properties where septic system failures have occurred and are still in place. The City will plan how to address efforts to monitor these locations with the goal of eliminating or improving the septic system (if possible). The City will work to determine why systems are failing. If systems failed and are now corrected and properly functioning, the City can monitor these locations (as needed) with assistance from UNCW through our water quality sampling contract. If systems have failed due to drainage field problems or tank collapse, then the City needs to work with NHCo and CFPUA to determine why these have failed and to make sure these are corrected or eliminated with service to CFPUA's system (Summer/Fall 2012).

Finalize efforts with New Hanover County Health Dept. for reporting and documentation of failed septic systems within the City's jurisdiction area (Summer 2012).

The City continues to work on a GIS database for illicit discharges for tracking purposes. Sanitary sewer overflows as reported to the City from CFPUA will also be added to this database.

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 D.

POST-CONSTRUCTION SITE RUNOFF CONTROLS

1. Objectives for Post-Construction Site Runoff Controls

(a) Manage stormwater runoff from new development / redevelopment that drains to the MS4 and disturbs an acre or more of land surface, including projects less than an acre that are part of a larger common plan of development or sale.
(b) Provide a mechanism to require long term operation and maintenance of BMPs.
(c) Ensure controls are in place to minimize water quality impacts.

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.

BMP	**Measurable Goals**	**YR 1**	**YR 2**	**YR 3**	**YR 4**	**YR 5**
Establish a Post-Construction Stormwater Management Program	Develop and adopt by ordinance (or similar regulatory mechanism) a program to address stormwater runoff from new development and redevelopment. Implement and enforce the program within 24 months of the permit issue date.		X			

The City's Land Development Code was amended and adopted on September 15, 2009 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 new Coastal Stormwater Legislation

<u>12-13 Proposed Objectives</u>

Continue to implement the amended ordinances.

Establish strategies which include BMPs appropriate for the MS4	Develop strategies that include a combination of structural and/or non-structural BMPs. Implement them within 24 months of the permit issue date. Provide a mechanism to require long-term operation and maintenance of structural BMPs. Require annual inspection reports of permitted structural BMPs performed by a qualified professional (i.e., someone trained and certified by NC State for BMP Inspection & Maintenance).		X			

The amended stormwater ordinance from 2009 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.

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). An inspection summary is included in Appendix F. In addition, sample inspection reports are provided.

12-13 Proposed Objectives

Continue biannual inspections for next year to ensure compliance with maintenance requirements and report items of non-compliance to property owners.

Improve documentation procedure for BMP compliance inspections by updating database and reporting system.

Establish nutrient sensitive waters (NSW) protection measures (for programs with development or redevelopment draining to NSW waters)	Develop, adopt, and implement an ordinance (or similar regulatory mechanism) to ensure that the best management practices reduce nutrient loading to the maximum extent practicable. Develop and include a nutrient application (fertilizer and organic nutrients) management program in the Post-construction Stormwater Management Program. In areas where the Environmental Management Commission has approved a Nutrient Sensitive Water Urban Stormwater Management Program, the provisions of that program fulfill the nutrient loading reduction requirement.		X			

Per NCDWQ staff, there are no current NSW requirements for our area in the Cape Fear River Basin and there are none on the immediate horizon.

12-13 Proposed Objectives

Staff will continue to track this issue through NCDWQ.

Establish a program under the Post-Construction	Coordinate with County health department to control the known sources		X			

minimum measure to control the sources of fecal coliform to the maximum extent practicable	of fecal coliform to the maximum extent practicable. Implement within 24 months of the permit issue date.					

The City established a domestic animal waste ordinance in 2009 as part of ordinance revision process and continues to use the ordinance to address pet waste.

The City has worked into its modified stormwater ordinance requirements for structural BMPs in SA watersheds that help to control sources of fecal coliform to the maximum extent practicable.

12-13 Proposed Objectives

City Staff will continue implementing its domestic animal waste ordinance and try to determine the effectiveness of the program.

City Code, Permitting Regulations, Easement, and/or Deed Restrictions and Protective Covenants	Ensure development activities will maintain the project consistent with approved plans.		X			

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.

12-13 Proposed Objectives

Continue to implement new Land Development Ordinance and its requirements.

Operation and Maintenance Plan	Implement or require an operation and maintenance plan that ensures the adequate long-term operation of the structural BMPs required by the program. The operation and maintenance plan may require the owner of each structural BMP to submit a maintenance inspection report on each structural BMP annually to the local program.					X

11-12 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). An inspection summary is included in Appendix F. In addition, sample inspection reports are provided.

The City finalized a 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.

12-13 Proposed Objectives

City staff will continue to inspect all privately owned BMPs and submit inspection documentation as needed.

City Staff will continue to review O&M manual for permit renewal dates, O&M schedules and any other relevant information for the long term maintenance of BMPs.

Setbacks for Built-upon Areas	Require built upon areas to be located at least 30 feet landward of all perennial and intermittent surface waters except as provided for in the Permittee's approved Post-Construction Stormwater Ordinance.		X			

	For purposes of this section, a surface water shall be present if the feature is shown on either the most recent version of the soil survey map prepared by the Natural Resources Conservation Service of the United States Department of Agriculture or the most recent version of the 1:24,000 scale (7.5 minute) quadrangle topographic maps prepared by the United States Geologic Survey (USGS). Relief from this requirement may be allowed when surface waters are not present in accordance with the provisions of 15A NCAC 02B .0233(3)(a).					

The existing ordinance requires a 50 foot setback for new development and a 30 foot setback for redevelopment consistent with the Coastal Stormwater legislation.

12-13 Proposed Objectives

Continue to enforce set back requirements per new Land Development Ordinance.

POLLUTION PREVENTION AND GOOD HOUSEKEEPING FOR MUNICIPAL OPERATIONS

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

Prevent or reduce stormwater pollution from municipal operations.

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

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

BMP	Measurable Goals	YR 1	YR 2	YR 3	YR 4	YR 5
Develop an operation and maintenance program	Develop an operation and maintenance program for structural stormwater BMPs, storm sewer system maintenance which may include street sweeping, and municipal operations such as recycling and household hazardous waste and oil collection.		X			

11-12 Accomplishments

The City currently has a program for the operation and maintenance of all City owned structural BMPs, storm sewer system, and street sweeping. In addition, there is a recycled oil program for City operations and an annual Household hazardous waste collection day (conducted in cooperation with New Hanover County).

The City compiled available State DWQ stormwater permits and O&M plans for City owned BMPs in order to review maintenance requirements, permit renewal dates and any additional documentation that might be needed. This information provides the City with a manual that can be reviewed by maintenance crews in order to keep the BMPs in compliance.

The City finalized its Standard Operating Procedures Field Manual for its maintenance activities for stormwater municipal operations. City storm crews now have a manual on their person for reference when conducting field activities (Sample in Appendix F).

12-13 Proposed Objectives

Update O&M manual as new permitted City projects are added.

Update or modify SOP Field Manual as needed.

Develop Site Pollution Prevention Plan for Municipal Facilities	Develop and implement Site Pollution Prevention Plan for Municipal Facilities owned and operated by the permittee with the potential for generating polluted stormwater runoff that has the ultimate goal of preventing or reducing pollutant runoff.			X		

11-12 Accomplishments

The City and its consultant finalized Site Pollution Prevention Plans (SPPP) for its Fleet Maintenance building and operations. The City has begun implementing some of the recommended BMPs in the plan and will follow up with remaining suggestions in the Spring and Summer of 2012.

12-13 Proposed Objectives

Train staff on SPPP requirements for Fleet Maintenance site. Follow up with the implementation of suggested BMPs in the plan.

Follow through on necessary documentation within Stormwater Pollution Prevention Plan.

Inspection and evaluation of facilities, operations, and the MS4 system and associated structural BMPs.	Maintain an inventory of facilities and operations owned and operated by the permittee with the potential for generating polluted stormwater runoff, including the MS4 system and associated structural BMPs. Conduct inspections at facilities and operations owned and operated by the permittee for potential sources of polluted runoff, the stormwater controls, and conveyance systems. Evaluate the sources, document deficiencies, plan corrective actions, implement appropriate controls, and document the accomplishment of corrective actions.				X	

11-12 Accomplishments

Planned and budgeted for updating site improvements per SPCC for the Operations Complex and the Police Headquarters. Began inspections of sites to review practices and conditions at the existing sites. The plans will be reviewed each year and updated as necessary with regard to any changes to the existing plan.

12-13 Proposed Objectives

Make necessary improvements to sites with SPPP and SPCC plans. Bring into compliance the suggestions within the plans (ex. Spill drums and kits inventory at sites). Provide training for

staff and continue documentation of plan. Make changes and amend the plan if necessary. Make necessary inspections to sites according to the plans.

Conduct staff training	Conduct staff training specific for pollution prevention and good housekeeping procedures.		X			

11-12 Accomplishments

The City opted to conduct staff training for department supervisors and crew leaders on Pollution Prevention and Good Housekeeping for its City facilities in year one and two. City staff has followed up site inspections for City municipal operations and have addressed areas of concerns with individual site managers. In addition, some of this year's Illicit Discharge training addressed Good Housekeeping procedures (See Appendix F).

12-13 Proposed Objectives

The City will provide staff training to Fleet Maintenance in mid Spring of 2012. Training for our Buildings Dept. maintenance staff will also be conducted for requirements under the SPCC plans for Summer 2012.

Review of municipality owned or operated regulated industrial activities	Conduct annual review of the industrial activities with a Phase I NPDES stormwater permit owned and operated by the permittee. Review the following aspects: the Stormwater Pollution Prevention Plan where one is required, the timeliness of any monitoring reports required by the Phase I permit, and the results of inspections and subsequent follow-up actions at the facilities.			X	X	X

No Phase I NPDES stormwater permit is owned and operated by the permittee now that the wastewater treatment plants and the water treatment facility have been turned over to CFPUA.

12-13 Proposed Objectives

The City will address this measure in the event anything changes.

Spill Response Procedures	Establish spill response procedures for municipal operations owned and operated by the permittee with the potential to generate polluted stormwater runoff.		X			

11-12 Accomplishments

The City's Operations Complex and the Police Headquarters each required an SPCC plan and addresses this requirement. The City began implementing these plans in 2011. Each plan addresses spill response procedures for each site.

The City's Fleet Maintenance site finalized its SPPP in 2011 and began implementing some of the recommended BMPs for minimizing potential spills.

12-13 Proposed Objectives

The City will train staff members associated with spill response as outlined in the SPPP and SPCC plans in mid to late Spring 2012.

The City will continue with the implementation of the remaining recommended BMPs for the Fleet Maintenance site under the SPPP.

Prevent or Minimize Contamination of Stormwater Runoff from all areas used for Vehicle and Equipment Cleaning	Describe measures that prevent or minimize contamination of the stormwater runoff from all areas used for vehicle and equipment cleaning. Perform all cleaning operations indoors, cover the cleaning operations, ensure washwater drain to the sanitary sewer system, collect stormwater runoff from the cleaning area and providing treatment or recycling, or other equivalent measures. If sanitary sewer is not available to the facility and cleaning operations take place outdoors, the cleaning operations shall take place on grassed or graveled areas to prevent point source discharges of the washwater into the storm drains or surface waters. Where cleaning operations cannot be performed as described above and when operations are performed in the vicinity of a storm drainage collection system, the drain is to be covered with a portable drain cover during clean activities. Any excess ponded water shall be removed and properly handled prior to removing the drain cover. The point source discharge of vehicle and equipment wash waters, including tank cleaning operations, are not authorized by		X			

	this permit and must be covered under a separate NPDES permit or discharged to a sanitary sewer in accordance with applicable industrial pretreatment requirements.					

Maintenance and cleaning conducted at the City's Operations complex continues to occur at a wash down station equipped with an oil water separator that accepts wash water and directs it to the sanitary sewer.

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.

Vehicle maintenance for all City vehicles is conducted at the Fleet Maintenance building located at the Operations Complex. In the event of an accidental spill, floor drains are connected to on site oil water separators. Used vehicle fluids are collected and disposed and/or recycled of properly in their respective, protective containers.

The current SPPP plan and the current SPCC plans for the individual City sites address the above concerns for Good Housekeeping procedures.

12-13 Proposed Objectives

Continue monitoring and implementing each respective SPPP and SPCC plan for compliance. Update as needed.

Conduct employee training for Fleet Maintenance staff on Pollution Prevention/Good Housekeeping requirements under new SPPP.

Conduct employee training for City emergency responders on Illicit Connection/Pollution Prevention identification while out on patrol.

THREATENED OR ENDANGERED SPECIES

Certain waters provide habitat for federally-listed aquatic animal species that are listed as threatened or endangered by the U.S. Fish and Wildlife Service or National Marine Fisheries Service under the provisions of the Endangered Species Act, 16 U.S.C. 1531-1544 and subsequent modifications.

The shortnose sturgeon (*Acipenser brevirostrum*) was listed as endangered on March 11, 1967 (32 FR 4001) and remained on the endangered species list with enactment of the ESA in 1973. Shortnose sturgeon occur in most major river systems along the eastern seaboard of the United States. Shortnose sturgeon inhabit the main stems of their natal rivers, migrating between freshwater and mesohaline river reaches. Spawning occurs in upper, freshwater areas, while feeding and overwintering activities may occur in both fresh and saline habitats.

Under the provisions of the Final Recovery Plan published by the National Marine Fisheries Service (NMFS) in December 1998, the permittee shall implement measures to increase awareness of shortnose sturgeon and their status by formulating a public education program that generates public interest in sturgeon and sturgeon recovery by contacting media outlets, suggesting feature stories, and using existing forums for educating the public (e.g., public aquaria, FWS Partners for Wildlife Program, private foundations). Articles, posters, and pamphlets should be published to increase public knowledge of shortnose sturgeon and their unique and complex life history. This information may include identifiable features of the species, listing status, range, susceptibility to incidental captures, and a number or address to report sightings or captures. The permittee shall offer to work with schools to develop and evaluate educational materials and curricula that introduce students to sturgeons, the river/estuarine environment, and the ESA.

11-12 Accomplishments

Stormwater Services staff continued to implement several key strategies established in the Shortnose Sturgeon Education Plan. The plan guides public education efforts about the endangered Shortnose Sturgeon. Education materials produced by the city incorporate the following information about the Shortnose Sturgeon: federal listing status, identifiable features, life history, range/local habitat, reasons for decline in species population, susceptibility to incidental captures, barriers to recovery (threats and solutions), and a contact agency/phone number to report sightings or captures.

Informational bookmarks and brochures were distributed at speaking engagements and community events such as Earth Day and homeowner's association presentations. The Shortnose Sturgeon video continues to play on GTV-8 and is posted on the city's website.

The Shortnose Sturgeon was mentioned in several news articles because it's "cousin" the Atlantic Sturgeon, received Endangered Species status in the river system in our area.

12-13 Proposed Objectives

Continue providing educational info about the Shortnose Sturgeon on the Stormwater Services website, GTV-8, through partner/contract agencies, and during 8th grade school presentations.

Appendixes

APPENDIX A: PUBLIC EDUCATION AND OUTREACH

Included in this section:
BMP Reporting Table
Identification of Target Pollutants, Sources, And Target Audiences

DATE / TIME	PLACE / EVENT	AUDIENCE	ACTIVITY OR STAFF	TECHNIQUES/ METHODS USED	RESULTS OF ACTIVITY OR INFO COLLECTED OR COMMENTS
BMP(a) Identify Target Pollutants & Sources					
Pollutants and sources are identified in the Appendix.					
BMP(b) Identify Target Audiences					
Target audiences for each pollutant are identified in the Appendix.					
BMP(c) Stormwater Website					
Ongoing/ Regular Updates	City of Wilmington Stormwater Services webpages	General public; website viewers	Stormwater staff	Keep website regularly updated with fresh content	Post info on website - stormwater news, events, education publications, videos, printed material, etc.
BMP(d) Develop & Distribute Public Education Materials to Identified User Groups					
In addition to public outreach efforts in this category, the Stormwater Code Enforcement Officer also distributes education materials to targeted user groups (i.e. pet owners, auto shops, restaurants, residents, etc). Code enforcement distributes this info to citizens and businesses that have been identified as non-compliant with the City's stormwater codes. Information is included in the Enforcement Actions Appendix.					
3/5/11	Poster creation for targeted direct viewing	Public transportation commuters (WAVE Transit)	Stormwater staff	What Goes in Here poster & Cigarette Butt poster created for display in 22 WAVE Transit buses	Stormwater education posted inside WAVE Transit buses to educate commuters
4/1/11	Brochure creation and distribution	Businesses around Kerr Avenue Wetland	Stormwater staff CFRW staff	Burnt Mill Creek/Kerr Avenue Wetland information brochure	Distributed by CFRW to businesses that directly front and impact the Kerr Avenue Wetland
5/11/12	Brochure creation and distribution	General public Property owners	Stormwater staff	Stormwater is a Dirty Word! brochure	Brochure incorporates actions and on the ground BMPs
5/27/11	Vehicle magnet creation	Motorists Passengers	Stormwater staff Enforcement staff	24 stormwater vehicle awareness magnets posted on Stormwater Services field vehicles	Magnets promote awareness of the City's stormwater hotline, pet waste, yard waste and the destination of polluted runoff

6/1/11	Poster creation for targeted direct distribution	Businesses: Construction, Painters, etc.	Stormwater staff	Business poster	Created for distribution to professionals in all facets of the construction industry
6/20/11	Wildlife signage creation	Visitors to Greenfield Lake Park	Stormwater staff	Reasons Not To Feed Waterfowl & Alligators signage created	Educates lake patrons about reasons and laws for not feeding wildlife
6/22/11	Targeted direct mail	Businesses: Construction, Painters	Stormwater staff	Letter & Business poster mailed to database	Inform businesses of improper practices that impact water quality and the City's ordinance/fines.
8/1/11	Targeted email	City employees	Fleet Management Staff	Direct email to all employees	Tips for fueling and driving; preventing spills
9/11/11	Targeted direct mail	Auto care professionals: mechanics, car washes, retail stores, etc.	Stormwater staff	Letter, Business poster, Auto Care poster mailed to database	Inform auto care professionals of improper practices that impact water quality and the City's ordinances/fines.

