# City of Wilmington, North Carolina

# STORMWATER MANAGEMENT PLAN & ANNUAL NPDES PERMIT REPORT

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

**NPDES Permit No.:** NCS000406

**Reporting Year:** July 1, 2013 – June 30, 2014

## 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

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## INTRODUCTION

### Stormwater Management Plan Overview

The North Carolina Division of Water Quality issued NPDES Phase II Permit NCS000406 to the City of Wilmington effective November 12, 2012. The Stormwater Management Plan is the City of Wilmington's program to comply with NPDES Phase II permit NCS000406 for stormwater discharges from Small Municipal Separate Storm Sewer Systems (MS4s). The plan defines strategies and guidelines necessary for protecting water quality and reducing pollutant discharges to the maximum extent practicable. The plan also includes reporting results for the current yearly reporting period from July 1, 2013 to June 30, 2014.

The plan is a guidance document to be used by the City staff and the general public. The plan is evolving and will address needs and priorities that will be reflected in compliance programs over the 5 year implementation schedule.

As required by EPA regulations for the NPDES Phase II stormwater programs, the following six minimum measures are addressed in the plan:

1. Public Education and Outreach
2. Public Participation and Involvement
3. Illicit Discharge Detection and Elimination
4. Construction Site Runoff Control
5. Post-Construction Runoff Control
6. Pollution Prevention and Good Housekeeping for Municipal Operations

### Program Implementation Status

The City of Wilmington is pleased to report excellent progress for year 2 compliance with requirements of NPDES Phase II permit NCS000406. Primary areas of work include:

- Continued implementation of amended ordinances related to Post Construction and Illicit Discharge BMPs.
- Continued mapping of stormwater infrastructure along with improvements to the GIS database design.
- Continuation of Public Outreach and Public Participation efforts.
- Continued implementation of SPPP and SPCC plans and inventory and recommendation plans of municipally owned operations with the potential to pollute.
- Implementation of several key actions of the Bradley and Hewletts Creek Watershed Restoration Plan, including the installation of a large bioretention area through the collaborative efforts of plan partners and stakeholders.

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

## CITY OF WILMINGTON STORMWATER SERVICES OVERVIEW

### Comprehensive Stormwater Management

Comprehensive stormwater management takes into account both the quantity and quality of stormwater runoff and is reflected in five core components of Wilmington's Stormwater Services program:

#### Management & Planning

Master planning utilizes the existing stormwater system inventory to develop a long range plan to improve drainage and water quality within an entire watershed. When planning on such a large scale, Stormwater Services seeks involvement and input from citizens and stakeholders. Management activities also include customer service – responding to customer concerns or inquiries and administrative services required for operation of the City stormwater utility.

#### Regulatory and Enforcement

Regulatory and enforcement activities are outlined in the City's existing stormwater ordinance requiring comprehensive stormwater management and creating technical standards for design and maintenance of private stormwater facilities. Stormwater Services also provides 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,

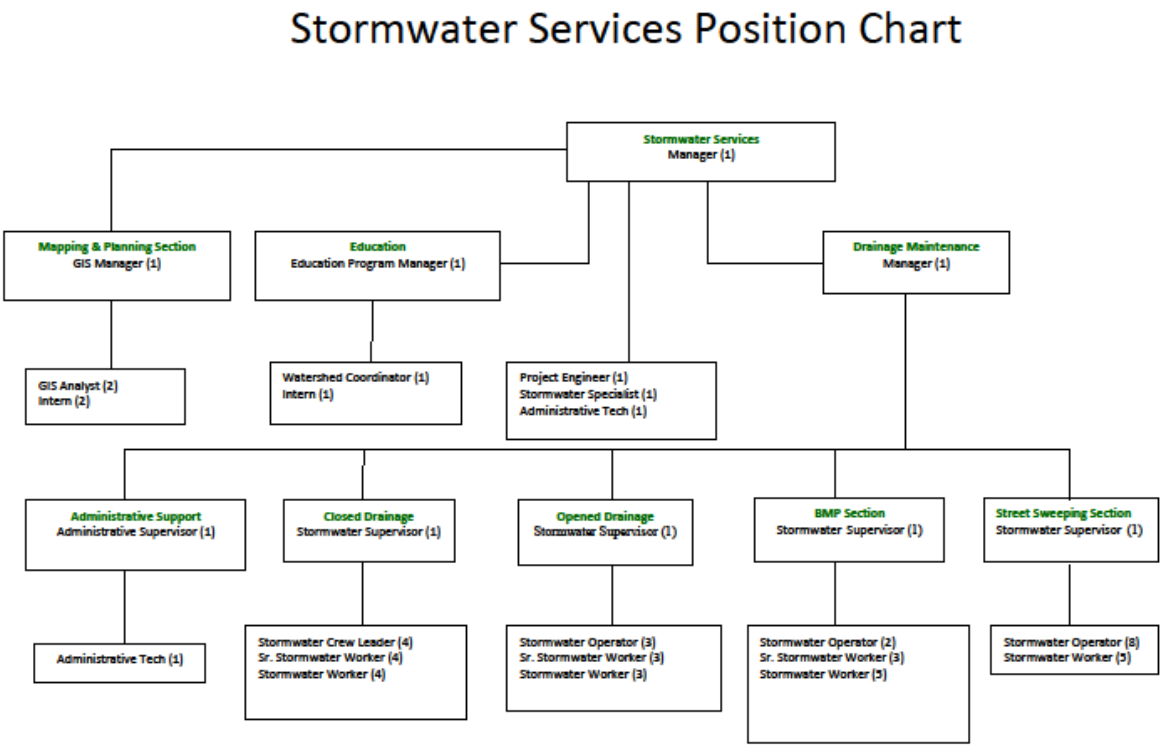
sediment, and other pollutants entering open or closed drainage routes. BMP maintenance consists of activities necessary to keep over 62 BMP sites including ponds, wetlands, and bio-retention areas in fully-functioning condition.

**Water Quality**

Water quality monitoring is executed by the University of North Carolina at Wilmington under annual contract with the City. Monitoring is performed on specific creeks and waterways within the City limits. Monitoring tests for specific pollutants and resulting data is used to plan capital improvement projects, guide outreach and education efforts, assess water quality at the sites monitored, identify persistent pollutant discharge areas or points, help to build a framework for future detection and tracing of pollutant sources and obtain grant funding. In addition, Stormwater Services implements an extensive outreach, education, and public involvement program that serves the citizens of Wilmington and includes a wide array of water quality education programming and materials. These programs include school presentations, homeowner association outreach, stormwater publications and giveaways, mass media advertising, special event exhibits, workshops, volunteer cleanups and storm drain marking, and collaborative efforts such as grant projects. These efforts strive to educate and engage citizens in protecting and improving local water quality through awareness, education, behavior modification and action.

## Management and Planning

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



***Estimated FY 14-15 Stormwater Management Fund Budget for NPDES***

| | FY 13-14 Adopted | FY 14-15 Adopted |
|---|---|---|
| **REVENUES** | | |
| Storm Water Utility Fees | 7,005,774 | 6,482,279 |
| City Streets Storm Water Fees | 1,912,915 | 2,073,600 |
| Storm Water Discharge permits | 20,000 | 20,000 |
| NCDOT Drainage Maintenance | 37,000 | 37,000 |
| Interest Earnings | 18,418 | 25,039 |
| Miscellaneous | - | - |
| Appropriated Fund Balance | - | - |
| *TOTAL REVENUES* | 8,994,107 | 8,637,918 |
| **EXPENDITURES** | | |
| Public Services | 5,015,591 | 5,154,710 |
| Nondepartmental | 752,235 | 839,363 |
| Debt Service | 2,626,281 | 2,043,845 |
| Contingency | 100,000 | 100,000 |
| Transfer to Capital Project Fund | 500,000 | 500,000 |
| *TOTAL EXPENDITURES* | 8,994,107 | 8,637,918 [1] |

[1] The FY 2015 budget was adopted by the Wilmington City Council on June 17, 2014

## Regulatory and Enforcement

### *Public Services Code Enforcement*

The City's stormwater ordinance required by this permit has been effective since November 1, 2009. Citizens can report suspected pollution through the Stormwater Hotline and the webpage reporting form. All complaints received by the Stormwater Division either from the public or from City staff is investigated; corrective action is prescribed; documented and followed until the violation is resolved. A Enforcement/Civil Penalty Guidance tool has been developed and is now being used to ensure consistency and help to guide the decision making process for NOVs and Civil Penalty issuance. Any complaints received that have environmental impacts other than stormwater or fall outside the City's regulatory authority are referred to DENR DWQ Wilmington Regional Office.

In an effort to maximize voluntary compliance, the City has, and will continue to develop and distribute educational materials to targeted populations in an aggressive manner. Consequently, all complaints provide the opportunity to educate the public on the issues that threaten stormwater, the best management practices for prevention, the awareness of our city's stormwater program, and the new ordinance.

### *Compliance through Public Education*

The stormwater code enforcement program strives to maximize voluntary compliance through public education and use enforcement through penalties as a last resort. Staff has found that most stormwater ordinance violations can be resolved through public education. Most of the people encountered violating the ordinances are not even aware of their wrongdoings. Teaching them why they are in violation and why it matters works because most people want to do the right thing. There are very few repeat offenders. In Fiscal Year 2014, a total of 1 repeat offender was identified. Our enforcement and civil penalties are reserved for 1) serious discharges and spills with the potential of harming human health and the environment, 2) repeat offenders, and 3) as a last resort to achieve compliance.

The program developed an assortment of educational material for targeted audiences, as well as targeted pollutants that teach the public about our stormwater ordinance and pollution prevention. For other circumstance specific letters are written with instructions to guide violators to a solution and compliance expectations. This clear outline of the City's expectations is a powerful tool for preventing future pollution problems.

### *Yard Waste*

Yard waste violations receive a face to face meeting and a standardized letter explaining the ordinance and the reasons why it is necessary. Also highlighted are the expectations for compliance and civil penalties for any future violations. This letter is accompanied by a poster in English or Spanish and in various sizes. The poster's objective is to help educate landscape companies and their employees on the ordinance requirements that keep yard waste out of the drainage system and surface waters and the city's expectations.

***Pet Waste***

Reports of pet waste violations receive a face to face meeting if possible. A brochure and flyer has been developed explaining the dangers of pet waste bacteria in surface waters and the city's expectations as well as the ordinance and penalty amounts for any violations. Pet waste message flags are used and distributed with ordinance information in parks and public places, and in specific neighborhoods in response to complaints. The pet waste flyer is also available in poster size for display when needed in parks and common areas.

***Illicit Discharges***

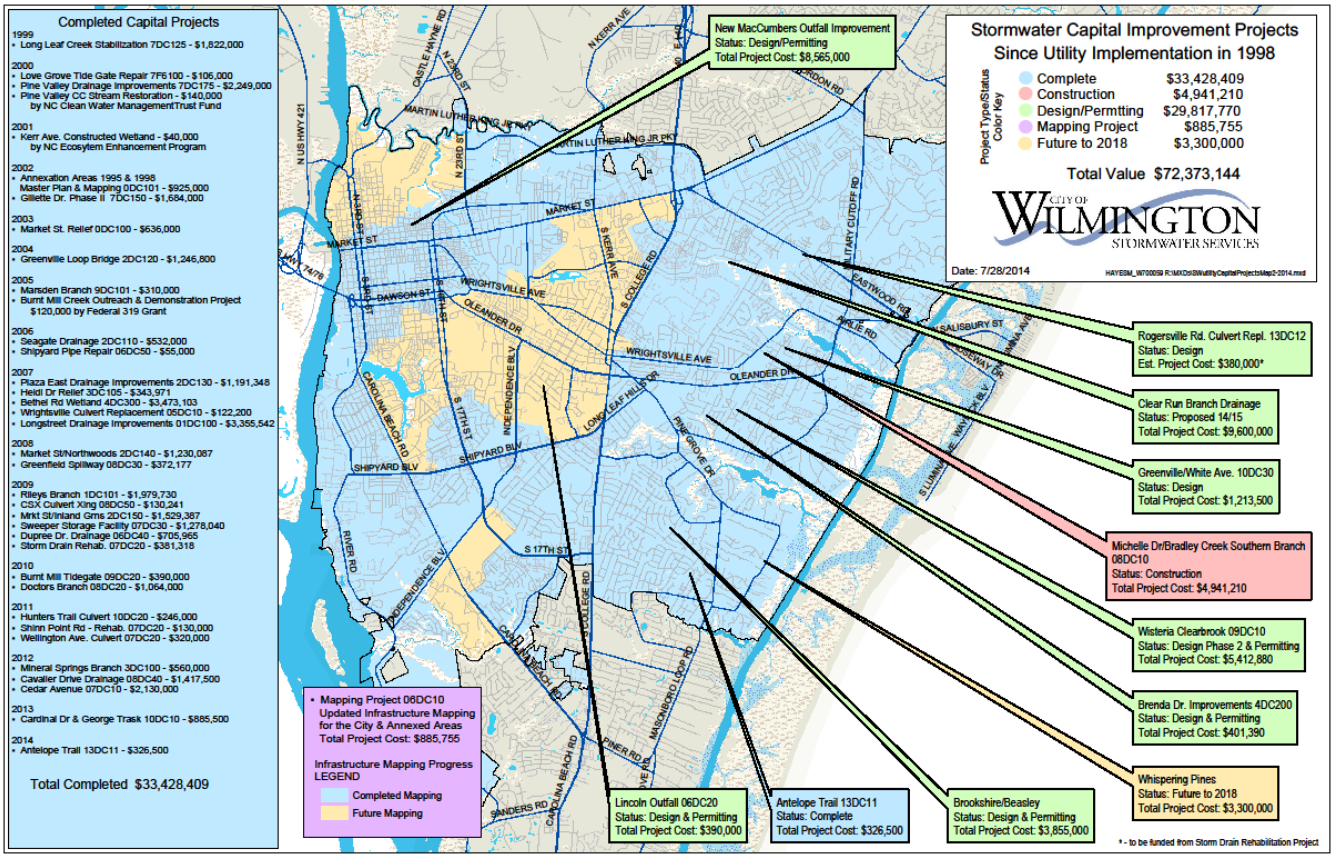
Reports of illicit discharges are addressed on a case by case basis. Informational posters and brochures for general use have been developed for distribution targeting the general public as well as specific source types that are typical in any urban area. These posters are kept on hand distributed to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

***Cape Fear Public Utility Authority***

The Cape Fear Public Utility Authority (CFPUA) currently employs six (6) Environmental Compliance Officers that implement and enforce elements of the City's NPDES Wastewater Discharge Permit to include the City's Collection System Permit. As part of those requirements the group regulates sanitary sewer overflows (SSOs) and eliminates any wastewater or other polluted waters from leaving their system. They respond to reports and investigate leads generated by the public or monitoring results as part of their permit requirement and respond using public education, enforcement and maintenance. The CFPUA copies the City on all SSOs and follows up with monitoring results and clean up measures. The CFPUA has maintained right of entry on the properties that it services. The city and CFPUA are working together to keep open lines of communication, continue to build relationships and combine resources in a continued effort to locate chronic leaks and minimize release to MS4.

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

## Capital Improvements



## *In-House Projects*

| Location | Pipe | | | | Structures | | | Total Cost |
|---|---|---|---|---|---|---|---|---|
| | Amt. | Size | Type | Cost | Amt. | Type | Cost | |
| | | | | | 3 | Casting, frame & grate 24" x 36" | | |
| | | | | | 2 | special made 5' x 5' | | |
| 400 Blk. S 16th St | 120 | 12" | RCP | $ 5,970.81 | 1 | special made 4' x 4' | $ 3,816.19 | $ 9,787.00 |
| | 64 | 12" | RCP | | 1 | casting complete 24" x 24" | | |
| 4107 Benfield Ct. | 8 | 18" | RCP | $ 6,256.07 | 1 | casting frame & grate 24" x 36" | $ 2,172.91 | $ 8,428.98 |
| | | | | | 1 | casting frame & grate 2' x 3' | | |
| 111 N. Cardinal Dr. | 56 | 15" | RCP | $ 2,627.73 | 1 | slab top 5' x 5' | $ 8,801.50 | $ 11,429.23 |
| | 16 | 18" | RCP | | | | | |
| Greenville Ave. & Harvest Grove Lane | 3 | 12" | Corrugated | $ 2,236.41 | 1 | casting frame & grate 24" x 36" | $ 2,767.12 | $ 5,003.53 |
| | | | | | 2 | casting manhole complete 24" | | |
| | | | | | 1 | prefab top 5' x 5' | | |
| 1936 Kent St. | 22 | 12" | RCP | $ 1,163.28 | 1 | prefab top 4' x 4' | $ 7,743.13 | $ 8,906.41 |
| 5329 Oleander Dr | 16 | 15" | RCP | $ 4,451.54 | | | | $ 4,451.54 |
| Vision Dr. & George Trask Dr | 56 | 24" | RCP | $ 7,129.46 | | | | $ 7,129.46 |
| 227 N. 7th St. | | | | | 1 | casting complete 24" x 24" | $ 3,494.99 | $ 3,494.99 |
| 460 Baytree Rd. | | | | | 1 | casting frame & grate 24" x 36" | $ 2,268.40 | $ 2,268.40 |
| 615 Bess St. | | | | | 1 | casting complete 24" x 24" | $ 3,394.86 | $ 3,394.86 |
| 4023 Crofton Place | | | | | 1 | casting mahole complete 24" | $ 6,246.01 | $ 6,246.01 |
| 600 Blk. George Trask Dr | | | | | 1 | headwall | $ 2,722.00 | $ 2,722.00 |
| 314 Rose Ave | | | | | 1 | casting frame & grate 24" x 36" | $ 1,785.19 | $ 1,785.19 |
| N. Hampton Rd. & Barksdale Rd | | | | | 1 | casting frame grate w/hood 24" x 36" | $ 3,377.73 | $ 3,377.73 |
| **Total** | | | | **$ 29,835.30** | | | **$ 48,590.03** | **$ 78,425.33** |

## Operations and Maintenance

### *Yearly Maintenance Activities Chart*

| | Amount | Unit of Measure | Labor Hrs. | Total Cost |
|---|---|---|---|---|
| **SECTION 1: CONSTRUCTION** | | | | |
| **C-1** Construction - Structure | 17.00 | each | 1307.00 | $ 48,416.78 |
| **C-1** Construction - Pipe | 361.00 | ft. | 722.50 | $ 29,835.30 |
| **C-2** Construction - Flume | | | | |
| **C-3** Construction - Ditch | 1.00 | each | 63.50 | $ 2,833.64 |
| **C-3** Construction - BMP | | | | |
| **C-0** Construction - Stock pile material | 110.00 | load | 194.00 | $ 7,998.11 |
| **C-0** Construction - Plan work | | | 189.00 | $ 5,939.89 |
| **SECTION 2: INSPECTION** | | | | |
| **I-1** Inspection - Closed | | | 6175.50 | $149,226.53 |
| **I-1** Inpection - Video | 6975.00 | ft. | 367.00 | $ 9,604.24 |
| **I-1** Inspection-Video data management | | | 40.50 | $ 974.46 |
| **I-1** Inspection-new system | | | | |
| **I-1** Inspection-Survey | | | | |
| **I-2** Inspection-Open | | | 1226.50 | $ 28,226.79 |
| **I-3** Inspection-BMP | 793.00 | each | 419.50 | $ 8,580.65 |
| **I-3** Inspection-Lake | 7.00 | each | 14.00 | $ 298.09 |
| **I-4** Inspection-Tide gate | | | | |
| **I-0** Inspection-Miscellaneous | | | | |
| **I-0** Inspection-Plan work | | | 24.25 | $ 701.16 |
| **SECTION 3: MAINTENANCE** | | | | |
| **M-1** Maintenance-BMP | 880.00 | each | 4584.50 | $420,665.13 |
| **M-1** Maintenance-Right of Way | | | 2517.75 | $ 66,806.82 |
| **M-2** Maintenance-Ditching manual | 213644.50 | each | 5895.00 | $132,677.35 |
| **M-3** Maintenance-Ditching mechanical | 13428.00 | ft. | 1427.25 | $ 50,731.75 |
| **M-4** Maintenance-Culvert | 1708.00 | each | 609.25 | $ 14,271.00 |
| **M-5** Maintenance-Pipe | 89957.00 | ft. | 2245.00 | $ 61,398.19 |
| **M-5** Maintenance-Structure | 13041.50 | each | 4136.50 | $105,485.81 |
| **M-5** Maintenance-Reset cover | 171.00 | each | 227.00 | $ 5,067.37 |
| **M-6** Maintenance-Lake | 72.00 | each | 782.50 | $ 26,983.78 |
| **M-7** Maintenance-Mowing | 606986.50 | ft. | 2600.00 | $ 96,167.20 |
| **M-7** Maintenance-Mowing right of way | 103.82 | acre | 361.50 | $ 11,285.54 |
| **M-8** Maintenance-Tide gate | 19.00 | each | 65.00 | $ 1,415.48 |
| **M-9** Maintenance-Sweep streets | 8924.05 | mile | 5699.25 | $341,365.82 |
| **M-9** Maintenance-Sweep support | | | 3112.50 | $ 98,986.43 |
| **M-10** Maintenance-Haul waste | 541.00 | load | 452.00 | $ 16,147.44 |
| **M-10** Maintenance-Screen material | | | 2115.00 | $ 89,186.64 |
| **M-11** Maintenance-Vehicle | | | 1791.25 | $ 56,002.78 |
| **M-0** Maintenance-Yard | | | 752.50 | $ 15,690.72 |
| **M-0** Maintenance-Plan work | | | 13.50 | $ 385.32 |
| **SECTION 4: REPAIR** | | | | |
| **R-1** Repair-Pipe failure | 193.00 | each | 5698.00 | $196,978.84 |
| **R-2** Repair Pipe work | 641.00 | ft. | 2121.00 | $ 83,219.46 |
| **R-2** Repair-Convert structure | 15.00 | each | 929.50 | $ 31,024.03 |
| **R-3** Repair Structure | 121.00 | each | 2841.75 | $ 91,340.04 |
| **R-4** Repair Erosion | 1615.00 | ft. | 667.50 | $ 43,728.66 |
| **R-5** Repair Replace cover | 87.00 | each | 122.50 | $ 13,177.95 |
| **R-5** Repair Tide gate | | | | |
| **R-0** Repair- Plan work | | | 91.00 | $ 2,587.00 |

## Water Quality

### *Monitoring Program Overview*

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

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

### *Water Quality Methods*

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

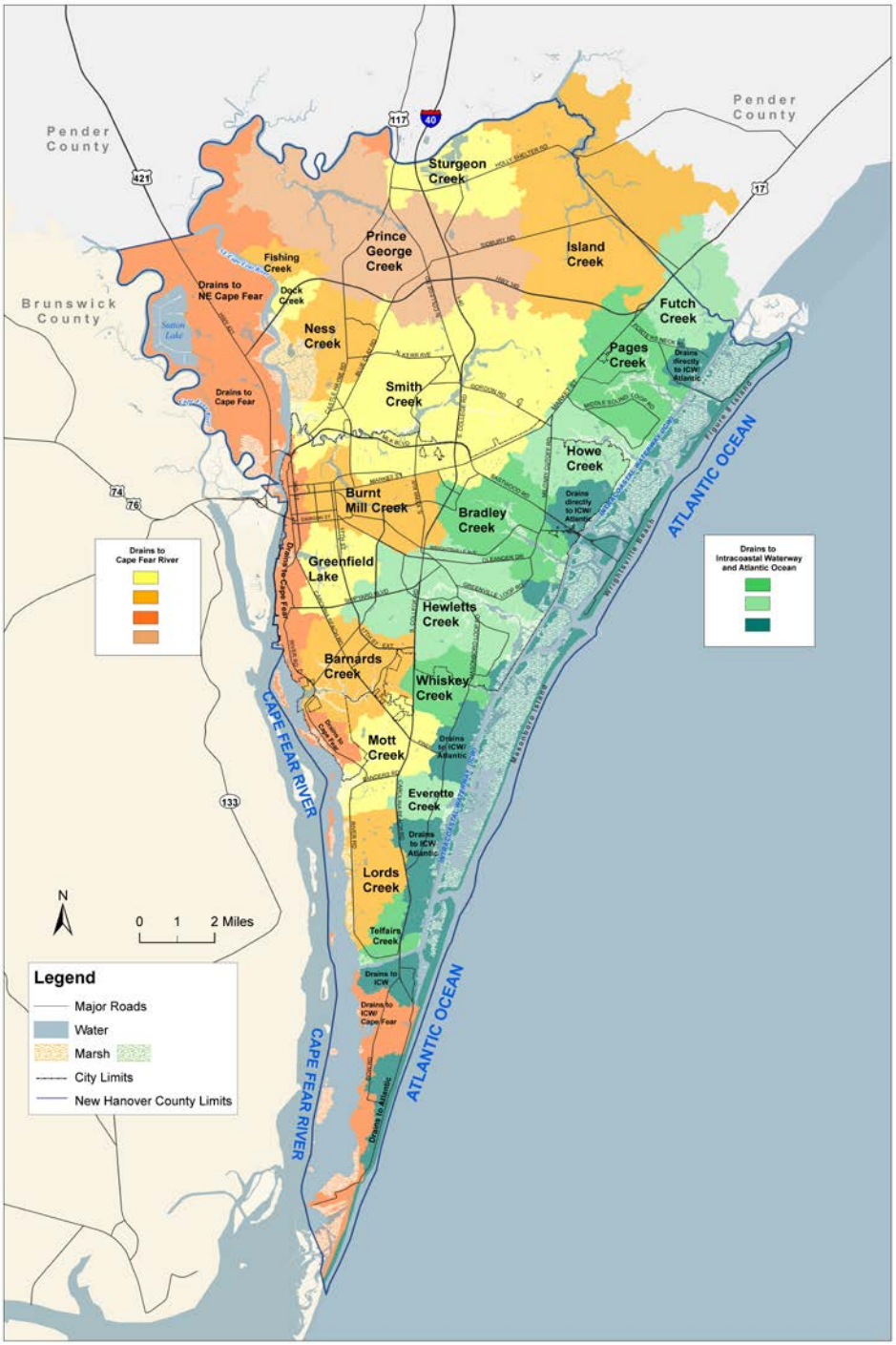
The analytical method used to measure chlorophyll *a* is described in Welschmeyer (1994) and US EPA (1997). Chlorophyll *a* concentrations were determined from the 1.0 micrometer glass fiber filters used for filtering samples for nitrate+nitrite and orthophosphate analyses. All filters were wrapped individually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

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

molar ratios for relevant sites (N/P). Fecal coliform concentrations were determined using a membrane filtration (mFC) method (APHA 1995).

For a large wet detention pond (Ann McCrary Pond on Burnt Mill Creek) and for a constructed wetland on Kerr Avenue (at the headwaters area of Burnt Mill Creek) UNCW collected data from input (control) and outfall stations. This data was used to test for statistically significant differences in pollutant concentrations between pond input and output stations. The data were first tested for normality using the Shapiro-Wilk test. Normally distributed data parameters were tested using the paired-difference t-test, and non-normally distributed data parameters were tested using the Wilcoxon Signed Rank test. Statistical analyses were conducted using SAS (Schlotzhauer and Littell 1987).

***Wilmington (New Hanover County)Watersheds Map***



*Wilmington Watersheds Yearly Monitoring Report (UNCW)*

# ENVIRONMENTAL QUALITY OF WILMINGTON AND NEW HANOVER COUNTY WATERSHEDS, 2013

by

Michael A. Mallin, Mary Grace Lemon, Matthew R. McIver

CMS Report 14-01

Center for Marine Science

University of North Carolina Wilmington

Wilmington, N.C. 28409

May 2014

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

Funded by:

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# Executive Summary

This report represents combined results of Year 16 of the Wilmington Watersheds Project. Water quality data are presented from a watershed perspective, regardless of political boundaries. The 2013 program involved 7 watersheds and 22 sampling stations. In this summary we first present brief water quality overviews for each watershed from data collected between January and December 2013.