BMP(e) Media Campaign					
Winter/Spring 2011	Going Green Magazine	General public, adults	Stormwater 101 Article - Yard Waste: Don't Blow It!	Magazine article with photos	Target Audience: Adults/general public Environmental groups Reach & Frequency: 8000 printed, also available online Total cost: Free
April 2011 Earth Day Edition	Going Green Magazine	General public, adults	Stormwater Ad - Prevent Stormwater Pollution	Magazine ad	Target Audience: Adults/general public Environmental groups Reach & Frequency: 8000 printed, also available online Total cost: Free
April - May 2011	TV - WECT-6 & Bounce network	TV viewers ages 25-65 in Wilmington	Pet Waste PSA (How to Train a Human) Yard Waste (Don't Blow It!)	:30 second stormwater PSA on network TV 9 spots total, plus $1 bonus ads on WECT Weather Plus	Target Audience: General public Reach: 71.8% for viewers age 25-64 Frequency: 3.1 Total cost: $4500
Mar - May 2011	Cumulus Broadcasting WWQQ 101.3 (Country) WKXS 94.5 (Modern Rock Hawk)	Pet owners, homeowners, landscapers, yard maintenance professionals	Pet Waste & Yard Waste :30 second PSAs	Two :30 second PSAs on broadcast radio stations 272 ads total: 136 purchased, 136 free	Target Audience: Landscapers, Pet owners, General public Reach: 67,507 adults Frequency: 5.0 times Total cost: $3500

Sept-Oct 2011	Cumulus Broadcasting (97.3 & 94.5)	Homeowners, landscapers, general public	General Stormwater & Yard Waste :30 second PSAs	Two :30 second PSAs on broadcast radio stations 240 ads total: 120 purchased, 120 free	Target Audience: Homeowners, Landscapers, General public Reach: 49,221 adults / 22.7 times Frequency: 5.9 times Total cost: $2500
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 me with reach and frequency data for the campaigns I run on their stations. The data provided references last year's available reach and frequency data for these stormwater outreach campaigns. Approved 8/17/11 per M. Randall, NC DWQ.					
Sept-Nov 2011	TV - WECT-6 & Bounce Network	TV viewers ages 35-64 in Wilmington	Yard Waste (Blown It!) PSA	:30 second stormwater PSA on network TV 86 spots total, including free bonus ads on Bounce TV	Target Audience: Homeowners, yard care professionals, general public Reach: 79.8% of viewers age 35-64 Frequency: 3.6 Total cost: $4085
9/2011	TV-WECT-6 Lifestyles print magazine	New Hanover County residents	What Goes in Here stormwater print ad	Cape Fear Lifestyles magazine	Magazine mailed by WECT to 50,000 NHC residents Target Audience: NHC residents Reach: 50,000 households Total cost: $415
Jan-Feb 2012	TV - WECT-6 & Bounce Network	TV viewers ages 25-65 in Wilmington	General Stormwater & Yard Waste :30 second PSAs	:30 second stormwater PSA on network TV 86 spots total	Target Audience: General public Reach: 71.2% for viewers age 25-64 Frequency: 3.8 Total cost: $4000
Jan-Feb 2012	Cumulus Broadcasting - 97.3 & 94.5 FM	General public, adults	Litter & General SW PSA	Two :30 second PSAs on broadcast radio stations 120 ads total: 120 purchased, 120 free	Target Audience: Landscapers, Pet owners, General public Reach: 67,507 adults Frequency: 5.0 times Total cost: $2500
Fall 2011	Going Green Magazine	General public, adults	Canines for Clean Water Promote Pet Waste Disposal	Article	Target Audience: Adults/general public Environmental groups Reach & Frequency: 8000 printed, also available online Total cost: Free
Ongoing	City GTV-8 and City website	GTV-8 cable access TV viewers	Stormwater Pollution Messages	Educational PSAs, documentaries, narrated slide shows Several different PSAs airing concurrently or alternating	Target Audience: General public Reach & Frequency: varies due to government programming Total cost: Free

BMP(f) Establish Hotline / Helpline					
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. See Appendix for hotline reporting information.					
Ongoing	Stormwater Hotline info	General public	Stormwater staff	Hotline Billboard poster and promo items (pen, magnet, sticky notes)	Developed to raise public awareness about the stormwater hotline and web reporting form

BMP(g) Establish Public Outreach & Education Program & Implement Within 12 Months.					
Newspaper Articles, Press Releases, or Paid Advertisements					
3/23/2011	Star News	General public	Wilmington to buy golf course for new park	News article	City purchases Inland Greens and will receive stormwater improvements
3/28/2011	Star News	General public	Lock and Dam No. 1 to close for construction	News article	Army Corps to install fish passages which will help the shortnose sturgeon to spawn in the river
4/5/11	Star News	General public	Wilmington officials to vote on Greenfield Lake historic status	News article	Water quality problems as a result of sewer leaks
5/10/11	Star News	General public	Why calling Greenfield Lake green isn't all bad these days	News article	Greenfield Lake water quality status
5/12/11	Star News	General public	Land transfer to aid Wilmington drainage project	News article	Sharon Road property transferred from the county to the city for drainage improvement project
5/12/11	Star News	General public	Man-made wetlands succeed in cleaning up Hewletts Creek	News article	JEL Wade Wetland is successful at removing pollutants
8/22/11	Star News	General public	Part of city trail closed for drainage project	News article	Cavalier Drive project information
8/25/11	Press Release; news advisory	General public	Hurricane preparation & yard debris disposal	Distributed to local mass media news outlets	Public notification about hurricane prep and debris disposal
9/2/11	Star News	General public	City works to update system that combats creek flooding	News article	BMC tidegate article
11/12/2011	Star News	General public	Fisheries crew tagging sturgeon to learn about their movements	News article	Efforts to tag and protect sturgeon in the Cape Fear River
1/24/2012	Star News	General public	Sewage spill on Barnards Creek contained	News article	Sewer rupture spills 1 million gallons of sewage into Barnards Creek

1/26/2012	Star News	General public	More than a million gallons of sewage spills into Barnards Creek	News article	Sewage spill into Barnards Creek
2/8/2012	Star News	General public	Atlantic Sturgeon declared endangered	News article	Made mention of the endangered status of the Shortnose Sturgeon

Targeted Direct Mail

4/22/11	Targeted direct mail	Shinn Point neighborhood residents	Stormwater staff	Project information	Shinn Point project info, map, and lane closure notice mailed to residents
4/23/11	Targeted direct mail	Winter Park area residents & Elementary School	Stormwater staff	Project information	Project notice #1 mailed to citizens, businesses, schools in the Winter Park area for the MacMillan Avenue stormwater drainage project
6/3/11	Targeted direct distribution - doorhanger	Hunter's Trail area	Stormwater staff	Project information	Doorhanger provided to property management of Hunter's Trail apartments for distribution to residents
7/15/11	Targeted direct mail	Cavalier Drive neighborhood	Stormwater staff	Project information	Project notice mailed to neighborhood residents about the Cavalier Drive stormwater drainage project
8/5/11	Targeted direct mail	Winter Park area residents, Winter Park Elementary, Friends School	Stormwater staff	Project information	Project notice #2 mailed to neighborhood residents about the Cavalier Drive stormwater drainage project
9/21/11	Targeted direct mail	Greenville Ave residents	Stormwater staff Dewberry Consulting	Project information	Mailed to citizens & businesses in the area of the Greenville Ave. drainage project

Displays at Point of Purchase

N/A					

Utility Bill Inserts

The Cape Fear Public Utility Authority bills the public for stormwater utility fees. The city no longer sends out bills. Therefore, we are not able to include stormwater info in utility bills.

Public Meetings

10/1/2011	Inland Greens Clubhouse	Property owners at Inland Greens	Stormwater staff Parks staff	Direct contact meeting	Public meeting to show citizens the conceptual park and drainage plans for Inland Greens. Approximately 60 people in attendance.

Community Events

4/30/11	Lower Cape Fear Earth Day Celebration at Hugh MacRae Park	Festival attendees, general public	Stormwater staff (SWS is an annual sponsor of Lower Cape Fear Earth Day Festival)	Display booth to promote stormwater pollution prevention	Stormwater information distributed. 4,000+ attendees
5/5/11	Williston Middle School	Burnt Mill Creek Watershed Residents	NCSU staff Stormwater staff	Green Streets project meeting	Meeting to encourage residents to provide input on green streets project
5/7/11	Paw Jam	Pet owners	Stormwater staff NHSWCD staff	Canines for Clean Water booth - interactive event where pet owners sign a pledge to be clean up after their pets	130+ pet owners signed pledge and received dog bandana, treats, and stormwater literature. Dogs have a chance to be featured on city website
5/21/11	Gator Fest	General public Lake patrons Pet owners	Stormwater staff	Canines for Clean Water booth - interactive event where pet owners sign a pledge to be clean up after their pets	50+ pet owners signed pledge and received dog bandana, treats, and stormwater literature. Dogs have a chance to be featured on city website
2/16/12	Pet Expo @ the Schwartz Center	Pet owners	NHSWCD staff	Canines for Clean Water booth - interactive event where pet owners sign a pledge to be clean up after their pets	30+ pet owners signed pledge and received dog bandana, treats, and stormwater literature. Dogs have a chance to be featured on city website
Ongoing - 2nd Thursday of every month	Monthly Rain Barrel Sales	General public	Stormwater staff NHSWCD	Monthly rain barrel sale to the general public; held 2nd Thursday of each month at NHC Government Center with partner agency, NHSWCD	Stormwater runoff reduction and water conservation education

Contest

N/A					

Storm Drain Marking

Ongoing campaign	Campaign to place storm drain markers and educational doorhangers throughout the City	City residents, businesses, landscapers	Stormwater staff CFRW NHSWCD	Stormwater awareness and pollution prevention	Markers were placed in the Greenfield Lake Watershed by partner agencies and their volunteers.

Stream & Litter Clean-ups

March 2011-Dec 2011	8 watershed cleanup events including the Annual Big Sweep event	Volunteers	Cape Fear River Watch	Watershed cleanup and/or invasive species vegetation removal Areas cleaned include Greenfield Lake, Smith Creek, Cape Fear River, Randall Pond, Kerr Avenue Wetland	8 cleanup events 186 volunteers contributed a total of 355 hours. Collected 230 (30 gallon) bags of trash and/or invasive species vegetation

Group Presentations, Speeches

6/1/11	Cape Fear Community College	CFCC Sustainability Class	Stormwater staff	Stormwater/Enviroscape presentation	Delivered Enviroscape presentation about stormwater, NPS pollution, and solutions
10/12/11	Wilmington Regional Association of Realtors	Property Management Council	Stormwater staff	Speaker-led presentation and Powerpoint	8 property managers/realtors in attendance

News Coverage

Summer 2011	Jordan Lake Nutrient Mgt guide	Jordan Lake area	Watershed staff	mentioned the City's Enviroscape Watershed Education program	None
8/29/2011	Lumina News	General public	Staff reporter	Article	Coastal swimming waters may be affected by excessive rains, flooding from Hurricane Irene
9/7/11	WWAY-TV3	General public	TV Reporter	On air coverage	Water worries linger in Hurricane Irene's wake for NC
2/27/12	News 14 Carolina	General public	Wilmington tests new stormwater cleanup measures in problem areas	TV news coverage	Green Street project at 12th & Dock Streets

Workshops and Classroom Outreach

March 2011-February 2012	All New Hanover County Middle Schools	8th grade science classes	Stormwater Services, NHSWCD, CFRW	Enviroscape Presentations	69 presentations given to approximately 2,000+ eighth grade students
11/16/11	Enviroscape Instructor Training Video	8th grade Enviroscape presenters	Stormwater Services	Recorded and produced a new training video for Enviroscape instructors	Watching the training video is a requirement for all new Enviroscape instructors

Distributing promos/giveaways

10/12/11	Wilmington Regional Association of Realtors	Property Management Council	Stormwater staff	Presentation and distributed complimentary education items	8 property managers/realtors received promo items
10/27/11	Birch Creek Week	Birch Creek Condo Owners	Stormwater staff	Promotional items for education workshops during the week	Stormwater education materials and giveaways distributed to workshop attendees
Ongoing	Public meetings, displays, city buildings, pet events	General public	Stormwater staff	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 events, etc.

Brochures, Displays, Signs, Welcome Packets, Pamphlets

4/30/11	Lower Cape Fear Earth Day Celebration at Hugh MacRae Park	Festival attendees, general public	Stormwater staff (SWS is an annual sponsor of Earth Day)	Display booth and interactive game to promote Stormwater Pollution Prevention	Stormwater information & educational promo items distributed. 4,000+ attendees

5/1/11	Brochure creation	General public Homeowners	Stormwater staff	Stormwater is a Dirty Word brochure	Promotes structural and action-oriented stormwater BMPs
5/27/11	Truck Magnets	Motorists Passengers	Stormwater staff Enforcement staff	24 stormwater vehicle awareness magnets created for all the Stormwater Services field vehicles	Messages promote awareness of the City's stormwater hotline, pet waste, yard waste and the destination of polluted runoff
6/20/11	Wildlife Feeding signage creation	Visitors to Greenfield Lake Park	Stormwater staff	Reasons Not To Feed Waterfowl & Alligators signage created	Educates lake patrons about reasons and laws about not feeding wildlife
6/22/11	Poster creation for targeted direct distribution	Construction workers Painters	Stormwater staff	Construction poster	Distributed to professionals in all areas of the construction industry

Local Cable Access

Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	Monthly rain barrel sale to the public	Inform public about opportunity to purchase reduced price rain barrels
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	Re-route your downspout	Inform public about re-directing downspouts to let water soak in, instead of runoff
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	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	Cable access TV viewers	Stormwater staff GTV-8 Staff	Pet waste ordinance slides, detailing ordinance rules and fines	Inform public of pet waste ordinance
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	Yard waste ordinance slides, detailing ordinance rules and fines	Inform public of yard waste ordinance
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	Illicit discharge ordinance slides, detailing ordinance rules and fines	Inform public of illicit discharge ordinance
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	Stormwater hotline slides	Inform public of pollution prevention hotline and web-based reporting tool
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	Scrolling slides	Upcoming events slides (i.e. monthly rain barrel sale)
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	7 part documentary series Aired beginning in March 2009	It's Our Water (looks at all aspects of water thru teams of 8th grade students)
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	:30 second PSA	UNCW Buffers PSA
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	:30 second PSA	UNCW Pet Waste PSA (2 - hogs & fast dogs)

Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	:30 second PSA	Fertilizer PSA UNCW
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	:30 second PSA	Johnny Fishpatrick PSA - NC DENR
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	:30 second PSA	Keep America Beautiful Grasshopper PSA
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	Narrated slide show featuring 7 stormwater pollutants	Stormwater 101 Slideshow series

Newsletters

Spring 2011	Citywide Public Information Report	City residents Public library Special events	Stormwater staff PIO Staff	40,000+ distributed	UNCW Water Quality Info Canines for Clean Water Yard Waste ad
Fall 2011	Citywide Public Information Report	City residents Public library Special events	Stormwater staff PIO Staff	40,000+ distributed	City drainage projects Yard debris disposal tips
Winter 2012	Citywide Public Information Report	City residents Public library Special events	Stormwater staff PIO Staff	40,000+ distributed	Pet Waste - take 2 campaign!

Citizen Contacts

Ongoing/ Regularly	Stormwater Office via phone or email	Citizen	Stormwater staff	Email or phone responses to requests for information, literature, etc.	Information provided to citizens regarding specific nature of contact

Weekly Update Articles for City Council / Media / City Staff

Weekly	Email	City Council, City employees Media	City staff	Weekly update of city news, events, projects, etc.	Stormwater information was included in 8 Weekly Updates

Stormwater Staff / City Employee Trainings

4/14/11	Greenfield Lake	City BMP & Open Drainage crews	Cape Fear River Watch	Greenfield Lake invasives and lake ecology training	18 staff in attendance
1/12/12	Community Services – downtown	Code Enforcement staff	Public Services Compliance Officer	Discussed code enforcement regulations within the Public Services Division	9 Code Enforcement staff in attendance

Grant Projects

Completed 2011	Developed watershed restoration plans for Hewletts and Bradley Creeks	Hewletts & Bradley Creek watershed residents and businesses	Stormwater Services NC Coastal Federation (grant administrator) Town of Wrightsville Beach Stormwater Division	Watershed restoration plan development	Watershed restoration plans ready for implementation
Ongoing	Street retrofit grant	Burnt Mill Creek Watershed	Stormwater Services NCSU (grant administrator)	Stormwater improvement project on city streets in downtown area	Street retrofits and public education in the Burnt Mill Creek Watershed

Identification of Target Pollutants, Sources and Audiences

The following pollutants have been identified as significant sources of pollution in our waterways. Many of these pollutants also negatively impact the proper function of the storm drainage system. These particular pollutants were chosen to be the focus of our education program based on several sources of data including UNC-Wilmington water quality monitoring data, New Hanover County Animal Control statistics, and the 2006 NC Statewide Stormwater Survey of North Carolina residents. This particular survey has provided valuable insight and documentation into residents' awareness, perceptions, and behaviors about stormwater runoff pollution in NC.