Barnards Creek – Barnards Creek drains into the Cape Fear River Estuary. It drains a 4,161 acre watershed that consists of 22.3% impervious surface coverage, and a population of approximately 12,200. Water column sampling was not funded during 2013.

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 27.6% impervious surface coverage, with a population of about 16,470. Three sites were sampled, all from shore. In 2013 there were no significant algal blooms recorded, and average dissolved oxygen was good 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.

Burnt Mill Creek – Burnt Mill Creek drains a 4,252 acre watershed with a population of about 23,700. Its watershed is extensively urbanized (33.8% impervious surface coverage) and drains into Smith Creek. Three locations were sampled during 2013. This creek had very poor water quality, with high fecal coliform counts occurring at two of the three sites exceeding the human contact standard > 50% of occasions sampled. One major and several minor algal blooms occurred in 2013. Dissolved oxygen concentrations were good in the upper creek and poor in the lower creek in 2013.

The effectiveness of Ann McCrary wet detention pond on Randall Parkway as a pollution control device for upper Burnt Mill Creek was mixed for 2013. Comparing inflows to outflows, there was a significant increase in dissolved oxygen and pH, but also increases in chlorophyll *a*, total phosphorus and total suspended solids. However, there were significant decreases in conductivity, fecal coliform counts, ammonium and nitrate. Several water quality parameters showed an increase in pollutant levels along the creek from the exit from the detention pond to the downstream Princess Place sampling station, including fecal coliform bacteria, nitrogen and phosphorus.

Greenfield Lake – This lake drains a watershed of 2,551 acres, covered by about 37% impervious surface area with a population of about 10,630. This urban lake has suffered from low dissolved oxygen, algal blooms, periodic fish kills and high fecal bacteria counts over the years. The lake was sampled at four tributary sites and three in-lake sites. The four tributaries of Greenfield Lake (near Lake Branch Drive, 17$^{th}$ Street, Jumping Run Branch, and Lakeshore Commons Apartments) all suffered from low dissolved oxygen problems. In 2013 there was good dissolved oxygen at the in-lake stations.

Algal blooms are periodically problematic in Greenfield Lake, and have occurred during all seasons, but are primarily a problem in spring and summer. In 2013 algal blooms continued to occur in the lake. The continuing presence of the blooms has led NCDENR to propose (February

2014) that this lake be added to the NC 303(d) list for excessive chlorophyll *a*. In the period 2007-2013 there was a statistically significant relationship within the lake between chlorophyll *a* and BOD5, meaning that the algal blooms are likely an important cause of low dissolved oxygen in this lake. Stormwater runoff into the streams also contributes BOD materials into the lake. In 2013 all tributary stations and one in-lake station exceeded the fecal coliform State standard on 33% or more of occasions sampled.

From 2005 to 2013 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, and improved in-lake dissolved oxygen content.

Hewletts Creek – Hewletts Creek drains a large (7,435 acre) watershed into the Intracoastal Waterway. This watershed has about 25.1% impervious surface coverage with a population of about 20,210. In 2013 the creek was sampled at four tidal sites and one non-tidal freshwater site.

Incidents of hypoxia did not occur in 2013 as no concentrations sampled were below 5.0 mg/L. Turbidity was low, and algal blooms were not problematic in 2013. Fecal coliform bacteria counts exceeded State standards on 83% of the time at MB-PGR and NB-GLR, and 67% of the time at PVGC-9 and SB-PGR. The geometric means at PVGC-9, MB-PGR and NB-GLR all exceeded 200 CFU/100 mL for a poor rating for this pollutant parameter.

During 2007 the 7.6 acre JEL Wade wetland (located at the end of Bethel Road) was constructed to treat stormwater runoff from a 589 acre watershed within the Hewletts Creek drainage. Drainage for this wetland enters the south branch of the creek, upstream of the SB-PGR sampling site. This constructed wetland has continued to function extremely well in reduction of nutrients and fecal bacteria from stormwater inputs. Additionally, sampling data collected downstream of the wetland at Station SB-PGR shows 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 21.1% impervious surface coverage. Two stations were sampled in Howe Creek in 2013. Two major algal blooms were seen at the uppermost station HW-DT and one at HW-GP. The uppermost station HW-DT was rated poor for high fecal coliform bacteria counts, exceeding the state standard on 100% of the times sampled, while HW-GP was also rated poor, exceeding the standard on 33% of occasions sampled, and HW-FP were rated fair and good, respectively. Dissolved oxygen concentrations were rated fair at HW-DT and good at HW-GP.

Howe Creek sediments were sampled for metals and toxicants at two sites on October 7. None of the parameters sampled exceeded limits considered harmful to benthic organisms.

Motts Creek – Motts Creek drains a watershed of 3,328 acres into the Cape Fear River Estuary with a population of about 9,530; impervious surface coverage 23.1%. This creek was not sampled for water quality by UNCW in 2013.

However, UNCW sampled the Mott's Creek sediments at Station MOT-RR, the bridge where Mott's Creek passes under River Road. Based on the suggested guidelines for potential toxicity of metals, PCBs and PAHs, the creek sediments at that location were of good quality to support aquatic life.

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 33% impervious surface coverage, with a population of about 31,780. One estuarine site on Smith Creek, SC-CH, was sampled by UNCW under the auspices of the Lower Cape Fear River Program (LCFRP).

The dissolved oxygen standard for Smith Creek, which is rated as C Sw waters is 4.0 mg/L, which was violated one time in our 2013 samples. The North Carolina turbidity standard for estuarine waters (25 NTU) was exceeded one of 12 sampling occasions. There were no algal blooms present upon any of our 2013 sampling occasions. Fecal coliform bacterial concentrations exceeded 200 CFU/100 mL on 33% of samples in 2013, for a Poor rating; although no samples were unusually high.

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 26.3% impervious surface area. One station, on Masonboro Loop Road, was sampled from shore along this creek in 2013. This site had low to moderate nutrient concentrations and no algal bloom problems. Dissolved oxygen was substandard (below 5.0 mg/L) on one of six occasions sampled, whereas fecal coliform bacteria counts were above standard on 50% of occasions sampled.

Sediment metals and toxicants were collected on one occasion (5/31/13) from Whiskey Creek. The upper two tributary stations, WC-NB and WC-SB, had no levels of metals, PCBs, or PAHs that were in excess of concentrations known to be toxic to benthic organisms However, Station WB-MLR, at Masonboro Loop Road bridge, had excessive concentrations of total PAHs, as well as these individual PAHs: benzo(a)anthracene, benzo(a)pyrene, fluoranthene, phenanthrene and pyrene. Downstream at the Whiskey Creek Marina (WC-MR) the only parameter found in excessive sediment concentrations was copper. It is likely that leachate of copper from boat paints accounted for the excessive concentrations.

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 (Appendix A) for a parameter less than 10% of the time sampled, it is rated Good; if it exceeds the standard 10-25% of the time it is rated Fair, and if it exceeds the standard > 25% of the time it is rated Poor for that parameter. We applied these numerical standards to the water bodies described in this report, based on 2013 data, and have designated each station as good, fair, and poor accordingly (Appendix B).

Fecal coliform bacterial conditions for the entire Wilmington City and New Hanover County Watersheds system (22 sites sampled for fecal coliforms) showed 9% to be in good condition, 9% in fair condition, but **82%** in poor condition, worse than 2012. Dissolved oxygen conditions

system-wide (22 sites) showed 73% of the sites were in good condition, 9% were in fair condition, and 18% were in poor condition, a notable improvement from 2012. For algal bloom presence, measured as chlorophyll *a*, 77% of the 22 stations sampled were rated as good, 9% as fair and 14% as poor (Greenfield Lake and upper Howe Creek) a slight improvement from 2012. For turbidity, 21 of the 22 sites sampled were rated as good, while one site, Smith Creek at Castle Hayne Rd. was rated fair. 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 – 34% impervious coverage; Greenfield Lake – 37% impervious coverage.

## 2013-2014 NPDES PROGRAM HIGHLIGHTS & ANNUAL REPORTING

### Public Education & Outreach

- Year 2 of a three-year survey to Restaurants in the City of Wilmington concluded
- 74 presentations delivered to 8th grade science classes in New Hanover County serving over 2000 students
- Wilmington Area Watershed map was finalized with a first printing run of 2000 maps for distribution to teachers and at public events

### Public Involvement & Participation

- Public input meetings were held for the Brookshire/Beasley and Clear Run Branch stormwater improvement projects.
- 56 storm drain markers were placed by volunteers in the Independence South and Holly Glen neighborhoods this year
- 9 watershed cleanups involving 154 volunteers contributing 306 volunteer hours and collecting over 217 thirty-gallon bags of trash

### Illicit Discharge Detection and Elimination (IDDE)

- 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.
- An annual schedule for dry weather flow monitoring was developed.

### Post-Construction Site Runoff Controls

- Continued implementing the City's Land Ordinance Code to provide post construction controls to meet the requirements of the City's Phase II permit and to bring the ordinance into compliance with the recent Coastal Stormwater Legislation.
- Conducted inspections on privately owned BMPs located within the City limits in order to ensure that maintenance requirements were being met by property owners.

### Pollution Prevention and Good Housekeeping for Municipal Operations

- Continued implementation of BMPs in SPPP for Fleet Maintenance Facility.
- Continued documentation for SPPP and SPCC plans.
- Created recommendation plans for several City facilities with the potential to pollute.
- Continued inspections of City fire stations for compliance with wash down stations.

### Voluntary Watershed Restoration Plan

- Planning and installation of the Tidal Creek Community Rain Garden on Oleander Drive.
- Presentation of the restoration plan at North Carolina LID Summit in Raleigh, NC, and the Tidal Creek Summit in Wilmington, NC.
- Developed educational mailing for target watershed residents and businesses concentrating on pet waste as the primary source of bacteria in local tidal creeks.
- Completed development of HOW website, brochure, and Make-A-Ripple outreach materials.

## PUBLIC EDUCATION AND OUTREACH

### 1. Objectives for Public Education and Outreach

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

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

### 2. BMPs for Public Education and Outreach

The permittee shall implement the following BMPs to meet the objectives of the Public Education and Outreach Program.

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

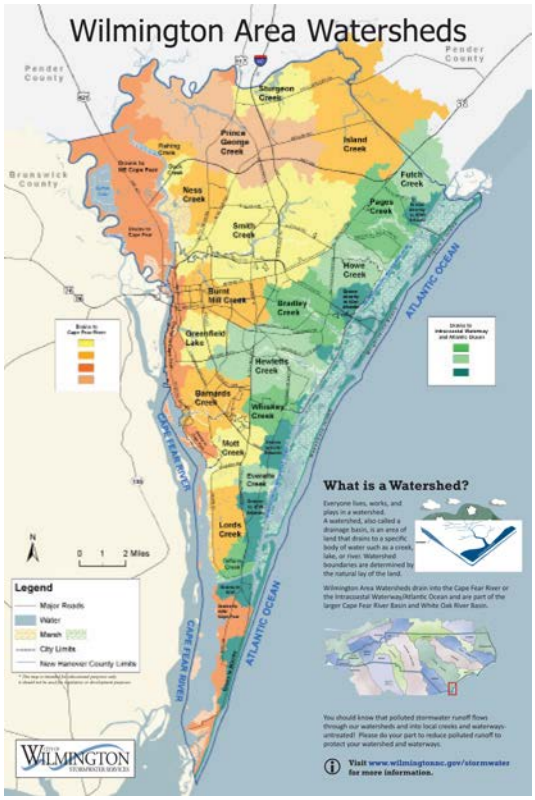
**Accomplishments:**

A comprehensive plan including our outreach/education program goals and objectives and target pollutants, sources and audiences is included in the Public Education and Outreach Appendix. The plan defines the origin and sources of each pollutant, target audience(s), and includes suggested outreach strategies and key outreach messages. Staff regularly uses this information as a guide for planning, implementing, and evaluating outreach and education efforts throughout the city. This summary will be updated and modified as pollutant sources, target audience demographics, public awareness, water quality, and other program variables change over time.

| | |
|---|---|
| b. Distribute public education materials and information to identified target audiences and user groups. For example, schools, homeowners, and/or businesses. | The permittee shall distribute stormwater educational materials and information to appropriate target groups. Instead of developing its own materials, the permittee may rely on Public Education and Outreach materials supplied by the state, and/or other entities through a cooperative or contractual agreement, as available, when implementing its own program. |

**Accomplishments:**

After many years in development, a full-color Wilmington Area Watershed Map was finalized and printed. The map development process included many years of gathering stakeholder input including collaborative meetings held with New Hanover County, UNC-Wilmington, New Hanover Soil & Water and City Stormwater and Planning Departments, as well as defining new watershed boundaries in the county and refining city watershed boundaries with the best data currently available. The Watershed Map will be used by all entities as a common platform to educate the public. Copies are available from Wilmington Stormwater Services, as well as on the Stormwater Services website. In the first month, over 400 watershed maps were distributed.




Stormwater education staff made several presentations to conferences and civic groups including the American Public Works Association, Cape Fear Rotary Club, and UNCW graduate and undergraduate classes.

Enviroscape Watershed Education Presentations were given to all 8th grade science classes in New Hanover County Schools, serving approximately 70 classes and over 2,000 students.

Stormwater education and code enforcement staff continued an effort to educate restaurants within the Wilmington city limits and evaluate our education efforts and public awareness through an educational mailing and return survey. The survey will be mailed to approximately 500+ restaurants over the course of 3 years. In this second year of the survey, packets were mailed to 148 of these restaurants in January 2014. Based on the survey questions that could solicit correct responses (questions 1, 3, 4), it was determined that 90% of respondents answered the survey questions correctly. (Total # of correct survey answers/total survey responses received).

New Hanover Soil & Water Conservation District (NHSWCD), a contracted agency, participated in several pet-related events including Paws for People and Pawz in the Park with the Canines for Clean Water program and booth. Canines for Clean Water is a program developed by the city that is implemented by both the city and NHSWCD to educate pet owners about the problems of uncollected pet waste and fecal coliform bacterial pollution. The program continues to have a large amount of public participation at pet events. Pet owners sign a pledge promising to clean up their pet's waste and owners receive a pet bandana, goodie bag and chance to show off their pooch's photo online. www.wilmingtonnc.gov/canines

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

**Accomplishments:**
The internet is a powerful tool for disseminating stormwater education and pollutant 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, hotline reporting webform, Enviroscape 8th grade program information, storm drain marking program information, UNCW monitoring data, maintenance activities, educational print materials and videos (brochures, newsletters, local watershed map, posters, documentaries, PSAs, etc), and much more.

We continue to promote and drive citizens to our website through inclusion on staff business cards, print materials, paid television and radio public service announcements (PSAs), citywide Stormwater Watch newsletter, community presentations and signage. The shorter web address has proven invaluable and easier for citizens to find our website and specific content: www.wilmingtonnc.gov/stormwater

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

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


Hotline/web reports are routed to the Stormwater Code Compliance Officer who tracks, investigates, and responds to each hotline report. The hotline and online reporting webform are advertised on the City's cable TV channel and via the stormwater website, citywide newsletters, public presentations, large educational magnets on stormwater fleet vehicles, and promotional outreach items including pens, refrigerator magnets, and post-it notes for giveaways to the public. Thirteen calls were placed to the City's Stormwater hotline and online webform for this reporting period. The nature of the hotline reports are found in the Enforcement section of the Appendix.

In 2014, 25 new stormwater hotline signs were placed beneath existing watershed delineation signs along roadways throughout the city. The hotline signs include the phone # where citizens can report instances or potential sources of water pollution. Next year, we will add signs to the remaining signposts in the city.

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

**Accomplishments:**

The extent of exposure requirement is extensively documented in tables in the Public Education Appendix, as well as the Public Involvement Appendix. Documentation includes the date of event or activity, the type of event/activity, audience reached, who delivered the content, the method of delivery and/or message, and the resulting attendance or participation.

**Assessment of Program Implementation**

The outreach and education program continues to implement a variety of activities and programs that meet or exceed the minimum requirements of our NPDES permit. We have fulfilled NPDES requirements and internal goals for the reporting period.

**Objectives for Next Year**

- Develop Landscaping/Yard Care poster for distribution to landscaping contractors and homeowners.
- Post Stormwater Hotline signage on remaining watershed delineation signs throughout the city. Also replace any missing watershed signs.
- Post pet waste educational signage along public easements and other areas based on staff recommendations and citizen complaints of problem areas with uncollected pet waste.
- Implement Year 3 of the targeted Restaurant evaluation survey and education effort and finalize survey results.
- Develop content for the citywide Annual Spring Stormwater Watch public newsletter, to include UNCW's annual water quality data and the State's 303(d) list data.
- Deliver the Enviroscape Watershed program to 8$^{th}$ grade science classes in New Hanover County Schools. Develop relationship with the new New Hanover County Schools Science Coordinator.
- Record new Yard Waste PSA in hi-definition format to be compatible with network TV.
- Education manager will attend Statewide EENC/ Southeastern Environmental Education Alliance Conference, as well as continue to pursue EE recertification through the NC Office of Environmental Education.

## PUBLIC INVOLVEMENT AND PARTICIPATION

### 1. Objectives for Public Involvement and Participation

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

### 2. BMPs for Public Involvement and Participation

The permittee shall implement the following BMPs to meet the objectives of the Public Involvement and Participation Program.

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

**Accomplishments:**

The City of Wilmington Stormwater Services contracts annually with Cape Fear River Watch (CFRW) and New Hanover Soil & Water Conservation District (NHSWCD) to implement public involvement and participation activities, as well as public education and outreach services. Both organizations sign an annual contract with the City which specifies services and deliverables that enable Stormwater Services to meet many of its NPDES public education and involvement requirements. In addition to full time staff, each agency taps into a volunteer base and encourages citizens to be involved in the implementation of public involvement and public participation activities.

Services performed by CFRW & NHSWCD include activities such as volunteer watershed clean-up events, volunteer creek monitoring, wetland monitoring and plantings, educational workshops for the schools and the community, participation in the Lower Cape Fear Stewardship Awards program, monthly rain barrel sale, LID consultation, volunteer storm drain marking, public eco-tours and high school Envirothons, community stormwater best management practice (BMP) installations via NC CCAP, website updates, and more.

Each agency provides the City with four quarterly progress reports and invoice during the contract for services performed. The cumulative Year End progress report for each agency is included in the Public Involvement and Participation Appendix of this annual report.

| | |
|---|---|
| b. Mechanism for Public involvement | The permittee shall provide and promote a mechanism for public involvement that provides for input on stormwater issues and the stormwater program, implemented locally or through cooperative or contractual agreement. These mechanisms could include public meetings, citizen/business surveys, citizen portal website feedback, public event participation, one-on-one citizen contact, etc. |

**Accomplishments:**

We jointly participate in a monthly rain barrel sale which is organized by the New Hanover Soil & Water Conservation District. In 2014, a new vendor was contracted to offer two different styles and sizes of rain barrels for sale. This new vendor, Rain Barrel USA, is a North Carolina company that was willing to let us sell barrels on consignment. The sale is publicized through a variety of media outlets including city and county public TV and websites, press releases, garden shows, and special events. This year, 80 rain barrels were sold to the public.

Stormwater Services conducted a second public meeting in March 2014 for the Brookshire/Beasley stormwater improvement project. Meeting notices were sent to citizens that will be affected by the pending project.

Stormwater education and code enforcement staff continued an effort to educate restaurants within the Wilmington city limits and evaluate our education efforts and public awareness through an educational mailing and return survey. The survey will be mailed to approximately 500+ restaurants over the course of 3 years. This second year, in January 2014, survey packets were mailed to 148 of these restaurants. Based on the survey questions that could solicit correct responses (questions 1, 3, 4), it was determined that 90% of respondents answered the survey questions correctly. (Total # of correct survey answers/total survey responses received).

Please visit the Public Involvement and Participation Appendix for activities accomplished by Cape Fear River Watch and New Hanover Soil & Water Conservation District during this period.

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

**Accomplishments:**

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

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

outreach items including pens, refrigerator magnets, and post-it notes for giveaways to the public. Thirteen calls were placed to the City's Stormwater hotline and online webform for this reporting period. The nature of the hotline reports are found in the Enforcement section of the Appendix.

**Assessment of Program Implementation**

The City has continued to partner with contract agencies to implement public education, involvement and participation activities. These annual, contractual agreements have resulted in numerous public and action-oriented activities including watershed cleanups, storm drain marking, community workshops, grant partnerships, monthly rain barrel sale, eco-tours, BMP installations, and more.

This past year, the city also conducted efforts to reach out to the public regarding the planning and implementation of drainage projects in the areas of Longstreet, Antelope Trail, Brookshire/Beasley and Clear Run Branch.

**Objectives for Next Year**

- Utilize partner agencies to implement community-focused initiatives such as storm drain marking, watershed cleanups, Canines for Clean Water events, etc.
- Conduct public outreach and meetings for upcoming stormwater drainage projects.
- Promote Stormwater Pollution Prevention Hotline by posting hotline signage throughout city watersheds.

## ILLICIT DISCHARGE DETECTION AND ELIMINATION (IDDE)

### 1. Objectives for Illicit Discharge Detection and Elimination

a. Implement and enforce a program to address the detection and elimination of illicit discharges into the MS4.

b. Maintain a storm sewer system map, showing the location of all major outfalls and the names and location of all waters of the United States that receive discharges from those outfalls;

c. Prohibit, through ordinance, or other regulatory mechanism, non-storm water discharges except as allowed in this permit and implement appropriate enforcement procedures and **actions;**

d. Implement a plan to detect and address non-storm water discharges, including illegal dumping, to the MS4;

e. Inform public, employees, businesses, and the general public of hazards associated with illegal discharges, how to recognize illicit discharges and improper disposal of waste; and

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

### 2. BMPs for Illicit Discharge Detection and Elimination

The permittee shall implement the following BMPs to meet the objectives of the Illicit Discharge Detection and Elimination Program and shall notify the Division prior to modification of any goals.

| BMP | Measurable Goals |
|---|---|
| a. Maintain adequate legal authorities | The permittee shall annually review the permittee's IDDE ordinances or other regulatory mechanisms, or adopt any new ordinances or other regulatory mechanisms that provide the permittee with adequate legal authority to prohibit illicit connections and discharges and enforce the approved IDDE Program. |

**Accomplishments:**

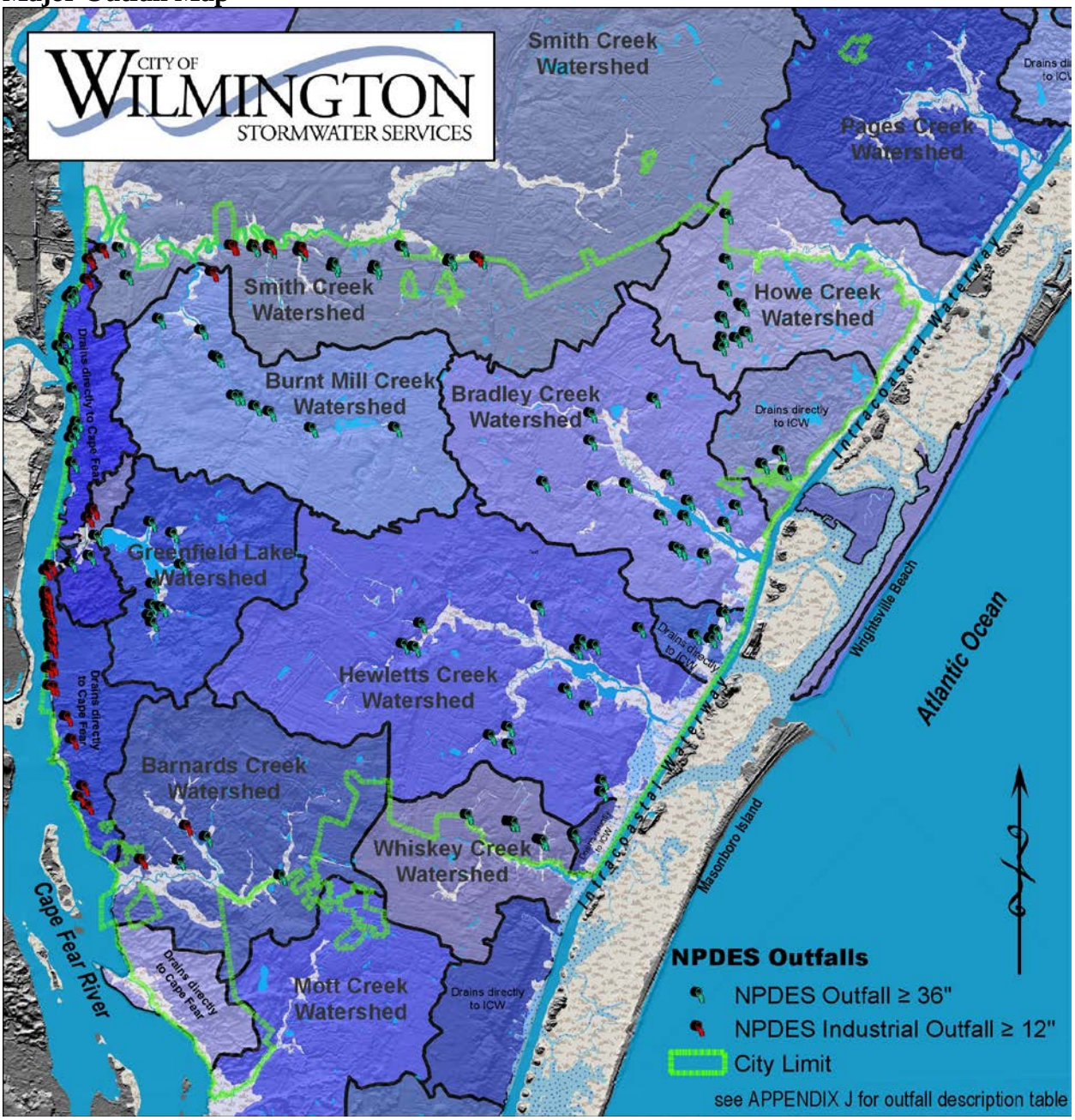
The City continues to utilize the existing ordinances in place to address illicit discharges to its system. The City passed the Ordinance to amend Chapter 12 of the City Code on 9/15/2009 to address illicit discharges to the stormwater system and to protect public water and sewer systems. This Ordinance change went into effect on November 1, 2009.

The current Cape Fear Public Utility Authority (CFPUA) ordinance defines wastewaters that are required to be discharged into the sanitary sewer system. The City utilizes CFPUA's ordinance to address discharges of regulated wastewaters to the City's MS4 and other natural outlets.

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

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

**Major Outfall Map**




**Accomplishments:**

The City continues to maintain a basemap of major outfalls and receiving water bodies. Outfalls are classified and added to the GIS dataset as mapping of the City MS4 proceeds. Additionally, the City has made significant improvements to the GIS mapping of watershed

boundaries using the best available data.