Target Pollutant	**Pollutant Source**	**Target Audience(s)**
Bacteria, viruses, parasites, and nutrients	Pet Waste (Education regarding sanitary sewer overflows is conducted by CFPUA)	-Pet owners -Pet industry professionals -General public
Nutrients such as nitrogen and phosphorous	Fertilizer	-Homeowners/residents -Landscape/Turf Maintenance Professionals -General public
Toxic chemicals including herbicides, fungicides, and insecticides	Pesticides	-Homeowners/residents -Landscapers -Pest Control Applicators -General public
Organic materials including leaves, grass clippings, pine straw, sticks, limbs, and other yard trimmings	Yard Waste/Debris	-Homeowners/residents -Landscape/Turf Maintenance Professionals -General public
Sand, dirt, gravel, clay, soil, etc.	Sediment	-Homeowners/residents -Businesses -Construction/developers -Landscape/Turf Maintenance Professionals -General public
Plastics, paper, cigarette butts, etc.	Litter	-Smokers -Motorists -Young Adults -General public
Motor oil, antifreeze, grease, gas, and other vehicle fluids	Auto Fluids	-Do-it-yourself oil changers -Vehicle owners -Vehicle maintenance & repair shops -General public
Phosphorous, soaps, grime	Car Washing Soaps	-Homeowners/residents -General public

Target Pollutant: Bacteria, Viruses, Parasites, Nutrients
Pollutant Source: Pet Waste
Pet waste contains a host of bacteria, viruses, parasites and nutrients that contribute to surface water pollution and public health risks.

Pollutant Info
Animal waste is generated from the natural biological processes of domesticated and wild animals. Although waste from wild animals contributes to pollutant levels in our waters, the focus of our efforts are to inform the public of the problems and solutions associated with waste from domesticated pets.

Problem/Issue
According to 2006 data provided by New Hanover County Animal Control Services, there were 53,630 registered dogs and cats in New Hanover County (33,828 registered dogs and 19,802 registered cats). In addition, it is estimated that there are 5 unregistered pets for every 1 registered pet.

These numbers, in conjunction with the average defecation rate of pets, are a significant source of bacterial pollution draining to our area waterways. Canines produce an average of ¾ lb of waste per day; applying that rate to the number of dogs registered in New Hanover County in 2006 equates to 25,371 pounds of excrement produced daily by canines in New Hanover County. If we consider the estimated number of unregistered dogs, that figure climbs significantly.

Stormwater contamination from pet waste poses serious health risks for humans. When pet waste is left on the ground, stormwater runoff can carry viruses, bacteria, and parasites from pet waste into local surface waters via the stormwater drainage system. Humans can become ill by swimming or recreating in waters contaminated by pet waste, eating shellfish from contaminated waters, coming in direct contact with pet waste, or from flies which spread diseases. Wilmington's creeks and waterways are regularly monitored by UNCW Center for Marine Science Research staff, and surface waters in the Wilmington area consistently exceed the state standards for fecal coliform counts in human contact waters as set by NC DEHNR (Mallin et. al). High fecal coliform counts in Wilmington's waterways are a direct result of pet waste contaminated stormwater runoff. The health risks to humans associated with the bacteria and parasites polluting surface water from pet-waste contaminated stormwater runoff make education and outreach on pet waste a top priority.

Several diseases that humans can contract from pathogens in pet waste include:

Toxoplasmosis - Toxoplasmosis is a parasitic disease caused by the protozoan *Toxoiplasma gondii* and infects most warm-blooded animals including humans. The primary host is the felid (cat) family. Humans can contract the disease by ingestion of infected animal (especially cat) feces through hand-to-mouth contact following activities that involve touching anything that has come into contact with animal feces such as gardening, cleaning a litter box, etc. Humans can also contract the disease by ingestion of water contaminated with Toxoplasma, such as contact recreation in water contaminated with the Toxoplasma. A person suffering from acute toxoplasmosis show flu-like symptoms, swollen lymph nodes, or muscle aches and pain that lasts

for a month or more. Young children, elderly people, pregnant women, and immuno-compromised patients, such as those with HIV/AIDS, are especially susceptible to toxoplasmosis. Severe toxoplasmosis can cause damage to the brain or the eyes and birth defects in newborns ("Toxoplasmosis: Fact Sheet" CDC Division of Parasitic Diseases).

E. Coli - Escherichia coli (E. coli) are one of the main species of bacteria living in the lower intestines of mammals such as dogs and cats. Humans can contract E. coli through ingestion of water contaminated with the bacteria through drinking or contact recreation. People generally become ill from E. coli two to eight days after being exposed to the bacteria, and infection often causes severe bloody diarrhea and abdominal cramps; complications from severe E. coli infection can lead to death. In some people, E. coli infection can cause a complication called hemolytic uremic syndrome (HUS), a life-threatening condition that is usually treated in an intensive care unit through blood transfusions and kidney dialysis. A small percentage of persons with HUS have immediate complications with lifelong implications such as blindness, paralysis, persistent kidney failure, and mild abnormalities in kidney function ("Disease Listing, Escherichia Coli O157:H7, General Information" CDC Division of Bacterial and Mycotic Diseases).

Salmonella - Salmonellosis is an infection of the intestines caused by Salmonella bacteria, which are found in the feces of people and animals infected with Salmonella. Humans can contract Salmonella infections through contact with infected animals or their feces, including contact recreation or drinking water contaminated with the bacteria. Salmonella in humans can cause diarrhea, stomach pain, nausea and vomiting, and fever and headache, usually within 6 to 72 hours after exposure to Salmonella ("Disease Listing, Salmonellosis, General Information" CDC Division of Bacterial and Mycotic Diseases).

Gastroenteritis - Gastroenteritis is a general term referring to inflammation or infection of the gastrointestinal tract, primarily the stomach and intestines. Gastroenteritis is the most common illness associated with swimming in water polluted by sewage and/or pet waste, and it occurs in a variety of forms that can have one or more of the following symptoms: nausea, vomiting, stomach ache, diarrhea, headache, and fever ("Viral Gastroenteritis" Center for Disease Control and Prevention, Respiratory and Enteric Virus Branch.).

Roundworm - Roundworms, or nematodes, are a group of invertebrates whose larvae can be found in animal feces. Human can contract roundworm infections either by ingestion or through the skin ("Toxocariasis: Fact Sheet" CDC Division of Parasitic Diseases).

Some of the most common parasitic roundworms that can be transmitted to humans are:
Enterobius vermicularis, the pinworm that causes **enterobiasis**
Ascaris lumbricoides, the large intestinal roundworm that causes **ascariasis**
Necator and *Ancylostoma*, two types of hookworms that cause **ancylostomiasis**
Trichuris trichiura, the whipworm that causes **trichuriasis**
Strongyloides stercoralis that causes **strongyloidiasis**
Trichinella spiralis that causes **trichinosis**
Pet waste also seriously impacts a waterway by contributing nutrients that spur excessive weed and algae growth. When algal biomass decomposes, it consumes large amounts of dissolved oxygen (DO) from the water that can lead to dangerously low dissolved oxygen levels and fish

kills. This nutrient-rich water impairs aquatic habitat and is unattractive and unhealthy for drinking, swimming, fishing, and other recreational activities.

Target Audience
Based on the results of the 2005 Survey of North Carolina residents' stormwater behaviors and the City of Wilmington demographics, it was determined that education and outreach efforts should target the following audiences *(Note: A target audience is subject to modification over time pending results of periodic assessment and evaluation):*

Pet Owners
Pet owners are considered the primary focus for outreach and education. By right of ownership, a pet owner is empowered with the ability to reduce pet waste-contaminated stormwater runoff by cleaning up after his/her pet. Successful and continued education and outreach to pet owners has the potential to significantly reduce bacterial pollution and eutrophication of Wilmington's waterways.

Pet owners offer a variety of reasons for not picking up after their pets, including:
Not wanting to touch it
Thinking of it as fertilizer
Believing it will decompose quickly and go back into the soil
Being unaware of the health risks
Feeling it is their private property and therefore can do whatever they wish

The habit of NC pet owners cleaning up after their pets reflects these attitudes. Significantly more than half of each demographic (age, sex) in the survey responded to picking up after their pet as "Sometimes," "Rarely," or "Never" (Bartlett C-51). This data leads to the conclusion that the primary target audience for education and outreach should be broad initially, and adjusted to target more specific demographics pending the results of assessment and evaluation of education efforts.
18 to 64 year olds: Based on the survey results, the target audience's age is very broad. Pet owners aged 65 and older exhibit slightly better waste clean-up habits; the survey did not include pet owners under the age of 18.

Males and Females: Females were reported as having slightly better pet waste clean-up habits than males, but significantly more than half of each group still reported cleaning up after their pet as "Sometimes," "Rarely," or "Never."

Pet Industry Professionals/Businesses/Events
Education and outreach to pet industry professionals is extremely important because of their regular contact with pet owners. Targeting businesses, professionals, and events that cater to pet owners will enable us to educate those in the profession as well as have them serve as a conduit to deliver education and outreach messages. Businesses, professionals, and events that should be targeted include:
Veterinarians
Animal hospitals
Pet sitters
Doggie day cares

Pet trainers
Pet exercisers
Kennels and animal shelters
Groomers and pet spas
Pet supply stores
Pet magazines
Dog Jog, Paw Jam and other special events for pets
Local adoption agencies
Animal Control & the Humane Society

General Audience

By targeting a general audience for education and outreach efforts, we will be able to encourage more environmental stewardship of citizens in the community. Both pet owners as well as non-pet owners will understand the connection between pet waste and poor water quality, and as a result more pet owners will feel obligated to clean up after their pet as they will feel pressure from other citizens to do so. As more citizens are aware of the health consequences as well as the impacts to Wilmington's waterways, the more likely they are to report pet waste violators, or interject when witnessing a pet waste violation.

Key Messages for Pet Waste Education

Uncollected pet waste pollutes Wilmington's waterways and threatens public health.
Bacteria in pet waste can cause diseases and infections in humans and other animals.
Bacteria and nutrients in pet waste can cause serious water quality problems.
Pet owners/custodians should always clean up and properly dispose of pet waste by methods such as bagging, burying waste, using a pet waste digester, using a covered letterbox, etc.
Pet waste should not be flushed down the toilet in New Hanover County.

Message Distribution

Distribute pet waste education brochures through all veterinarian offices in New Hanover County.
Add more pet waste educational signs to the pet waste stations in City Parks.
Revise pet waste ordinance and require pet owners to pick up after their pet on public property. Include a clause that requires pet owners to show they have something on their person to do so (i.e. bag, scooper, etc).
Mail a pet waste education brochure to all registered pet owners in New Hanover County.
Using male-oriented media, target males, ages 18-64 through a mass media campaign for pet waste.
Establish contact with pet industry professionals and businesses to disseminate pet waste education messages, such as mailing them informational and educational materials, giving presentations at their businesses or community events, meeting with them and highlighting education outreach materials, etc.
Participate annually in the Wilmington Dog Jog event and Paw Jam event to disseminate pet waste messages.
Include blurbs in the citywide newsletter mailed quarterly to all citizens.
Contact local media outlets to suggest feature stories and/or articles regarding the importance of proper pet waste disposal

Develop and distribute public service announcements on pet waste on cable access and paid media as the budget permits

Assessment and Evaluation

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
Assess and evaluate local water quality utilizing yearly UNCW Center for Marine Science annual water quality reporting, specifically Fecal Coliform counts in local waters

Target Pollutant: Nutrients (nitrogen, phosphorous)
Target Pollutant Source: Fertilizer
Nutrients found in fertilizer, including phosphorous and nitrogen, cause algal blooms, low dissolved oxygen levels, fish kills, and poor aquatic habitat.

Pollutant Info
Fertilizers are substances spread on or worked into soil to increase its capacity to support plant growth. Fertilizers can be composed of organic and inorganic chemicals and compounds, and typically provide, in varying proportions, three major plant nutrients: nitrogen, phosphorous, and potassium. Sources of fertilizers include residential and commercial applications, applied by a wide variety of people ranging from the novice homeowner and gardener to professionally-trained landscapers and turf maintenance workers. Although not typically found in the City of Wilmington, another major source of fertilizer application is the farming of crops.

Problem/Issue
Proper application of fertilizer results in minimal environmental concerns, however negligent or improper application of fertilizers results in the introduction of nutrients and chemicals into local waterways via stormwater runoff. Improper application includes over-applying by frequency or volume, applying the wrong fertilizer compound, applying before rain, and failure to clean excess fertilizer from driveways and streets after application.

The chemicals and nutrients in fertilizers wash into surface waters during rain events or irrigation practices and result in eutrophication, which is the abundant accumulation of nutrients that support a dense growth of algae and other organisms. Decaying algae depletes dissolved oxygen from the water, resulting in a decrease of available oxygen for aquatic inhabitants like fish. This leads to a decline in aquatic organism populations from oxygen deprivation, or hypoxia.

Harmful algal blooms also prevent sunlight from penetrating surface waters, making it difficult for benthic, or bottom dwelling plants, to perform photosynthesis, which also further reducing the oxygen content of the water. Some algal blooms can be toxic to plant and animals, including humans.

Target Audience
The target audience for fertilizer education and outreach includes homeowners, business owners, and landscape and turf maintenance professionals. Generally, trained landscape business professionals have had some training and special knowledge on proper fertilization measures, however continuing education for alternatives to fertilizer application and frequent over-application is still very necessary for this sector. Homeowner education should be a top priority.

<u>Homeowners</u>
About 5% of residents who apply fertilizer to their yard apply it monthly. The majority of responses to “monthly” were of the highest income level of the survey respondents. The most responses to applying fertilizer 2-3 times per year were from the two highest income brackets in the survey (Bartlett 14).

Male homeowners who spend less than $500 per year on lawn care are the group that applies the most fertilizer themselves and not by hiring a professional service. Those who spend more tend to hire a professional service ("Toolbox – Audience Data").

Landscape and Turf Maintenance Professionals

Professionals employed in landscaping and turf maintenance should be a target audience due to their frequent use of fertilizers.

Key Messages for Fertilizer Education

There is a direct link between improper fertilizer application and poor water quality impacts, including fish kills, habitat destruction, and water quality degradation.

Promote time and money-saving alternatives to traditional fertilizer application including "grasscycling" (leaving grass clippings on the lawn as a natural fertilizer and soil conditioner), composting, using organic fertilizers, and getting a free soil test to determine the correct nutrient needs of a lawn and the proper application rates.

If you use fertilizer, read the label and apply correctly (i.e. not before it rains).

Fertilizer should be collected off of paved surfaces such as sidewalks and driveways.

Yard waste is also a source of nutrients because of the fertilizer attached and the nature of the organic matter, so yard waste should always be disposed of properly.

Citizens should employ a sense of responsibility and environmental stewardship to apply fertilizer properly.

Message Distribution

Distribute fertilizer education brochures to all yard maintenance and turf management businesses in New Hanover County.

Mail a fertilizer education brochure to all City of Wilmington residents.

Include blurbs in the citywide newsletter mailed quarterly to all Wilmington citizens.

Establish contact with local homeowners associations to disseminate fertilizer education messages through mailings, newsletters, presentations, and meetings, etc.

Establish contact with yard maintenance and turf management businesses to disseminate fertilizer education messages and encourage and ensure proper staff training.

Establish contact with management staffs of the golf courses in New Hanover County to disseminate fertilizer education messages and ensure proper staff training.

Contact local media outlets to suggest feature stories and/or articles regarding the importance of proper fertilizer application.

Develop and distribute public service announcements on the importance of proper fertilizer application.

Assessment and Evaluation

Periodically assess the habits of homeowners and landscape industry professionals by:

Direct observation of the fertilizer application habits of homeowners and landscape industry professionals in the Wilmington area

Surveys of the fertilizer application habits of homeowners and landscape industry professionals in the Wilmington area

Assess and evaluate local water quality utilizing yearly UNCW Center for Marine Science annual water quality reporting, specifically nitrogen, phosphorus, BOD, and algal bloom frequencies and locations

Target Pollutant: Toxic chemicals
Target Pollutant Source: Pesticides
Pesticides include herbicides, fungicides, and insecticides which are chemicals that can persist in the environment and disrupt aquatic habitat, contaminate water resources, and cause toxicity in humans, animals and aquatic habitat.

Pollutant Info
Pesticides are applied by homeowners, business owners, landscape and turf maintenance professionals, and exterminators and pest control professionals.

As defined by the Environmental Protection Agency (EPA), a pesticide is "any substance or mixture of substances intended for preventing, destroying, repelling, or lessening the damage of any pest." Sources of pesticides include applications to homes and businesses by homeowners, business owners, or commercial pesticide professionals. Agricultural application of pesticides is not considered a source in Wilmington because of the absence of agricultural operations in the area.

Problem/Issue
Commonly used organophosphate pesticides are present in urban stormwater runoff and are responsible for toxicity to aquatic life in receiving water bodies. Pesticides can bio-accumulate up the food chain and pose a threat to beneficial bugs, the aquatic environment, wildlife, and humans.

Target Audience
Homeowners and Residents
A majority of the target pollutant pesticides are commonly available from home improvement and gardening stores and do not require training or licensing as a prerequisite to purchase or application. Thus, home and residential applications by citizens potentially contributes to the contamination of stormwater and surface water from pesticides. Education and outreach to Wilmington's residents on the proper application techniques and practices for pesticides would potentially reduce improper application, and thus reducing the potential for contamination of stormwater runoff. Owners or operators of small businesses that perform their own landscape maintenance should be addressed in this target audience group also.