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

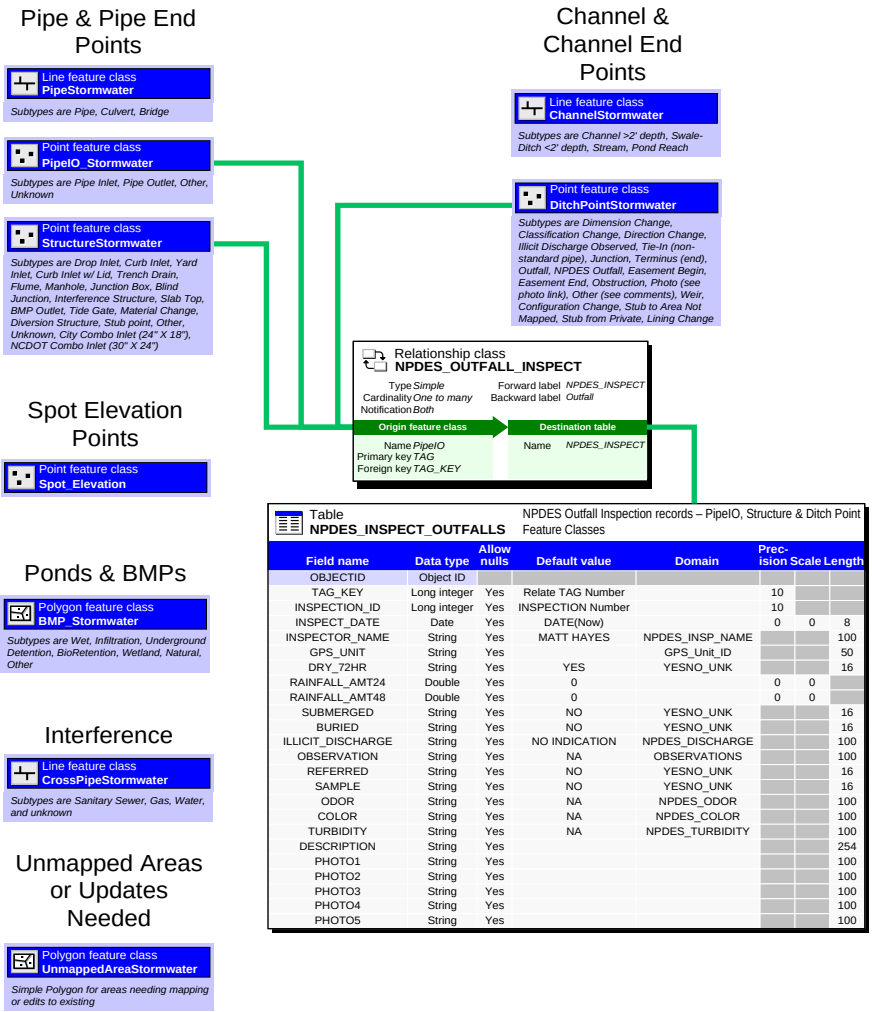
**Accomplishments:**

The City began implementing procedures for its dry weather flow monitoring program this reporting period. A dry weather flow monitoring schedule was developed for the 2014/15 calendar year based on identified outfall locations and their associated trunk lines. Twelve known location points were documented along outfalls in the Burnt Mill Creek watershed.

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 inspections.

The diagram below shows the main structural elements of the stormwater GIS and allows for storing inspection records conducted to detect dry weather flows.

**Stormwater GIS Elements & Inspection Table Relationships**




| 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 |

The City is currently undergoing a change in its Stormwater GIS Manager position. This along with a very wet late spring/early summer has put the dry weather flow program a few months behind schedule. As conditions change in the weather patterns and the new position is filled we should be able to resume the monitoring schedule in August/September 2014.

| | |
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| d. Investigations into the source of all identified illicit discharges. | The permittee shall maintain, and evaluate annually written procedures for conducting investigations of identified illicit discharges. |

**Accomplishments:**

The City has continued to utilize its Illicit Discharge Detection Elimination (IDDE) Policy and Procedures Manual document. The purpose of this document is to provide a standard for guidance and information for the effective and efficient implementation of the Illicit Discharge Detection and Elimination Program within the City of Wilmington. The document outlines the investigation, testing, coordination with other authorities, GIS inventory, follow up, and documentation procedures to be taken to resolve a questionable dry weather flow.

The City had its first full year of data input and documentation through *Intelligov*, our data management system. All details of incidences are reported are entered from the start of an incidence until the investigation until is closed. This documentation into *Intelligov* has allowed for the extraction of data for evaluation of our program, and assessment to identify repeat offenders and chronic violators as well as serve as help us identify areas of the City with higher violation reports. See Appendix I.

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

**Accomplishments:**

The City continues to address illicit discharges in the stormwater system and to protect public water under its Ordinance. This Ordinance change went into effect on November 1, 2009. The City continues to update the Illicit Discharge Detection Elimination (IDDE) Policy and Procedures manual as the program evolves. The purpose of this document is to provide standards for protocol, field guidance and information for the effective and efficient implementation of the Illicit Discharge Detection and Elimination (IDDE) Program. We continue to update as procedures change and become more efficient for data collection and reporting into the City's tracking database *Intelligov*.

The City has updated the IDDE manual to include *Intelligov* documentation additions of ID incidents as well as more information and protocol for the Dry Weather Flow Program for this year.

| | |
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| f. Employee Training | The permittee shall implement and document a training program for appropriate municipal staff who as part of their normal job responsibilities, may come into contact with or otherwise observe an illicit discharge or illicit connection to the storm sewer system. |

**Accomplishments:**
The City did not conduct training for staff during this reporting year. However, training is scheduled for staff in late August – early September 2014 for the Engineering Department (Construction Inspectors). In addition, new employee training material and presentations have been discussed as part of an on-boarding process when new hires start in their respective positions with the City. Training material for these new employees is planned for implementation during the upcoming reporting period. Refresher training and education for existing staff will be updated as necessary and implemented every 1-2 years.

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

**Accomplishments:**
Stormwater education and code enforcement staff continued an effort to educate restaurants within the Wilmington city limits and evaluate our education efforts and public awareness through an educational mailing and return survey. The survey will be mailed to approximately 500+ restaurants over the course of 3 years. In this second year of the survey, packets were mailed to 148 of these restaurants in January 2014. Based on the survey questions that could solicit correct responses (questions 1, 3, 4), it was determined that 90% of respondents answered the survey questions correctly. (Total # of correct survey answers/total survey responses received).

New Hanover Soil & Water Conservation District (NHSWCD), a contracted agency, participated in several pet-related events including Paws for People and Pawz in the Park with the Canines for Clean Water program and booth. Canines for Clean Water is a program developed by the city that is implemented by both the city and NHSWCD to educate pet owners about the problems of uncollected pet waste and fecal coliform bacterial pollution. The program continues to have a large amount of public participation at pet events. Pet owners sign a pledge promising to clean up their pet's waste and owners receive a pet bandana, goodie bag and chance to show off their pooch's photo online. www.wilmingtonnc.gov/canines

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

**Accomplishments:**
The Stormwater Pollution Prevention hotline was established in January 2010 to field calls from the public to report illicit discharges and other instances of potential 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. The hotline and online reporting form are advertised on the City's cable TV channel and via the stormwater website, citywide newsletters, public presentations, large educational magnets on stormwater fleet vehicles, and promotional outreach items including pens, refrigerator magnets, and post-it notes for giveaways to the public. Six calls were placed to the City's Stormwater hotline and online outreach reporting form for this reporting year. The results of those calls are found in the Enforcement section of Appendix D.

| | |
|---|---|
| i. Enforcement | The permittee shall implement a system to track the issuance of notices of violation and enforcement actions as administered by the permittee. The data maintained in this system shall enable permittee to identify chronic violators for initiation of actions to reduce noncompliance. |

**Accomplishments:**

The City of Wilmington uses *Intelligov* data management system to track all requests for service. This includes illicit discharge reports from the public and from City staff. This system allows us to enter all relevant data from an investigation and then analyze, map, and track various aspects of the incident including enforcement actions and repeat offenders in order to identify chronic violators. For year 2013-2014 there was one repeat offender for Illicit Discharges. See Appendix I for enforcement actions summary for this reporting year.

**Assessment of Program Implementation**

The City continues to implement and enforce its IDDE program to address the detection and elimination of illicit discharges. The City has been implementing its finalized dry weather flow monitoring program. A dry weather flow monitoring schedule was developed for the 2014/15 calendar year based on identified outfall locations and their associated trunk lines. Due to changes in the GIS Manager's position and weather events, the effectiveness of this program will be monitored throughout the upcoming reporting period and reevaluated at the end of the period because of a delay in the monitoring schedule.

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

The City has documented its first full year of *Intelligov data*, our data management system, after finalizing procedures in the previous year. Improved reporting and documentation into *Intelligov* will allow for the extraction of data for evaluation of our program, and assessment to identify repeat offenders and chronic violators as well as serve as help us identify areas of the City with higher violation reports.

Public education regarding illicit discharges continues to be one of the major goals for the City. Staff worked in cooperation with Stormwater Code Enforcement to develop targeted educational and enforcement materials. A survey has been mailed to over half of the 500+ restaurants in our community. In this second year of the survey, packets were mailed to 148 of these restaurants in January 2014. Based on the survey questions that could solicit correct responses (questions 1, 3, 4), it was determined that 90% of respondents answered the survey questions correctly. (Total # of correct survey answers/total survey responses received).

**Objectives for Next Year**

- Evaluate success of the dry weather flow monitoring to determine if changes need to be addressed.
- Evaluate effectiveness of *Intelligov* reporting practices. Assess locations of offenders to determine repeat violations and make recommendations to address those sites.
- Determine effectiveness of public education efforts to restaurants by looking at frequency of violations in those areas.
- Implement training sessions for new employees regarding IDDE.

## 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. Implement and enforce a program to address storm water runoff from new development and redevelopment projects that require a CAMA major development permit or a Sedimentation and Erosion Control Plan. The program shall ensure that controls are in place that would prevent or minimize water quality impacts.

b. Implement strategies which include a combination of structural and/or non-structural best management practices (BMPs) appropriate for the community;

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

d. Adequate long-term operation and maintenance of BMPs.

### 2. BMPs for Post-Construction Site Runoff Controls

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

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

**Accomplishments:**
The City continues to utilize the Land Development Code that was amended and adopted on September 15, 2009 to provide post construction controls in order to meet the requirements of the City's Phase II permit and to bring the ordinance into compliance with the new Coastal Stormwater Legislation.

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

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

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

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

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

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

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

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

Record (as-built) drawings (reproducible mylar) for all stormwater management facilities certified by an authorized registered professional must be provided to the City for permanent record.

When deemed necessary by the City, an easement in a form approved by the City attorney, granting the City and its agents and representatives adequate and perpetual access to the facility and sufficient area for inspection and maintenance, if necessary, by the City, its agents and representatives. Said easement shall be filed in the New Hanover County Registry, at the expense of the applicant, and shall bind all subsequent owners and assigns of the facility and of the property on which the facility is located.

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

*The approval of the stormwater permit shall require an enforceable restriction on property usage that runs with the land, such as recorded deed restrictions or protective covenants, to ensure that future development and redevelopment maintains the site consistent with the approved project plans.*

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

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| f. Provide a mechanism to require long-term operation and maintenance of structural BMPs. | The permittee shall implement or require an operation and maintenance plan for the long-term operation of the structural BMPs required by the program. |

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

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| g. Inspections of Structural Stormwater Control Measures | To ensure that all stormwater control measures meet the permittee's performance standards and are being maintained pursuant to the maintenance agreement, the permittee shall develop and implement a written inspection program for structural stormwater controls installed pursuant to the permittee's post-construction program.<br><br>The permittee shall document and maintain records of inspections, findings and enforcement actions and make them available for review by the permitting authority. |

**Accomplishments:**
Under the current stormwater management ordinance of the City, permitees of structural BMPs are required to properly maintain their stormwater management systems to ensure long term operation. The City conducted biannual compliance inspections for privately owned stormwater BMPs in order to ensure maintenance responsibilities are being undertaken by property owners. Inspections were conducted by a City staff member who has completed the Stormwater BMP Inspection and Maintenance Certificate offered through NC State's Biological and Agricultural Engineering Department (certification #182). Recertification occurred in March 2013. An inspection summary is included in Appendix F. In addition, sample inspection reports are provided.

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

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

**Accomplishments:**
Currently all ordinances, design standards, application forms, BMP Manual and Technical

Standards for developers are found online at the City's website. The city provides instruction online for the forms so that developers can provide the necessary documentation for the process review.

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

**Accomplishments:**

The City has tracked the issuance of violations through its current inspection process since the implementation of the stormwater ordinance. The City made improvements in the inspection process and its associated database for private BMPs. The updated database will allow for improved documentation of City inspections. Additional improvements are being discussed to the database that may also provide for easier data extraction and be more specific to an individual inquiry, such as chronic violators. We hope to finalize the second phase of the database improvements in fall 2014.

**Assessment of Program Implementation**

The City has continued to maintain adequate legal authorities to meet the objectives of the Post-Construction Site Runoff Controls program through its Land Development Code. In addition, the City continues to conduct site plan reviews utilizing the City's Land Development Code in order to provide post construction controls to meet the requirements of the City's Phase II permit.

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

**Objectives for Next Year**

- Review ordinances to determine if any changes are needed to improve the post-construction requirements.
- Continue to update and evaluate database of new or redeveloped projects to determine if information can be improved, if documentation is adequate, and if modification for data extraction is needed.
- Start second phase of BMP inspection database improvements in fall 2014. With the discussed planned improvements, the City should be able to look for trends in repeat offenders and address them through education and outreach of property owners.

**3. Post-construction Stormwater Runoff Controls for New Development**

a. In order to fulfill the post-construction minimum measure program requirement the permittee may use the Department's model ordinance, design its own post-construction practices that meet or exceed the Department's Stormwater Best Management Practices Manual on scientific and engineering standards, or develop its own comprehensive watershed plan that is determined by the Department to meet the post-construction stormwater management measure required by 40 Code of Federal Regulations§ 122.34(b)(5)(l July 2003 Edition).

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

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

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

## POLLUTION PREVENTION AND GOOD HOUSEKEEPING FOR MUNICIPAL OPERATIONS

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

a. Implement an operation and maintenance program that includes a training component and has the ultimate goal of preventing or reducing pollutant runoff from municipal operations.

b. Provide employee training to prevent and reduce storm water pollution from activities such as park and open space maintenance, fleet and building maintenance, new construction and land disturbances, and storm water system maintenance.

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

The permittee shall implement the following BMPs to meet the objectives of the Pollution Prevention and Good Housekeeping Program.

| BMP | Measurable Goals |
|---|---|
| a. Inventory of municipally owned or operated facilities | The permittee shall maintain a current inventory of facilities and operations owned and operated by the permittee with the potential for generating polluted stormwater runoff. |

**Accomplishments:**

The City created an inventory of its known facilities with the potential for generating polluted runoff. Sites were identified by location, type of facility and potential pollution sources. Sites were evaluated to determine if further implementation of pollution prevention measures are necessary based on current on-site procedures and equipment. Recommendations are currently being considered for potential pollution sources at certain locations. Based on these recommendations, the City will provide necessary BMPs on site to minimize the threat of potential sources.

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

The Parks and Recreation (P&R) facilities located at Legion Stadium, Front Street (main P&R facility), and Olsen Park were evaluated for their good housekeeping procedures and on-site maintenance activities. The City finalized its documentation of these sites and created recommendation plans (if necessary) based on their activities, locations and descriptions of possible pollution sources.

In addition, the City evaluated its Street Sweeping Garage (Coleman Complex) and Fire Stations

to address the same concerns. A recommendation plan was also created for the sweeper facility. Fire Station locations are currently being evaluated and recommendations to improve maintenance practices and storage of materials at these sites will be completed by the end of 2014.

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

**Accomplishments:**
Currently, The City relies on a SPCC plan and a SPPP for the Operations Complex and Fleet Maintenance building. These plans focus on the activities at Fleet Maintenance and also preventive inspections at the City's fueling islands, (2) 10,000g. fuel tanks and the 6 generators on site. An additional SPCC for the Police Headquarters addresses inspections for their fueling island and backup generator as well.

Staff training of site managers continued to take place this past reporting period to ensure that documentation of plans is occurring. Further training by facility managers to their respective staff included in the plan continues to be documented as well.

The City will include the recent recommendation plans for Parks and Recreation facilities and the Coleman Sweeper Complex in its annual reviews to ensure that BMPs are being implemented and sites are conducting good housekeeping practices.

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| c. Spill Response Procedures | The permittee shall have written spill response procedures for municipally- owned or operated facilities. |

**Accomplishments:**
Spill Response procedures are identified in the City's SPCC plans for the Operations Complex and Police Headquarters and also in the SPPP for Fleet Maintenance. The City will continue to follow these plans and make any changes if necessary and also ensure documentation is occurring within the plans.

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

**Accomplishments:**
The City currently utilizes BMPs that help reduce polluted stormwater runoff from streets, roads,

and public parking lots within its jurisdictional area. Stormwater crews sweep City streets with curbing (on average) twice/month, NCDOT owned roads once/month, and City owned parking lots from once/month to once/ quarter. City owned parking lots include City operations facilities, City Hall, parks locations, and recreation facilities.

In reporting year 2013/14, street sweepers swept 8,924.1 curb miles while collecting 3,114.1 tons of debris, sediment, vegetation and trash potentially diverted from the stormwater sewer system.

In fiscal year 2013/14, hand maintenance and vacuum trucks cleaned 89,957.0 linear feet of pipe and removed blockages and cleaned 13,041.1 drainage inlets and manholes while collecting 1,334.4 tons of debris, sediment, vegetation and trash potentially diverted from being discharged into our receiving waters.

In addition, the City is also a member of the Urban Stormwater Consortium of the Water Resources Research Institute of the University of North Carolina. This group is funding a research proposal to look at nutrient and carbon loading in gross solids in urban catch basins. Because gross solids in stormwater runoff are an un-quantified (or under quantified) source of nutrients to receiving waters, the study will partner with the City of Wilmington and three other NC municipalities to select four drain inlets with up to four land types represented per the study. Data collected will be analyzed for mass, volume, bulk density, total nitrogen, total phosphorus, total carbon, and composition of material.

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

**Accomplishments:**
See above 2.(d).

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| f. Operation and Maintenance (O&M) for municipally - owned or maintained catch basins and conveyance systems | Within 12 months, the permittee shall develop and implement an O&M program for the stormwater sewer system including catch basins and conveyance systems that it owns and maintains. |

**Accomplishments:**
The City currently has a program for the operation and maintenance of all City owned structural BMPs, storm sewer system, and street sweeping. This program includes repair, inspection and maintenance of all City owned right of ways and officially accepted easements. This information was previously included in this report under *Operations/Maintenance – Yearly Maintenance Activities Table* on page 11.

The City also keeps and updates a BMP Manual for all of its City owned BMPs. The manual includes all associated State DWQ stormwater permits, O&M plans, and site mapping in order to review maintenance requirements and permit renewal dates along with any additional

documentation that might be needed. This manual provides information that can be readily reviewed by maintenance crews in order to keep the BMPs in compliance.

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| g. Identify structural stormwater controls | The permittee shall maintain a current inventory of municipally-owned or operated structural stormwater controls installed for compliance with the permittee's post-construction ordinance. |

**Accomplishments:**
The City keeps and updates a BMP Manual for all of its City owned BMPs. The manual includes all associated State DWQ stormwater permits, O&M plans, and site mapping in order to review maintenance requirements and permit renewal dates along with any additional documentation that might be needed. This manual provides information that can be readily reviewed by maintenance crews in order to keep the BMPs in compliance.

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

**Accomplishments:**
The City keeps and updates a BMP Manual for all its City owned BMPs. The manual includes all associated State DWQ stormwater permits, O&M plans, and site mapping in order to review maintenance requirements and permit renewal dates along with any additional documentation that might be needed. This manual provides information that can be readily reviewed by maintenance crews in order to keep the BMPs in compliance. Documentation occurs with every BMP site visit and maintenance activity.

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

**Accomplishments:**
The City has compiled all pesticide, herbicide and fertilizer application certifications for its Parks and Recreation and Stormwater personnel to ensure that they are current. These certifications are updated and renewed annually.

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

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

A planned spill response training course that was scheduled for Fleet Maintenance staff was to have occurred during this past reporting year but had to be postponed due to schedule conflicts. This training has been placed by staff as priority during the current fiscal year. Because of this unplanned postponement of training, the Good Houskeeping/Pollution Prevention training was also rescheduled for another date. After discussion with fleet staff, the Good Housekeeping/Pollution Prevention training will be considered for scheduling in Sept./Oct. 2014. The City will then evaluate which other facilities could benefit from the training and plan accordingly with those facility supervisors. A supervisor training record for Fleet Maintenance and the Police Headquarters is found in Appendix G.

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| k. Prevent or Minimize Contamination of Stormwater Runoff from all areas used for Vehicle and Equipment Cleaning | The permittee shall describe and implement measures to prevent or minimize contamination of stormwater runoff from all areas used for vehicle and equipment cleaning. |

**Accomplishments:**
Maintenance and cleaning conducted at the City's Operations Complex continues to occur at a wash down station 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.

The Parks and Recreation Dept., located away from the Operations Complex, is located in an older section of the City. Although the buildings are somewhat older, they do not have any floor drains located within them. Minor small engine repair does occur within some of the maintenance buildings. If a minor spill was to occur, it is promptly taken care of with an absorbent granular material and disposed of in containers. Part of the recommendations for BMP (a.) in this section is to ensure that this absorbent is being properly disposed of. The City is currently finalizing this matter with P&R supervisors.

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.

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

The City began maintaining a current inventory of its own facilities and operations with the potential for generating polluted stormwater runoff. These locations are not identified as requiring a SPCC or SPPP due to the nature of activities and limited fuel storage capacity on site. However, good housekeeping recommendation plans for site specific activities for Parks and Recreation and Stormwater facilities were conducted and completed. These documents provide recommendations to site supervisors for pollution prevention/good housekeeping implementation measures.

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

**Objectives for Next Year**

- The City will continue to follow up on the recommendation plans for sites with the potential to pollute. The City will implement the BMPs suggested in the recommendation plans.
- Investigate and implement good housekeeping and compliance measures at the City fire station facilities. Work with site supervisors to provide education and training to staff.
- Conduct additional employee training per SPPP and SPCC plan.
- Update BMP records of Division of Water Quality permitted locations as needed for City owned facilities.
- Ensure documentation for SPCC and SPPP are being completed for various site locations.

## TOTAL MAXIMUM DAILY LOADS (TMDLs)

### 1. Objective

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

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

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

### 2. Best Management Practices (BMPs)

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

| BMP | Measurable Goals |
|---|---|
| a. Identify, describe and map watershed, outfalls, and streams | Within 12 months the permittee shall prepare a plan that:<br>• Identifies the watershed(s) subject to an approved TMDL with an approved Waste Load Allocation (WLAs) assigned to stormwater,<br>• Includes a description of the watershed(s),<br>• Includes a map of watershed(s) showing streams & outfalls<br>• Identifies the locations of currently known major outfalls within its corporate limits with the potential of contributing to the cause(s) of the impairment to the impaired segments, to their tributaries, and to segments and tributaries within the watershed contributing to the impaired segments and<br>• Includes a schedule to discover and locate other major outfalls within its corporate limits that may be |

| BMP | Measurable Goals |
|---|---|
| | contributing to the cause of the impairment to the impaired stream segments, to their tributaries, and to segments and tributaries within the watershed contributing to the impaired segments. |

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

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| c. Assessment of available monitoring data | Within 24 months the permittee's plan shall include an assessment of available monitoring data. Where long-term data is available, this assessment should include an analysis of the data to show trends. |

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| d. Monitoring Plan | Within 36 months the permittee shall develop and submit to the Division a Monitoring Plan for each pollutant of concern or cause of impairment as specified in the TMDL. The permittee shall maintain and implement the Monitoring Plan as additional outfalls are identified and as accumulating data may suggest. Following any review and comment by the Division the permittee shall incorporate any necessary changes to monitoring plan and initiate the plan within 6 months. Modifications to the monitoring plan shall be approved by the Division. Upon request, the requirement to develop a Monitoring Plan may be waived by the Division if the existing and proposed measures are determined to be adequate to enhance water quality and reduce non-point source pollutant loading to the maximum extent practicable (MEP). |

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

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

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

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

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

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

**4. Watershed Restoration Plan approved by the Division**

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

**Bradley & Hewletts Creek Watershed Restoration Plan Accomplishments:**

The Bradley and Hewletts Creek Watershed Restoration Plan has seen significant development over the last year. In 2013 and 2014, the plan, known publically as the Heal Our Waterways (HOW) program, gained recognition and exposure through a series of education and outreach efforts, in addition, the installation of best management practices (BMP) focused on volume reduction in both of the targeted watersheds.


Education and outreach efforts included an educational postcard describing the drinking water, wastewater, and stormwater systems in the City of Wilmington and the differences between each. The postcard specifically highlighted the fact that stormwater is not treated before discharging into local waters. An additional educational postcard was sent out in July 2014 detailing the issue of pet waste as a source of bacteriological pollution in local waters. The postcard encouraged residents to clean up after their pets and to dispose of waste properly. Postcards were sent out to 16,524 residential and commercial addresses in both the targeted watersheds and adjacent areas draining directly to the Intracoastal Waterway.

Digital billboard signs were used once again to make citizens aware of local water quality issues. A six week run of a digital advertisement stating 'Clean Waterways Are Everybody's Business' with a link to the City of Wilmington stormwater website was completed in June. The image averaged 8509 total out of home (OOH) impressions each day. A PSA encouraging car and boat washing on the lawn or in commercial car washes was run in the month of June on WECT, the local NBC station. The campaign included 109 spots over the course of one week with an average frequency of 3.0 with 421.5 impressions. Digital advertisements were also used for mobile devices; the click-through linked to the HOW website and to the PSA clip.

Presentations to community groups as well as audiences at industry conferences continued through the 2013-2014 fiscal year. City staff presented different elements of the restoration plan at the Tidal Creek Summit in Wilmington as well as the North Carolina LID Symposium in Raleigh. Presentations were also made to smaller groups such as UNCW classes and community groups such as Cape Fear River Watch. The HOW staff also maintained an interactive presence at community meetings and local Earth Day festivities.

New educational materials were developed over the course of the year for use in outreach campaigns and community awareness. The Heal Our Waterways brochure was designed and printed for distribution to the public, and website content was added, including the latest press coverage of HOW projects as well as testimonials from local citizens that have lived along the creeks. Staff developed a series of talking points for residents interested in educating others on the issue of stormwater, as well as the HOW program

itself, and is in the process of developing BMP maintenance hand-outs for citizens who decide to install practices.

One central project for the program over the last year was a successful collaboration that resulted in the installation of large-scale BMPs in public areas. The Tidal Creek Food Co-op community rain garden was designed and installed over the course of the last year. The garden, designed by senior design students at the N.C. State School of Biological and Agricultural Engineering, is an 1,070 $m^3$(0.11 ha) infiltration basin with a total storage volume of 450 $m^3$. The project was designed not only to capture and treat stormwater runoff from a large adjacent parking lot (contributing drainage area = 0.81 ha), but also to act as an education centerpiece for the city's watershed restoration effort. The garden was planted with sod and native plants by volunteers from UNCW and the local community and has weathered two major rain events intact. The next step in this project is to provide educational signage around the garden to teach visitors about stormwater and how the garden is helping to improve water quality. Signage will also encourage citizens to incorporate BMPs on their own properties and in their everyday actions.

The project has been one that presents the usual challenges of multi-agency collaboration. The project team included representatives from UNCW and NCSU, the Tidal Creek food co-op, NCDOT, the City of Wilmington, the NC Cooperative Extension, The Coastal Federation, and the Surfrider Foundation. The priorities of the different agencies did not always match so it required consistent communication and considerable effort to maintain forward momentum toward the common goal. In the end, the project was a great success and a testimony to the power of collaboration in a community as a force for grassroots change.

In addition to the Tidal Creek Co-op rain garden project, the HOW program continued work on the NERRS grant awarded last year to a collaborative including the North Carolina Coastal Federation, the Town of Wrightsville Beach, UNCW, and Withers and Ravenel Engineers. The grant includes the installation of municipal volume reduction stormwater measures in Wrightsville Beach as well as residential installations in a neighborhood located in the Hewletts Creek Watershed. The neighborhood projects include permeable pavement driveways, rain barrels, rain gardens, and a stormwater wetland constructed in a city easement. The HOW program will also use this neighborhood as a testing ground for education materials and outreach efforts and collect feedback from residents. This information will be analyzed and applied to future outreach campaigns in order to maximize the efficacy of the HOW message.


Volume reduction projects that are in design or in the ground are now being tracked and quantified in the GIS Atlas, or Creek Counter. Staff has entered projects completed by the city and our partners in the last year, as well as some notable projects that were installed before the approval of the watershed restoration plan. Atlas entries include residential and municipal rain gardens, large constructed wetlands, rain barrels, bioinfiltration cells, and permeable pavement installations. Progress in volume reduction for each watershed is illustrated in the table below. The high percentage of volume reduction shown in the Hewletts Creek hydrograph can be attributed to Wade Park, a large constructed wetland installed by the city and partners in 2007 to treat high volumes of runoff toward the headwaters of the creek. The project was a very rare opportunity to retrofit suburban land for stormwater treatment.

| Watershed | Baseline Hydrograph Volume (2010) | Current Hydrograph Volume | Difference in Volume from Baseline | First Hydrograph Goal (2006) | Progress to First Hydrograph Goal (2006) | Final Hydrograph Goal (1981) | Progress to Final Hydrograph Goal (1981) |
|---|---|---|---|---|---|---|---|
| Hewletts Creek | 487.64 | 472.31 | 15.33 | 456.87 | 49.93% | 241.98 | 6.25% |
| Bradley Creek | 323.64 | 323.59 | 0.05 | 303.91 | 0.25% | 136.49 | 0.03% |

**All volumes in acre feet.**


Because volume reduction is the metric for the watershed restoration project, quantification and tracking are of the upmost importance. Citizens and businesses are encouraged to report BMP installations through the HOW website or through direct contact with staff so that they may be counted toward volume reduction, as well as recognized for their efforts. Small yard signs were designed and printed to be awarded to those who participate in the program.

As established in the restoration plan, efforts are ongoing to secure funding for BMP projects in the Bradley and Hewletts Creek Watersheds. In June 2014 the city submitted, in partnership with N.C. State University, an application for funds from the 319 water quality grant program. The proposal included five separate BMP projects in the Hewletts Creek Watershed including municipal, commercial, and residential installations and education efforts. The city was notified in early July 2014 that the application had advanced to the second round of consideration. If funded, the Hewletts Creek projects offer ample opportunity for education and outreach as well as the primary goal of volume reduction. Dedicated funds were also approved in the City of Wilmington budget for the 2014-15 fiscal year that will allow HOW staff to contract with an outside agency to install residential and commercial practices in the targeted watersheds.

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

After the first full year of implementation, the HOW program made progress toward its hydrograph goals. However, the relatively large gains made in the Hewletts Creek hydrograph for volume reduction are primarily a function of the 2007 Wade Wetlands project; it is not expected that the HOW program will continue to see comparably-sized volume reduction projects in the future. There will be limited opportunities in the future for such large scale installations on public property so it will be necessary for the program to concentrate on smaller commercial and residential applications. Many neighborhoods in the watersheds either lack gutters or are high density- developments that have limited potential for retrofits; these conditions make successful neighborhood-wide education and retrofit efforts more difficult. However, there remain many opportunities to work with individual property owners to install BMPs on a residential and commercial scale. While one-on-one interaction is always most effective, it limits the efficiency of the time investment when residents and property owners are not addressed in a group setting. To address this, the HOW program will make efforts to work within schools, with parent groups, and with neighborhood HOAs to bring the issue of stormwater management to a broader audience.

The 6 goals and 35 objectives upon which the restoration plan is based are on, or ahead of schedule with the exception of Objective 2 which states that the plan shall*: Determine Appropriate Water Quality Classifications and Designated Uses Where Water Quality Impairment Exists.*

**Objective 1: Continue existing programs that address water quality impairments in both watersheds**: The City has continued its environmental education and outreach through mailings and public event participation as well as the Enviroscape program which is present in every 8$^{th}$ grade classroom in New Hanover County. The City continues to work with internal staff to promote the flow of data from each department for use in populating the GIS Atlas. Currently the City is developing its comprehensive plan for future growth and development; New Hanover County, where the City of Wilmington is located, is going through a similar process.

In accordance with Action 1-5, it is the intent of the HOW program to become involved in the planning process to encourage, the incorporation of low impact design (LID) in future capital projects, as well as making it a priority in the comprehensive plan. The program will also seek to encourage communication between departments and sections within the City, as well as between government agencies, with the purpose of establishing baseline goals and an understanding of the need for stormwater volume reduction and LID in general.

**Objective 2: Determine appropriate water quality classifications and designated uses where water quality impairment exists**: In accordance with Action 2-1 the University of North Carolina at Wilmington (UNCW) continues to do regular surface water sampling to determine what effects the program's volume reduction efforts are having on the health of the creeks.

Plan Objective 2 concentrates heavily on the classification of local waters and how appropriate current classifications are under modern conditions. Ongoing issues regarding the proper classification of some waters and the possibility of a reassessment of those classifications and their criteria by the State of North Carolina have delayed staff in addressing this objective in the last year. The timeline for this objective will depend largely on when, and if, an overhaul of the classification takes place. Objective 2 is not necessarily time sensitive and may therefore be

readdressed in years 3 and 4 when the restoration plan has gained enough recognition to perpetuate its own momentum. At that point it may be more in the interest of the plan to focus on reclassification efforts, if necessary.

**Objective 3: Reduce the transport of bacteria from land to water by reducing and tracking volume reduction**: The GIS atlas has been populated with new BMP installations as well as a select few major projects installed by the City and its partners. Although this year the program was largely successful in securing funds for the Hewletts Creek Watershed, the Bradley Creek Watershed was not well represented in grants. The difference in funding is one of logistics. Hewletts Creek is classified as SA waters but, it does not currently meet the standards for use and is therefore officially impaired. This impairment status qualifies Hewletts Creek for a myriad of grants that concentrate on the restoration of impaired waters. Bradley Creek is classified as SC and therefore has no bacteriological standard for use. Though not clean, the creek is not technically 'impaired' and therefore not eligible for the same funding opportunities. Going forward, the efforts in Bradley will need to concentrate on residential and commercial BMP installations that are funded fully, or in large part, by the property owner.

**Objective 4: Promote stormwater reduction efforts**: The HOW program has made efforts to promote the GIS Atlas by incorporating it into HealOurWaterways.org as well as presentations to the public and at industry conferences. In accordance with Action 4-10, HOW staff began working with program partners and residential homeowners to retrofit properties through the Raintree pilot project, and continues to promote LID practices in private development through site visits and outreach.

UNCW has begun the process of centralizing stormwater management on campus and in line with Action 4-9 both HOW and City staff has been present during partner meetings. The HOW program, in partnership with N.C. State University, has submitted for a 319 grant proposal that would provide stormwater retrofits, as well as outreach and education, to students and parents at Parsley Elementary School. The project dovetails with Objective 4-8 which encourages this kind of retrofit initiative at county schools.

There are additional actions under Objective 4 that will require attention in the future. For example, Action 4-4 calls for the promotion of tree plantings. Although this has not been specifically addressed in the first eighteen months of the program, there is the opportunity for the HOW program to get involved in the local annual Arbor Day tree give- away. Sponsorship of this event will help draw attention to the need for native tree plantings and the importance of riparian buffers for water quality.

As addressed in Objective 1, the HOW program will begin to promote stormwater reduction measures on City streets in future capital improvement projects. In addition to local efforts, the HOW staff will begin to work with NCDOT to incorporate retrofits into highway upgrades, and have already included a NCDOT project in a current grant application. The stormwater ponds targeted in Action 4-11 have not yet been evaluated for volume reduction potential. Regional universities are studying possible retrofits that would serve to reduce volume and remove pathogens in these ponds, but that work has not been completed. Once we have a clearer idea of what actions would be most effective for the purposes of our program we will begin the task of identifying the best ponds as retrofit candidates.

**Objective 5: Form and maintain partnerships**: Through project development and collaboration, the HOW program forged new partnerships within the community including working relationships with the Surfrider Foundation, Tidal Creek Co-op, and N.C. State University. In line with Action 5-6, the HOW program partnered with UNCW to install a large public rain garden on a parcel of land owned by the University not adjacent to campus proper. The installation was a huge success and UNCW continues to maintain the garden as part of that partnership. In addition to partnering on current projects, the HOW program also developed a contract with New Hanover Soil and Water Conservation District to conduct project management for BMP installations in Hewletts and Bradley Creek in the next fiscal year.

**Objective 6: Measure success and adapt plan based upon results**: There are many ways to measure success for this program, not the least of which is through volume reduction recorded in the GIS Atlas. In that category the plan has done very well, particularly with the inclusion of Wade Wetland as well as other practices installed in the recent past. To further advance those efforts there will be more time devoted to recruiting citizens into individualized action. The establishment of public and centralized BMPs in the last year has helped create on- the -ground educational pieces that will help spread the message to residents and businesses alike. With successful and aesthetically pleasing BMPs to represent the cause, it becomes much easier to inspire people to act on their own properties.

In conclusion, there are 16,500 watershed residents who are potential participants in this program, and the HOW staff intends to make every effort to educate these residents to the problem of stormwater pollution, and to encourage behavior changes as well as small and large scale BMP installations, focusing primarily on volume reduction. Going forward, the HOW program will continue to search for funding and collaboration opportunities that will not only allow for larger installations but will also provide staff the occasion to meet and work with residents and business owners for more targeted work within the watersheds. As the program develops, additional goals and or objectives may rise to notice, but in its current form the HOW program has sufficient course to address the current established goals.

**5. Information regarding North Carolina TMDLs**

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

# APPENDICES

## APPENDIX A: PROGRAM IMPLEMENTATION INCLUDING MODIFICATIONS AND JUSTIFICATION

None for this reporting period.

## APPENDIX B: PUBLIC EDUCATION AND OUTREACH

Included in this section:

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

| DATE OF EVENT/ ACTIVITY | EVENT/ACTIVITY | AUDIENCE | DELIVERED BY (AGENCY) | METHOD OF DELIVERY / MESSAGE | ATTENDANCE/ PARTICIPATION |
|---|---|---|---|---|---|
| **BMP a. Define outreach/education program goals including a description of the target pollutants, sources, and target audiences** | | | | | |
| Outreach and education program goals, as well as a description of the target pollutants, sources, and target audiences, why they were selected and key outreach messages are thoroughly identified in the Appendix. This section is updated as necessary to reflect changes in the target audience characteristics, awareness, etc. | | | | | |
| **BMP b. Distribute public education materials and information to identified target audiences and user groups. For example, schools, homeowners, and/or businesses.** | | | | | |
| In addition to public outreach efforts in this category, the Stormwater Compliance Officer also distributes education materials to the public and targeted user groups (i.e. pet owners, auto shops, restaurants, residents, etc) and issues NOVs and fines to citizens and businesses that have been identified as non-compliant with the City's stormwater codes. Information about code enforcement actions are included in the Appendix. | | | | | |
| Ongoing | 8th Grade Enviroscape Watershed Presentations | All 8th Grade NHC Schools Science Classes | Stormwater Services CFRW NHSWCD | Classroom presentation about watersheds, water quality, nonpoint source pollution, BMPs and stewardship | 2000 students |
| 9/9/2013 | Targeted direct mail (complaint driven) | Quail Ridge Road residents | Stormwater Services | Inform residents about pet waste pollution, the impacts on water quality, and the City's ordinance and associated fines. | 20 code enforcement letters and pet waste education brochures mailed to residents |
| 8/15/2013 | Targeted doorhangers | Residents and businesses affected by Longstreet Paving and Stormwater project | Stormwater Services | Project info and lane closure doorhanger distributed to local residents in advance of project work | 50 project and public meeting announcement doorhangers delivered to residents |
| 9/16/2013 | Presentation: APWA Conference about Cedar Avenue project | APWA Conference attendees | Stormwater Services McKimley Horn Engineers | Powerpoint presentation about project | 125 public works engineers, consultants, municipal managers |
| 9/17/2013 | Presentation: APWA Conference about Educating the Public and Creating a Watershed Ethic in Citizens | APWA Conference attendees | Stormwater Services | Powerpoint presentation about effectively educating the public | 125 public works engineers, consultants, municipal managers |
| 10/4/2013 | Presentation: Cape Fear Rotary Club at Jungle Rapids about Stormwater 101 | Rotary Club members | Stormwater Services | Stormwater 101 powerpoint presentation and educational giveaways | 50 members |

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|---|---|---|---|---|---|
| 12/5/2013 | Targeted doorhangers | Residents and businesses affected by Antelope Trail stormwater project | Stormwater Services<br>Hibbert Enterprises | Project info notice distributed to local residents in advance of project work | Project doorhangers delivered to residents |
| 1/6/2014 | Direct mailing to Restaurants in Wilmington city limits (Year 2 of mailing and survey) | Wilmington Restaurants | Stormwater Services | Mailed code enforcement letter, restaurant education poster, and return mail survey | Year 2 of the education effort resulted in 15 returned surveys and a 90% correct response rate |
| 2/1/2014 | Mid-Atlantic Marine Educators Conference | Conference Attendees | Stormwater intern | Stormwater educational giveaways - brochures, zip wallets, tote bags | 50 conference attendees |
| 2/1/2014 | New Wilmington Area Watershed Map | General Public<br>Teachers<br>Event attendees | Stormwater Services<br>& GIS<br>City Planning<br>NHSWCD<br>UNCW<br>New Hanover County | New Wilmington Area Watershed Map features the entire county and redefined watershed boundaries, as well as watershed education blurb | Distributed to stakeholders for comment |
| 2/10/2014 | Presentation: UNCW Foundations in Environmental Mgt. class | Graduate students | Stormwater Services | Stormwater presentation, constraints, PSAs, Enviroscape demonstration | 7 students |
| 3/1/2014 | Targeted doorhangers | Residents and businesses affected by Brookshire / Beasley stormwater project | Stormwater Services | Public meeting notice distributed to residents | 150 doorhangers delivered to residents |
| 3/11/2014 | Public Meeting: Brookshire/Beasley project | Residents and businesses affected by Brookshire/ Beasley stormwater project | Stormwater Services<br>URS Corporation | Brookshire/Beasley public meeting with residents impacted by upcoming project | 50 residents attended public meeting |
| 3/21/2014 | Presentation: UNCW Environmental Policy Class | Undergraduate students | Stormwater Services | Stormwater presentation and educational giveaways - brochures, zip wallets, tote bags | 22 students |
| 3/30/2014 | Paws for People 5k at UNCW | Pet owners | NHSWCD Services | Canines for Clean Water booth - interactive event where pet owners sign a pledge to clean up after their pet and submit a photo of their pet to be featured on website wilmingtonnc.gov/canines | 32 pet owners signed pledge and received dog bandana, treats, and stormwater literature. |
| 4/26/14 | Lower Cape Fear Earth Day Celebration at Hugh MacRae Park | Festival attendees, general public | Stormwater Services (SWS is an annual sponsor of Lower Cape Fear Earth Day Festival) | Display booth to promote stormwater pollution education with an interactive game/quiz and stormwater prizes | 4,000+ attendees |

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| 5/3/2014 | Pawz in the Park at Battleship Park | Pet owners | NHSWCD | Canines for Clean Water booth - interactive event where pet owners sign a pledge to clean up after their pet and submit a photo of their pet to be featured on website wilmingtonnc.gov/canines) | 61 pet owners signed pledge and received dog bandana, treats, and stormwater literature. Dogs have a chance to be featured on city website |
| 5/21/2014 | Pet Waste Signage | Pet owners | Stormwater Services | Created new pet waste signage to place in city easements where pet owners walk their dogs | 25 signs created |
| 6/1/2014 | Wilmington Area Watershed Map | General Public Teachers Event attendees | Stormwater Services | New Wilmington Area Watershed Map first printing run of 2000 copies | Distributed to teachers and the general public during events and presentations |
| 6/1/2014 | Targeted doorhangers | Residents and businesses affected by Clear Run Branch stormwater project | Stormwater Services | Public meeting notice distributed to residents affected by Clear Run Branch project | 150 doorhangers delivered to residents |
| 6/25/2014 | Public Meeting: Clear Run Branch project | Residents and businesses affected by stormwater project | Stormwater Services Moffit and Nichol | Clear Run Branch public meeting with residents impacted by project | 50 number of residents attended public meeting |

| **BMP c. Informational Web Site (www.wilmingtonnc.gov/stormwater)** | | | | | |
|---|---|---|---|---|---|
| Ongoing/ Regular Updates | Stormwater Services website | General public, website viewers | Stormwater Services | Dedicated stormwater website | Updates to the Stormwater website are ongoing. The site is regularly updated with fresh content including current projects, PSAs, news, upcoming events, education publications, videos, printed material, etc. |
| Ongoing | Stormwater Hotline info advertised on City website homepage and Facebook page | General public | Stormwater Services Communications Div. | Stormwater hotline and web reporting form for public; posted on website under What's New section and on City's Facebook page | Stormwater website, city website, Facebook fans, general public |
| 7/3/2013 | City of Wilmington website homepage and facebook news | General public Web Viewers | Communications Div. | News article - Heavy rains no match for stormwater projects | City of Wilmington Website viewers and Facebook fans |
| 7/10/2013 | City of Wilmington website homepage and facebook news | General public Web Viewers | Communications Div. | News article - Wilmington goes green | City of Wilmington Website viewers and Facebook fans |
| 7/10/2013 | City of Wilmington website homepage and facebook news | General public Web Viewers | Communications Div. | News article - Rain gardens help stormwater runoff | City of Wilmington Website viewers and Facebook fans |

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|---|---|---|---|---|---|
| 7/12/2013 | City of Wilmington website homepage and facebook news | General public Web Viewers | Communications Div. | News article - Flooding expected this weekend | City of Wilmington Website viewers and Facebook fans |
| 7/12/2013 | City of Wilmington website homepage and facebook news | General public Web Viewers | Communications Div. | News article - Rain Gardens help stormwater runoff | City of Wilmington Website viewers and Facebook fans |
| 8/8/2013 | City of Wilmington website homepage and facebook news | General public Web Viewers | Communications Div. | News article - Section of Rose Ave. closed for drainage project | City of Wilmington Website viewers and Facebook fans |
| 8/15/2013 | City of Wilmington website homepage and facebook news | General public Web Viewers | Communications Div. | News article - Clear Run Branch streambank stabilization | City of Wilmington Website viewers and Facebook fans |
| 8/15/2013 | City of Wilmington website homepage and facebook news | General public Web Viewers | Communications Div. | News article - Barksdale Road project | City of Wilmington Website viewers and Facebook fans |
| 8/15/2013 | City of Wilmington website homepage and facebook news | General public Web Viewers | Communications Div. | News article - Longstreet pipe & paving project | City of Wilmington Website viewers and Facebook fans |
| 12/10/2013 | City of Wilmington website homepage and facebook news | General public Web Viewers | Communications Div. | News article - Antelope Trail construction update | City of Wilmington Website viewers and Facebook fans |
| 12/12/2014 | City of Wilmington website homepage and facebook news | General public Web Viewers | Communications Div. | News article - Antelope Trail drainage project starts | City of Wilmington Website viewers and Facebook fans |
| 12/23/2013 | City of Wilmington website homepage and facebook news | General public Web Viewers | Communications Div. | News article - Street Sweeper Facility Continues to save money | City of Wilmington Website viewers and Facebook fans |
| 1/22/2014 | City of Wilmington website homepage and facebook news | General public Web Viewers | Communications Div. | News article - Carp help Greenfield Lake water quality | City of Wilmington Website viewers and Facebook fans |
| 3/10/2014 | City of Wilmington website homepage and facebook news | General public Web Viewers | Communications Div. | News article - Stormwater public input meeting | City of Wilmington Website viewers and Facebook fans |
| 3/27/2014 | City of Wilmington website homepage and facebook news | General public Web Viewers | Communications Div. | News article - Rain garden at fire station #9 | City of Wilmington Website viewers and Facebook fans |
| 4/28/2014 | City of Wilmington website homepage and facebook news | General public Web Viewers | Communications Div. | News article - New rain garden helps water quality | City of Wilmington Website viewers and Facebook fans |
| 4/30/2014 | City of Wilmington website homepage and facebook news | General public Web Viewers | Communications Div. | News article - Spring newsletter and UNCW/DWQ surface water quality report | City of Wilmington Website viewers and Facebook fans |
| 4/30/2014 | City of Wilmington website homepage and facebook news | General public Web Viewers | Communications Div. | News article - Antelope Trail project wraps up | City of Wilmington Website viewers and Facebook fans |

## BMP d. Maintain Hotline/Help line

The Stormwater Pollution Prevention Hotline was established in January 2010 to field calls from the citizens, businesses, and city employees regarding illicit discharges and other reports of stormwater pollution. The hotline phone # is **910-341-1020** and the web address is **www.wilmingtonnc.gov/reportstormwaterpollution.** Hotline/web reports are routed to the Stormwater Code Compliance Officer who tracks, investigates, and responds to all hotline reports. Information regarding hotline reports is included in the Enforcement Appendix section including the number and nature of hotline phone/web reports.

| | | | | | |
|---|---|---|---|---|---|
| Ongoing | Stormwater Hotline advertised using various outreach methods: truck magnets, signs, billboards, presentations, etc. | General public | Stormwater Services | Hotline poster, website, GTV-8 and promo items (pens, magnets, sticky notes) are used to raise awareness of the Stormwater Hotline | Distribution varies based on method or event used |
| December 2013 | Stormwater Hotline Signage installed on 25 existing watershed signposts | Drivers General public | Stormwater Services | Stormwater Hotline Signage posted along area roadways to encourage the public to report stormwater pollution | Vehicular traffic - impressions unknown |

## BMP e. Extent of Exposure/Reporting Requirements

***Media Advertising Campaigns***

| | | | | | |
|---|---|---|---|---|---|
| September - November 2013 | Mass Media - WECT-6 TV and website campaign (including Top Story wrap on website) | General public Males 25-64 | Stormwater Services | :30 second stormwater PSA<br>- Yard Waste PSA<br>93 spots total | Target Audience: General public, males<br>TV Reach: 82% for viewers age 25-64<br>TV Frequency: 3.6<br>WECT.com Web Reach: 250,000 unique visitors per month<br>1.9 million average page views per month<br>Total cost: $4500 |
| September - November 2013 | Mass Media - Cumulus Radio Broadcasting - WKXS 94.5 (The Hawk) and Blinks campaign | General public | Stormwater Services | :30 second PSAs on broadcast radio stations<br>-Yard Waste PSA<br>1296 ads total with PSAs and blinks combined | Target Audience: Landscapers, Pet owners, General public<br>Reach: 67,507 adults<br>Frequency: 5.0 times<br>Total cost: $4500 |
| Sept 2013 - January 2014 | WAVE Transit Public Transportation System - Mobile Advertising | Motorists Pedestrians | Stormwater Services Partnership with Keep America Beautiful | Stormwater advertising on the side of a public transit hybrid bus for 1 year<br>-Pollution Prevention Ad: What Goes in Here, Ends up Here | Target Audience: General public<br>Reach: Motorists<br>Frequency: On bus daily<br>Total cost: $2500 |
| Winter/Spring 2014 | Going Green Magazine-Stormwater Ad | General public Adults | Stormwater Services | Print and digital online magazine ad - Pet Waste (page 13) | Target Audience: Adults/general public, Environmental groups<br>Reach & Frequency: 8000 printed, also available online<br>Total cost: Free |
| Spring 2014 | Going Green Magazine - Magazine-Stormwater Article | General public Adults | Stormwater Services | Print and digital online magazine article - Environmentally-Friendly Vehicle & Boat Washing (page 14) | Target Audience: Adults/general public, Environmental groups<br>Reach & Frequency: 8000 printed, also available online<br>Total cost: Free |

| | | | | | |
|---|---|---|---|---|---|
| March 2014 | Pet Waste PSA filming and production | General public | Stormwater Services<br>WECT | :30 second pet waste PSA filmed by WECT. Stormwater staff wrote the script and directed PSA. PSA aired from March-May 2014. Also engaged in online advertising campaign on WECT.com | Recorded for the purpose of airing on WECT and GTV-8 and also posting on the Stormwater website and youtube |
| March - May 2014 | Mass Media - WECT-6 TV and website campaign (including Top Story wrap on website) | General public<br>Males 25-64 | Stormwater Services | :30 second stormwater PSA<br>- Pet Waste (2014) PSA<br>93 spots total | Target Audience: General public, males<br>TV Reach: 82% for viewers age 25-64<br>TV Frequency: 3.6<br>WECT.com Web Reach: 250,000 unique visitors per month<br>1.9 million average page views per month<br>Total cost: $4500 |
| April - June 2014 | Fairway Outdoor Billboard Advertising | Motorists<br>Pedestrians | Stormwater Services<br>Keep America Beautiful of NHC | Billboard Ad "What Goes in Here, Ends up Here" anti-litter billboard | Target Audience: General public<br>Reach: Motorists<br>Frequency: Rotating - shown for 8 seconds every minute 24/7<br>Total cost: $1000 |
| Cumulus Media is no longer purchasing Arbitron or Nielson ratings systems. This is a cost-cutting measure on their part, but it means they no longer have the ability to provide us with reach and frequency data for the campaigns I run on their stations. The data provided references prior years available reach and frequency data for these stormwater outreach campaigns. Approved per M. Randall, NC DWQ. | | | | | |

***Local Cable Access (GTV-8)***

| | | | | | |
|---|---|---|---|---|---|
| Airs on rotating schedule | GTV-8 City's cable access channel stormwater programming (slides) | Cable access TV viewers | Stormwater staff<br>GTV-8 Staff | Monthly rain barrel sale to the public | Inform public about opportunity to purchase reduced cost rain barrels every month |
| Airs on rotating schedule | GTV-8 City's cable access channel stormwater programming (slides) | Cable access TV viewers | Stormwater staff<br>GTV-8 Staff | Re-route your downspout | Inform public about re-routing downspouts to let water soak in, instead of runoff |
| Airs on rotating schedule | GTV-8 City's cable access channel stormwater programming (video slideshow) | Cable access TV viewers | Stormwater staff<br>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 stormwater programming (slides) | Cable access TV viewers | Stormwater staff<br>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 stormwater programming (slides) | Cable access TV viewers | Stormwater staff<br>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 stormwater programming (slides) | Cable access TV viewers | Stormwater staff GTV-8 Staff | Stormwater hotline info | Inform public of water pollution/illicit discharge and hotline to report pollution |
| Airs on rotating schedule | GTV-8 City's cable access channel stormwater programming (PSA) | 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 stormwater programming (PSA) | Cable access TV viewers | Stormwater staff GTV-8 Staff | :30 second PSA | Hard to Train a Human Pet Waste PSA 2014 (refilmed in Hi-Def) |
| Airs on rotating schedule | GTV-8 City's cable access channel stormwater programming (PSA) | Cable access TV viewers | Stormwater staff GTV-8 Staff | :30 second PSA | Stormwater Basics 2013 PSA |
| Airs on rotating schedule | GTV-8 City's cable access channel stormwater programming (PSA) | Cable access TV viewers | Stormwater staff GTV-8 Staff | :30 second PSA | Yard Waste PSA 2010 |
| Airs on rotating schedule | GTV-8 City's cable access channel stormwater programming (PSA) | Cable access TV viewers | Stormwater staff GTV-8 Staff | :30 second PSA | Litter UNCW PSA |
| Airs on rotating schedule | GTV-8 City's cable access channel stormwater programming (PSA) | 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 stormwater programming (PSA) | 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 stormwater programming (PSA) | Cable access TV viewers | Stormwater staff GTV-8 Staff | :30 second PSA | Not your Ashtray PSA |
| Airs on rotating schedule | GTV-8 City's cable access channel stormwater programming (documentary) | Cable access TV viewers | Stormwater staff GTV-8 Staff | Documentary | Airlie Gardens documentary |
| Airs on rotating schedule | GTV-8 City's cable access channel stormwater programming (documentary) | Cable access TV viewers | Stormwater staff GTV-8 Staff | Documentary | Puget Sound Scuba Urban Pollution documentary |