Yard Maintenance, Turf Management, Exterminator/Pest Control Professionals
It can be assumed that professionals in this industry have been properly trained and educated in application practices for pesticides and thus this group is the second tier priority target audience. However, due to the frequency of applications by members of this target audience group, the potential for contamination of stormwater runoff by pesticides through improper application by members of this target audience group is still present. Consequently, education and outreach on proper application techniques to this target audience group is needed.

Key Outreach and Education Messages for Pesticides
Awareness of the impact of pesticides on surface waters via stormwater runoff.
A direct link exists between animal and habitat impacts and the application of pesticides.

Citizens/landscapers should be encouraged to use native plants which don't require pesticides, use natural controls such as ladybugs and weeding by hand, using organic pesticides, reading the label to apply correctly (i.e. not before it rains) and using pesticides as a last resort.
Citizens should employ a sense of responsibility and environmental stewardship to apply pesticides properly.

Message Distribution
Establish contact with yard maintenance, turf management, and exterminator/pest control professionals in New Hanover County to disseminate pesticide education messages and encourage and ensure proper staff training.
Distribute pesticide education brochures to all yard maintenance, turf management, exterminators, and pest control professionals in New Hanover County.
Establish contact with local homeowners association and property management companies to disseminate pesticide education messages.
Mail a pesticide education brochure to all Wilmington residents.
Include blurbs in the citywide newsletter mailed quarterly to all Wilmington citizens.
Work with NC Cooperative Extension Service to implement educational workshops focused on proper pesticide use for professionals needing NC Pesticide credits.
Contact local media outlets to suggest feature stores and/or articles regarding the importance of proper pesticide application.
Develop and distribute a public service announcement on the importance of proper pesticide application.

Assessment and Evaluation
Periodically assess the pesticide application habits of homeowners, yard maintenance, turf management, and exterminator/pest control professionals by:
Direct observation pesticide application habits of homeowners, yard maintenance, turf management, and exterminator/pest control professionals
Surveys of pesticide application habits of homeowners, yard maintenance, turf management, and exterminator/pest control professionals
Assess and evaluate local water quality utilizing yearly UNCW Center for Marine Science annual water quality reporting, specifically nitrogen, phosphorus, BOD, and algal bloom frequencies and locations

Target Pollutant: Organic material, nutrients (nitrogen, phosphorous)
Target Pollutant Source: Yard Waste/Debris
Organic matter such as grass clippings, leaves, and other yard trimmings contribute nutrients to waterways that result in aquatic weed and algae growth, low dissolved oxygen levels, fish kills, and impaired habitat. Sediment is often attached to this organic matter.

Pollutant Info
Yard waste is produced as a result of landscaping, mowing, clipping, pruning, and gardening around homes and businesses. Yard waste consists of organic matter such as grass clippings, leaves, and branches, etc., and is produced by landscape maintenance performed by homeowners and commercial landscapers.

Problem/Issue
Yard waste can clog the storm drainage system causing flooding of streets, homes and businesses.

Yard waste that ends up traveling all the way through the drainage system ends up in local surface waters, which impacts aquatic life and habitat by introducing excess nitrogen and phosphorus to the water. This overabundance of nutrients is called eutrophication and can lead to severe algal blooms. As the algal blooms decompose, it uses up the dissolved oxygen in the water that aquatic organisms, like fish, need to survive. In addition, yard waste often carries fertilizers, pesticides, and sediment attached to it that compounds the problem of eutrophication and threatens the flora and fauna in our waterways.

Target Audience
96% of North Carolina residents surveyed reported having a yard that they personally mow. 95% of urban respondents to the survey reported either leaving their grass clippings on their lawn, collecting them and throwing them in the garbage, or using them for mulch and/or compost. Less than 2% of urban respondents reported as to blowing or raking their yard waste down the storm drain. Reponses to the survey were broken down by education level, with the largest percentages as ‘High School Graduates’ and ‘Some College’ (Bartlett, C-21).

<u>Lawn Maintenance and Landscape Industry Professionals</u>
Since lawn maintenance professionals are more frequent to generate yard waste than the average home owner, they are potentially a greater contributor to the introduction of yard waste into the storm drainage system.

<u>Homeowners</u>
Based on survey results, as well as the fairly even distribution of respondents by education level who reported to rake or blow their yard waste down the storm drains, the target audience should be a broad, encompassing audience. A slight priority may be given to high school and college aged audience. Based on the survey results, audience members with experience in a vocational or technical school should be given the lowest priority.

Key Outreach and Education Messages for Yard Waste

A direct link exists between fish kills and aquatic habitat destruction as a result of improper yard waste disposal habits.

A direct link exists between flooding of streets and property as a result of improper yard waste disposal habits.

Landscapers/citizens should practice proper disposal methods such as grasscycling, composting, collecting/containing yard waste for pick-up and not blowing or placing debris into any part of the storm drainage system.

Citizens should employ a sense of responsibility and environmental stewardship to dispose of yard waste properly.

Message Distribution

Establish contact with yard maintenance and turf management professionals in New Hanover County to disseminate yard waste education messages and encourage and ensure proper staff training.

Distribute yard waste educational brochures to all yard maintenance, turf management, and property management professionals in New Hanover County.

Establish contact with local homeowners association and property management companies to disseminate yard waste education messages.

Mail a yard waste educational brochure to all Wilmington residents.

Include blurbs in the citywide newsletter mailed quarterly to all citizens.

Contact local media outlets to suggest feature stories and/or articles regarding the importance of proper yard waste disposal habits.

Assessment and Evaluation

Elicit counts of Stormwater Maintenance Department responses to clogged stormwater system components as a result of yard waste

Periodically assess the yard waste disposal habits of property owners and landscape/maintenance industry professionals in Wilmington by:

Direct observation of habits

Surveys of habits

Count of citations issued pertaining to improper yard waste disposal habits

Count of reported violations to Stormwater Hotline

Assess and evaluate local water quality utilizing yearly 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)
Target Pollutant Source: Sediment
Sediment includes particles of sand, dust, dirt, gravel and soil that cause turbidity and problems for aquatic life.

Pollutant Info
Sediment is generated by the processes of natural or accelerated erosion. Natural erosion is the process of weathering that forms soil. Accelerated erosion is a result of land-disturbing activities by humans that loosens topsoil and makes it more prone to erode; construction-related activities are an example of accelerated erosion. Another example is an eroding stream bank caused by lack of a vegetated buffer.

While natural erosion contributes sediment to our waterways, the majority of the sediment comes from areas where accelerated erosion has occurred. Other sources of sediment include poorly vegetated areas in yards of homes and businesses.

Problem/Issue
Sedimentation occurs when stormwater runoff carries soil particles from an area, such as a construction site, and transports them to surface waters such as a stream or creek. Sediment can fill in a waterbody or clog the storm drainage system, which can lead to flooding of streets and property.

Excessive sedimentation clouds the water, a condition known as turbidity. Increased turbidity causes problems for aquatic plants and animals. Aquatic plants, like all other plants, require sunlight to perform photosynthesis. As water turbidity increases, the amount of sunlight able to penetrate through the water column decreases. This reduces the amount of sunlight that reaches aquatic plants, and therefore impairing plants' abilities to photosynthesize. Turbid water impairs the vision of animals, like fish, and their ability to hunt prey. Sediment in the water also impairs the ability of fish and other animals to breathe because sediment can clog their gills.

As sediment in water settles, it covers the benthic (bottom-dwelling) environment. Settling sediment smothers fish eggs, shellfish, coral, and benthic plants.

Sediment also serves as a vehicle for other pollutants like phosphorus, pathogens, and heavy metals to enter the aquatic environment. These other pollutants are often attached to sediment that ends up in surface waters, and as a result, cause their own myriad of problems to the environment.

Target Audience
Sources of sediment in our surface waters are primarily the result of accelerated erosion or erosion from any land-disturbing activity such as gardening, planting, construction, etc. The environmental consequences of sedimentation of surface waters are not widely understood by citizens, and an effective education and outreach campaign should convey the key messages to a wide target audience.

Homeowners and Business Owners

A broad audience should be blanketed by education and outreach efforts. Addressing citizens and businesses that only have bare spots in their yards is unfeasible and impracticable, and therefore the efforts for education and outreach should be as far-extending as possible, relaying the key messages in a package rather than tailoring key messages to specific target audience groups. These messages should also target homeowners that live along water conveyances that have significant erosion due to lack of a vegetated buffer to stabilize the bank.

Construction, Landscape, and Related Business Professionals

Due to the high amount of construction and development in Wilmington, a second-tier target audience group should be addressed that includes construction, landscape, and related industry professionals. The activities executed by members of these industries have very high potential to significantly contribute to sediment loading of stormwater runoff. Sediment and erosion control techniques are generally legally required when performing construction and landscape activities, and targeting this group with education and outreach on the environmental and legal importance of these methods can prevent a potentially large amount of sediment from being carried off by stormwater runoff.

Key Outreach and Education Messages for Sediment

A direct link exists between sediment and poor water quality.
Sedimentation impacts aquatic life and habitat.
Citizens can plant groundcover, shrubs, and trees to hold soil in place and reduce erosion.
Sediment should be collected off streets, driveways and other hard surfaces.
Developers should follow all sedimentation and construction site laws and practices.
Citizens and businesses should employ a sense of responsibility and environmental stewardship to contain and control sources of sediment.

Message Distribution

Promote the NC Division of Land Resources “1-866-STOP-MUD” toll free hotline to report possible violations of the Sedimentation Pollution Control Act.
Establish contact with construction, landscaping, and related business professionals in New Hanover County to disseminate sediment education messages and encourage and ensure proper staff training.
Distribute sediment educational brochures to all construction, landscaping, and related business professionals in New Hanover County.
Establish contact with local home owners associations and property management companies to disseminate sediment education messages.
Include blurbs in the citywide newsletter mailed quarterly to all citizens.
Contact local media outlets to suggest feature stories and/or articles regarding the problems caused by sediment entering the stormwater drainage system.

Assessment and Evaluation

Assess and evaluate local water quality utilizing yearly UNCW Center for Marine Science annual water quality reporting, specifically Total Suspended Solids (TSS)

Target Pollutant: Plastic, paper, cigarette butts, etc.
Target Pollutant Source: Litter
Litter includes plastics, paper, cigarette butts, and any other trash not properly disposed of that can end up in waterways and affect aquatic habitat, wildlife, and water quality.

Pollutant Info
Litter is generated as a result of the intentional or unintentional disposal of trash, cigarette butts, paper scraps, food wrappers, etc. onto the open ground or anywhere other than a trash can, dumpster, or recycling bin.

Problem/Issue
Litter is carried by stormwater runoff into the drainage system where it can clog storm drains and drainage routes and cause flooding onto streets and property.

Litter that travels all the way through the drainage system ends up in local surface waters where it causes many problems:
Fish, birds and other wildlife often mistake litter for food and become sick or die from ingesting it.
Fish, birds and other wildlife become entangled in litter and perish because they become strangled or are not able to properly ingest their food.
Litter can introduce chemical pollutants into waterways. Cigarette butts can leach chemicals such as cadmium, lead, and arsenic into the marine environment within one hour of contact with water.
Litter is extremely costly to clean up, yet very easy to prevent. The North Carolina Department of Transportation alone spent $16 million in 2006 cleaning up roadside litter.

Target Audience
Although no surveys has been performed in Wilmington or North Carolina targeting the litter habits of citizens, other research can be considered applicable in defining the target audience. Based on an inquiry to the North Carolina Administrative Office of the Courts, a summary of the littering offenses for calendar year 2006 showed that there were 218 littering charges including six offense codes, with 81 convictions. The majority of the offenses were: *Littering not more than 15 pounds* (132) and *Improper Loading/Covering of Vehicle* (69) ("Litter Data").

Research on litter habits of Victoria, Australia citizens has shown that men litter more than women, students are more likely to litter than other people, most littering occurs in transport sites, smoking areas and market sites, and the most common reasons for littering are: "too lazy" (24%), " no ashtray" (23%), and "no bin" (21%) ("VLAA – Facts About Butt Litter"). Finally, an abundance of research has shown that cigarettes are the largest source of litter. The public education and outreach for litter should target the following audiences:

<u>General, Encompassing Audience</u>
Despite several surveys and research, there is no such thing as a stereotypical litterbug. Litter habits cannot be confined to a particular demographic, and therefore education and outreach efforts should extend to every citizen in Wilmington.

Smokers

Cigarette butts are the largest environmental litter problem both locally and worldwide. Smokers should be educated that cigarette butts are a major source of litter and that they negatively impact the environment.

Drivers of Pickup Trucks and/or Open Trailers

A lot of roadside litter in North Carolina results from poor securing of cargo loads. Drivers that may be transporting loads of debris, yard waste, trash, etc often do not secure their loads in their truck beds or open trailers and then the load gets blown off of the vehicle and onto the roads and surrounding areas *(Keep It In Your Bed…).*

Key Outreach and Education Messages for Litter

A direct link exists between animal kills, habitat destruction, and water quality degradation as a result of littering.

There is a direct link between flooding of streets/property as a result of litter being carried by stormwater into the drainage system.

Messages should encourage the use of trash bins and reducing, reusing, and recycling.

Messages should include the specific impacts of litter on local waterways and inhabitants (i.e. plastic bags get mistaken as jellyfish by sea turtles) and litter decomposition rates to raise awareness of the longevity of litter in our environment.

Citizens should employ a sense of responsibility and environmental stewardship to dispose of yard waste properly to dispose of litter properly and encourage the reporting of litter violators and the enforcement of litter offenses.

Message Distribution

Distribute pocket ashtrays to residents of New Hanover County to encourage proper cigarette butt disposal.

Work with Keep America Beautiful of New Hanover County to develop and implement a public service campaign for litter education and outreach.

Develop and distribute posters to disseminate litter education and outreach messages

Distribute educational giveaways (i.e. pencils) about littering to students in New Hanover County.

Include blurbs in the citywide newsletter mailed quarterly to all citizens.

Educate citizens and students about using North Carolina's Swat-A-Litterbug program.

Establish contact with local sanitary disposal services to disseminate messages on proper load securing.

Contact local media outlets to suggest feature stories and/or articles regarding problems caused by litter entering the stormwater drainage system

Working with other local agencies, conduct volunteer litter clean-ups.

Assessment and Evaluation

Elicit count of Stormwater Maintenance Department responses to clogged stormwater sewer system components as a result of litter.

Have Stormwater Maintenance crews continually provide field observations of problem litter areas for clean-up by KAB 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
Count of reported violations to Keep America Beautiful of NHC
Count of reported violations to Swat-a-Litterbug from New Hanover County
Water quality levels, specifically litter quantities observed
Assess and evaluate local water quality utilizing yearly UNCW Center for Marine Science annual water quality reporting

Target Pollutant: Motor oil, antifreeze, grease, gas, and other vehicle fluids
Target Pollutant Source: Auto Fluids
Auto fluids include gas, motor oil, gear oil, grease, and antifreeze which do not dissolve in water. These fluids can spread quickly in water poisoning fish and other organisms and bonding to birds. Petroleum products are especially harmful to plants, wildlife, and humans.

Pollutant Info
Vehicle fluids and chemical pollutants can come from intentional or unintentional disposal of fluids such as motor oil, antifreeze, grease, gas, and other vehicle fluids. Sources of these fluids are leaking vehicles or machinery, leaking oil containment devices, industrial facilities, vehicle and machinery repair facilities, storage areas (including marinas), fuel stations, parking lots, and improper disposal of chemicals by homeowners or businesses, such as the do-it-yourself homeowner.

Problem/Issue
The types and sources of this pollutant class vary considerably. As of April 2, 2007, there were 178,091 registered vehicles in New Hanover County and 83,087 within the City of Wilmington limits (Cochran, D.).

Vehicles have seals and gaskets that are leaking or have the potential to leak a variety of fluids. An accumulation of oil and grease on roadways and parking lots gets carried away by stormwater runoff. Once in water, it forms a film and makes oxygen transfer difficult and toxic for aquatic animals and plants. In fact, 1 quart of motor oil can contaminate 250,000 gallons of water.

Chemicals can also enter surface waters by accumulating on sediment that is picked up by runoff. In this case, the sediment eventually settles to the bottom of the water column and adversely affects benthic organisms.

Target Audience
Do-It-Yourself Oil Changer
Citizens who perform maintenance on their own vehicles should be given a high priority for education and outreach efforts based on the potential for improper disposal methods. Only about a fifth of respondents who reported owning a vehicle also reported servicing the vehicle at home; the remainder of the respondents reported using a commercial oil change facility. Males are the typical at-home vehicle oil-changer, grouped by following age brackets (listed from the largest group to smallest): 35-44, 45-54, 18-24, over 65, 55-64, and 25-34. Race could also be considered in defining the target audience; Asian respondents reported the highest percentage of pouring used oil down the stormwater drain following servicing their vehicle. White respondents reported the highest percentage of pouring used oil in a designated section of their yard following servicing their vehicle (Bartlett C-37).

Vehicle Maintenance and Repair Businesses
It could be assumed that the highest density of vehicles leaking oils and greases are located in and around commercial businesses that perform maintenance and repair on vehicles and machinery. While these vehicles await repair, they are usually stored in open (non-covered)

parking lots; the runoff from large parking lots are a large contributor to oil and grease entering our surface waters. Also, these businesses generally have on-site storage for both new and used oils, and both have the potential to leak during filling, emptying, and storage unit failure.

Owners of Vehicles, Machinery, and Equipment

This target audience is large, broad, and encompassing of residents and businesses. All vehicles, machinery, and equipment that utilize oil and grease for operation have the potential to leak and contribute to stormwater pollution. In particular, vehicle owners should be educated to check for leaks, keep vehicles tuned up, repair leaks, check tire pressure and recycle vehicle fluids and batteries. In addition, citizens should be encouraged to utilize the stormwater hotline (future) to report instances of illegal fluid dumping.