***News Coverage***

| | | | | | |
|---|---|---|---|---|---|
| 8/1/2013 | WECT TV6 news story | Station viewers | WECT reporter | TV news coverage - Fears cleared- Clear Run Creek overhauled | Stats:<br>-WECT-TV6 reaches 176,000 homes/per wk<br>-WECT.com has 250,000 average unique visitors per month and 1,200,000 average page views per month |

| | | | | | |
|---|---|---|---|---|---|
| 7/31/2013 | Star News article | Newspaper and online readers | Star News reporter | Print and online newspaper article- Sewage spill spews 442,000 gallons of wastewater | Stats:<br>-94,492 print readers<br>-628,086 monthly unique visitors to online website |
| 8/1/2013 | Star News article | Newspaper and online readers | Star News reporter | Print and online newspaper article- Bacteria levels in Hewletts Creek declining after sewage spill | Stats:<br>-94,492 print readers<br>-628,086 monthly unique visitors to online website |
| 8/1/2013 | WECT TV6 news story | Station viewers | WECT reporter | TV news coverage- CFPUA releases test results for Hewletts Creek overflow | Stats:<br>-WECT-TV6 reaches 176,000 homes/per wk<br>-WECT.com has 250,000 average unique visitors per month and 1,200,000 average page views per month |
| 8/2/2013 | Lumina News article | Newspaper and online readers | Lumina News reporter | Print and online newspaper article- Power failure causes massive Hewletts Creek wastewater spill | Stats:<br>-Weekly print newspaper and online website<br>-6,345 print readers/wk<br>-6,700 weekly online readers |
| 8/15/2013 | Star News article | Newspaper and online readers | Star News reporter | Print and online newspaper article- Utility authority scrutinizes factors in major sewage spill | Stats:<br>-94,492 print readers<br>-628,086 monthly unique visitors to online website |
| 8/21/2013 | Star News article | Newspaper and online readers | Star News reporter | Print and online newspaper article- Oyster rising - Farmers work to propel aquaculture in NC | Stats:<br>-94,492 print readers<br>-628,086 monthly unique visitors to online website |
| 8/29/2013 | Lumina News cartoon | Newspaper and online readers | Lumina News reporter | Print and online newspaper article- Welcome to the Beach! bacteria cartoon | Stats:<br>-Weekly print newspaper and online website<br>-6345 print readers/wk<br>-6700 weekly online readers |
| 9/3/2013 | Star News article | Newspaper and online readers | Star News reporter | Print and online newspaper article- Success of stormwater program leading to other projects | Stats:<br>-94,492 print readers<br>-628,086 monthly unique visitors to online website |

| | | | | | |
|---|---|---|---|---|---|
| 9/9/2013 | Star News editorial | Newspaper and online readers | Star News reporter | Print and online newspaper article- Conservation efforts can pay off, especially when groups come together | Stats:<br>-Daily print newspaper and online website<br>-94,492 print readers<br>-628,086 monthly unique visitors to online website |
| 10/11/2013 | Star News - My Reporter question | Online readers | Star News reporter | Online My Reporter question- Why is the water level at Greenfield Lake so low? | Stats:<br>-Daily print newspaper and online website<br>-94,492 print readers<br>-628,086 monthly unique visitors to online website |
| 10/11/2013 | Star News - My Reporter question | Online readers | Star News reporter | Online My Reporter question- Will they ever clear weeds around the pond in the park between Chestnut Street and Princess Place Drive? | Stats:<br>-Daily print newspaper and online website<br>-94,492 print readers<br>-628,086 monthly unique visitors to online website |
| 10/28/2013 | Star News article | Newspaper and online readers | Star News reporter | Print and online newspaper article - City takes measures to prevent future New Centre flooding | Stats:<br>-94,492 print readers<br>-628,086 monthly unique visitors to online website |
| 11/1/2013 | Star News editorial | Newspaper and online readers | Star News editor | Print and online newspaper article- Flooding in New Centre Drive area points to need for better planning | Stats:<br>-Daily print newspaper and online website<br>-94,492 print readers<br>-628,086 monthly unique visitors to online website |
| 12/13/2013 | Star News article | Newspaper and online readers | Star News reporter | Print and online newspaper article- Drainage project to begin in Kelly Road area | Stats:<br>-94,492 print readers<br>-628,086 monthly unique visitors to online website |
| 2/5/2014 | Star News article | Newspaper and online readers | Star News reporter | Print and online newspaper article- 14 New Hanover rivers, creeks below standard | Stats:<br>-94,492 print readers<br>-628,086 monthly unique visitors to online website |

| | | | | | |
|---|---|---|---|---|---|
| 2/5/2014 | Star News article | Newspaper and online readers | Star News reporter | Print and online newspaper article- Water cleanup takes considerable time, money | Stats:<br>-94,492 print readers<br>-628,086 monthly unique visitors to online website |
| 2/11/2014 | Star News article | Newspaper and online readers | Star News reporter | Print and online newspaper article- Bioretention area part of plan for Hewletts Creek restoration | Stats:<br>-94,492 print readers<br>-628,086 monthly unique visitors to online website |
| 2/19/214 | Star News article | Newspaper and online readers | Star News reporter | Print and online newspaper article- Apartment complex to DNA test dog doo | Stats:<br>-94,492 print readers<br>-628,086 monthly unique visitors to online website |
| 4/21/2014 | Star News article | Newspaper and online readers | Star News reporter | Print and online newspaper article - Project aims to ease Wilmington flooding problems (Brookshire/Beasley project) | Stats:<br>-94,492 print readers<br>-628,086 monthly unique visitors to online website |
| 5/1/2014 | Lumina News article | Newspaper and online readers | Lumina News reporter | Print and online newspaper article- My Thoughts editorial (water quality / environmental focus) | Stats:<br>-Weekly print newspaper and online website<br>-6,345 print readers/wk<br>-6,700 weekly online readers |

***Distributing promos/giveaways***

| | | | | | |
|---|---|---|---|---|---|
| Ongoing | Public Meetings, events, displays, city buildings | General public | Stormwater Services | Distribute items or leave in strategic locations where citizens will pick them up | Spread stormwater messages via freebies/promos at events such as Earth Day, Canines for Clean Water, etc. |
| 9/17/2013 | APWA Conference Presentation | Conference attendees | Stormwater Services | Educating the Public: Creating a Watershed Ethic in Citizens | Stormwater educational freebies distributed: bags, pens, magnets |
| 4/26/14 | Lower Cape Fear Earth Day Celebration at Hugh MacRae Park | Festival attendees, general public | Stormwater Services (SWS is an annual sponsor of Earth Day) | Display booth, interactive game, and educational giveaways distributed. Focus: Notorious Pollutants | Approx 5000 |
| 2/10/2014 | UNCW Undergraduate Class Presentation | Environmental Policy Class | Stormwater Services | Stormwater educational giveaways - brochures, zip wallets, tote bags | 22 students |
| 5/18/2014 | Church Event in Burnt Mill Creek Watershed (Mary Bridgers Park) | St. Paul's Episcopal Church | Stormwater Services | Stormwater giveaways - bags, pens, brochures | 50 promo items for participants |

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

| | | | | | |
|---|---|---|---|---|---|
| December 2013 | Stormwater Hotline Signage installed on 25 existing watershed signposts | Drivers General public | Stormwater Services | Stormwater Hotline signage posted along area roadways to encourage the public to report stormwater pollution | Vehicular traffic - impressions unknown |
| 6/1/2014 | Wilmington Area Watershed Map | General Public Teachers Event attendees | Stormwater Services | New Wilmington Area Watershed Map first printing run of 2000 copies | Distributed to teachers and the general public during events and presentations. 400 distributed in first month. |

***Newsletters***

| | | | | | |
|---|---|---|---|---|---|
| Summer 2013 | Citywide Public Information Report Newsletter | City residents Public library Special events | Stormwater Services Communications Div. | Burnt Mill Creek article | 40,000+ newsletters mailed to city residents |
| Winter 2014 | Citywide Public Information Report Newsletter | City residents Public library Special events | Stormwater Services Communications Div. | Brief highlights about Stormwater Drainage Projects, Inland Greens Park, Maintenance Activities | 40,000+ newsletters mailed to city residents |
| Winter 2014 | Citywide Public Information Report Newsletter | City residents Public library Special events | Stormwater Services Communications Div. | Stormwater Projects article - 2012-2013 Stormwater Improvements overview | 40,000+ newsletters mailed to city residents |
| Spring 2014 | Stormwater Watch Newsletter Insert included in Citywide Public Information Report Newsletter | City residents Public library Special events | Stormwater Services Communications Div. | UNCW Annual Water Quality Report including Stormwater Pollution 101 and 3 Water Systems | 40,000+ newsletters mailed to city residents |

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

| | | | | | |
|---|---|---|---|---|---|
| Weekly | Weekly Email Update | City Council Employees Media | Various city staff | Weekly update of city news, events, projects, etc. | Stormwater information was included in 13 Weekly Updates |

***Grant Projects***

| | | | | | |
|---|---|---|---|---|---|
| Began Jan 2014 (2.5 year grant) | 319 DREAMS Grant with NCSU | Burnt Mill Creek | NCSU Stormwater Services | Stormwater improvement project on city property housing DREAMS in downtown area of BMC Watershed | Proposed BMPs include rain gardens, permeable pavement and cisterns. Students and staff at DREAMS will be integrating the BMPs into educational activities |

| | | | | | |
|---|---|---|---|---|---|
| Ongoing | Developed watershed restoration plan for Hewletts and Bradley Creeks, now being implemented by Watershed Coordinator | Hewletts & Bradley Creek watershed residents and businesses | Partners:<br>Stormwater Services<br>NC Coastal Federation (grant administrator)<br>Town of Wrightsville Beach Stormwater Division | Heal Our Waterways program implementation | Watershed restoration plan implementation began in 2013 |

***Citizen Contacts***

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

CITY OF WILMINGTON
STORMWATER SERVICES

# Public Outreach & Education, Public Involvement & Participation Plan


**Compiled**
**August 2012**

## Table of Contents

## Introduction

Stormwater runoff is water from rain or irrigation that flows over land and into local creeks, streams and waterways. According to the US Environmental Protection Agency (EPA), stormwater runoff is the #1 source of surface water pollution.

Impervious surfaces are hard surfaces that water cannot penetrate, such as driveways, streets, parking lots and rooftops, which prevent stormwater runoff from naturally soaking into the ground. Instead, runoff flows over these surfaces picking up pollutants such as pet waste, auto fluids, fertilizers, pesticides, litter, and yard waste and carries them through the stormwater drainage system, directly into our waterways.

In Wilmington, runoff travels through a complex, interconnected system of storm drains, pipes, ditches, creeks and other natural and man-made features. In Wilmington, the storm drainage system consists of approximately:

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

This plan for Public Education and Outreach and Public Participation and Involvement is a segment of the City of Wilmington's Comprehensive Stormwater Management Plan (hereinafter referred to as Stormwater Plan), as required by the State of North Carolina Department of Environment and Natural Resources Division of Water Quality Permit No. NCS000406. The permit authorizes the City of Wilmington to discharge stormwater from their municipal separate storm sewer system (MS4) to the receiving waters of the State within the Cape Fear and White Oak River Basins, under Environmental Protection Agency's National Pollutant Discharge Elimination System (NPDES) Program.

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

Since 1993, scientists at the UNC Wilmington Center for Marine Science Research have been assessing the water quality of Wilmington's major waterways. Approximately 70 sampling sites assess the water quality of 10 of Wilmington's tidal creeks, as well as Greenfield Lake, and the Cape Fear River. The findings are reported annually and serve as a valuable tool to gauge changes in water quality in the area.

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

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

## Mission of Stormwater Services

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

## Goals & Objectives ~ Outreach, Education, Involvement Program

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

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

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

- Storm drains and drainage conveyances (i.e. ditches) carry water directly to local waterways without any treatment. Only rain should go down the storm drain!

- Impervious surfaces increase the speed and volume of polluted stormwater runoff entering the stormwater drainage system.

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

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

- Reduce the amount of polluted stormwater runoff entering local waterways by utilizing BMPs (Best Management Practices). BMPs are any action or on-the-ground practice that reduces the amount of stormwater and pollution flowing into waterways. BMPs such as rain gardens, rain barrels, and re-routing downspouts to grassy areas allow stormwater runoff to soak into the ground and be cleaned and filtered naturally.

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

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

## Target Pollutants, Sources, and Audiences

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

This is a working document; therefore the goals and target pollutants will change over time based on the target audiences' knowledge and implementation of stormwater-friendly practices, as well as water quality data and trends.

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

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

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

**Pollutant Source:**

Likely Residential Sources: Domesticated Animals, Stray and Feral Animals
Likely Commercial/Industrial Sources: Boarding Kennels, Veterinarian Facilities, Pet-Related Businesses

**Background/Environmental Impacts:**

- Storm drains and drainage conveyances (i.e. ditches) carry polluted runoff directly to local waterways without any treatment. Only rain should go down the storm drain!
- Fecal coliform bacteria is the #1 pollution problem impacting Wilmington's creeks and waterways, as identified through water quality monitoring. The primary source of this bacterial pollution is canine and outdoor cat waste.
- Stormwater runoff washes bacteria, parasites, viruses, and nutrients from animal waste directly into our waterways.
- There is a direct correlation between the amount of impervious surface coverage and fecal coliform bacteria counts in Wilmington's waterways.
- Once in our waterways, these pathogens can cause shellfish bed closures, swimming advisories, algal blooms, low dissolved oxygen levels, fish kills, and impaired aquatic habitat.
- High levels of fecal coliform bacteria can cause diseases and infections in humans upon contact such as roundworm, salmonellosis, toxoplasmosis, E. coli, and gastroenteritis.

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

**Key Outreach Messages**:

- Messages should connect uncollected pet waste to water quality problems and human health impacts.
- Dogs waste is a major source of bacterial pollution considering their population, daily defecation rate, and bacterial production. Outdoor cats are also a major problem for these same reasons; steps should be taken to control their waste as well.
- Bacteria can cause diseases in humans and other animals.
- Pet owners have a responsibility to clean up after pets and dispose of the waste properly.
- Debunk barriers to cleaning up after pets (i.e. it's not fertilizer, it's okay to use a bag to pick it up with your hand, pet waste is still a problem even if it's in your own backyard, etc).
- Pet owners should be aware of and abide by the City's Pet Waste Ordinance:
  - Fully and immediately clean up after pets on any public property. *(Public property consists of streets, sidewalks, right of ways, parks, plazas, stream banks, public accesses, pathways, drainageways, storm drains, creeks, officially accepted easements, etc.)*
  - Carry a clean-up device (i.e. bag, scooper) at all times.
  - Show the clean-up device to a Code Enforcement Official, if requested.
  - Bag and dispose of pet waste in a closed trash receptacle or refuse container.
  - Do not flush pet waste down the toilet (Cape Fear Public Utility Authority ordinance).
  - Fines for non-compliance with the City's pet waste ordinance are $250 per occurrence.
- Utilizing BMPs, such as rain gardens, rain barrels, and re-routing downspouts to grassy areas allows polluted runoff to soak into the ground and be cleaned and filtered naturally.

| Target Audience | Audience Description (Why Selected?) | Suggested Outreach Strategies |
|---|---|---|
| Pet Owners | By right of ownership, a pet owner has the power to reduce pet waste-contaminated runoff by cleaning up after their pet. Survey data reports both females and males should be targeted, with a slightly higher % of males not picking up. | • Educate citizens about the City's pet waste ordinance via the stormwater website and GTV<br>• Participate in local pet-related events (i.e. Paw Jam)<br>• Continue Canines for Clean Water program (C4CW)<br>• Post educational signs at pet waste stations<br>• Distribute pet waste education brochures and flyers during special events<br>• Air public service announcements in paid spots<br>• Direct mail enforcement letter to neighborhoods with complaints<br>• Include blurbs in the citywide newsletter<br>• Utilize enforcement actions when necessary for violators of the pet waste ordinance |
| Pet-Related Businesses | Targeting pet-related businesses will educate those in the profession about best practices for pet waste management and also serve as a conduit to deliver outreach messages to the public. Businesses include:<br><br>- Veterinarians<br>- Animal hospitals<br>- Kennels<br>- Pet stores<br>- Groomers<br>- Trainers<br>- Petsitters | • Encourage businesses to be models for environmental stewardship at their place of business (i.e. install pet waste receptacles in parking lot islands or properly design kennel runs for waste removal)<br>• Encourage businesses to post the pet waste education poster and/or brochures for customers to view |

| | | |
|---|---|---|
| | - Doggie day care<br>- Local pet magazines<br>- Local adoption agencies<br>- NHC Animal Control<br>- NH Humane Society | |
| Management/ Residents of Apartment Complexes | Apartment complexes often experience problems with uncollected pet waste on their property. In Wilmington, a large number of college students with pets reside in these complexes. Management can play a key role in educating their residents about pet waste and implementing and enforcing a pet waste management policy on their property. | • Provide materials to educate the management of apartment complexes on how to institute a pet waste policy, as well as provide a consistent policy for enforcement<br>• Encourage apartment complex management to educate their residents by distributing the City's pet waste education materials to each apartment<br>• Encourage management to post the pet waste education poster and/or brochure in common areas for their residents to view<br>• Encourage management to be make it easy for their residents to manage pet waste by installing pet waste receptacles around the property |
| **Assessment & Evaluation** | | |
| • Assess and evaluate local water quality utilizing UNCW Center for Marine Science annual water quality monitoring, specifically Fecal Coliform counts in local waters<br>• Periodically assess the habits of pet owners and pet industry professionals by:<br>- Direct observation of habits *(collects vs. doesn't collect, where dispose, etc.)*<br>- Count of citations issued for pet waste violations<br>- Count of reported complaints to Stormwater Hotline regarding pet waste violations | | |

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

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

**Pollutant Source:**
Likely Residential Sources: Homeowners, Gardeners, etc.
Likely Commercial/Industrial Sources: Landscapers, Turf Maintenance, Golf Courses, etc.

**Background/Environmental Impacts:**

- Storm drains and drainage conveyances (i.e. ditches) carry polluted runoff directly to local waterways without any treatment. Only rain should go down the storm drain!
- Lawn fertilization is one of the most widespread watershed behaviors by homeowners and landscaping companies.
- Improper application of fertilizer results in the introduction of nutrients into our waterways via stormwater runoff.
- Yard waste (i.e. grass clippings, leaves, pinestraw) are often improperly blown or directed into streets, storm drains, and ditches leading to clogged stormwater conveyances resulting in flooding of streets and property. This organic matter can also flow through the drainage system introducing nutrients and pesticides into waterways.
- Fertilizers and yard waste that end up in local surface waters impact aquatic life by introducing an overabundance of nutrients, a process known as eutrophication.
- Eutrophic water conditions cause algal blooms. Once the excess nutrients are used up in a water body, the algae will decompose using up the dissolved oxygen in the water, which aquatic organisms (i.e. fish) need to survive. This can lead to fish kills.
- Algal blooms produced from eutrophic conditions also prevent sunlight from reaching benthic (bottom-dwelling) aquatic plants and organisms.
- Some types of algal blooms are toxic to plants and animals, including humans.

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

**Key Outreach Messages**:

- A direct link exists between improper fertilizer application and yard waste disposal and poor water quality resulting in algal blooms, fish kills, and habitat degradation.
- Grasscycle! Leave grass clippings on the lawn to reduce or eliminate the need for fertilizer. Clippings conserve soil moisture and are a natural fertilizer.
- Compost yard waste and use the resulting material in your landscape or garden
- Contain yard waste for City pickup.
- Before fertilizing, get a free soil test from NHC Cooperative Extension. It will tell you the exact nutrients your lawn needs and could save you money spent on fertilizer.
- Design and maintain lawns with the goal of absorbing runoff. For instance, minimize the use of lawn area and fertilizer by replacing with native trees, shrubs, plants and groundcover.
- Use alternatives to fertilizer such as organic fertilizer, compost, grasscycling, worm poop, etc.
- If fertilizer must be used, read the label and apply correctly. Improper application includes over-applying by frequency or volume, applying the wrong type, applying before rain, and failure to clean excess fertilizer from driveways and streets after application.
- Utilizing BMPs, such as rain gardens, rain barrels, and re-routing downspouts to grassy areas allows polluted runoff to soak into the ground and be cleaned and filtered naturally.
- Improper disposal of yard waste (leaves, grass clippings, pine straw) can clog the storm drainage system causing flooding of streets and property.
- Landscapers/Property owners should be aware of and abide by the City's Yard Waste Ordinance:
  - It is unlawful to rake, sweep, blow, wash, direct or place any debris into the storm drainage system. (*The storm drainage system consists of streets, storm drains, ditches, swales, creeks, lakes, rights-of-way, dedicated easements, etc).*
  - Property owners shall keep all ditches, drains, swales, and other drainageways on their property free from obstructions which would impede the flow of water.
  - Fines for non-compliance with the City's yard waste ordinance are $250 per occurrence.
- Landscaping company employees should be trained on proper fertilization and yard waste disposal practices.

| Target Audience | Audience Description (Why Selected?) | Suggested Outreach Strategies |
|---|---|---|
| Homeowners/ Residents | Many citizens improperly apply fertilizer and/or blow yard waste into the street or storm drain. Target audience is majority male homeowners for self-application of fertilizer and yard waste disposal. Also target households that hire landscaping companies. | • Distribute fertilizer and yard waste education brochures and soil test kits to Wilmington residents during HOA presentations and special events like Earth Day<br>• Inform residents about proper disposal methods for yard waste including grasscycling, composting, and collecting yard waste for pick-up by posting info on GTV<br>• Post educational lawn care poster on stormwater website<br>• Air public service announcements on mass media outlets<br>• Include blurbs in citywide newsletter<br>• Submit periodic press releases to the media |

| | | |
|---|---|---|
| Landscapers and Turf Maintenance Professionals | Landscaping and turf maintenance companies frequently use fertilizers and produce a large amount of yard waste on a regular basis. Employees are often male and of Hispanic background. | • Distribute large format education poster about yard waste disposal to landscapers and lawn maintenance companies, available in both English and Spanish<br>• Emphasize proper staff training on practices like fertilization application and yard waste disposal<br>• Distribute fertilizer education info to golf course management<br>• Post outreach materials in English and Spanish on stormwater website and GTV<br>• Utilize enforcement actions when necessary for violators of yard waste ordinance |
| **Assessment & Evaluation** | | |
| • Periodically assess the habits of homeowners and landscape industry professionals by:<br>- Direct observation of the fertilizer application habits of homeowners and landscape industry<br>- Surveys of the fertilizer application habits of homeowners and landscape industry professionals<br>• Assess and evaluate local water quality utilizing UNCW Center for Marine Science annual water quality reporting, specifically nitrogen, phosphorus, BOD, and algal bloom frequencies and locations | | |

**Target Pollutant: SEDIMENT (sand, dirt, gravel, clay, soil particles)**

*Sediment is generated by the process of natural or accelerated erosion and consists of sand, dirt, clay, or soil particles. Sedimentation occurs when stormwater runoff carries soil particles from a disturbed land area or eroding stream bank to surface waters. Sediment can quickly fill in a waterbody, clog the storm drainage system, and cause turbidity and problems for aquatic life.*

**Pollutant Source:**
Likely Residential Sources: Yards, Driveways, etc.
Likely Commercial/Industrial Sources: Construction Sites, Landscapers, Clear-cut Land, etc.

**Background/Environmental Impacts:**

- Storm drains and drainage conveyances (i.e. ditches) carry polluted runoff directly to local waterways without any treatment. Only rain should go down the storm drain!
- Both natural and accelerated erosion produce sediment. Natural erosion is the process of weathering that forms soil. Accelerated erosion is a result of land-disturbing activities by humans that loosen topsoil, making the land more prone to erode quickly (i.e. construction-related activities).
- While natural erosion contributes sediment to waterways, the majority of sediment comes from areas where accelerated erosion has occurred. Stormwater runoff carries soil particles from a disturbed area of land to local creeks and streams. The waves created by boaters can also cause accelerated erosion near the banks.
- Excessive sedimentation can fill in a water body or clog the storm drainage system, leading to flooding. Sedimentation also impacts bottom-dwelling organism by smothering fish eggs, shellfish, coral and benthic (bottom-dwelling) plants.
- Sediment can also cause water to become cloudy, also known as turbidity. Turbidity impairs the photosynthesis of aquatic plants, as well as the ability of aquatic animals to breathe and see prey/predators.
- Sediment serves as a “transport vehicle” for other pollutants such as nutrients, metals, and bacteria. These pollutants attach to sediment particles and cause additional water quality issues when the sediment gets stirred up (i.e. boating, hurricanes, etc) and re-pollutes the water.
- Other sources of sediment include poorly vegetated areas in a yard or landscape.

**Target Pollutant: SEDIMENT (eroding streambanks, construction, exposed soil)**

**Key Outreach Messages**:

- Any land-disturbing activity including gardening, planting, construction, etc. can produce sediment which can lead to flooding of streets and property when the sediment is carried into the storm drainage system via stormwater runoff.
- There is a direct link between sediment and poor water quality, in addition to impacts on aquatic life and habitat.
- Residents can plant groundcover, shrubs, and trees to hold soil in place and prevent erosion. Use native plants whenever possible – they don't need fertilizers and pesticides. For properties with sandy soil, mix organic matter (i.e. compost) in with the sand to allow plants to grow better.
- Mulch should be used to cover exposed soil and prevent it from washing away.
- Sediment should be collected off paved surfaces and not rinsed or blown into the drainage system.
- Lack of vegetation along waterfront property and streambanks can produce significant erosion. These types of property owners should be encouraged to plant vegetative buffers.
- Developers should follow all sedimentation and construction site laws and practices. Construction site violations can be reported to the State Hotline: 1-800-STOP-MUD
- Utilizing BMPs, such as rain gardens, rain barrels, and re-routing downspouts to grassy areas, allows polluted runoff to soak into the ground and be cleaned and filtered naturally.

| Target Audience | Audience Description (Why Selected?) | Suggested Outreach Strategies |
|---|---|---|
| General Public/ Homeowners | The environmental consequences of sedimentation are not widely understood by citizens. Sources of sediment in our surface waters are primarily the result of human-related activities. Homeowners may have exposed soil in lawns or landscape beds or poorly vegetated areas on their property. Target both males and females. | • Encourage homeowners to plant vegetation or apply mulch to anchor soil in place and prevent erosion during HOA or community presentations<br>• Post outreach materials on stormwater website and GTV<br>• Lack of vegetation along waterfront property and streambanks can produce significant erosion. These types of property owners should be encouraged to plant vegetative buffers.<br>• The public should be made aware of the City's yard waste ordinance via GTV and paid spots on mass media |
| Construction/ Landscape Professionals | Construction, landscape, and related industries significantly contribute to sediment loading in waterways. Employees in this field are often male. | • Promote compliance with the land development code and sedimentation and erosion control laws<br>• Encourage proper staff training with construction, landscaping, and related businesses<br>• Post outreach materials on stormwater website and GTV<br>• Construction workers and landscapers should be aware of the City's yard waste ordinance which prohibits sediment from being blown into streets and storm drains. Provide landscaping companies with the yard waste poster that addresses sediment |

**Assessment & Evaluation**

- Assess and evaluate local water quality utilizing UNCW Center for Marine Science annual water quality reporting, specifically Total Suspended Solids (TSS)
- Gather information from NHC Sedimentation and Erosion program about violations within the city

**Target Pollutant: CHEMICALS (pesticides, pressure washing and cleaning soaps)**

*Stormwater runoff washes harmful chemicals found in pesticides, pressure washing cleaners, vehicle washing soaps and other illicit discharges directly into our waterways. All of these pollutant sources contain toxic chemicals that can persist in the environment, causing toxicity in humans and aquatic organisms, in addition to contaminating drinking water resources.*

**Pollutant Source:**
Likely Residential Sources: Homeowners, Gardeners, Car/Boat Owners, etc.
Likely Commercial/Industrial Sources: Pressure Washers, Vehicle Washing Businesses, Turf/Landscape Professionals, Restaurants, etc.

**Background/Environmental Impacts:**

- Storm drains and drainage conveyances (i.e. ditches) carry polluted runoff directly to local waterways without any treatment. Only rain should go down the storm drain!
- An illicit discharge is any unlawful disposal, placement, emptying, dumping, spillage, leakage, pumping, pouring, emission, or other discharge of any substance other than stormwater into the storm drainage system.
- Chemicals and cleaning agents used to wash cars, boats, driveways and other surfaces are carried into storm drains and eventually into our waterways. These chemicals can destroy the external mucus layer on fish that protects them from bacteria and parasitic infections.
- Commonly used organophosphate pesticides are present in stormwater runoff and are toxic to aquatic life in receiving water bodies. Pesticides bio-accumulate up the food chain and are harmful to beneficial insects, humans and other wildlife, as well as entire aquatic ecosystems.

**Target Pollutant: CHEMICALS (pesticides, pressure washing/vehicle washing soaps and cleaners, etc.)**

**Key Outreach Messages**:

- There is a direct link between the use of chemicals on land (i.e. pesticides, pressure washing cleaners) and water quality and habitat impacts (i.e. frogs with six legs).
- Install native plants which do not require pesticides or fertilizers.
- Use alternatives to pesticides such as ladybugs, weeding by hand, and organic pesticides.
- If you must apply pesticides, read the labels and apply the correct amounts. Do not apply before rain.
- Suggest less toxic, environmentally-friendly alternatives to chemicals.
- Promote info on how to properly dispose of chemicals and other household chemicals, including promotion of Household Hazardous Waste Collection Days.
- Pressure washing surfaces and washing cars/boats using soaps or cleaning agents of any toxicity level can negatively affect water quality. These surfaces can only be washed legally with plain, clear water.
- Wash on grassy areas that can absorb and filter the chemicals and wastewater naturally.
- Businesses are required to capture and discharge the wastewater legally in a treatment system.
- The City's Illicit Discharge ordinance specifies that it is unlawful to dispose of or discharge any substance other than stormwater into the storm drainage system. Fines are up to $10,000 per offense.
- Utilizing BMPs, such as rain gardens, rain barrels, and re-routing downspouts to grassy areas allows polluted runoff to soak into the ground and be cleaned and filtered naturally.

| Target Audience | Audience Description (Why Selected?) | Suggested Outreach Strategies |
|---|---|---|
| Homeowners / Residents | All citizens have the potential to contribute chemical pollution by washing outdoors (i.e. driveways, homes, lawn furniture) or by using pesticides around their property. Target a higher % of males. | • Distribute educational materials to residents about practicing environmentally safe gardening/lawn maintenance and washing of materials outdoors<br>• Emphasize compliance with the City's Illicit Discharge ordinance<br>• Promote the stormwater hotline to report illicit discharges<br>• Post outreach materials on stormwater website and GTV<br>• Promote Household Hazardous Waste Collection Days |
| Mobile Detailers, Pressure Washers | Businesses that wash surfaces often use cleaning agents containing chemicals that are harmful to our waterways. These chemicals can be easily washed into the storm drainage system. Target males. | • Mail educational info to pressure washing businesses and mobile detailers<br>• Post outreach materials on stormwater website and GTV |
| Landscape/Turf Maintenance Professionals | Landscape/turf maintenance professionals frequently use pesticides. Employees in this field are often male. | • Promote training of workers for proper application of pesticides<br>• Emphasize use of pesticides as a last resort; promote alternatives<br>• Post outreach materials on stormwater website and GTV |
| Restaurants | Restaurants often clean equipment or dump mop wash water outdoors. The discharge of any type of wastewater into the storm drainage system is unlawful. | • Distribute educational poster to local restaurants<br>• Disseminate business checklist to ensure stormwater-friendly practices<br>• Encourage employee training on wastewater practices, proper chemical use and disposal, etc.<br>• Promote compliance with the illicit discharge ordinance via GTV and website |

**Assessment & Evaluation**

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

practices

- Periodically assess the pesticide application habits of homeowners and landscape professionals by:
    - Direct observation of pesticide application habits of homeowners and landscape professionals
    - Surveys of pesticide application habits of homeowners and landscape professionals
- Assess and evaluate local water quality utilizing UNCW Center for Marine Science annual water quality reporting, specifically focusing on illicit discharge tested locations

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

*Litter is generated as a result of improperly discarded plastics, food wrappers, cigarette butts, etc. that can wash into waterways via the storm drainage system and impact habitat, wildlife, and water quality.*

**Pollutant Source:**
Likely Residential Sources: Motorists, Smokers, General public, Trash pickup incidental litter, etc.
Likely Commercial/Industrial Sources: Restaurants, Retail Centers, Construction Sites, etc.

**Background/Environmental Impacts:**

- Storm drains and drainage conveyances (i.e. ditches) carry polluted runoff directly to local waterways without any treatment. Only rain should go down the storm drain!
- Litter is carried by stormwater runoff into the drainage system where it can clog storm drains and drainage routes and cause flooding on streets and property.
- Litter that washes into local surface waters can be mistaken by fish, birds and other wildlife for food that become sick or die from ingesting it. Wildlife also can become entangled in litter and die as a result.
- Litter is often produced as a result of being dropped during trash pickup.
- Litter introduces chemical pollutants into waterways, such as plastics and cigarette butts.
- Cigarette butts are a major source of litter and contain many dangerous toxins that can leach into waterways.
- Littered areas beget litter; areas that are clean tend to repel litter.

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

**Key Outreach Messages**:

- Flooding of streets/property is sometimes attributed to the accumulation of litter in the drainage system.
- A direct link exists between animal impacts, habitat destruction, and water quality as a result of littering.
- Cigarette butts leach chemicals such as cadmium, lead, and arsenic into the aquatic environment within one hour of contact with water.
- The 2011 Ocean Conservancy International Coastal Cleanup identified cigarette butts as the #1 most littered item.
- Litter attracts wildlife to the side of the road where they are likely to get hit by oncoming vehicles.
- Utilizing BMPs, such as rain gardens, rain barrels, and re-routing downspouts to grassy areas allows polluted runoff to soak into the ground and be cleaned and filtered naturally. BMPs can also trap litter so it doesn't wash away.

| Target Audience | Audience Description (Why Selected?) | Suggested Outreach Strategies |
|---|---|---|
| Youth (8th grade presentations) | Litter habits cannot be confined to a particular demographic in most cases. However, targeting 8th graders during yearly presentations should be a priority since they are in the developmental stage of thinking and forming opinions. | • Make students aware of the impact of littering and the toxicity of many littered items<br>• Emphasize easy solutions to littering - using trash or recycling receptacles<br>• Promote the 5 R's: Reduce, Reuse, Recycle, Refuse, Repurpose<br>• Explain the negative impacts on wildlife species (i.e. plastic bags look like jellyfish to sea turtles) |
| Smokers | Cigarette butts are the largest environmental litter problem both locally and worldwide. Target both male and female smokers. | • Display signs encouraging proper disposal of cigarette butts in public areas (i.e. Wave Transit buses)<br>• Post outreach materials on stormwater website and GTV<br>• Encourage use of ashtrays for smokers<br>• Distribute pocket ashtrays at public events |
| Motorists and Pedestrians | Along roadways, motorists (52%) and pedestrians (23%) are the largest contributors of litter. Target males and females. | • Educate citizens about North Carolina's Swat-A-Litterbug program via website and GTV<br>• Remind motorists about the proper disposal of trash by displaying educational signs on public transportation vehicles (i.e. Wave Transit buses)<br>• Encourage use of car litterbags for proper trash disposal |

**Assessment & Evaluation**

- Conduct an informal poll before 8th grade presentations to gauge how many students litter and then pledge not to litter after the presentation.
- Elicit count of Stormwater Maintenance Department responses to clogged stormwater drainage system components as a result of litter.
- Have Stormwater Maintenance crews continually provide field observations of problem litter areas for clean-up by community service workers or Cape Fear River Watch.
- Periodically assess the litter disposal habits of Wilmington residents by:
  - Direct observation of habits
  - Surveys of habits
  - Count of citations issued pertaining to improper litter disposal habits
  - Count of reported violations to Stormwater Hotline, Keep America Beautiful of NHC, or Swat-a-Litterbug from New Hanover county

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

*Vehicle pollution comes from the intentional or unintentional disposal of vehicle fluids into our waterways, some of which washes off impervious surfaces into the drainage system or is disposed of improperly. These fluids are insoluble and can easily contaminate water resources, as well as poison fish and other aquatic organisms.*

**Pollutant Source:**
Likely Residential Sources: Motorists, Backyard Mechanics
Likely Commercial/Industrial Sources: Vehicle Maintenance Repair Shops, Mobile Detailers, Dealership Lots

**Background/Environmental Impacts:**

- Storm drains and drainage conveyances (i.e. ditches) carry polluted runoff directly to local waterways without any treatment. Only rain should go down the storm drain!
- Vehicles have seals and gaskets that have the potential to leak a variety of fluids, such as oil and grease. An accumulation of these fluids on roadways and parking lots gets carried away by stormwater runoff emptying into our waterways.
- Commonly, it is the backyard mechanic that is illegally dumping or draining vehicle fluids.
- 1 quart of motor oil can contaminate 250,000 gallons of water.
- Once vehicle pollution enters a body of water, it disperses quickly and forms a film on the water's surface, making oxygen transfer from the surface to the bottom difficult, as well as toxic for aquatic organisms.
- It is a common watershed behavior to wash vehicles on impervious (hard) surfaces
- Washing vehicles or boats can cause nutrients, heavy metals, hydrocarbons and grime to wash down the street and into waterways.
- Soaps and detergents used to wash vehicles or boats are carried into storm drains and eventually into our waterways. These chemicals can destroy the external mucus layer on fish that protects them from bacteria and parasitic infections.
- Vehicle washers are typically unaware of the content of washing soaps and detergents and their impact on water quality.

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

**Key Outreach Messages**:

- There is a direct link between the introduction of vehicle fluids and water quality degradation, habitat destruction and plant/animal death.
- All vehicles, machinery, and equipment that utilize vehicle fluids (i.e. oil, grease) for operation have the potential to leak and contribute to water pollution.
- Keep vehicles tuned up, check and repair leaks, check tire pressure, and recycle or properly dispose of vehicle fluids and batteries.
- Properly clean up vehicle leaks and fluid spills using an absorbent material (i.e. kitty litter) to soak up the spill. Sweep up contaminated absorbent, put in a sealed bag and place in the trash.
- Driving less, carpooling or using alternative transportation are some of the best ways to prevent vehicle pollution.
- Washing vehicles or boats using soaps/detergents can negatively affect water quality by contaminating them with chemicals, debris, or sediment that is washed off of vehicles, driveways, parking lots, etc.
- Wash vehicles on the grass using a phosphate-free detergent, and/or use a commercial car wash which recycles and treats wash water. If you must wash on pavement, use plain, clear water and no chemicals.
- On-site storage (i.e. fluids, batteries) has the potential to leak during filling, emptying, storage unit failure, or vandalism.
- Business owners should be aware of and abide by the City's Illicit Discharge Ordinance which states that
    - Anyone found responsible for causing a polluting substance to enter the storm drainage system will be subject to a fine up to $10,000 per violation.
    - The city will have the authority to enter property to inspect for illicit discharges, and if found, to require that they be disconnected and permanently closed.
    - Commercial businesses will not be permitted to wash vehicles, equipment, or any other surfaces with any soaps or solvents or dislodge any other substance that may be harmful to surface waters, unless the resulting wastewater is diverted to the sanitary sewer system.
    - Restaurants will not be permitted to discharge any wastewater outside.
    - Dumpster lids must be kept closed and dumpster plugs in place.
    - Swimming pool water must be de-chlorinated before discharging.
    - Floor drains in old buildings, connected to the storm drainage system, will be required to be disconnected and permanently closed.
    - Residents and businesses will be expected to prevent harmful substances from running off into the storm drainage system.
    - Fines for non-compliance with the City's illicit discharge ordinance are up to $10,000 per offense.
- Utilizing BMPs, such as rain gardens, rain barrels, and re-routing downspouts to grassy areas allows polluted runoff to soak into the ground and be cleaned and filtered naturally.

| Target Audience | Audience Description (Why Selected?) | Suggested Outreach Strategies |
|---|---|---|
| General Public/ Backyard Mechanics | All citizens of driving age have the potential to contribute to vehicle pollution by nature of driving the vehicle or washing it. For backyard dumping of auto fluids, target males. | • Emphasize vehicle maintenance is the #1 priority (i.e. tune ups)<br>• Post outreach materials on stormwater website and GTV<br>• Promote alternative methods of transportation (i.e. public transportation, carpooling, bikes, walking, bio-fuels)<br>• Encourage the utilization of the stormwater hotline to report illegal fluid dumping<br>• Encourage environmental stewardship to practice eco-friendly vehicle washing using commercial car wash businesses or washing vehicles in a grassy area to absorb polluted runoff<br>• Mark storm drains in visible areas to prevent illegal dumping |
| Vehicle Maintenance | Businesses in auto parts or maintenance/repair-related | • Distribute Auto Care educational poster to businesses for employees to learn about proper vehicle maintenance, fluid |

| | | |
|---|---|---|
| Repair, and Auto Parts Businesses | fields deal with vehicle fluids on a regular basis. Most employees are male. | storage and disposal methods, and the City's Illicit Discharge ordinance<br>• Post outreach materials on stormwater website and GTV |
| Pressure Washers, Vehicle Washing Businesses, Dealership Lots | Vehicle washing businesses often use cleaning agents containing chemicals that are harmful to our waterways. These chemicals, along with other vehicle fluids, can be easily washed into the storm drainage system. Employees are typically male. | • Distribute educational flyer to businesses<br>• Encourage environmental stewardship to practice eco-friendly vehicle washing using commercial car wash businesses or washing vehicles in a grassy area, or washing using plain water and no chemicals over pavement<br>• Post outreach materials on stormwater website and GTV |

**Assessment & Evaluation**

- Periodically assess vehicle fluid disposal habits of Wilmington residents and businesses
    - Direct observation of habits
    - Surveys of habits
    - Count of reported violations pertaining to chemical leaks or disposal habits to Stormwater Hotline
- Periodically assess vehicle washing and exterior home washing habits of Wilmington residents by:
    - Direct observation of habits
    - Surveys of habits
- Assess and evaluate local water quality utilizing UNCW Center for Marine Science annual water quality monitoring

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## APPENDIX C: PUBLIC INVOLVEMENT AND PARTICIPATION

Included in this section:

- BMP Reporting Table
- Cumulative Year End Reports for Contractual/Cooperative Agreements with:
  - Cape Fear River Watch
  - New Hanover Soil & Water Conservation District

| DATE OF EVENT/ ACTIVITY | EVENT/ACTIVITY | AUDIENCE | DELIVERED BY (AGENCY) | METHOD OF DELIVERY / MESSAGE | ATTENDANCE/ PARTICIPATION |
|---|---|---|---|---|---|
| **BMP a. Volunteer community involvement program** | | | | | |
| ***Community Events / Participation*** | | | | | |
| 3/30/2014 | Paws for People 5k at UNCW | Pet owners | NHSWCD staff | Canines for Clean Water booth - interactive event where pet owners sign a pledge to be clean up after their pets and can submit photos to be featured on city website | 32 pet owners signed pledge and received dog bandana, treats, and pet waste literature. Dogs have a chance to be featured on city website |
| 5/3/2014 | Pawz in the Park at Battleship Park | Pet owners | NHSWCD | Canines for Clean Water booth - interactive event where pet owners sign a pledge to be clean up after their pets and can submit photos to be featured on city website | 61 pet owners signed pledge and received dog bandana, treats, and pet waste literature. Dogs have a chance to be featured on city website |
| 4/26/14 | Lower Cape Fear Earth Day Celebration at Hugh MacRae Park | Festival attendees, general public | Stormwater Services (SWS is an annual sponsor of Lower Cape Fear Earth Day Festival) | Display booth to promote stormwater pollution education with an interactive game/quiz and stormwater prizes | 5,000+ attendees |
| ***Monthly Public Rain Barrel Sale*** | | | | | |
| Monthly | Monthly rain barrel sale to the general public. Held the 2nd Thursday of each month at NHC Government Center with partner agency, NHSWCD | General public | Stormwater Services NHSWCD | Stormwater runoff reduction, watershed and water conservation education with rain barrel sale attendees. A new vendor was selected and used this year to offer different barrels and sizes to the public (rainbarrelusa.com) | 80 total sales this year |
| ***Storm Drain Marking*** | | | | | |
| Ongoing campaign | Campaign to place storm drain awareness markers and educational doorhangers throughout the City | City residents, businesses, landscapers | Contract agencies: CFRW NHSWCD and their volunteers | Stormwater awareness activity. Place educational drain markers on storm drains and distribute educational doorhangers to residents in areas the markers are placed | 56 markers were placed in the Independence South and Holly Glen neighborhoods this year |

***Stream & Litter Clean-ups***

| | | | | | |
|---|---|---|---|---|---|
| Ongoing | Watershed cleanups including the Annual Big Sweep event | Volunteers | CFRW and volunteers | Watershed cleanup and/or invasive species vegetation removal<br><br>Areas cleaned include Greenfield Lake, Smith Creek, Cape Fear River, Burnt Mill Creek, Randall Pond, Kerr Avenue Wetland | 9 cleanup events including Big Sweep<br><br>154 volunteers contributed a total of 306 hours<br><br>Collected 217 (30 gallon) bags of trash and/or invasive species vegetation |

***Watershed Watch Creek Observation Monitoring***

| | | | | | |
|---|---|---|---|---|---|
| Every other month | Volunteer monitoring of creek segments that drain to Cape Fear River | Volunteers are trained to make these observations. City staff receive these reports | CFRW and volunteers | Volunteers conduct bi-monthly observations of area creeks and provide a monitoring report and photos to Stormwater Services | Observations include creek and corridor conditions, vegetation and wildlife present, litter quantity, and suggestions for remediation |

***Contracts / Cooperative Agreements***

The City of Wilmington contracts annually with Cape Fear River Watch (CFRW) and New Hanover Soil & Water Conservation District (NHSWCD) to implement additional public involvement and participation activities, as well as education and outreach activities. Both organizations sign a yearly contract with the City of Wilmington that includes specific deliverables that enable the City to meet many of its federal NPDES permit requirements. Copies of these contracts and a year end report are included in the Appendix. Below is a summary of each agency's annual service deliverables.

**CFRW** - Supports NPDES permit activities including: 8th grade classroom presentations, educational programs for Wilmington residents, volunteer storm drain marking, 10 volunteer watershed cleanups and coordination, volunteer watershed monitoring program, grant project partnership, Greenfield Lake & Kerr Ave. education/monitoring, support for NPDES public meetings and education efforts, quarterly reporting/invoicing.

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

## BMP b. Mechanism for Public involvement

***Public Meetings & Input***

| | | | | | |
|---|---|---|---|---|---|
| 8/15/2013 | Targeted doorhangers | Residents and businesses affected by Longstreet Paving and stormwater project | Stormwater Services | Project info and lane closure doorhanger notice distributed to local residents in advance of project work | 50 project and public meeting announcement doorhangers delivered to residents |
| 9/16/2013 | Presentation: APWA Conference | APWA Conference attendees | Stormwater Services McKimley Horn Engineers | Powerpoint presentation about Cedar Avenue project | 125 public works engineers, consultants, municipal managers |

| | | | | | |
|---|---|---|---|---|---|
| 9/17/2013 | Presentation: APWA Conference | APWA Conference attendees | Stormwater Services | Powerpoint presentation about educating the Public and creating a watershed ethic in citizens | 125 public works engineers, consultants, municipal managers |
| 10/4/2013 | Presentation: Stormwater 101 | Cape Fear Rotary Club members, held at Jungle Rapids | Stormwater Services | Stormwater 101 powerpoint presentation and educational giveaways | 50 members attended |
| 12/5/2013 | Targeted doorhangers | Residents and businesses affected by Antelope Trail stormwater project | Stormwater Services Hibbert Enterprises | Project info notice distributed to local residents in advance of project work | 150 doorhangers delivered to residents |
| 1/6/2014 | Direct mailing to Restaurants in Wilmington city limits (Year 2 of mailing and survey) | Wilmington Restaurants | Stormwater Services | Mailed code enforcement letter, restaurant education poster, and return mail survey | Year 2 of the education effort resulted in 15 returned surveys and a 90% correct response rate |
| 3/1/2014 | Targeted doorhangers | Residents and businesses affected by Brookshire / Beasley stormwater project | Stormwater Services | Public meeting notice doorhanger distributed to residents | 80 doorhangers delivered to residents |
| 3/11/2014 | Public Meeting: Brookshire/Beasley project | Residents and businesses affected by Brookshire/ Beasley stormwater project | Stormwater Services URS Corporation | Brookshire/Beasley public meeting with residents impacted by upcoming project | 40 residents attended |
| 6/1/2014 | Targeted doorhangers | Residents and businesses affected by Clear Run Branch stormwater project | Stormwater Services | Public meeting notice distributed to residents | 150 doorhangers delivered to residents |
| 6/25/2014 | Public Meeting: Clear Run Branch project | Residents and businesses affected by stormwater project | Stormwater Services Moffit and Nichol | Clear Run Branch public meeting with residents impacted by project | 50 residents attended public meeting |

## BMP c. Maintain Hotline/Help line

The Stormwater Pollution Prevention Hotline was established in January 2010 to field calls from the citizens, businesses, and city employees regarding illicit discharges and other reports of stormwater pollution. The hotline phone # is **910-341-1020** and the web address is **www.wilmingtonnc.gov/reportstormwaterpollution.** Hotline/web reports are routed to the Stormwater Code Compliance Officer who tracks, investigates, and responds to all hotline reports. Information regarding hotline reports is included in the Enforcement Appendix section including the number and nature of hotline phone/web reports.

| | | | | | |
|---|---|---|---|---|---|
| Ongoing | Stormwater Hotline advertised using various outreach methods: truck magnets, signs, billboards, presentations, etc. | General public | Stormwater Services | Hotline poster, website, GTV-8 and promo items (pens, magnets, sticky notes) are used to raise awareness of the Stormwater Hotline | Distribution varies based on method or event used |
| December 2013 | Stormwater Hotline Signage installed on 25 existing watershed signposts | Drivers General public | Stormwater Services | Stormwater Hotline Signage posted along area roadways to encourage the public to report stormwater pollution | Vehicular traffic - impressions unknown |

# Cumulative Year End Contract Agency Reports

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

## Quarterly Progress Report #3: April 1 – June 30, 2014

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, 2013** through **June 30, 2014** for the agreed amount of $**15,000**. These contracted services, implemented as equitably as possible throughout the fiscal year, assist the City in meeting requirements of the federal NPDES Stormwater Permit.

**Public Education/Outreach** ***Total Allocated Cost: $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 the specific NC Essential Standard and objectives for the Hydrosphere unit. Enviroscape instructors will be trained, certified, and follow all applicable Enviroscape policies and procedures as set forth by the City of Wilmington Stormwater Services. A maximum of 3 trained Enviroscape instructors from each agency (which includes the Enviroscape supervisor) are permitted to deliver presentations in 8th grade. 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. **($2000)**

## October 1 - December 31, 2013

| **8th Grade Enviroscape Presentations** | | | | |
|---|---|---|---|---|
| **Date** | **School** | **Grade** | **# of presentations** | **# of students** |
| 10/8/13 | Myrtle Grove | 8 | 4 | 100 |
| 10/22/13 | Murray | 8 | 2 | 50 |
| 10/24/13 | Murray | 8 | 1 | 25 |
| 11/13/13 | Noble | 8 | 1 | 25 |
| 11/19/13 | Williston | 8 | 2 | 55 |
| 11/20/13 | Williston | 8 | 2 | 55 |
| 12/11/13 | Trask | 8 | 1 | 20 |
| 12/19/13 | Trask | 8 | 1 | 19 |

## January 1 - March 31, 2014

| 8th Grade Enviroscape Presentations | | | | |
|---|---|---|---|---|
| **Date** | **School** | **Grade** | **# of presentations** | **# of students** |
| 2/5/14 | Trask | 8 | 3 | 57 |
| 2/25/14 | Holly Shelter | 8 | 3 | 60 |

## April 1 – June 30, 2014

| 8th Grade Enviroscape Presentations | | | | |
|---|---|---|---|---|
| **Date** | **School** | **Grade** | **# of presentations** | **# of students** |
| 4/30/14 | Roland Grise | 8 | 2 | 58 |
| 5/1/14 | Roland Grise | 8 | 2 | 55 |
| **Other Enviroscape Presentations** | | | | |
| **Date** | **School/Event** | **Grade** | **# of presentations** | **# of students** |
| 5/9/14 | Homeschool Enviroscape | 7 - 8 | 1 | 12 |

**Provide educational programs for Wilmington residents.** Educational programs include First Saturday Seminars, presentations to community and civic organizations, and other scheduled talks in the community. Educational programs for homeowners associations should be planned and coordinated with Stormwater Services. Educational programs will also include eco-tours and birding tours at Greenfield Lake and Smith Creek paddling tours. Efforts will be made to inform the local media about educational programs. **($3000)**

## July 1 - September 30, 2013

| First Saturday Seminars | | | |
|---|---|---|---|
| **Date** | **Topic** | **Speaker** | **Attendance** |
| 8/3//13 | Backyard Birds | Jill Peleuses | 65 |
| 9/7/13 | Chemical-free Gardens and Yards | Evan Folds | 60 |
| **Other Presentations by CFRW Staff** | | | |
| **Date** | **Organization/Audience** | **Topic/Speaker** | **Attendance** |
| 8/19/13 | College group | Kemp-Water quality | 52 |
| 9/16/13 | UNCW Group | Kemp-Water quality | 40 |
| 9/23/13 | CFRW Volunteers | Kemp-BMP landscaping | 13 |
| **Greenfield Lake Tours & Smith Creek Paddle Tours** | | | |
| **Date** | **Group Served/Audience** | **Type of Tour/Topic/Location** | **Attendance** |
| 7/30/13 | YWCA summer campers Ages 6–8 | Walking Eco Tour and paddleboat tour | 50 |
| 7/31/13 | YWCA summer campers Ages 9–11 | Walking Eco Tour and paddleboat tour | 55 |
| 8/8/13 | CFRW summer campers Ages 9-12 | Walking Eco Tour and paddleboat tour | 12 |
| 8/15/13 | CFRW summer campers 13-16 | Walking Eco Tour and paddleboat tour | 12 |
| 8/22/13 | Wilmington Preparatory Academy | Walking Eco Tour and paddleboat tour | 10 |
| 9/6/13 | 4th and 5th Graders | Walking Eco Tour and paddleboat tour | 14 |

## October 1 - December 31, 2013

| First Saturday Seminars | | | |
|---|---|---|---|
| **Date** | **Topic** | **Speaker** | **Attendance** |
| 10/5/13 | History & Ecology of CF River | Phillip Gerard | 68 |
| 11/2/13 | Invasive Species | Melanie Doyle | 62 |
| 12/7/13 | Managed Bird Habitats Lower CF | Lindsey Addison – Audubon NC | 70 |

| Other Presentations by CFRW Staff | | | |
|---|---|---|---|
| **Date** | **Organization/Audience** | **Topic/Speaker** | **Attendance** |
| 10/23/13 | Good Shepherd Homeless Shelter | GFL stewardship/Scott & Kay Lynn | 20 |
| 10/29/13 | UNCW presentaion | Water Quality/Kemp Burdette | 20 |
| 11/5/13 | Freshmen Env. Studies UNCW | CFRW mission/KL Hernandez | 25 |
| 11/10/13 | Membership meeting | CFRW mission/ Kemp Burdette | 75 |
| 11/11/13 | UNCW presentation | Environmental challenges/ Kemp Burdette | 30 |
| 11/14/13 | Cucalorus film at CFRW | Invasive species/Kemp opening remarks | 20 |
| **Greenfield Lake Tours & Smith Creek Paddle Tours** | | | |
| **Date** | **Group Served/Audience** | **Type of Tour/Topic/Location** | **Attendance** |
| 10/14/13 | UNCW OLLI GFL tour | Walking eco tour/water quality at GFL/Kemp | 50 |
| 10/16/13 | UNCW OLLI Wednesdays in Nature at GFL | Walking eco tour/water quality at GFL/Kemp | 60 |
| 10/16/13 | Friends School/7th and 8th Grade | Walking eco tour/water quality at GFL/Kay Lynn | 20 |
| 10/19/13 | Smith Creek Paddle | eco tour/water quality/Kemp Burdette | 58 |
| 10/28/13 | DC Virgo/6th graders | Walking eco tour/water quality at GFL/Kay Lynn | 90 |