Key Outreach and Education Messages for Chemicals

There is a direct link between plant and animal kills, habitat destruction, and water quality degradation as a result of the introduction of vehicle fluids into stormwater runoff.
Vehicle owners should be educated to check for leaks, repair them, keep vehicles tuned up, check for proper tire pressure and recycle vehicle fluids and batteries.
Citizens should employ a sense of responsibility and environmental stewardship to dispose of yard waste properly to dispose of litter properly and encourage the reporting of litter violators and the enforcement of litter offenses.

Message Distribution

Develop and distribute educational brochures to the community.
Distribute educational brochures to vehicle repair/maintenance facilities to disseminate proper chemical storage and disposal messages.
Establish contact with local home owners association and property management companies to disseminate chemical education messages.
Include blurbs in the citywide newsletter mailed quarterly to all citizens.
Contact local media outlets to suggest feature stories and/or articles pertaining to problems caused by chemicals entering the stormwater drainage system.
Distribute educational brochures on chemicals to all automobile owners in New Hanover County to encourage proper vehicle maintenance and chemical storage/disposal methods.

Assessment and Evaluation

Periodically assess vehicle fluid disposal habits of Wilmington residents and businesses
Direct observation of habits
Surveys of habits
Count of citations issued pertaining to improper chemical disposal habits
Count of reported violations pertaining to chemical leaks or disposal habits to Stormwater Hotline
Assess and evaluate local water quality utilizing yearly UNCW Center for Marine Science annual water quality reporting

Target Pollutant: Phosphorous, Dirt/Grime, Detergents
Target Pollutant Source: Car Washing Soaps/Detergent
Soaps used to wash vehicles often contain phosphorous, a primary nutrient of aquatic weeds and algae. Dirt and grime from vehicle washing activities are also washed into waterways.

Pollutant Info
Washing cars, boats, homes, and driveways can send soap, dirt and grime into our waterways via stormwater runoff or hose water. Some cleaning agents are more toxic to aquatic and marine organisms than others, but improper washing of cars or boats utilizing cleaning agents of any toxicity level can negatively affect water quality by contaminating the water with sediment, debris, or chemicals washed off of vehicles, driveways, etc.

Problem/Issue
Chemicals and cleaning agents that wash into storm drains and then our waterways can destroy the external mucus layers of fish that protect them from bacteria and parasites. This leads to fish kills as a result of bacterial or parasitic infections.

Many detergents also contain phosphates which promote excessive algae and aquatic weed growth. Phosphates are nutrients that promote the growth of plants and cause the growth of algae and aquatic weeds.

During the process of washing cars, boats, etc, other pollutants such as sediment, heavy metals, and chemicals may be washed away too. These pollutants are then picked up by stormwater runoff and cause their own negative consequences to the aquatic ecosystems in our area.

Target Audience
Homeowners/Do-it-Yourself Car Washers
The most important group to target concerning this pollutant is citizens that wash their cars in residential areas. Based on the survey of NC residents' habits, the members of this target group that should be given priority are people in the income bracket of $35,000 to $75,000, age group 35-44, and female (Bartlett C-37). These groups accounted for the most responses to letting their soapy water run into the street or driveway.

Do-it-Yourself Boat Washers
Although the survey did not include any questions on the washing habits of boat owners, this group should be given a high priority because of the potential to directly contaminate surface waters when washing their boats at moor. Boat owners that wash their boats at home on the trailer should be included in the same group as the do-it-yourself car washer.

Businesses Related to Home, Car, and Boat Cleaning
It is important to include businesses that perform cleaning or detailing of cars and boats in education and outreach efforts. These businesses include:
Mobile Cleaning Businesses, including pressure washing and boat cleaning services
Car Detailing Facilities (stationary)
Automobile Sales Businesses

General, Encompassing Audience
A general target audience is necessary because all residents and/or businesses have the potential to contribute to this target pollutant through simply washing something outdoors, such as driveways, homes, lawn furniture, or just about anything else.

Key Outreach and Education Messages for Soaps and Detergents
Create awareness of the impact of the vehicle washing activities into surface waters either directly or via stormwater runoff.
There is a direct link between aquatic impacts such as algal blooms and fish kills as a result of improper vehicle care habits.
Messages should encourage citizens to wash vehicles on the grass, use a phosphate-free detergent, and/or use a commercial car wash.
Citizens should employ a sense of responsibility and environmental stewardship to practice vehicle washing so that it does not harm the environment or our waterways.

Message Distribution
Distribute educational brochures to automobile owners in New Hanover County to disseminate messages on proper automobile washing practices.
Distribute educational brochures to boat owners in New Hanover County to disseminate messages on proper boat washing practices.
Establish contact with business related to automobile or boat cleaning and pressure washing to disseminate messages on cleaning agents entering the stormwater drainage system.
Partner with commercial car wash businesses to promote their use as an alternative to washing on the street or driveway.
Develop and distribute advertisements about vehicle washing to run in print media.
Establish contact with local home owners associations and property management companies to disseminate educational messages on cleaning agents.
Include blurbs in the citywide newsletter mailed quarterly to all citizens.
Contact local media outlets to suggest feature stories and/or articles pertaining to problems caused by cleaning chemicals/agents entering the stormwater drainage system.

Assessment and Evaluation
Periodically assess vehicle washing and exterior home washing habits of Wilmington residents by:
Direct observation of habits
Surveys of habits

APPENDIX B: PUBLIC INVOLVEMENT AND PARTICIPATION

Included in this section:
BMP Reporting Table
Contracts/Cooperative Agreements with:
-New Hanover Soil & Water Conservation District
-Cape Fear River Watch

DATE	PLACE/EVENT	AUDIENCE	INDIVIDUALS WHO PERFORMED ACTIVITY/CONTENT	TECHNIQUES/ METHODS USED	RESULTS OF ACTIVITY/ INFO COLLECTED

BMP(a) Administer a Public Involvement Program
This requirement is being met as outlined in b-e below

BMP(b) Allow the Public an Opportunity to Review & Comment on Stormwater Plan
This requirement was satisfied in Year 3.

BMP(c) Organize a Volunteer Community Involvement Program
The City of Wilmington 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 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 the NPDES BMP requirements. Copies of these contracts and yearly reports are included in the Appendix. Below is a summary of each organization's deliverables in regards to NPDES:
CFRW - 8th grade classroom presentations, community education programs, storm drain marking, watershed cleanup and coordination, grant project partnership, Greenfield Lake & Kerr Ave. education/monitoring, public involvement volunteer program, volunteer monitoring program, support for NPDES public meetings and education efforts, quarterly reporting)
NHSWCD - 8th grade classroom presentations, fecal coliform education, community presentations, outreach events, LID education, teacher workshops, environmental field days, contests, education website, storm drain marking, grant project partnership, annual Rain Barrel Sale, NCCAP administration and implementation, Stewardship program coalition member, , stormwater BMP installation, easement conservation, support for NPDES public meetings and education efforts, quarterly reporting.

Visit the Appendix to review the contracts and accomplished deliverables of each contracted organization.

BMP(d) Establish a Mechanism for Public Involvement					
4/22/11	Targeted direct mail	Shinn Point neighborhood residents	Stormwater staff	Project information	Mailed Shinn Point project info, map, and lane closure notice to residents
4/23/11	Targeted direct mail	Winter Park area residents Winter Park Elementary School staff, students, parents	Stormwater staff	Project information	Mailed to citizens, businesses, schools in the Winter Park area for the MacMillan Avenue stormwater drainage project

4/30/11	Lower Cape Fear Earth Day Celebration at Hugh MacRae Park	Festival attendees, general public	Stormwater staff (SWS is an annual sponsor of Lower Cape Fear Earth Day Festival)	Display booth to promote stormwater pollution prevention	Stormwater information distributed. 4,000+ attendees
5/7/11	Paw Jam	Pet owners	Stormwater staff NHSWCD staff	Canines for Clean Water booth - interactive event where pet owners sign a pledge to be clean up after their pets	130+ pet owners signed pledge and received dog bandana, treats, and stormwater literature. Dogs have a chance to be featured on city website
5/21/11	Gator Fest	General public Lake patrons Pet owners	Stormwater staff	Canines for Clean Water booth - interactive event where pet owners sign a pledge to be clean up after their pets	50+ pet owners signed pledge and received dog bandana, treats, and stormwater literature. Dogs have a chance to be featured on city website
9/21/11	Targeted direct mail	Greenville Ave residents	Stormwater staff Dewberry Consulting	Project information	Mailed to citizens & businesses in the area of the Greenville Ave. drainage project
9/24/11	Big Sweep Nationwide Cleanup	Greenfield Lake and behind Everybody's Grocery in the Greenfield Lake Watershed	37 volunteers (adults and youth)	Streambank, shoreline, inlet streams, and canoe cleanup of Greenfield Lake	45 volunteers contributed a total of 135 hours. Collected thirty -seven 30 gallon bags of trash, box spring and other trash
10/1/2011	Inland Greens Clubhouse	Property owners at Inland Greens	Stormwater staff Parks staff	Direct contact meeting	Public meeting to show citizens the conceptual park and drainage plans for Inland Greens. Approximately 60 people in attendance.
2/16/12	Pet Expo @ the Schwartz Center	Pet owners	NHSWCD staff	Canines for Clean Water booth - interactive event where pet owners sign a pledge to be clean up after their pets	30+ pet owners signed pledge and received dog bandana, treats, and stormwater literature. Dogs have a chance to be featured on city website
March 2011-Dec 2011	8 watershed cleanup events including the Annual Big Sweep event	Volunteers	Cape Fear River Watch	Watershed cleanup and/or invasive species vegetation removal Areas cleaned include Greenfield Lake, Smith Creek, Cape Fear River, Randall Pond, Kerr Avenue Wetland	8 cleanup events 186 volunteers contributed a total of 355 hours. Collected 230 (30 gallon) bags of trash and/or invasive species vegetation

Ongoing - 2nd Thursday of every month	Monthly Rain Barrel Sales	General public	Stormwater staff NHSWCD	Monthly rain barrel sale to the general public; held 2nd Thursday of each month at NHC Government Center with partner agency, NHSWCD	Stormwater runoff and water conservation education and collection
Ongoing	Stormwater office via phone or email, public meetings, etc.	General public, citizens, businesses	Stormwater staff	Email or phone responses to citizen requests for information, literature, etc.	Information provided for specific nature of contact

BMP(e) Establish a Hotline/Helpline

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. Visit the Appendix for hotline report information.

Ongoing	Stormwater Hotline info	General public	Stormwater staff	Hotline Billboard poster Hotline promos (pen, magnet, sticky notes)	Developed educational items to raise awareness about the stormwater hotline and web reporting form

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

Annual Service Contract: July 1, 2011 - June 30, 2012

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, 2011** through **June 30, 2012** for the agreed amount of $**15,000**. These contracted services assist the City in meeting requirements of the federal NPDES Stormwater Permit.

Public Education/Outreach

Total Allocated Cost: $5000

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 specific NCSCOS goals and objectives for the hydrosphere/water quality. 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. CFRW will also work cooperatively with Stormwater Services to provide additional presentations in addition to the 8th grade program, as needed. A summary will be provided for each additional presentation given. CFRW was provided with city funds to purchase an Enviroscape for the express purpose of being available to conduct 8th grade presentations. Additional presentations should not conflict with the 8th grade presentations in any fashion. **($2500)**

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 winter, spring, and fall birding tours at Greenfield Lake and Smith Creek paddling tours. Efforts will be made to inform the local media about educational programs. **($2500)**

Public Involvement/Volunteer Efforts

Total Allocated Cost: $5000

Engage in a volunteer Storm Drain Marking program to educate residents about stormwater and encourage public involvement and participation. Staff will use supplied markers, identify areas to mark drains, train volunteers in marking and safety, and help provide

oversight of the program. A trained CFRW staff member is required to be present during all storm drain marking activities and volunteer efforts. **($500)**

Coordinate volunteer clean-ups of local watersheds. These cleanups will focus on Greenfield Lake, Smith Creek, Burnt Mill Creek, Barnards Creek, the Cape Fear River, and as the need is discovered by the City or Watershed Watch volunteers. A minimum of 7 clean-ups will be completed including at least one site for Big Sweep, an annual international clean-up. 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. A summary of each clean-up will be completed and submitted to Stormwater Services. The cleanup summary will be submitted within 10 days of cleanup and 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, and if possible photographs to document work completed. Efforts will be made to inform the local media about upcoming cleanup events. **($2500)**

Conduct a volunteer watershed monitoring program and alert Stormwater Services when volunteers find problem areas. Monthly Watershed Watch volunteer monitoring activities will be conducted and will target high priority creeks or creek sections identified in cooperation with Stormwater Services. A monitoring report with basic field observations and photo documentation will be maintained and submitted for review to Stormwater Services at least every 3 months. In addition, significant water quality problems identified during observation monitoring will be reported immediately to the appropriate officials. **($2000)**

Programs/Partnerships

Total Allocated Cost: $1000

Serve as an active partner organization on local grant projects and initiatives that benefit local surface water quality and water resources. Examples may include the Greenfield Lake wildlife feeding project, NCSU street retrofit grant project, and the Smith Creek paddle trail. **($1000)**

Monitoring Activities

Total Allocated Cost: $3000

Monitor, maintain, and provide outreach/education for the Kerr Avenue Stormwater Wetland. Activities include supporting school group clean-ups, maintenance of plants as needed, evaluation and consulting on larger maintenance needs. A brief monitoring report will be sent monthly via e-mail to Stormwater Services for the period of April through November. Observations will be conducted between the 20^{th} – 24^{th} of each month and reports will be submitted within 10 days of observation. The monitoring report will include observations such as water clarity, invasive species, algae, wildlife, maintenance/restoration opportunities, photographs, and if applicable, the number of participants, hours worked, and brief description of the work/activity completed. Outreach/education activities will include presentations to groups or periodic outreach such as information provided to educate business owners/operators and property owners in close proximity to the Kerr Ave wetland. **($1500)**

Monitor, evaluate, and consult on aquatic vegetation management techniques implemented to improve the water quality of Greenfield Lake. A brief monitoring report will be sent monthly via e-mail to Stormwater Services for the period of April through November. Observations will be conducted between the 26^{th} – 30^{th} of each month and reports will be

submitted within 10 days of observation. The monitoring report will include observations from specified locations around the lake highlighting water clarity, invasive species, algae, wildlife, maintenance and restoration opportunities, and photographs. **($1500)**

Monitoring and Cleanup reports will be submitted using supplied templates and within 10 days of the observation/event and according to pre-determined observation schedule.

Contract Administration

Total Allocated Cost: $1000

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 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.

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: **Scott Whitham ($1000)**

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.

Signature:_____ **Date:** _____

Elise Rocks- President, Cape Fear River Watch, Inc.

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

Quarterly Progress Report #2: October 1 – December 31, 2011

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, 2011** through **June 30, 2012** for the agreed amount of $**15,000**. These contracted services assist the City in meeting requirements of the federal NPDES Stormwater Permit.