## January 1 - March 31, 2014

| First Saturday Seminars | | | |
|---|---|---|---|
| **Date** | **Topic** | **Speaker** | **Attendance** |
| 1/4/14 | Migratory Fish | Joe Facendola | 69 |
| 2/1/14 | Fort Fisher | Chris Fonvielle. | 61 |
| 3/1/14 | Historic Wilmington and CF River | Beverly Tetterton | 64 |
| **Other Presentations by CFRW Staff** | | | |
| **Date** | **Organization/Audience** | **Topic/Speaker** | **Attendance** |
| 1/9/14 | Anadromous Fish | WHQR radio interview/Kemp Burdette | Thousands? |
| 1/15/14 | Water Quality | Kayak Club/Kemp Burdette | 35 |
| 1/18/14 | StriperFest | Anadromous Fish - various organizations | 420 |
| 3/7/14 | Girl Scouts | Stormwater and Wildlife/Pine Valley Methodist Church | 15 |
| 3/17/14 | Water Quality | UNCW class/Kemp Burdette | 10 |
| 3/22/14 | World Water Day | UNCW class/Kemp Burdette | 60 |
| 3/25/14 | Friends School 2nd Graders | Threats to fisheries/Friends School | 35 |
| 3/27/14 | Water Quality | UNCW class/Kemp Burdette | 15 |
| **Greenfield Lake Tours & Smith Creek Paddle Tours** | | | |
| **Date** | **Group Served/Audience** | **Type of Tour/Topic/Location** | **Attendance** |
| 1/23/14 | CB AIG class | Alligators and bird feeding | 11 |

## April 1 – June 30, 2014

| Other Presentations by CFRW Staff | | | |
|---|---|---|---|
| **Date** | **Organization/Audience** | **Topic/Speaker** | **Attendance** |
| 4/5/14 | Girl Scouts | Stormwater/Wildlife/GFL | 12 |
| 4/9/14 | New Hanover High | Water quality | 50 |
| 4/11/14 | UNCW students | Cleanup Randall Pond | 20 |
| 4/23/14 | Forest Hills 4$^{th}$ Grade | Raindrop Journey/GFL | 65 |
| 4/28/14 | Sierra Club | Water quality | 50 |
| 5/3/14 | Community | LakeFest/Greenfield Lake | 240 |
| 5/8/14 | High School Students | Stormwater/Wildlife/GFL | 8 |
| 5/16/14 | Cape Fear River Partnership | Stormwater/Wildlife/History GFL | 12 |
| 5/18/14 | St. Paul's Church Group | Nature walk/water quality | 35 |
| 6/16/24 | UNCW students | Water quality | 20 |

| | | | |
|---|---|---|---|
| 6/18/14 | Childcare Network | Stormwater/Wildlife | 15 |
| 6/19/14 | SENCASPA community group | Water quality | 25 |
| 6/23/14 | League of Women Voters | Water quality | 35 |
| 6/24/14 | YWCA Summer Camp | Stormwater/Wildlife | 15 |
| 6/25/14 | YWCA Summer Camp | Stormwater/Wildlife | 45 |
| 6/26/14 | YWCA Summer Camp | Stormwater/Wildlife | 50 |
| **Greenfield Lake Tours & Smith Creek Paddle Tours** | | | |
| **Date** | **Group Served/Audience** | **Type of Tour/Topic/Location** | **Attendance** |
| 4/28/14 | UNCW OLLI GFL tour | Environment, history, wildlife, plants | 15 |

## Public Involvment/Volunteer Efforts *Total Allocated Cost: $5400*

**Encourage public involvement by engaging city residents/businesses/civic groups in a volunteer Storm Drain Marking program in the city to educate residents about stormwater pollution. A minimum of 2 separate volunteer days is required.** For each outing day, a minimum of 7 markers will be applied per volunteer group and doorhangers will be distributed to surrounding residences/businesses. Staff will assist in identifying areas to mark drains, train volunteers in marking and safety, educate volunteers about the purpose of the program, use supplied markers, and help provide oversight of the program. A trained CFRW staff member is required to be present during all storm drain marking activities and with each volunteer group. **($500)**

### October 1 - December 31, 2013

| **Storm Drain Marking** | | | |
|---|---|---|---|
| **Date** | **Name of Volunteer Organization, Business, etc.** | **Volunteers** | **Area Marked & # of Storm Drains Marked** |
| 10/23/13 | Friends School 7th & 8th grade | 10 | Independent South/8 |
| 11/6/13 | Friends School 7th & 8th grade | 10 | Independent South/8 |

**Coordinate volunteer clean-ups of local, city 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. *Reports will be submitted using supplied templates and within 10 days of the cleanup event.* Reports will include: the specific watershed, the location within the watershed that was cleaned, number of participants, hours worked, estimate of the quantity of waste materials removed, and photographs to document work completed, including before and after of site and volunteer photos. Efforts will be made to inform the local media about upcoming cleanup events. **($3800)**

### July 1 - September 30, 2013

| **Watershed Clean-ups** | | | | |
|---|---|---|---|---|
| **Date** | **Watershed** | **Specific Area Cleaned** | **Trash Collected (ie. type, # of 30 gallon bags)** | **# Volunteers/Hours Contributed** |
| 8/10/13 | Burnt Mill Creek | Randall Pond and land area | Fourteen 30 gallon bags | 10/20 |
| 9/21/13 | Greenfield Lake | Lake, Park, and adjacent area | Twenty two 30 gallon bags | 49/98 |
| 9/21/13 | Burnt Mill & Smith Creeks | Kayaks put in at Archie Blue Park – 3 miles of shoreline | Thirty four 30 gallon bags | 10/30 |

## October 1 - December 31, 2013

| Watershed Clean-ups | | | | |
|---|---|---|---|---|
| **Date** | **Watershed** | **Specific Area Cleaned** | **Trash Collected (ie. type, # of 30 gallon bags)** | **# Volunteers/Hours Contributed** |
| 10/12/13 | Cape Fear River | Historic riverfront | 17 30 gal. bags of trash | 11/22 |
| 12/14/13 | Greenfield Lake | Inlets and other problem areas | 16 30 gal. bags of trash | 12/24 |

## January 1 - March 31, 2014

| Watershed Clean-ups | | | | |
|---|---|---|---|---|
| **Date** | **Watershed** | **Specific Area Cleaned** | **Trash Collected (ie. type, # of 30 gallon bags)** | **# Volunteers/Hours Contributed** |
| 1/25/14 | Greenfield Lake | Drainage ditch and wooded area at 1814 Burnett Blvd. | 50 30 gal. bags of trash | 23/46 |
| 2/22/14 | Greenfield Lake | 11th st. south drainage ditch | 28 30 gal. bags of trash | 12/24 |

## April 1 – June 30, 2014

| Date | Watershed | Specific Area Cleaned | Trash Collected (ie. type, # of 30 gallon bags) | # Volunteers/Hours Contributed |
|---|---|---|---|---|
| 4/12/14 | Burnt Mill Creek | Drainage ditch off Cedar St. and Covin St. and Broad St. | 30 30 gal. bags of trash | 15/30 |
| 6/14/14 | Burnt Mill Creek | Kerr Ave. BMP | 6 30 gal. bags of trash | 12/12 |

**Conduct a volunteer watershed monitoring program and alert Stormwater Services when volunteers find problem areas.** Every other month Watershed Watch volunteer monitoring activities will be conducted 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 other month. In addition, significant water quality problems identified during observation monitoring will be reported immediately to the appropriate officials. CFRW will work with Stormwater Services to modify monitoring/reporting template this year. *Reports will be submitted within 10 days of monitoring.* **($1100)**

## July 1 - September 30, 2013

Watershed Watch Reports were submitted in both August and September for Burnt Mill Creek/Shirley Rd. and also for Burnett Blvd. ditch beside Cape Fear Outdoor Equipment in the Greenfield Lake Watershed. In August a report was submitted for Burnt Mill Creek/Wallace Park. In September a report was submitted for Smith Creek/Shirley Rd.

## October 1 - December 31, 2013

Watershed Watch Reports were submitted for November for Smith's Creek/Shirley Rd. and also for Burnett Blvd. ditch beside Cape Fear Outdoor Equipment in the Greenfield Lake Watershed and also for Burnt Mill Creek/Shirley Rd.

## January 1 - March 31, 2014

Watershed Watch Reports were submitted in January and March for Burnt Mill Creek/Grace St. and also for Burnt Mill Creek/Shirley Rd.

**April 1 – June 30, 2014**
Watershed Watch Reports were submitted in June for Burnt Mill Creek/Mary Bridges Park and also for Burnt Mill Creek/Shirley Rd.

**Programs/Partnerships** ***Total Allocated Cost: $600***
**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, local grant projects, and the Smith Creek paddle trail. **($600)**

**July 1 - September 30, 2013**
CFRW incorporated wildlife feeding short presentation into every eco tour at Greenfield Lake. This quarter, 161 individuals were educated regarding the negative impacts of feeding wildlife at Greenfield Lake. In addition to the eco tours, CFRW created a powerpoint presentation highlighting the impact of feeding waterfowl human food. We presented this to 15 girls scouts on September 24th at the CFRW headquarters. Greenfield Lake Boat Rental Staff have spoken to several dozen park visitors, informing them about the Wildlife Feeding Education Campaign and directing them to the signs explaining the harm caused by feeding wildlife.

**October 1 - December 31, 2013**
Greenfield Lake Boat Rental Staff have spoken to several dozen park visitors, informing them about the Wildlife Feeding Education Campaign and directing them to the newly erected signs explaining the harm caused by feeding wildlife. Smith Creek Paddle with 58 participants. Kemp Burdette facilitated two City of Wilmington Comprehensive Plan neighborhood meetings. CFRW applied for and received a grant to fund signage for paddle trails around Eagles Island with COW as a coalition partner.

**January 1 - March 31, 2014**
Greenfield Lake Boat Rental Staff have spoken to several dozen park visitors, informing them about the Wildlife Feeding Education Campaign and directing them to the erected signs explaining the harm caused by feeding wildlife. Kemp Burdette facilitated a City of Wilmington Comprehensive Plan neighborhood meeting. Kemp Burdette met with members of St. Paul's Church regarding Burnt Mill Creek.

**April 1 – June 30, 2014**
Greenfield Lake Boat Rental Staff have spoken to several dozen park visitors, informing them about the Wildlife Feeding Education Campaign and directing them to the erected signs explaining the harm caused by feeding wildlife. Kemp Burdette and CFRW continue to attempt to save the Lower Cape Fear River Basin through advocacy by battling Titan Cement, Duke Energy, CAFOs, Fracking, and other potential polluters alongside various environmentally aware groups.

**Monitoring Activities** ***Total Allocated Cost: $3000***
**Monitor, maintain, and provide outreach/education for the Kerr Avenue Stormwater Wetland.** Activities include clean-ups, maintenance of plants as needed, and evaluation/ feedback 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 using supplied templates 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. **($1350)**

**July 1 - September 30, 2013**
Monitoring Reports for July, August, and September were completed and submitted.

**October 1 - December 31, 2013**
Monitoring Reports for October and November were completed and submitted.

Kerr Avenue Wetland – Resources Class Visit by UNCWilmington
Discussion of the Wetland Function, Stormwater, Water Properties, and Plant Types
Invasive Removal and Trash Pickup as Service

**April 1 – June 30, 2014**
Monitoring Reports for April, May, and June were completed and submitted.

*Kerr Avenue Wetland Outreach conducted by volunteer interns Shawn and Meghan:*
Harris Teeter – spoke to manager, received three pamphlets
P.T.'s Grille – spoke to cashier, received two pamphlets
Long Island Eatery – spoke to manager, received one pamphlet
TJ & Company Salon and Spa – spoke to employee, received one pamphlet
Low Tide Pub – spoke to bartender/server, received one pamphlet
Apple Annie's Bake Shop – spoke to employee, received one pamphlet
Big Gal's Plus Size Consignment – spoke to employee, received one pamphlet
The Eclectic Etc. – spoke to manager/owner, received one pamphlet
Sally Beauty Supply – spoke to cashier, received one pamphlet
Andrea's Salon – spoke to employee, received two pamphlets
Wilmington Furniture & Mattress Co.- spoke to employee, gave a pamphlet to her and manager
ACE Laundromat- dropped off three pamphlets
Taqueria La Tapatia- spoke to employee, received on pamphlet
Trolly Stop- spoke to both managers, received two pamphlets
Tonia's Exclusive Hair Gallery- spoke to manager and employee, received two pamphlets
Cookout- spoke to manager, received one pamphlet
K-mart- spoke to employee, received one pamphlet
McDonald's- spoke to manager dropped off one pamphlet
Where businesses were closed, we placed 1-2 pamphlets in each mailbox:
CPR Stat, Anthony's Hair & Body, Silver Shears Hair Styling, Still Waters Salon Suites, A Shear Distinction Hair Salon, Broswell Photography, Lifeline Pregnancy Center

**Monitor and evaluate the condition of Greenfield Lake, including the aquatic vegetation management techniques implemented to improve the water quality of the 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 using supplied templates within 10 days of observation.* The monitoring report will include observations from specified locations around the lake highlighting water clarity, invasive species, algae, wildlife, spillway depth, maintenance and restoration opportunities, and photographs. **($1650)**

**July 1 - September 30, 2013**
Monitoring Reports for July, August, and September were completed and submitted.

**October 1 - December 31, 2013**
Monitoring Reports for October and November were completed and submitted.

**April 1 – June 30, 2014**
Monitoring Reports for April, May, and June were completed and submitted.

**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.

CFRW will maintain all records and reports *(ie. annual contract, quarterly reports, quarterly invoices, monitoring reports, cleanup reports, educational activities, educational print materials, etc)* related to this contract on a fiscal year basis (July 1-June 30). These records should be retained for a period of at least 5 years. In addition, an annual compilation CD or DVD copy will be provided to the City of Wilmington Stormwater Services by July 15th for the prior FY. These files are public record and should be accessible.

**Contact person:** Stormwater Services requires one main point of contact for the implementation, management, communication and reporting of this annual contract. This staff person will be the individual that implements the majority of contract services, and therefore will be the most familiar with the contract. The designated contact person is: **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 will be included in the City's NPDES yearly report to the State.

**Report compiled by: Scott Whitham** **Date: 7/1/14**

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

## Quarterly Progress Report #4: April 1 – June 30, 2014

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, 2013** through **June 30, 2014** for the agreed amount of **$26,500**. These contracted services, implemented as equitably as possible throughout the fiscal year, assist the City in meeting requirements of the federal NPDES Stormwater Permit.

## Public Education/Outreach

***Total Allocated Cost: $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 the specific NC Essential Standard and objectives for the Hydrosphere unit. Enviroscape instructors will be trained, certified, and follow all applicable Enviroscape policies and procedures as set forth by the City of Wilmington Stormwater Services. A maximum of 3 trained Enviroscape instructors from each agency (which includes the Enviroscape supervisor) are permitted to deliver presentations in 8th grade. Additional presentations should not conflict with the 8th grade presentations in any fashion. Other efforts may include assisting with curriculum development, outreach, teacher relations, and training instructors. **($1987.50)**

### October 1-December 31, 2013

| **8th Grade Enviroscape Presentations** | | | | |
|---|---|---|---|---|
| **Date** | **School** | **Grade** | **# of presentations** | **# of students** |
| 10/9/13 | Myrtle Grove Middle | 8th | 2 | 48 |
| 10/22/13 | Murray Middle | 8th | 1 | 27 |
| 10/23/13 | Murray Middle | 8th | 2 | 51 |
| 10/24/13 | Murray Middle | 8th | 2 | 49 |
| 11/5/13 | Noble Middle | 8th | 2 | 54 |
| 11/6/13 | Noble Middle | 8th | 1 | 23 |
| 11/13/13 | Noble Middle | 8th | 1 | 25 |
| 11/19/13 | Williston Middle | 8th | 2 | 50 |
| 12/19/13 | Trask Middle | 8th | 1 | 26 |

Completed all training criteria for one new instructor as well as provided availability for upcoming spring semester.

**January 1 – March 31, 2014**

| 8th Grade Enviroscape Presentations | | | | |
|---|---|---|---|---|
| **Date** | **School** | **Grade** | **# of presentations** | **# of students** |
| 2/4/2014 | Trask Middle | 8th | 2 | 50 |
| 2/5/2014 | Trask Middle | 8th | 1 | 26 |
| 2/27/2014 | Holly Shelter Middle | 8th | 2 | 56 |

**April 1 – June 30, 2014**

| 8th Grade Enviroscape Presentations | | | | |
|---|---|---|---|---|
| **Date** | **School** | **Grade** | **# of presentations** | **# of students** |
| 4/29/2014 | Roland Grise Middle | 8th | 2 | 57 |
| 4/30/2014 | Roland Grise Middle | 8th | 2 | 58 |

**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 the Canines for Clean Water (C4CW) booth at a minimum of 3 pet-related events (with pets present at a minimum of 2 events) which target city residents. The expectation is to target well-attended events. **($1325)**

**October 1-December 31, 2013**

Booked participation in paws4people 5K and Pawz in the Park pet event in upcoming quarters.

**January 1 – March 31, 2014**

| Pet Events | | | | |
|---|---|---|---|---|
| **Date** | **Event** | **Location** | **Method of Delivery/Materials/Theme/Etc.** | **Attendance** |
| 3/30/2014 | Paws4people 5K | UNCW campus | C4CW display table and pledge signatures acquired | 35 |

**April 1 – June 30, 2014**

| Pet Events | | | | |
|---|---|---|---|---|
| **Date** | **Event** | **Location** | **Method of Delivery/Materials/Theme/Etc.** | **Attendance** |
| 5/3/2014 | Pawz in the Park | Battleship Park | C4CW display table and pledge signatures acquired | 61 |
| 6/7/2014 | Brunswick WaterFest | Battleship Park | C4CW display table and pledge signatures acquired | 5 |

**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)**

**October 1-December 31, 2013**

| Stormwater 101 Presentations | | | |
|---|---|---|---|
| **Date** | **Organization/Audience** | **Method of Delivery/Materials/Etc.** | **Attendance** |
| 10/16/13 | UNCW Environmental Studies Class | Power point presentation, presentation provided to students electronically. Link to Citizens Guide also provided to all electronically. | 37 |
| 11/16/13 | UNCW UNI Class | Power point presentation, presentation provided to students electronically. Link to Citizens Guide also provided to all electronically. | 12 |

**April 1 – June 30, 2014**

| Stormwater 101 Presentations | | | |
|---|---|---|---|
| **Date** | **Organization/Audience** | **Method of Delivery/Materials/Etc.** | **Attendance** |
| 5/18/14 | St. Paul's Church | Enviroscape model with posters and script from Stormwater 101 presentation. Links to citizens guide and promotional materials distributed from City Stormwater Services | 80 |

**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 Wilmington Earth Day Festival each spring. NHSWCD staff will attend and provide BMP and rain barrel sale information at the annual Wilmington Garden Show, or its equivalent. 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. **($2650)**

**July 1 - September 30, 2013**

NHSWCD Staff has attended two meetings regarding Earth Day. Staff is now responsible for finances of the Earth Day Alliance and has taken on a major role of finding funders as well as other responsibilities usually performed by the Chair of the committee. All NHSWCD Staff have taken some responsibility of the Chair's role in order for the committee to continue to function.

**October 1-December 31, 2013**

| Community Outreach Events | | | | |
|---|---|---|---|---|
| **Date** | **Event** | **Location** | **Method of Delivery/Materials/Theme/Etc.** | **Attendance** |
| 10/26/13 | Operation Medicine Drop | NHC Medical Mall | Provided brochures and information about water pollution caused by "flushed" drugs. Also coordinated recycling of all medical bottles. | 752 |
| 1/1/13-1/11/13 | Cape Fear Fair and Expo | Fair Grounds at NHC Airport | Display/Booth regarding District programs as it relates to Agriculture. Reducing non-point source water pollution as it relates to all programs was also displayed | 10,000+ |

Staff has attended two regular meetings regarding and two sub-committee meetings finances as well as outreach for the Earth Day Festival. Staff is currently working to have the 501c3 license reinstated as well as working on updating information required by the State of North Carolina.

**January 1- March 31, 2014**

| Community Outreach Events | | | | |
|---|---|---|---|---|
| **Date** | **Event** | **Location** | **Method of Delivery/Materials/Theme/Etc.** | **Attendance** |
| 1/18/14 | Cape Fear River Watch Striper Fest | Coastline Convention Center | Assisted in activities geared toward children to help learn about water quality and local water issues. | 450 |
| 1/24 & 1/25/2014 | TreeFest | Independence Mall | Worked the two day event, which provides free seedling and grassplugs to county residence to help control soil erosion and improve water quality as a result. Gave away over 7250 seedlings and 750 grassplugs. | 1033 |
| 2/10/2014 | Bellamy Going Green | Bellamy Mansion | Participated in a public education event about rain water collection and promoted the rain barrel sale and stormwater reduction education. | 75 |
| 3/18/2014 | Coastal Envirothon | Cool Springs Education Center | Staff provided support for participating teams. Three local teams from Hoggard High School | 300 |

| | | | | |
|---|---|---|---|---|
| | | | attended, participated and advanced to the state level. | |
| 3/22/14 | Operation Medicine Drop | NHC Medical Mall | Coordinated recycling of all plastics (bottles and lids) and all paper products (boxes and inserts). | 645 |
| 3/22/14 | World Water Day Girl Scout Day | Greenfield Lake | 5 station field day that included NHSWCD staff doing the enviroscape for the scouts | 83 |

Staff has attended 2 Earth Day meetings in order to finalize logistics for this year's events.

**April 1- June 30, 2014**

| **Community Outreach Events** | | | | |
|---|---|---|---|---|
| **Date** | **Event** | **Location** | **Method of Delivery/Materials/Theme/Etc.** | **Attendance** |
| 4/26/14 | Wilmington Earth Day Festival | Hugh MacRae Park | Worked the 1-day event, including set-up, breakdown, and logistics throughout the day. Also set up a display booth regarding District programs. | 5000 |
| 5/3/2014 | CFRW LakeFest | Greenfield Lake | Display/booth regarding District programs. Booth activities geared toward children to help learn about water quality and local water issues | 30 |

**Promote/consult on Low Impact Development (LID) including stormwater Best Management Practices (BMPs) to developers, engineers, architects, property owners, HOAs, etc.** Promote BMPs, 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. **($662.50)**

**July 1 - September 30, 2013**

NHSWCD staff provided comments for six plans submitted to New Hanover County Technical Review Committee (NHC TRC). These comments include ideas and suggestions to follow the City/County LID manual as well as best management practices that would work with the soils found on the site.

**October 1-December 31, 2013**

NHSWCD staff provided comments for five plans submitted to New Hanover County Technical Review Committee (NHC TRC). These comments include ideas and suggestions to follow the City/County LID manual as well as best management practices that would work with the soils found on the site.

**January 1- March 31, 2014**

NHSWCD staff provided comments for three plans submitted to New Hanover County Technical Review Committee (NHC TRC) and two concept plans for the City of Wilmington. These comments include ideas and suggestions to follow the City/County LID manual as well as best management practices that would work with the soils found on the site.

**April 1-June 30, 2014**

NHSWCD staff provided comments for five plans submitted to New Hanover County Technical Review Committee (NHC TRC). These comments include ideas and suggestions to follow the City/County LID manual as well as best management practices that would work with the soils found on site.

**Facilitate additional environmental education presentations in the community that highlight stormwater issues for local residents, students, teachers, 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. **($2650)**

## July 1 - September 30, 2013

| Environmental Education Presentations | | | | | |
|---|---|---|---|---|---|
| **Date** | **School/Audience** | **Grade** | **Topic/Activity** | **# presentations** | **Attendance** |
| 8/7/13 | Wrightsville Beach Surf Camp | K-3 | Water Pollution/Enviroscape | 1 | 13 |
| 8/14/13 | Wrightsville Beach Surf Camp | K-3 | Water Pollution/Enviroscape | 1 | 15 |
| 9/18/13 | Pine Valley Elementary | 4th | Geology | 1 | 12 |

## October 1-December 31, 2013

| Environmental Education Presentations | | | | | |
|---|---|---|---|---|---|
| **Date** | **School/Audience** | **Grade** | **Topic/Activity** | **# presentations** | **Attendance** |
| 10/2/13 | Holly Tree Elementary | 4th | Erosion | 1 | 31 |
| 10/7/13 | Isaac Bear High School | 9th | Water Quality Testing | 3 | 48 |
| 10/8/13 | Isaac Bear High School | 9th | Water Quality Testing | 1 | 25 |
| 10/8/13 | Elementary Science Teachers | K-5th | All District Programs for Students | 1 | 28 |
| 10/9/13 | High School Science Teachers | 9-12 | All District Programs for Students | 1 | 7 |
| 10/10/13 | Middle School Science Teachers | 6-8 | All District Programs for Students | 1 | 20 |
| 10/25/13 | Trask Middle | 8th | Aldo Leopold/Ecology | 4 | 84 |
| 11/8/13 | Trask Middle | 6th | Water Conservation | 1 | 25 |
| 11/13/13 | Trask Middle | 6th | Water Conservation | 1 | 36 |
| 12/7/13 | Hoggard High | 9th | "Living Soil" | 1 | 32 |
| 12/18/13 | Trask Middle | 8th | Ecology/Ocean food webs and pollution | 4 | 86 |

## January 1-March 31, 2014

| Environmental Education Presentations | | | | | |
|---|---|---|---|---|---|
| **Date** | **School/Audience** | **Grade** | **Topic/Activity** | **# presentations** | **Attendance** |
| 1/7/14 | Wilmington Academy of Arts & Science | 6, 7, 8 | "Living Soil" | 3 | 41 |
| 1/13/14 | Trask Middle | 6th | Water Conservation | 1 | 33 |
| 1/14/14 | Wrightsboro Elementary | 4th | Erosion & Weathering | 3 | 66 |
| 1/27/14 | Pine Valley Elementary | 5th | "Living Soil" | 1 | 55 |
| 2/4/14 | Island Montessori | 3rd | "Living Soils" | 1 | 30 |
| 2/5/14 | Island Montessori | 4th & 5th | "Living Soils" | 1 | 20 |
| 2/5/14 | Pine Valley Elementary | 4th & 5th | "Living Soils" | 3 | 85 |
| 2/21/14 | Trask Middle | 8th | Water bourne illness and pollution | 4 | 88 |
| 2/26/14 | Trask Middle | 6th | Water Conservation | 1 | 40 |
| 3/13/14 | Holly Tree Elementary | 3rd | Soil & plants | 1 | 39 |
| 3/14/14 | Holly Tree Elementary | 3rd | Soil & plants | 1 | 44 |
| 3/24/14 | Pack 277 – Cub and Boy Scouts | 1-12 | Enviroscape | 1 | 12 |
| 3/28/14 | Trask Middle | 8th | Aldo Leopold/Ecology | 4 | 88 |

**April 1-June 30, 2014**

| Environmental Education Presentations | | | | | |
|---|---|---|---|---|---|
| **Date** | **School/Audience** | **Grade** | **Topic/Activity** | **# presentations** | **Attendance** |
| 5/12/2014 | Blair Elementary | 3rd | Soils and Plants | 1 | 50 |
| 5/13/2014 | Castle Hayne Elementary | 3rd | Erosion and Weathering | 1 | 24 |
| 5/14/2014 | Blair Elementary | 3rd | Soils and Plants | 1 | 50 |
| 5/15/2014 | Castle Hayne Elementary | 3rd | Erosion and Weathering | 1 | 26 |
| 5/21/2014 | Blair Elementary | 3rd | Soils and Plants | 1 | 25 |
| 6/18/14 | Wrightsville Beach Surf Camp | K-3 | Water Pollution/Enviroscape | 1 | 15 |
| 6/25/14 | Wrightsville Beach Surf Camp | K-3 | Water Pollution/Enviroscape | 1 | 15 |
| 6/30/2014 | Childcare Network | K-7 | Erosion & Weathering | 1 | 25 |

**Organize/facilitate at least 2 Environmental Field Days 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/water quality, soils/erosion, forestry, wildlife, and other environmental issues. **($1987.50)**

**July 1 - September 30, 2013**

Staff has coordinated and organized two elementary school field days. These presentations are scheduled during the next quarter of reporting.