Public Education/Outreach

Total Allocated Cost: $5000

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 specific NCSCOS goals and objectives for the hydrosphere/water quality. 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. CFRW will also work cooperatively with Stormwater Services to provide additional presentations in addition to the 8th grade program, as needed. A summary will be provided for each additional presentation given. CFRW was provided with city funds to purchase an Enviroscape for the express purpose of being available to conduct 8th grade presentations. Additional presentations should not conflict with the 8th grade presentations in any fashion. **($2500)**

July 1 - September 30, 2011

8th Grade Enviroscape Presentations				
Date	**School/Event**	**Grade**	**# of presentations**	**# of students**
Other Enviroscape Presentations				
Date	**School/Event**	**Grade**	**# of presentations**	**# of students**
7/8/11	CFRW eco camp	3rd - 7th	1	7
7/11/11	CFRW eco camp	3rd - 7th	1	7
7/17/11	Boy scouts	6th - 9th	1	10

October 1 – December 31, 2011

8th Grade Enviroscape Presentations				
Date	**School/Event**	**Grade**	**# of presentations**	**# of students**
10/4/11	Holly Shelter	8	4	Approximately 75
10/5/11	Holly Shelter	8	1	Approximately 15
11/15/11	Roland Grise	8	2	Approximately 30
11/17/11	Roland Grise	8	2	Approximately 49
Other Enviroscape Presentations				
Date	**School/Event**	**Grade**	**# of presentations**	**# of students**

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 winter, spring, and fall birding tours at Greenfield Lake and Smith Creek paddling tours. Efforts will be made to inform the local media about educational programs. **($2500)**

July 1 – September 30, 2011

First Saturday Seminars			
Date	**Organization**	**Topic**	**Attendance**
7/2/11	CFRW (1st Saturday)	Rainwater Harvesting w/Rick Harris	55
8/6/11	CFRW (1st Saturday)	History of Wilmington Development w/Beverly Tetterton	60
9/3/11	CFRW (1st Saturday)	Energy (drilling, fracking, wind) w/Roger Shew	65
Other Presentations by CFRW Staff			
9/19/11	Kemp as guest speaker at UNCW Coastal Issues class	Coastal Issues (water quality and quantity)	40
9/28/11	Fort Fisher Aquarium	Educational booth	50
Greenfield Lake Eco-Trips/ Birding Tours			
7/1/11	Surf Camp	Nature tour GFL	13
7/8/11	Surf Camp	Nature tour GFL	12
7/15/11	Surf Camp	Nature tour GFL	14
7/22/11	Surf Camp	Nature tour GFL	12
7/29/11	Surf Camp	Nature tour GFL	13
8/5/11	Surf Camp	Nature tour GFL	14
8/12/11	Surf Camp	Nature tour GFL	11
8/19/11	Surf Camp	Nature tour GFL	13

October 1 – December 31, 2011

First Saturday Seminars			
Date	**Organization**	**Topic**	**Attendance**
10/1/11	Larry Cahoon	Water Quality/quality issues	60
11/5/11	Jill Peleuses	Backyard Habitats	45
12/3/11	Chris Fonvielle	Ft Fisher	60

Other Presentations by CFRW Staff			
10/2/11 (Kemp)	UNCW environmental studies	Water Quality	12
10/8/11 (Kemp)	AAUW	Water Quality	30
10/13/11 (Kemp)	Wilmington Business and Professional Women	Water Quality	25
11/9/11	CFRW Film Series	Groundwater Quality	20
11/1/11 (Kemp)	Birch Creek Week	Water Quality	12
12/6/11	CFRW	Industrial Impacts on Water Quality	30
12/11/11 (Kemp)	CFRW Annual Meeting	Water Quality	65
Greenfield Lake Eco-Trips/ Birding Tours			
10/12/11	Greenfield Lake	Lake tour – wildlife, history, ecology	5
10/19/11	Greenfield Lake	Lake tour – wildlife, history, ecology	4
10/24/11	St. Johns Pre-school	Walking nature tours	30
10/24/11	Trask	Walking nature tours	100
10/25/11	Trask	Walking nature tours	100
10/27/11	Trask	Walking nature tours	100
11/2/11	Greenfield Lake	Lake tour – wildlife, history, ecology	4
11/15/11	Greenfield Lake	Lake tour – wildlife, history, ecology	2
11/22/11	Greenfield Lake	Lake tour – wildlife, history, ecology	3

Public Involvement/Volunteer Efforts

Total Allocated Cost: $5000

Engage in a volunteer Storm Drain Marking program to educate residents about stormwater and encourage public involvement and participation. Staff will use supplied markers, identify areas to mark drains, train volunteers in marking and safety, and help provide oversight of the program. A trained CFRW staff member is required to be present during all storm drain marking activities and volunteer efforts. **($500)**

July 1 – September 30, 2011
October 1 – December 31, 2011

Storm Drain Marking			
Date	**Organization**	**Volunteers**	**# of stormdrains marked**
10/30/11	UNCW Learning Community Service Project	Kaitlyn Abdo, Allie Sheffer, Delaney Dyer, Stephanie MacDonald	8

Coordinate volunteer clean-ups of local watersheds. These cleanups will focus on Greenfield Lake, Smith Creek, Burnt Mill Creek, Barnards Creek, the Cape Fear River, and as the need is discovered by the City or Watershed Watch volunteers. A minimum of 7 clean-ups will be completed including at least one site for Big Sweep, an annual international clean-up. 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. A summary of each clean-up will be completed and submitted to Stormwater Services. The cleanup summary will be submitted within 10 days of cleanup and 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, and if possible photographs to document work completed. Efforts will be made to inform the local media about upcoming cleanup events. **($2500)**

July 1 – September 30, 2011

Watershed Clean-ups				
Date	**Watershed**	**Specific Area Cleaned**	**# Volunteers/Hours**	**Trash Collected (ie. type, # of 30 gallon bags)**
7/9/11	Greenfield Lake	Behind EVERYBODY'S grocery on Greenfield Ave.	11/16.5	Twenty 30 gal. bags, tires, shopping cart, other trash
8/13/11	Burnt Mill Creek	Randall Pond	23/34.5	Twenty seven 30 gal. bags, milk crate, other trash
9/24/11	Greenfield Lake	Greenfield Lake and behind EVERYBODY'S for annual BIG SWEEP event	37/111	Thirty seven 30 gal. bags, box spring, other trash

October 1 – December 31, 2011

Watershed Clean-ups				
Date	**Watershed**	**Specific Area Cleaned**	**# Volunteers/Hours**	**Trash Collected (ie. type, # of 30 gallon bags)**
10/8/11	Burnt Mill Creek	Downey Branch off Wrightsville Ave.	32/64	Six 30 gal. bags of trash and a great deal of kudzu and privet were removed.

Conduct a volunteer watershed monitoring program and alert Stormwater Services when volunteers find problem areas. Monthly Watershed Watch volunteer monitoring activities will be conducted and will target high priority creeks or creek sections identified in cooperation with Stormwater Services. A monitoring report with basic field observations and photo documentation will be maintained and submitted for review to Stormwater Services at least every 3 months. In addition, significant water quality problems identified during observation monitoring will be reported immediately to the appropriate officials. **($2000)**

July 1 – September 30, 2011

Watershed Watch Reports were submitted in August for Burnt Mill Creek/Shirley Rd. and also for Maides Park in the Smith Creek Watershed. Watershed Watch Reports were submitted in September for 1820 Burnett Blvd. and also for the area behind EVERYBODY's grocery store, both in the Greenfield Lake Watershed.

October 1 – December 31, 2011

A Watershed Watch Report was submitted by BSA Troop 274 in October for Burnt Mill Creek/Chestnut St.

Programs/Partnerships

Total Allocated Cost: $1000

Serve as an active partner organization on local grant projects and initiatives that benefit local surface water quality and water resources. Examples may include the Greenfield Lake wildlife feeding project, NCSU street retrofit grant project, and the Smith Creek paddle trail. **($1000)**

July 1 – September 30, 2011

Greenfield Lake Boat Rental Staff have spoken to several dozen park visitors, informing them about the new Wildlife Feeding Education Campaign and directing them to the newly erected signs explaining the harm caused by feeding wildlife.

CFRW is actively involved in the ongoing effort with NHC Library and COW to design a "Green" Park near the corner of 3rd and Chestnut streets.

October 1 – December 31, 2011
CFRW Staff worked closely with Wilmington Parks and Landscaping Division regarding the design and placement of the new Boat Motor Horsepower Limit signs at the Greenfield Lake boat ramp, and the placement of the new Wildlife Feeding Education Campaign signs around Greenfield Lake. CFRW continues to reach many members of the community regarding wildlife feeding education through Enviroscape presentations, when renting boats, and during land and water eco-tours at Greenfield Lake.

Monitoring Activities

Total Allocated Cost: $3000

Monitor, maintain, and provide outreach/education for the Kerr Avenue Stormwater Wetland. Activities include supporting school group clean-ups, maintenance of plants as needed, evaluation and consulting on larger maintenance needs. A brief monitoring report will be sent monthly via e-mail to Stormwater Services for the period of April through November. *Observations will be conducted between the 20th – 24th of each month and reports will be submitted within 10 days of observation.* The monitoring report will include observations such as water clarity, invasive species, algae, wildlife, maintenance/restoration opportunities, photographs, and if applicable, the number of participants, hours worked, and brief description of the work/activity completed. Outreach/education activities will include presentations to groups or periodic outreach such as information provided to educate business owners/operators and property owners in close proximity to the Kerr Ave wetland. **($1500)**

July 1 – September 30, 2011
Monitoring Reports for July, August, and September were completed and submitted. Two interns accompanied and were trained by the monitor in September.
October 1 – December 31, 2011
Monitoring Reports for October and November were completed and submitted.

The Kerr Ave., monitor, Bill Murray has discussed options with landscape architect Lara Berkley regarding the planting/moving of native plants in the Kerr Ave. wetland. CFRW hopes to lead a project in the Spring and involve volunteers in those efforts.

Monitor, evaluate, and consult on aquatic vegetation management techniques implemented to improve the water quality of Greenfield Lake. A brief monitoring report will be sent monthly via e-mail to Stormwater Services for the period of April through November. *Observations will be conducted between the 26th – 30th of each month and reports will be submitted within 10 days of observation.* The monitoring report will include observations from specified locations around the lake highlighting water clarity, invasive species, algae, wildlife, maintenance and restoration opportunities, and photographs. **($1500)**

July 1 – September 30, 2011
Monitoring Reports for July, August, and September were completed and submitted.
Six residents of the Lake Waccamaw Boys Home provided 12 hours of volunteer service cleaning trash at Greenfield Lake.

October 1 – December 31, 2011
Monitoring Reports for October and November were completed and submitted.

Monitoring and Cleanup reports will be submitted using supplied templates and within 10 days of the observation/event and according to pre-determined observation schedule.

Contract Administration

Total Allocated Cost: $1000

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 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.

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: **Scott Whitham ($1000)**

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: Scott Whitham **Date:** 01/03/12

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

Annual Service Contract: July 1, 2011 – June 30, 2012

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, 2011** through **June 30, 2012** for the agreed amount of **$26,500**. These contracted services assist the City in meeting requirements of the federal NPDES Stormwater Permit.

Public Education/Outreach

Total Allocated Cost: $13,250

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 specific NCSCOS goals and objectives for the hydrosphere/water quality. 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. Additional presentations should not conflict with the 8th grade presentations in any fashion. Other efforts may include assisting with outreach, teacher relations, and training instructors. **($1987.50)**

Increase awareness and public education about pet waste/fecal coliform bacteria. Implement education about pet waste, fecal bacteria, and the city's pet waste ordinance. Provide outreach and education materials via K-12 education programs, public meetings, agency website, and by participating/staffing a Canines for Clean Water booth at a minimum of 3 pet-related events including Paw Jam, and other events such as the Pooch Plunge, Pet Expo, etc. **($1325)**

Conduct at least 2 "Stormwater 101" presentations to HOAs, garden clubs, community/civic groups, developers, or during watershed-wide meetings. Initiate direct contact with potential audiences, promote program, and schedule presentations. **($662.50)**

Participate in local annual community outreach events. NHSWCD is a founding member of the Earth Day Alliance which organizes, implements, fundraises, and provides publicity for the Lower Cape Fear Earth Day Festival each spring. NHSWCD staff will attend and provide BMP and rain barrel sale information at the annual Wilmington Garden Show. NHSWCD may also assist with TreeFest, an annual program which distributes tree saplings to New Hanover County

citizens. In addition, NHSWCD will display program and educational information at the annual Cape Fear Fair and Expo. **($1987.50)**

Promote/consult on LID to developers, engineers, architects, property owners, etc. Promote LID and the local LID manual, provide input to City and NHC Technical Review Committees, as well as provide education and technical assistance as the need arises for property owners. **($622.50)**

Facilitate additional environmental education presentations for students, local residents, camps, business owners, etc. Topics include, but are not limited to, natural resource management, sustainability, and wildlife. Presentation topics will tie into water quality and conservation issues. **($1987.50)**

Organize, promote, and implement at least one Teacher Workshop a year serving teachers in New Hanover County. Workshops may include curriculum from at least one of the following: Project Wet; Food, Land and People; Project Learning Tree, Waste in Place, and Wonders of Wetlands. Staff will provide certification credits and renewal credits at qualifying workshops for those involved in the NC Environmental Education Certification program. **($1325)**

Organize and facilitate at least one Environmental Field Day a year serving an entire grade at a New Hanover County School. Provide Envirothon competition information and guidance to teachers and interested student organizations. Envirothon topics include aquatics, forestry, wildlife, soils, and other environmental issues. **($1325)**

Provide an opportunity for local 3-8th grade students to learn about watersheds, water quality, and stormwater through the Statewide District Poster, Essay and Speech contests. This year's theme is "Wetlands are Wonderful". **($662.50)**

Expand and maintain agency website. Maintain website and periodically update educational materials related to stormwater education. The website will also provide links to stormwater education materials in Spanish in an effort to reach more minorities in our region. CCAP project pictures will continue to be uploaded to the "Cost Share" link. A watershed map showing the types of CCAP BMPs and where they are located within local watersheds will continue to be updated and available on the website. Website will be promoted on local government TV. **($1325)**

Public Involvement/Volunteer Efforts

Total Allocated Cost: $1325

Engage in a volunteer Storm Drain Marking program to educate residents about stormwater and encourage public involvement for a minimum of 2 separate volunteer outings. Staff will use supplied markers, identify areas to mark drains, train volunteers in marking and safety, and help provide oversight of the program. A trained NHSWCD staff member is required to be present during storm drain marking activities and volunteer efforts. **($1325)**

Programs/Partnerships

Total Allocated Cost: $7950

Serve as an active partner organization on local grant projects and initiatives that benefit local surface water quality and water resources. This includes, but is not limited to, providing education and other programs related to a local grant or watershed plan implementation. **($397.50)**

Administer the NC Community Conservation Assistance Program (CCAP) in New Hanover County. Provide assistance with the demonstration, purchase, and installation of stormwater Best Management Practices (BMPs) for City/County residents and businesses. Activities may include identifying new BMPs and standards, updating BMP cost estimates, developing conservation plans for CCAP clients, assisting with the design and/or installation of stormwater BMPs, managing CCAP BMP project sites, and conducting annual spot checks. In addition, NHSWCD staff will promote CCAP through agency website, educational programs, publications, public/local government television, and to interested groups. NHSWCD will also continue to update the watershed map of CCAP BMPs installed/cost-shared by the district in the county and post map on agency website. **($3577.50)**

Partner with the City of Wilmington Stormwater Services and Rainwater Solutions, Inc. to hold a monthly public rain barrel sale for New Hanover County residents. NHSWCD will utilize local government television, local events including Earth Day and the Cape Fear Garden Show, agency website, and periodic press releases to the media to promote the sale. **($1192.50)**

Serve as an integral partner to facilitate the Lower Cape Fear Stewardship Development Award Program. The program recognizes developers for demonstrating outstanding environmental stewardship such as stormwater reduction through the protection and awareness of our natural resources. **($2385)**

Provide outreach and engage school administrators and teachers to identify a future BMP Outdoor Education site on a school campus. The future site would be used to increase hands-on education about stormwater, water quality, and wildlife habitat. **($397.50)**

Monitoring Activities

Total Allocated Cost: $1325

Serve as the lead agency for managing land conservation easements and stormwater education/outreach in the Hewletts Creek Watershed. Annually monitor 33 acres of conservation easements, develop and distribute conservation easement information to property owners adjacent to the easements, partner with YWCA to provide outdoor education programs on the 2 district-owned conservation easements, and provide an educational mailing to residents in the Hewletts Creek Watershed. In addition, NHSWCD will work with organizations/groups to provide stormwater education programs at the J.E.L. Wade Stormwater Wetland, as the need arises. **($1325)**

Contract Administration

Total Allocated Cost: $2650

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 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.

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. ($2650)**

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.

Signature:_____ **Date: _____**

William J. Hart, Vice Chair, NHSWCD

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

Quarterly Progress Report #2: October 1 – December 31, 2011

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, 2011** through **June 30, 2012** for the agreed amount of **$26,500**. These contracted services assist the City in meeting requirements of the federal NPDES Stormwater Permit.

Public Education/Outreach

Total Allocated Cost: $13,250

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 specific NCSCOS goals and objectives for the hydrosphere/water quality. 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. Additional presentations should not conflict with the 8th grade presentations in any fashion. Other efforts may include assisting with outreach, teacher relations, and training instructors. **($1987.50)**

July 1 - September 30, 2011

8th Grade Enviroscape Presentations				
Date	**School/Event**	**Grade**	**# of presentations**	**# of students**
9/20/11	Murray Middle	8th	2	52
9/27/11	Murray Middle	8th	2	50

Assisted with training for Enviroscape instructors on 7/7/11. Helped edit and prepare materials for training ahead of time in conjunction with City Stormwater Staff.

October 1 – December 31, 2011

8th Grade Enviroscape Presentations				
Date	**School/Event**	**Grade**	**# of presentations**	**# of students**
10/4/11	Murry Middle	8th	1	25
10/5/11	Holly Shelter	8th	3	84
11/16/11	Roland Grise	8th	2	51

Increase awareness and public education about pet waste/fecal coliform bacteria. Implement education about pet waste, fecal bacteria, and the city's pet waste ordinance. Provide outreach and education materials via K-12 education programs, public meetings, agency website, and by participating/staffing a Canines for Clean Water booth at a minimum of 3 pet-related events including Paw Jam, and other events such as the Pooch Plunge, Pet Expo, etc. **($1325)**

July 1 - September 30, 2011

Provided pet waste education materials to 1 homeowners association in the Hewletts Creek Watershed. Also updated formatting of website to make pet waste education materials more user friendly. Displayed and made available pet waste educational brochures at the County Government Fair in the County Government Center on August 31, 2010.

October 1 – December 31, 2011

Conduct at least 2 "Stormwater 101" presentations to HOAs, garden clubs, community/civic groups, developers, or during watershed-wide meetings. Initiate direct contact with potential audiences, promote program, and schedule presentations. **($662.50)**

July 1 - September 30, 2011

Stormwater 101 Presentations			
Date	**Organization**	**Topic**	**Attendance**

October 1 – December 31, 2011

Stormwater 101 Presentations			
Date	**Organization**	**Topic**	**Attendance**
10/26/11	WIN (Wednesdays in Nature)	Stormwater 101	21

Assisted with edits and updates to the presentation. Edits were needed to make presentation more concise and shorter in length.

Participate in local annual community outreach events. NHSWCD is a founding member of the Earth Day Alliance which organizes implements, fundraises, and provides publicity for the Lower Cape Fear Earth Day Festival each spring. NHSWCD staff will attend and provide BMP and rain barrel sale information at the annual Wilmington Garden Show. NHSWCD may also assist with TreeFest, an annual program which distributes tree saplings to New Hanover County citizens. In addition, NHSWCD will display program and educational information at the annual Cape Fear Fair and Expo. **($1987.50)**

July 1 - September 30, 2011

Community Outreach Events				
Date	**Location**	**Event**	**Attendance**	**Theme/Comments**
9/24/11	Wilmington	Big Sweep	1	Staff assisted with coordinating & participated in event.

Staff has attended one TreeFest planning meeting in order to prepare for that event this coming winter.

October 1 – December 31, 2011

Community Outreach Events				
Date	**Location**	**Event**	**Attendance**	**Theme/Comments**
10/26/11-11/6/11	Airport	Cape Fear Fair & Expo	35,000	Theme was No Farm, No Food. District provided information about BMPs for farms, and won 2nd place for display.
12/1/11	Ogden Elementary	3rd-5th Grade Science Fair Judging	n/a	Reviewed over 12 . Collectively picked top 6 to advance to county science fair.
12/13/11	Pine Valley Elementary	3rd-5th Grade Science Fair Judging	n/a	Reviewed over 60 projects. Picked top 6 to advance to county science fair.

Staff attended one TreeFest planning meeting in order to prepare for the event in January. Staff has attended one Earth Day planning meeting in order to prepare for the event in April. Staff attended one Keep America Beautiful meeting. Results were given from the Big Sweep, and the group is now working on planning the Great American Clean-up Event.

Promote/consult on LID to developers, engineers, architects, property owners, etc. Promote LID and the local LID manual, provide input to City and NHC Technical Review Committees, as well as provide education and technical assistance as the need arises for property owners. **($622.50)**

July 1 - September 30, 2011

Provided comments for two concept review plans for the City of Wilmington Technical Review Committee (TRC). Comments included soil types and suggestions of LID practices that could be used on the site. Provided comments for one first review plan for City of Wilmington TRC. Written comments and a map were provided for the site. Comments included soils types and suggestions for LID practices that could be used on the site.

October 1 – December 31, 2011

Provided comments for one first review plan for County of Wilmington TRC. Written comments and a map were provided for the site. Comments included soils types and suggestions for LID practices that could be used on the site.

Staff responded to request of homeowners and organizations regarding stormwater management on their property. Sites included Cape Fear Center for Inquiry, Unitarian Universalist Fellowship, a home on Indian Trail Dr, and a home on Seabreeze Avenue. All sites had similar problems regarding runoff volume and erosion problems. Staff gave appropriate recommendations based on the area, soil type, elevation, etc.

Facilitate additional environmental education presentations for students, local residents, camps, business owners, etc. Topics include, but are not limited to, natural resource management, sustainability, and wildlife. Presentation topics will tie into water quality and conservation issues. **($1987.50)**

July 1 - September 30, 2011

Environmental Education Presentations				
Date	**School/Event**	**Grade**	**# of presentations**	**# of participants**
7/1/11	Wrightsville Beach Surf Camp/ Enviroscape	K-3rd	1	16
7/8/11	Pax Natura/ water conservation	K-5th	1	21
7/15/11	Wrightsville Beach Surf Camp/Enviroscape	K-3rd	1	16
7/22/11	Wrightsville Beach Surf Camp/Enviroscape	K-3rd	1	16
7/29/11	Wrightsville Beach Surf Camp/Enviroscape	K-3rd	1	16
8/12/11	Wrightsville Beach Surf Camp/Enviroscape	K-3rd	1	13
8/19/11	Wrightsville Beach Surf Camp/Enviroscape	K-3rd	1	13

October 1 – December 31, 2011

Environmental Education Presentations				
Date	**School/Event**	**Grade**	**# of presentations**	**# of participants**
11/7/11	Pine Valley Elementary/ Soils Presentation	3rd	2	44
11/7/11	Pine Valley Elementary/ Erosion Presentation	5th	1	23
11/8/11	Pine Valley Elementary/ Soils Presentation	3rd	2	44
11/8/11	Pine Valley Elementary/ Erosion Presentation	5th	1	27
11/9/11	Pine Valley Elementary/ Erosion Presentation	5th	2	50
12/7/11	Roland Grise Middle/ Airlie 8th Grade Trip	8th	1	25

Organize, promote, and implement at least one Teacher Workshop a year serving teachers in New Hanover County. Workshops may include curriculum from at least one of the following: Project Wet; Food, Land and People; Project Learning Tree, Waste in Place, and Wonders of Wetlands. Staff will provide certification credits and renewal credits at qualifying workshops for those involved in the NC Environmental Education Certification program. **($1325)**

July 1 - September 30, 2011

District staff gave a 2 hour workshop for New Hanover County Teachers 8/19/11. Teachers earned 0.2 continuing education credits and learned about District programs offered throughout all grades as well as programs offer for teachers. A project WET workshop was scheduled for November as result of this meeting.

October 1 – December 31, 2011

District staff gave a 2 day WET (Water Education for Teachers) for New Hanover County Teachers 11/28/11-11/29/11. Teachers received 1.0 CEU's for attending and completing workshop homework. Approximately 10 teachers were in attendance.

Organize and facilitate at least one Environmental Field Day a year serving an entire grade at a New Hanover County School. Provide Envirothon competition information and guidance to teachers and interested student organizations. Envirothon topics include aquatics, forestry, wildlife, soils, and other environmental issues. **($1325)**

July 1 - September 30, 2011

Field days have been scheduled with three schools already, two in the second quarter and one in the third quarter. Staff distributed Envirothon material to Murray Middle School science teachers. Faculty seems interested in forming a middle school team and emails have been

exchanged to encourage new Envirothon participants. Envirothon material has also been newly updated on our web site and made more available.

October 1 – December 31, 2011

Environmental Field Day				
Date	**School(s)**	**Grade**	**Attendance**	**Topics/Activities**
10/24/11	Trask Middle School	6th	110	Soils, Water Quality, Wildlife, Forestry, & Greenfield Lake Eco Tour
10/25/11	Trask Middle School	6th	103	Soils, Water Quality, Wildlife, Forestry, & Greenfield Lake Eco Tour
10/27/11	Trask Middle School	6th	110	Soils, Water Quality, Wildlife, Forestry, & Greenfield Lake Eco Tour
11/22/11	Anderson Elem	3rd	110	Soil, Water Quality, Wildlife, Recycling

Provide an opportunity for local 3-8th grade students to learn about watersheds, water quality, and stormwater through the Statewide District Poster, Essay and Speech contests. This year's theme is "Wetlands are Wonderful". **($662.50)**

July 1 - September 30, 2011

Staff relayed contest information to Murray Middle School science teachers. Faculty seems interested in competing and emails have been exchanged to encourage participation.

October 1 – December 31, 2011

Staff scheduled presentations to promote the poster contest to all 3rd-5th grade students at Holly Tree Elementary. Staff also relayed contest information to teachers at Cape Fear Center for Inquiry. Teachers were interested in participating in all three contests.

Expand and maintain agency website. Maintain website and periodically update educational materials related to stormwater education. The website will also provide links to stormwater education materials in Spanish in an effort to reach more minorities in our region. CCAP project pictures will continue to be uploaded to the "Cost Share" link. A watershed map showing the types of CCAP BMPs and where they are located within local watersheds will continue to be updated and available on the website. Website will be promoted on local government TV. **($1325)**

July 1 - September 30, 2011

The web site is now undergoing regular, monthly maintenance and updates. Recent quarterly updates include but are not limited to; updated photos of BMPs, updated hyperlinks and repair of broken links, reposting the shortnose sturgeon video, increased descriptions to projects and programs, increased accessibility to the most recent Envirothon and District contest material and resources, updates regarding the transfer from DENR to NCDA&CS, and Eagles Island kayak trail map posted. A new and improved web layout has been designed (especially for the education and outreach tab) and will hopefully be implemented within the second quarter.

October 1 – December 31, 2011

Staff is continuing to update and maintain the website on a monthly basis. Materials are added on an as needed basis. Staff and supervisors will be working on a plan for the website during

strategic planning during the month of January. District website and contact information is announced and advertised on both City and County cable access channels.

Public Involvement/Volunteer Efforts *Total Allocated Cost: $1325*

Engage in a volunteer Storm Drain Marking program to educate residents about stormwater and encourage public involvement for a minimum of 2 separate volunteer outings. Staff will use supplied markers, identify areas to mark drains, train volunteers in marking and safety, and help provide oversight of the program. A trained NHSWCD staff member is required to be present during storm drain marking activities and volunteer efforts. **($1325)**

July 1 - September 30, 2011

Publicized and promoted Storm Drain Marking event around Greenfield lake 7/29/11. Materials promoting the event were posted and distributed a week prior to the event. No volunteers arrived to participate the day of marking so event was cancelled.

October 1 – December 31, 2011

Programs/Partnerships *Total Allocated Cost: $7950*

Serve as an active partner organization on local grant projects and initiatives that benefit local surface water quality and water resources. This includes, but is not limited to, providing education and other programs related to a local grant or watershed plan implementation. **($397.50)**

July 1 - September 30, 2011

Grant Projects / Water Quality Initiatives/Partnerships		
Date	**Topic/Discussion**	**Progress Made/Next Steps**

October 1 – December 31, 2011

Grant Projects / Water Quality Initiatives/Partnerships		
Date	**Topic/Discussion**	**Progress Made/Next Steps**
12/1/11	Hewlett's Creek & Wrightsville Beach Watershed Initiative	Visited sites in watersheds and provided insight regarding past experience with BMPs at sites for future planning.

Administer the NC Community Conservation Assistance Program (CCAP) in New Hanover County. Provide assistance with the demonstration, purchase, and installation of stormwater Best Management Practices (BMPs) for City/County residents and businesses. Activities may include identifying new BMPs and standards, updating BMP cost estimates, developing conservation plans for CCAP clients, assisting with the design and/or installation of stormwater BMPs, managing CCAP BMP project sites, and conducting annual spot checks. In addition, NHSWCD staff will promote CCAP through agency website, educational programs, publications, public/local government television, and to interested groups. NHSWCD will also continue to update the watershed map of CCAP BMPs installed/cost-shared by the district in the county and post map on agency website. **($3577.50)**

July 1 - September 30, 2011
Staff and Supervisors reviewed one application for the quarter. Application was put on hold until next quarter due to low score on ranking form.

Two site visits were performed. One site visit was to determine if CCAP was an appropriate fit for the issues the homeowner is having and what practices if any would work. District Staff and the Division of Soil and Water staff are currently working on a contract that may include a grass swale and vegetative cover. The second site visit was to check District Staff design and plan for the Cistern at Airlie Gardens.

The District was allocated approximately $4,000 from state funds for the FY 11/12 year and $7,100 in grant funds to install BMP's in New Hanover County.

Staff also attended the North Carolina Association of Soil & Water Districts CCAP Standing Committee meeting in Asheboro, NC at the end of July. This committee is tasked with looking for additional funds, promoting program and other needs as they arise.

October 1 – December 31, 2011
No new CCAP applications were received for this quarter. The cistern at Airlie Gardens was completed in October and is currently being used. A press release was distributed to the media.

District and Division staff have completed the design work for a grass swale and vegetative cover area on a property near Carolina Beach. Staff is now working with the homeowner to complete a contract and start installation of this project.

Partner with the City of Wilmington Stormwater Services and Rainwater Solutions, Inc. to hold a monthly public rain barrel sale for New Hanover County residents. NHSWCD will utilize local government television, local events including Earth Day and the Cape Fear Garden Show, agency website, and periodic press releases to the media to promote the sale. **($1192.50)**

July 1 - September 30, 2011
July 2011 – 4 barrels sold
August 2011 – 9 barrels sold
September 2011 – 1 barrel sold
All sales were promoted on City and County cable access channels as well as the District Facebook page.

October 1 – December 31, 2011
October 2011 – 4 barrels sold
November 2011 – 3 barrels sold
December 2011 – 1 barrel sold
All sales were promoted on City and County cable access channels as well as the District Facebook page.

Serve as an integral partner to facilitate the Lower Cape Fear Stewardship Development Award Program. The program recognizes developers for demonstrating outstanding

environmental stewardship such as stormwater reduction through the protection and awareness of our natural resources. **($2385)**

July 1 - September 30, 2011
Staff attended three SDC full committee meetings as well as a sub-committee meeting for the education and a sub-committee meeting for finance. District Staff serves as SDC Treasurer and is responsible for tracking all accounts and making payments as needed.

Applications for this program year have been received, and judging will occur in October.

October 1 – December 31, 2011
Staff attended three SDC full committee meetings as well as a sub-committee meeting for the events committee. The event will be held in February 2012 in Wilmington at the Wilmington Regional Realtors Association Building. The committee is working on training for professionals in the morning and afternoon, with the awards held at a luncheon.

Provide outreach and engage school administrators and teachers to identify a future BMP Outdoor Education site on a school campus. The future site would be used to increase hands-on education about stormwater, water quality, and wildlife habitat. **($397.50)**

July 1 - September 30, 2011
Staff has talked to teachers from four different schools who are trying to get administration on board for these types of projects. Interest is there from faculty, but administrative support needs to be garnered.

October 1 – December 31, 2011
District staff talked with staff at Cape Fear Center for Inquiry (CFCI). CFCI staff is interested in installing BMPs through CCAP program; however, the facility is to new to apply for CCAP. Staff would like to work toward an overall plan for the site in the future. Staff also talked with Tot Spot at the YWCA. YWCA staff was interested in expanding their current outdoor environmental education area. The expansion of this area is likely to happen in 2013.

Monitoring Activities

Total Allocated Cost: $1325

Serve as the lead agency for managing land conservation easements and stormwater education/outreach in the Hewletts Creek Watershed. Annually monitor 33 acres of conservation easements, develop and distribute conservation easement information to property owners adjacent to the easements, partner with YWCA to provide outdoor education programs on the 2 district-owned conservation easements, and provide an educational mailing to residents in the Hewletts Creek Watershed. In addition, NHSWCD will work with organizations/groups to provide stormwater education programs at the J.E.L. Wade Stormwater Wetland, as the need arises. **($1325)**

July 1 - September 30, 2011
District staff provided environmental education activities/programs to YWCA Camp students throughout the summer.

7/11/11	YWCA camp/forestry	preK	1	42
7/18/11	YWCA Camp/forestry	2-3rd	1	12

7/25/11	YWCA camp/water cycle	4-5th	1	19
8/12/11	YWCA Camp/Enviroscape	2-3rd	1	16
8/19/11	YWCA Camp/Enviroscape	4-5th	1	23

October 1 – December 31, 2011

Contract Administration

Total Allocated Cost: $2650

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 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.

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. ($2650)**

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.

Dru Harrison

Report compiled by: **Date: 1/6/12**

APPENDIX C: ILLICIT DISCHARGE DETECTION AND ELIMINATION

Employee Training

January 12, 2012
Conducted training for the City's Code Enforcement Dept. on Illicit Discharge Detection and Elimination. Public Services Code Enforcement Officer provided the presentation to 9 employees at the meeting located at the City's 305 Chestnut St. building.

Hotline Calls (910-341-1020)

Hotline Calls		
# of Calls	Type of Call/Complaint	%
4	Pet Waste	25
5	Illicit Discharge/Dumping	31
4	Yard Waste	25
3	Maintenance Call	19
16	TOTALS	100

Failed Septic Systems in Jurisdictional Area

Failed Septic System Addresses

300 Cabbage Inlet Ln.	3504 Violet Ct.	1531 Eastwood Rd.
108 Mullington Ln.	3435 Sea Eagle Ct.	6768 Market St.
1122 Navajo Trail	825 Beasley Rd.	5519 Fuller Dr.
7739 Masonboro Sound Rd.	707 Beasley Rd.	501 N. College Rd.
7715 Masonboro Sound Rd.	113 Blackbrook Ln.	1524 Southeast Harbor Dr.
7509 Masonboro Sound Rd.	5810 Woodland Trace	1311 Shipyard Blvd.
7413 Masonboro Sound Rd.	6329 Head Rd.	2209 Monroe St.
102 Magnolia Dr.	6428 Head Rd.	3314 River Rd.
427 Sylvan Dr.	311 Bradley Dr.	3330 River Rd.
423 Sylvan Ln.	110 Myrtle Ave.	
3518 Aster Ct.	202 Dogwood Dr.	

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) Beth Nunnally
Stormwater Compliance Officer
910-341-0092
beth.nunnally@wilmingtonnc.gov

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

3) Harvey London
Drainage Manager
910-341-4646
Harvey.london@wilmingtonnc.gov

4) David Mayes
Stormwater Services Manager
910-341-5880
Dave.Mayes@wilmingtonnc.gov

APPENDIX D: CONSTRUCTION SITE RUNOFF CONTROL

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 E: POST-CONSTRUCTION SITE RUNOFF CONTROLS

Included in this section:
Inspection Reporting Summary
Inspection Letter
Stormwater Detention Facility Compliance Inspection Report

2010 BMP Compliance Inspection Summary

Dates of Inspections	**Aug-Sept. 2011**	**Dec./Jan-11/12**
Total # Sites Inspected	315	317
Response Letter Severity		
Level 1 (first letter)	38	35
Level 2 (second letter)*	0	0
Level 3 (third letter)**	0	0
# of Sites Requiring Maintenance	38	35

*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

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

APPENDIX F: POLLUTION PREVENTION & GOOD HOUSEKEEPING FOR MUNICIPAL OPERATIONS

Sample SOP

CITY OF WILMINGTON STORMWATER MAINTENANCE SOP	
SOP Name: Construction - BMP	
SOP Number: C-3	**Effective Date:** 12/2011
Written by: J. Brown, H. Jordan, J. Daniel, M. Anderson, G. Williams, J. Bryant, A. McDowell, G. Sykes, J. Richardson, J. Anderson, B. Chambers	
Applies to the following activities: BMP Construction	
Type of crew required: Mechanical Ditching Crew, BMP Crew	
Power equipment required: • Chain Saw • Trash Pump **Heavy equipment required:** • Dump Trucks • Backhoe • Excavator	**Manual tools required:** • Rakes (fan, hard-toothed, pea) • Shovels • Site level (grade rod) • Sledge hammer • Bush axe • Loppers • Hand pruners
Personal protective & safety equipment required: • Chaps • Gloves • Hardhats • Glasses • Ear Protection • Boots (steel toe) • Safety Vest • Dust Mask	**Materials required:** • Wooden Stakes • Chains • Fuel/oil
Work Zone/Traffic Control Equipment: • Traffic Cones • Barricades • Traffic Signs • Stands	**Erosion Control Material:** • Grass Seed • Erosion Matting • Fill Dirt (if necessary) • Silt Fence • Rip Rap • Filter Fabric • Live Stakings (if necessary**)**
Specific Skills, Training, Certifications, or Licenses Required: • Heavy Equipment Operation Skills • Planting Training	

Protocols (Steps and procedures involved in this task or process.)

Method – Wet Ponds

- Prior to Construction activity
  - Call for utility lines location survey using the NC One Call service. Update the locate tickets as required.
  - Job site layout by City Survey Crews
  - Communicate conditions of work site to crew
- Employee must comply with Public Services Rules and Regulations during the performance of any assignment
- Receive daily assignment from Supervisor/Crew leader
- Pre-trip vehicle/truck
- Inspect working condition of manual and power tools needed for the job.
- Load necessary tools, materials and personal protection equipment for the job.
- Determine most direct route to site
- Travel to site
- Set out work zone and traffic control safety devices as required and in accordance with the Manual on Uniform Traffic Control Devices (MUTCD) standards. Notify the Stormwater Office of any road closures necessary. They will notify the appropriate agencies.
- Set cones or signs needed for vehicle/personnel safety in work zone (as applicable)
- Put on any additional personal safety equipment as needed
- Unload equipment and tools for the job
- Obey all safety rules and regulations while working
- Review site plans for construction of BMP
- Set up necessary erosion control devices
- Review construction plan specifications for BMP elevations
- Grade and excavate to construction plan elevations
- Place excavated soil into dump truck for site removal
- Construct and install all piping and structures per construction plan elevations
- Final grade BMP surfaces by hand or mechanically
- Install erosion control material on BMP surfaces (as needed).
- Seed or sod BMP surfaces per construction plan specifications.
- Install all vegetative plantings per construction plan specifications.
- Haul away soil and dispose of properly.
- Pack up all equipment leaving no tools or materials behind.
- Go to next job site if time permits. If not, proceed back to assigned section facility
- Unload necessary tools from the truck at facility

Method – Bioretention

- Prior to Construction activity
  - Call for utility lines locate
  - Job site layout by City Survey Crews
  - Communicate conditions of work site to crew
- Employee must comply with Public Services Rules and Regulations during the performance of any assignment
- Receive daily assignment from Supervisor/Crew leader
- Pre-trip vehicle/truck
- Inspect working condition of manual and power tools needed for the job
- Load necessary tools, materials and personal protection equipment for the job
- Determine most direct route to site
- Travel to site
- Once at sight implement necessary safety devices/measures, and traffic control (as applicable)
- Set cones or signs needed for vehicle/personnel safety in work zone (as applicable)
- Put on any additional personal safety equipment as needed
- Unload equipment and tools for the job
- Obey all safety rules and regulations while working
- Review site plans for construction of BMP
- Set up necessary erosion control devices
- Review construction plan specifications for BMP elevations
- Grade and excavate to construction plan elevations
- Place excavated soil into dump truck for site removal
- Construct and install all piping and structures per construction plan elevations
- Final grade BMP surfaces by hand or mechanically
- Install erosion control material on BMP surfaces (as needed)
- Seed or sod BMP surfaces per construction plan specifications
- Install all vegetative plantings per construction plan specifications
- Install mulch layer per construction plan specifications
- Haul away soil and dispose of properly
- Pack up equipment leaving no tools or equipment behind
- Go to next job site if time permits. If not, proceed back to assigned section facility
- Unload necessary tools from the truck at facility

Method – Wetlands

- Prior to Construction activity
  - Call for utility lines locate
  - Job site layout by City Survey Crews
  - Communicate conditions of work site to crew
- Employee must comply with Public Services Rules and Regulations during the performance of any assignment
- Receive daily assignment from Supervisor/Crew leader

- Pre-trip vehicle/truck
- Inspect working condition of manual and power tools needed for the job
- Load necessary tools, materials and personal protection equipment for the job
- Determine most direct route to site
- Travel to site
- Once at sight implement necessary safety devices/measures, and traffic control (as applicable)
- Set cones or signs needed for vehicle/personnel safety in work zone (as applicable)
- Put on any additional personal safety equipment as needed
- Unload equipment and tools for the job
- Obey all safety rules and regulations while working
- Review site plans for construction of BMP
- Set up necessary erosion control and turbidity control devices
- Review construction plan specifications for BMP elevations
- Grade and excavate to construction plan elevations
- Place excavated soil into dump truck for site removal
- Construct and install all piping and structures per construction plan elevations
- Final grade BMP surfaces by hand or mechanically
- Install erosion control material on BMP surfaces (as needed).
- Seed or sod BMP surfaces per construction plan specifications.
- Install all vegetative plantings per construction plan specifications.
- Haul away soil and dispose of properly.
- Pack up equipment leaving no tools or equipment behind
- Go to next job site if time permits. If not, proceed back to assigned section facility
- Unload necessary tools from the truck at facility

Note: Water Quality Observation – Throughout the duration of this construction task, staff shall make observations about the water quality in the drainage system and report any suspicious or abnormal conditions for further investigation to their supervisor.

APPENDIX G: THREATENED & ENDANGERED SPECIES (Shortnose Sturgeon)

Included in this section:
BMP Reporting Table

DATE / TIME	PLACE	AUDIENCE	INDIVIDUALS WHO PERFORMED ACTIVITY	TECHNIQUES/ METHODS USED	RESULTS OF ACTIVITY OR INFO COLLECTED
Create Public Education Program to Increase Awareness of the Shortnose Sturgeon					
Ongoing	New Hanover County Schools - 8th grade science classes	8th grade science classes	Stormwater staff NHSWCD staff CFRW staff	Highlight the Shortnose Sturgeon during classroom presentations and/or lead teachers to online resources about the endangered fish	Shortnose Sturgeon education for the students
Ongoing	Community events; speaking engagements	General public	Stormwater staff	Distribute Shortnose Sturgeon brochure and bookmark at community events and speaking events	Education about Shortnose Sturgeon provided to the public
Ongoing	City's Cable Access Channel (GTV-8)	TV Viewers	Stormwater staff GTV staff	Air Shortnose Sturgeon narrated slideshow on GTV	Shortnose Sturgeon education for cable access channel viewers
Ongoing	New Hanover Soil & Water Conservation District website	Web viewers	NHSWCD staff	Features information about the Shortnose Sturgeon on website	Education about Shortnose Sturgeon provided to the public thru partner agency
Ongoing	Cape Fear River Watch website	Web viewers	CFRW staff	Features information about the Shortnose Sturgeon on website	Education about Shortnose Sturgeon provided to the public thru partner agency
March - July 2010	Website	General public	Stormwater staff	Narrated slideshow, brochure, and bookmarks posted on Publications Page of stormwater website	Shortnose Sturgeon education for the public
11/12/2011	Star News	General public	Fisheries crew tagging sturgeon to learn about their movements	News article	Efforts to tag and protect sturgeon in the Cape Fear River
2/8/2012	Star News	General public	Atlantic Sturgeon declared endangered	News article	Made mention of the endangered status of the Shortnose Sturgeon

APPENDIX H: REGULATORY & ENFORCEMENT ACTIONS

The Public Services Department added to its staff a Code Enforcement officer in anticipation of the new Phase II requirements and Stormwater Ordinances regulating illicit discharges that became effective November 2009. The Stormwater Ordinance Enforcement Program currently consists of enforcing Wilmington's Code of Ordinance Chapter 12, Sec 12-22 which prohibits illicit discharges, illicit connections, pet waste on public property, obstructions and organic yard waste from purposefully being placed into any stormwater conveyance. Any other water quality concerns that are reported are investigated and resolved through our public education program.

In 11-12, the Public Services Department investigated approximately 125 stormwater complaints. The majority of reports consisted of Yard Waste and Illicit Discharges. When the department receives a complaint the date, time, location, contact, nature of the complaint, actions, recommendations and follow up are documented, as well as distribution of educational material, and enforcement actions. The first year of a new city wide data collection system has past which has improved the overall record keeping ability for this program, we continue to build in more capability to extract specific parameters which enable us to scrutinize the data in more detail. A summary of this year's activities are as follows:

ENFORCEMENT ACTIONS 2011-2012

Nature of Complaint	Number of reports	Resolved thru Public Education	NOV Issued	Referred to DWQ
Yard Waste	32	100%	0	0
Pet Waste	11	100%	0	0
Blockages	6	100%	0	0
Outreach	19	100%	0	0
Illegal Dumping	6	0	0	0
Illicit Discharge/ Sediment	51	90.2%	5	1
Illicit Connection (2)		50%	1	0
Dry Weather Flow (5)		N/A	0	0
SSO (11)		90.9%	1	0
Totals	125	100%	7	1

DEFINITIONS: Nature of Complaint

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 distribution of educational material and/or explanation of the ordinance with the possible fines.

Illicit Discharge/Sediment (Part 1, Sec. 12-22)
Complaints include issues reported as illicit discharges as defined by the ordinance. Reports include legal as well as illegal discharges which was determined after the investigation was completed. Resolution of an incident includes education to the public regarding stormwater pollution and awareness of the City ordinance with the potential fines for non compliance and repeat offenders. Written NOVs may be issued for more serious offences.

Illicit Connection (Part 1, Sec. 12-23)
Reports were the result of an illicit connection that impacted the City's stormwater system with a non-allowable discharge. All complaints in this category are the result of an investigation and the confirmation of illicit connection. Resolution of an incident includes education on the impacts to water quality, the City's ordinance requirements, and the potential fines for a violation. Additionally, follow up to the incident would include making sure the illicit connection was permanently closed.

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 were called in by citizens or City employees, due to their nature, may or may not have been substantiated after the investigation. Resolution of an incident includes education to all parties involved on the potential adverse health effects of pet waste pollution, prevention, the City's ordinance requirements and the potential fines for each violation.

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.

SSO (Part 1, Sec.12-24)
Sewer overflows from the CFPUA system, both reportable and not reportable. Resolution of the incident includes reviewing the DWQ reporting form for completion of corrective action items and review of educational material distributed near the incident.

City of Wilmington

CIVIL PENALTY CITATION

Citations may be paid by one of the following methods:

MAIL TO:

City of Wilmington - Collections
PO Box 1810
Wilmington, NC 28402-1810

If paying by mail, send check or money order made payable to "City of Wilmington". Do not send cash through the mail. Include this citation, or a copy of it, with payment and indicate the citation number on your check.

IN PERSON:

City of Wilmington - Collections
305 Chestnut Street (across from Thalian Hall)
If paying in person, bring this citation, or a copy of it, with your payment.

Failure to remit payment within ten (10) days after being cited may result in the City filing a civil action to recover the debt. An appeal must be made to the City Manager in writing within 30 thirty days after the date the notice is received.

If you have any questions regarding this matter, please call Stormwater Services at (910) 343-4777 and ask for the Stormwater Compliance Officer.

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

<HIGHEST RANKING RESPONSIBLE OFFICIAL>, <TITLE>
<COMPANY>
<ADDRESS>
<CITY, STATE, ZIP>

Subject: **NOTICE OF VIOLATION**
WILMINGTON CITY CODE
Chapter 12, Article III, Division 2,
Illicit Discharge and other Prohibited Wastes, Section 12-( )<a,b,c or d>
<insert Illicit Discharge(s) and Disposal(s), Illicit Connection(s), Accidental Discharge(s), Domestic Animal Waste, or Debris in the Storm Drainage System>

Dear <RESPONSIBLE OFFICIAL>:

North Carolina General Statute 160A-459 authorizes cities to adopt and enforce a storm water control ordinance to protect water quality and control water quantity.

On <DATE>, <INVESTIGATOR'S NAME> of Wilmington Storm Water Services conducted an investigation of your property located at <ADDRESS> in Wilmington, North Carolina. The investigation was conducted by authority granted under the City of Wilmington Storm Water Pollution Control Ordinance ("Ordinance"), Section 12-3(b) Enforcement of Chapter. As a result of that inspection, the conditions described below were found on the property in violation of the Ordinance, Section 12-22( )<a,b,c or d>,
<insert Illicit Discharge(s) and Disposal(s), Illicit Connection(s), Accidental Discharge(s), Domestic Animal Waste, or Debris in the Storm Drainage System >:

<State condition(s) causing the violation, including facts, findings and environmental impacts.>

<You were verbally notified of the violation on <DATE> and directed to immediately cease the discharge(s) causing the violation.> To achieve compliance with the legal requirements of the Ordinance, you must immediately cease the discharge(s) if you have not done so already. You must also implement the corrective actions listed below by
<DATE>. Furthermore, you must provide this office with written notification explaining the corrective actions taken. Please send your letter to the address on this letterhead to the attention of <SUPERVISOR'S NAME>.

Restore areas affected by the violation, as described above, to their pre-discharge condition.
Take appropriate remedial or preventive actions to prevent future illegal discharges.

In accordance with the Ordinance, Section 12-1( ) >a,b,c,d, Civil Penalties, you are subject to civil penalties of up to >Ten Thousand Dollars ($10,000.00) per day from the date the violation occurred forward. Each day of violation shall constitute a separate violation. Wilmington Stormwater Services will take any steps necessary to secure compliance with the Ordinance. One such step is that The City of Wilmington or a contractor designated by Wilmington Stormwater Services may abate a violation and/or restore impacted areas to their pre-violation condition should you fail to do so within the established compliance deadline, and any expense incurred for such restoration work in addition to the civil penalty shall be charged to you.

You may request a meeting with Wilmington Stormwater Services to present any information relevant to the violation. To request a meeting, contact <INVESTIGATOR'S NAME> at <PHONE #>. The meeting shall be requested before the established compliance deadline and will be scheduled at a time determined in the discretion of Wilmington Stormwater Services.

If you have any questions, please call me at <PHONE #>. You should not assume that your property is in compliance with the Ordinance until Wilmington Stormwater Services has notified you.

Your prompt cooperation in this matter is requested.

Sincerely,

Dave Mayes
Stormwater Services Program Manager
Wilmington Storm Water Services

<YOUR INITIALS>

Dear Landscape Industry Professional,

As a professional in the landscape industry, it is important that you are aware of recent changes made to the City of Wilmington's yard waste and debris ordinance. Debris is defined in the City Code as yard waste (i.e. leaves, pine straw, grass clippings, etc), sediment, trash, litter or debris of any kind.

As you may know, storm drains and ditches drain directly into our creeks and waterways. Yard waste in particular, can clog the stormwater drainage system resulting in flooded homes and businesses. In addition, yard waste that flows through the drainage system causes severe algal blooms, low oxygen levels, fish kills, and impaired aquatic habitat in our waterways.

As of **November 1, 2009**, the following provisions will be enforced:
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.

Suggested methods for complying with yard waste law include:
Direct or blow yard waste back onto a lawn or landscape area.
Sweep, rake, and/or collect yard waste off of hard surfaces.
Grasscycle - leave grass clippings on the lawn to decompose quickly and act as a natural fertilizer and to conserve moisture in the soil.
Compost yard waste to use in the lawn, garden, or landscape.
Collect and contain for city yard waste collection service (if available) according to specific yard waste collection policies. Do not use the city trash cart for yard waste or debris.
Collect and dispose of waste at a legally authorized yard waste collection facility.

As an important liaison between the City and your employees and clients, we request that you share this information with them as well. In addition, we have included a poster for you to display in your place of business. Thank you for your time and consideration regarding this important matter. If you have any questions, please don't hesitate to contact me.

Sincerely,

Beth Nunnally
Stormwater Compliance Officer
City of Wilmington Public Services
910-341-0092

Dear Restaurant or Bar Manager/Owner:

As a business professional operating in the city, it is important that you are aware of recent changes made to the City of Wilmington's Stormwater Ordinance regarding Illicit Discharge Chapter 12-22. These changes may affect the way you conduct daily business. An **illicit discharge** is described as "anything that enters the storm drainage system which is not composed entirely of rainwater."

As of **November 1, 2009**, the following provisions will be enforced regarding illicit discharges:
Any person or business found responsible for causing or allowing 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.
Allowable exceptions that *can* enter the drainage system include water from firefighting, waterline flushing, irrigation water, air conditioning condensate, de-chlorinated swimming pool water, etc. For a complete list of exceptions, visit www.wilmingtonnc.gov/publicservices/stormwater
The following examples of this ordinance include:
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 collected and discharged to the sanitary sewer system.
Restaurants will not be permitted to discharge any washwater or 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 entering the storm drainage system.
Fines for non-compliance with this ordinance are up to $10,000 per offense.

Please make the necessary adjustments to your procedures to comply with the new ordinance. Violations to this ordinance, based on the nature, can result in a maximum fine of up to $10,000.00 per violation. We request that you share this information with your employees as well. Thank you for your time and consideration regarding this important matter. If you have any questions, please don't hesitate to contact me.

Sincerely,

Beth Nunnally
Stormwater Compliance Officer
City of Wilmington Public Services
910-341-0092

APPENDIX I: MAJOR OUTFALLS LOCATION AND DESCRIPTION TABLE

Watershed	Latitude	Longtitude	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	34.24617	-77.93366	72	SMP	Single	NPDES outfall	2/28/2012	Fair

Creek						found		
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	NPDES outfall found	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	2/1/2012	Good

						found		
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	34.23969	-77.95146	48	RCP	Single	NPDES outfall	5/27/2011	Inaccessible

River						found		
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