**October 1-December 31, 2013**

| Environmental Field Day | | | | | |
|---|---|---|---|---|---|
| **Date** | **School/Audience** | **Grade** | **Topic/Activity** | **# presentations** | **Attendance** |
| 10/23/13 | Gregory Elementary | 3rd | Soils/Aquatics/Wildlife/Plants | 4 of each | 85 |
| 10/28/13 | Virgo Middle | 6th | Soils/Aquatics/Wildlife/Eco-Tour/Plants | 5 of each | 87 |
| 11/1/13 | Anderson Elementary | 3rd | Soils/Aquatics/Wildlife/Plants | 4 of each | 110 |

**Update and maintain agency website and social media outlets including 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. NC Community Conservation Assistance Program (CCAP) project pictures will continue to be labeled and updated and a map showing CCAP and other BMP projects will be updated and available on the website. The city's Report Stormwater Pollution hotline and online reporting form will be promoted and linked from the NHSWCD website. The NHSWCD website will be promoted on local government TV and social media outlets. **($1325)**

**July 1 - September 30, 2013**

Staff has continued to work with New Hanover County to convert our current website over to the new NHC format. District Staff is currently waiting for instructions and format to do so. In the interim Staff has continued to update the current website with events as well as announcements regarding current board openings.

**January 1- March 31, 2014**

The city's Report Stormwater Pollution hotline and online reporting form were added to the NHSWCD web site, with a direct link to the online reporting form. Staff and Supervisor changes were updated and the calendar underwent continual updates with events and classroom presentations. The NHSWCD website has continually been promoted on local government TV and social media outlets, with a large emphasis and increase in Facebook promotion. That rain barrel sale portion of the site is being updated, and the BMP photo gallery is being revamped entirely.

**April 1-June 30, 2014**

The NHSWCD website has been revised and updated, and in June it was transitioned to be nested under the New Hanover County Government website. The new website is soilwater.nhcgov.com. The rain barrel page was updated to reflect the new Square marketplace page, where customers can purchase rain barrels in advance.

## Public Involvment/Volunteer Efforts

***Total Allocated Cost: $994***

**Encourage public involvement by engaging city residents/businesses/civic groups in a volunteer Storm Drain Marking program in the city to educate residents about stormwater pollution. A minimum of 2 separate volunteer days is required.** For each outing day, a minimum of 7 markers will be applied per volunteer group and doorhangers will be distributed to surrounding residences/businesses. Staff will use supplied markers, identify areas to mark drains, train volunteers in marking and safety, educate them about stormwater runoff and the purpose of the program, and help provide oversight of the program. A trained NHSWCD staff member is required to be present with volunteers during all storm drain marking activities and volunteer efforts. **($994)**

**October 1-December 31, 2013**

| **Storm Drain Marking** | | | |
|---|---|---|---|
| **Date** | **Name of Volunteer Organization, Business, etc.** | **Volunteers** | **Area Marked & # of Storm Drains Marked** |
| 11/17/13 | UNCW Students | 4 | Holly Glenn, 8 drains marked |

**January 1 – March 31, 2014**

Third quarter marking events were supposed to take place on March 29th and/or 30th, but got rained out. They have been rescheduled for April 12th, in the fourth quarter. Cub and Tiger Scouts were one group and Boy and Eagle Scouts were the second group. Two staff members were fully trained to assist and lead this activity.

**April 1 – June 30, 2014**

| **Storm Drain Marking** | | | |
|---|---|---|---|
| **Date** | **Name of Volunteer Organization, Business, etc.** | **Volunteers** | **Area Marked & # of Storm Drains Marked** |
| 5/17/2014 | Boy Scouts/Cub Scouts of America | 12 | Windchime, Serratra Lane, Rounding Bend Lane area marked; 16 drains marked in total |

## Programs/Partnerships

***Total Allocated Cost: $8281***

**Serve as an active partner organization on local grant projects and initiatives that benefit local surface water quality and water resources.** Examples include, but are not limited to, providing education

and other programs related to a local grant, Bradley & Hewletts Creek Watershed restoration plan implementation, or development of a school BMP/outdoor educational center. **($2318.50)**

**July 1 - September 30, 2013**

| Grant Projects/Water Quality Initiatives/Partnerships | | |
|---|---|---|
| **Date** | **Topic/Discussion** | **Progress Made/Next Steps** |
| 9/13/13 | Bradley/Hewletts Creek Volume Reduction | Contributing member to group focused on reducing volume and installing BMPs in the Hewletts and Bradley Creek Watersheds. This group is focusing these efforts for a grant, and will be meeting quarterly until the requirements of the grant are fulfilled. |
| 9/25/13 | County Watershed Map | Provided input regarding names, boundaries, and other information that will be presented on at new watershed map for the county. |

**January 1- March 31, 2014**

| Grant Projects/Water Quality Initiatives/Partnerships | | |
|---|---|---|
| **Date** | **Topic/Discussion** | **Progress Made/Next Steps** |
| 2/20/14 | Bradley/Hewletts Creek Volume Reduction | Contributing member to group focused on reducing volume and installing BMPs in the Hewletts and Bradley Creek Watersheds. This group is focusing these efforts for a grant, and will be meeting quarterly until the requirements of the grant are fulfilled. This quarter meeting focused on next steps in the Rain Tree community and site plans for monitoring and large BMPs being installed in the community. |

Provided information to Watershed Coordinator regarding previously installed BMPs through CCAP to enter into tracking atlas. Also communicated regarding logistics of Rain Tree project.

**April 1-June 30, 2014**

| Grant Projects/Water Quality Initiatives/Partnerships | | |
|---|---|---|
| **Date** | **Topic/Discussion** | **Progress Made/Next Steps** |
| 6/25/14 | Bradley/Hewletts Creek Volume Reduction | Contributing member to group focused on reducing volume and installing BMPs in the Hewletts and Bradley Creek Watersheds. This group is focusing these efforts for a grant, and will be meeting quarterly until the requirements of the grant are fulfilled. This quarter meeting focused on next steps in monitoring and large BMPs being installed in the community. Permits to DOT were submitted and waiting for final comments to start construction. |

**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. **($2385)**

**July 1 - September 30, 2013**
NHSWCD received the FY 2014 allocation for CCAP BMPs. This year the District has approximately $4,200 to spend. One project has been approved. This project is to install curb cuts and a rain garden if there are enough remaining funds in a Home Owners Association in Greenfield Lake Watershed.

**October 1-December 31, 2013**
NHSWCD staff one technical review committee/subcommittee meeting in Raleigh on 10/22/13. Topics and issues covered future changes and plans for allocated CCAP funds across the state as well as the change to allow stormwater credit for pervious pavement.

**January 1- March 31, 2014**
Attended meeting in Raleigh 1/22/14 regarding funding restructure of CCAP program. Discussed different ideas of how to make greater impact with limited funds. A survey will be sent out across the state regarding successes and difficulties Districts have had with the program. Approved two different applications for Cistern projects. One project is in the Bradley Creek watershed. The other project is in the Burnt Mill Creek watershed.

**April 1-June 30, 2014**
Completed annual strategy plan for Division of Soil and Water, including funding request for next year, ranking forms for next year and policies regarding how contracts for the program will be approved. Also completed spot checks on 6 BMPs. All BMPs were in compliance; however, one BMP needed maintenance. Applicant for filter boxes was contacted and maintenance was performed.

**Administer and partner with the City of Wilmington Stormwater Services to hold a public rain barrel sale.** NHSWCD will utilize local government television, local events including Earth Day and the Cape Fear Garden Show, agency website, and periodic press releases to the media to promote the sale. Rain barrel buyers will be asked to give their watershed location in order to educate them about watersheds and record volume reduction for the Bradley/Hewletts Creek watershed restoration effort. **($1192.50)**

**July 1 - September 30, 2013**
8/8/13: 3 Moby, 2 Ivy and 1 Rain Water USA Barrel
9/12/13: 4 Ivy

**October 1 - December 31, 2013**
10/10/13: no sales
11/14/13: 3 Ivy, 8 Moby
12/12/13: 3 Ivy, 1 Moby

**January 1 - March 31, 2014**
1/9/14: 1 Ivy
2/13/14: 5 Ivy
3/10/14: 10 Ivy, 7 Moby

The rain barrel provider will be switched from Rain Water Solutions to Rain Barrel USA starting in the fourth quarter. This is due to the fact that RWS is no longer able to consign barrels to NHSWCD.

**April 1 – June 30, 2014**
4/14/14: 5 Moby, 5 Ivy, 3 Tall Stack (80 gallon barrel)
5/8/14: 3 Moby, 4 Short Stack (60 gallon barrel), 3 Tall Stack
6/12/14: 5 Short Stack, 4 Tall Stack

Total: 80 rain barrels sold during the annual contract period.

**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 and LID practices through the protection and awareness of our natural resources. **($2385)**

**July 1 - September 30, 2013**
Staff attended one regular board meeting, one awards committee meeting, and contributed materials via phone/email to one regular board meeting. Staff will continue to serve as Treasurer for this committee again this year. Staff has been working on coordinating changing over the old Stewardship website to a new website. The new website should be functional by February.

**October 1-December 31, 2013**
Staff attended two regular board meeting, one awards committee meeting, and the site judging event. Staff provide two treasurers reports. Staff has been working on coordinating changing over the old Stewardship website to a new website. Staff is working with other board members to present information on the program to the National Association of Conservation Districts.

**January 1- March 31, 2014**
Attended three regular board meetings and the awards event on 2/19/14. Four applicants received awards. Brunswick Nature Park, Tonbo Meadow, and Piney Ridge Nature Preserve received the significant achievement level and Live Oak Bank Headquarters received the Outstanding award. Brunswick Housing Opportunities and Leonidas Jack also received a Stewardship Champion award for their personal work towards supporting conservation and stewardship efforts in the community. Also served as a speaker to the National Association of Conservation Districts national webinar regarding urban issues within Districts 1/16/14. Staff provided background information on the program, successes, lessons learned, and importance of the program in the area.

**April 1-June 30, 2014**
Staff attended two regular board meetings and a board retreat. Staff continued to serve as Treasurer and was nominated to serve as Treasurer next year. As Treasurer completed end of year report as well as gathered materials for committee to preform and internal audit.

## Monitoring Activities

***Total Allocated Cost: $1325***

**Serve as the lead agency for managing land conservation easements in the Hewletts Creek Watershed and other potential sites.** Annually monitor currently held conservation easements, and provide educational contact with 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, 2013**

| **Education Presentations** | | | | |
|---|---|---|---|---|
| **Date** | **Audience/Topic** | **Grade** | **# presentations** | **# of students** |
| 8-15-13 | YWCA Camps | K-8 | 4 | 75 |

Staff presented water quality presentations and lead nature hikes with YWCA students. The hike was in the conservation easement the District holds for the YWCA. Students learned the importance and significance of this easement as well as information about natural resources including but not limited to water quality, forestry, and wildlife.

**April 1-June 30, 2014**

Completed easement check on 5/20/14. No violations or encroachments had occurred. Some erosion issues near the easement were reported. One site was due to home construction, and was reported to NHC engineering staff. The other site was due to Cape Fear Public Utility Authority maintenance and was reported to the Division of Water Resources. Approximately 300 newsletters were also mailed to Hewletts Creek residents and approximately another 300 NHC residents received the newsletter via email. The newsletter promoted the new re-route your downspout program as well as other District programs, including work in the Hewletts Creek Watershed.

## 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.

NHSWCD will maintain all records and reports related to this contract on a fiscal year (FY) basis (July 1-June 30). These records should be retained for a period of at least 5 years. In addition, an annual compilation CD or DVD copy will be provided to the City of Wilmington Stormwater Services by July 15th for the prior FY. These files are public record and should be accessible.

**Contact person:** Stormwater Services requires one main point of contact for the implementation, management, communication and reporting of this annual contract. This staff person will be the

individual that implements the majority of contract services, and therefore will be the most familiar with the contract. The designated contact person is: **Dru Harrison. ($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.

**Report compiled by:** Dru Harrison **Date:** 7/11/14

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

No employee training was conducted during this reporting year. Training is scheduled for staff in late August – early September 2014 for the Engineering Department (Construction Inspectors). In addition, new employee training material and presentations have been discussed as part of an on-boarding process when new hires start in their respective positions with the City. Training material for these new employees is planned for implementation during the upcoming reporting period. Refresher training and education for existing staff will be updated as necessary and implemented every 1-2 years.

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

**Cape Fear Public Utility Authority and City of Wilmington**

*Purpose:*

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

*Reporting Requirements:*

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

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

Spills greater than 1,000 gallons require an additional completed copy of the DWQ's Collection System Sanitary Sewer Overflow Reporting Form (CS-SSO) provided at the same time as when provided to the State. Failure to comply may result in an NOV for CFPUA. Clean up requirements are in accordance with the CFPUA's Clean up Procedure Policy. This information

will also be used in documenting the compliance with the City of Wilmington's annual NPDES Phase II Stormwater report to NCDWQ.

*City of Wilmington Contact Information:*

**Spills less than 1,000 gallons**

Use the Pollution Prevention Hotline: 910-341-1020
Or go to: www.wilmingtonnc.gov/reportstormwaterpollution and fill out the on line form.

**Spills greater than 1000 gallons or system leaks**

1) 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) Jim Conlon
Drainage Manager
910-341-4646
jim.conlon@wilmingtonnc.gov

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

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

**Dry Weather Flow Inspection Program**

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

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

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

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

Given that the City is located in a coastal area with tidal influence in parts of the MS4 and numerous groundwater sources infiltrating or directly routed into the MS4, our strategy for performing the observations will be adjusted accordingly. The initial location of all major outfall

points has provided the starting point for the Dry Weather Flow Inspection Program. Each of the major outfall points will be inspected, photographed and have an observation record saved to the GIS database as described above. Following completion of this effort, a similar systematic inspection of major trunk lines and areas of interest will begin.

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

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

## APPENDIX E: CONSTRUCTION SITE RUNOFF CONTROLS

Included in this section:

New Hanover County Erosion & Sedimentation Control Ordinance

**New Hanover County Ordinance:**

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

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

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

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

General requirements of the permit include among others:

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

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

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

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

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

Mandatory Standards For Land Disturbing Activity

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

(1) *Buffer zone*.

a. No land disturbing activity during period of construction or improvement to land shall be permitted in proximity to a lake or natural watercourse unless a buffer zone is provided along the margin of the watercourse of sufficient width to confine visible siltation within the 25 percent of the buffer zone nearer the land disturbing activity. Waters that have been classified as trout waters

by the environmental management commission shall have an undisturbed buffer zone 25 feet wide or of sufficient width to confine visible siltation within the 25 percent of the buffer zone nearest the land disturbing activity, whichever is greater. Provided, however, that the county may approve plans which include land disturbing activity along trout waters when the duration of said disturbance would be temporary and the extent of said disturbance would be minimal. This subdivision shall not apply to a land disturbing activity in connection with the construction of facilities to be located on, over, or under a lake or natural watercourse.

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

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

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

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

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

*(3) Ground cover.* Whenever land disturbing activity is undertaken on a tract comprising more than one acre, if more than one acre is uncovered, the person conducting the land disturbing activity shall install such sedimentation and erosion control devices and practices as are sufficient to retain the sediment generated by the land disturbing activity within the boundaries of the tract during construction upon and development of said tract, and shall plant or otherwise provide a permanent ground cover sufficient to restrain erosion after completion of construction or development. Except as provided in section 23-238(b)(5), provisions for a ground cover sufficient to restrain erosion must be accomplished within 30 working days or 120 calendar days following completion of construction or development whichever period is shorter.

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

Design and Performance Standards.

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

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

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

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

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

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

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

Responsibility For Maintenance.

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

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

## APPENDIX F: POST-CONSTRUCTION SITE RUNOFF CONTROLS

Included in this section:

Inspection Reporting Summary
Inspection Letter
Stormwater Detention Facility Compliance Inspection Report

| **Dates of Inspections** | **August 2013** | **June/July 2014** |
|---|---|---|
| **Total # Sites Inspected** | 321 | 325 |
| ***Response Letter Severity*** | | |
| Level 1 (first letter) | 31 | 42 |
| Level 2 (second letter)* | 0 | 0 |
| Level 3 (third letter)** | 0 | 0 |
| # of Sites Requiring Maintenance | 31 | 42 |

*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

## Summary of Plan Review Activities

| Project Name | Project Type | Permit Number | Date Permit Issued | Type of BMP |
|---|---|---|---|---|
| AA Storage Exp | SWP HD | 2013023 | 7/8/2013 | Pond |
| Carolina Gymnastics Academy Expansion | SWP HD | 2013021 | 7/10/2013 | Pond |
| NHRMC Outpatient Cardiology Center | SWP offsite | 1998004R1 | 7/12/2013 | |
| Taco Bell Fulton Station | SWP offsite | 2013022 | 7/29/2013 | |
| McDonald's Shipyard | SWP HD | 2013024 | 8/9/2013 | Alternative |
| Lake Park Village | SWP HD | 2013026 | 8/19/2013 | Infiltration |
| Splash N Dash | SWP HD | 2013027 | 8/20/2013 | Alternative |
| Croaker Web Bostic | Drain Plan | 2013028 | 8/30/2013 | |
| Hilton Event Deck | Drain Plan | 1998018R1 | 10/4/2013 | |
| City Marina-Wilmington- Harnett St Outfall | SWP LD | 2011036R3 | 10/22/2013 | |
| ABC Site on Kerr | Drain Plan | 1999024R1 | 10/29/2013 | |
| NHC Heallth Department Renovations | Drain Plan | 2013030 | 11/1/2013 | |
| Goodwill on Sir Tyler | SWP offsite | 2013031 | 11/4/2013 | |
| Dunkin Donuts Oleander | SWP offsite | 2013028 | 11/4/2013 | |
| Almost Airlie | Drain Plan | 2013032 | 11/8/2013 | |
| Waffle House CB Road | Drain Plan | 2013033 | 11/13/2013 | |
| US Cellular (Village at College/Oleander) | SWP HD | SDP 1999031R3 | 12/2/2013 | |
| Mayfaire Community Center Phase II, Lot 1-R | SWP HD | 2004010R3 | 12/3/2013 | |
| Panera Bread | SWP offsite | 2013034 | 12/9/2013 | |
| Progress 910 | SWP HD | 2013035 | 1/2/2014 | Pond, Inf. Basin |
| Oak Court Villas (aka Kerr Oak Aots) | SWP HD | 2014001 | 1/13/2014 | Infiltration, Perv. Concrete |
| Atlantic Marine | SWP HD | 2007062R2 | 1/17/2014 | |
| Live Oak Bank Phase II | SWP offsite | 2011034R1 | 2/3/2014 | |
| Belle Meade Village | SWP HD | 2014003 | 2/10/2014 | Wet Ponds |
| Lockwood Village | SWP HD | 2014004 | 2/18/2014 | Wet Ponds |
| Tennis with Love | Drain Plan | 2014005 | 2/20/2014 | |
| Cambridge Village | SWP HD | 2012004R1 | 3/11/2014 | |
| Springhill Suites | SWP offsite | 2014006 | 4/9/2014 | |
| Third and Princess Office | Redevelopment Exclusion | 2014009 | 5/6/2014 | |
| Spartina at Lumina Commons | SWP HD | 2014008 | 5/13/2014 | Infiltration, Perv. Concrete |
| Shops at College | SWP HD | 2014007 | 5/13/2014 | Offsite, Perv. Concrete |
| Tiburon Parc Apts. Phase II | SWP offsite | 2013020R1 | 5/19/2014 | |
| Handee Hugo Market St | SWP HD | 2000005R1 | 5/22/2014 | |
| Dollar General- Dogwood | SWP HD | 2014011 | 5/23/2014 | Infiltration |
| 2nd Church Alley Parking Lot | Drain Plan | 2014018 | 6/2/2014 | |
| COW Firestation #3 | SWP offsite | 2014010 | 6/3/2014 | |
| New Temple of Israel-School/Social Center | Drain Plan | 2014019 | 6/3/2014 | |
| Saxon Place | SWP HD | 2014012 | 6/3/2014 | Infiltration |
| Splash N Dash | SWP HD | 2013027R1 | 6/4/2014 | |
| SECU @ Randall | SWP HD | 2014014 | 6/20/2014 | Infiltration |

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

Form G-7

Sheet 1 of 1

## EMPLOYEE TRAINING CHECKLIST

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

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

Employee Signature: _____

Type/Print Employee Name and Title: JOHN FORNIN FLEET MANAGER

Date Training Received: 7/15/14

Instructor: James Quin 7/15/14

# APPENDIX H: TOTAL MAXIMUM DAILY LOADS (TMDL)

**Bradley & Hewletts Creek Watershed Restoration Plan**

- Heal Our Waterways Program

| DATE OF EVENT/ ACTIVITY | EVENT/ACTIVITY | AUDIENCE | DELIVERED BY (AGENCY) | METHOD OF DELIVERY / MESSAGE | ATTENDANCE/ PARTICIPATION |
|---|---|---|---|---|---|
| ***Presentations*** | | | | | |
| 8/13/2013 | Presentation: Cape Fear Arch, Wilmington, NC | Cape Fear Arch members, UNCW faculty | Heal Our Waterways | Power Point Presentation: Background of water quality issues, watershed health, and explanation of HOW program | 56 Attendees |
| 9/11/2013 | Presentation: UNCW marine science class | Marine science graduate students/ Faculty | Heal Our Waterways | Panel Presentation: Discussion on working in sciences, program development, HOW program | 20 Attendees |
| 9/17/2013 | Presentation: NCAPWA Conference, Wilmington NC | Engineers, planners, government, scientists | Heal Our Waterways | Power Point Presentation: Background of water quality issues and explanation of HOW program, new projects | Approximately 200 attendees |
| 10/9/2013 | Targeted direct mail | Bradley and Hewletts Creek Watershed Residents | Heal Our Waterways | Postcard detailing watersheds/ stormwater pollution | Inform residents about ecological address, impacts of stormwater, how they can help |
| 10/16/2013 | Presentation: UNCW Environmental Policy class | UNCW students, faculty, Tidal Creek co-op customers/ staff | Heal Our Waterways | Lecture: discussion of HOW program, Tidal Creek rain garden project, surveying site | 32 Attendees |
| 11/4/2013 | Targeted door hangers | Residents of Raintree neighborhood/ Hewletts Creek watershed | Heal Our Waterways | Grant BMP project/ Informational meeting | Neighborhood meeting announcement to introduce grant funded BMP project in area/ stormwater education |
| 11/13/2013 | Neighborhood project information meeting | Potential pilot project participants | Heal Our Waterways/ Coastal Federation | Power Point Presentation: stormwater education, NERRS grant plans, BMP installation, HOW program | 9 Attendees |
| 11/14/2013 | Presentation: UNCW environmental policy class | UNCW students, | Heal Our Waterways | Power Point Presentation: Stormwater education, current city efforts, HOW program, community involvement | 30 Students |

| | | | | | |
|---|---|---|---|---|---|
| 11/21/2013 | Presentation: UNCW environmental law classes (2) | UNCW students/faculty | Heal Our Waterways | Power Point Presentation: History of water quality regulation, HOW program, current water quality regs | 33 Students |
| 12/16/2013 | Presentation: Tidal Creek Summit- Wilmington, NC | Researchers, scientists, non-profits, students, regulators | Heal Our Waterways | Power Point Presentation: Heal Our Waterways: Getting Our Feet Wet | Approximately 200 attendees |
| 1/30/2014 | Presentation: UNCW marine science class | UNCW students | Heal Our Waterways | Power Point Presentation: Heal Our Waterways: How we Got Here | 24 Students |
| 1/30/2014 | Homeowner meetings: Raintree neighborhood | Neighborhood residents | Heal Our Waterways/ Coastal Federation | One-on-one meetings to discuss BMP installations | 12 Residences/20 Residents |
| 2/24/2014 | Rain garden training | Landscapers, residents | NC Cooperative Extension/ Heal our Waterways | Oral presentation on HOW program, recruiting participants | 25 Attendees |
| 3/10/2014 | Discussion panel: UNCW Graduate School | UNCW students | Heal Our Waterways | Panel presentation on working with voluntary participation | 15 Students |
| 3/26/2014 | Presentation: NCLID Summit, Raleigh NC | Researchers, developers, designers, engineers | City of Wilmington | Power Point Presentation: Watershed Restoration Through Voluntary Action | Approximately 260 attendees |
| 4/24/2014 | Presentation to UNCW Environmental Law class | UNCW students | Heal Our Waterways | Power Point Presentation: Regulation from City to State | 30 Students |
| 6/17/2014 | Presentation: UNCW environmental science class | UNCW students | Heal Our Waterways | Power Point Presentation: Regulation from City to State | 12 Students |
| 6/17/2014 | Presentation: UNCW environmental law classes | UNCW students | Heal Our Waterways | Power Point Presentation: Stormwater Pollution and Watershed Restoration | 10 Students |
| 6/18/2014 | Presentation: NCSU Engineering Camp students | High school students, NCSU staff, Tidal Creek Co-op staff | Heal Our Waterways/ NCSU staff | Oral Presentation: Rain garden design/planning/ community project | 36 Attendees |

***Informational Website***

| | | | | | |
|---|---|---|---|---|---|
| Ongoing/ In development | Heal our Waterways Informational Website | General Public/Website Viewers | HOW staff/ Maximum Design Agency | Dedicated Heal Our Waterways website | Stormwater/BMP education, media links, participation links |
| 4/24/2014 | City of Wilmington Website/ Facebook Page | General Public/Website Viewers | City Communications Staff | Facebook and Website updates | HOW/ City Earth Day participation |
| April 28- 30, 2014 | City of Wilmington Website/ Facebook Page | General Public/Website Viewers | City Communications Staff | Facebook and Website updates | Tidal Creek Co-op rain garden installation |

***Media Campaigns***

| | | | | | |
|---|---|---|---|---|---|
| April 20 - June 1 2014 | Fairway Outdoor Advertising | Motorists Pedestrians | Heal Our Waterways | Billboard Ad "Clean Waterways are Everyone's Business" | Target Audience: General public Reach: Motorists Frequency: Rotating - shown for 8 seconds every minute 24/7 Total cost: $1350 |
| June 2- June 15, 2013 | Mass Media- WECT.com digital adds | Website visitors | Heal Our Waterways | 30 second PSA: Wash your car on the lawn/ link to HOW website | 30,000 Commercials in June 2014 |
| June 2- June 15, 2014 | Mass Media- WECT PSA | General Public | Heal Our Waterways | 30 second PSA: Wash your car on the lawn | Recorded for the purpose of airing on WECT and GTV-8 and also posting on the HOW website |

***News Coverage***

| | | | | | |
|---|---|---|---|---|---|
| 2/4/2014 | Star News article: 14 New Hanover rivers, creeks below standard | Newspaper and online readers | Star News | Print and online newspaper article | Stats: -94,492 print readers -628,086 monthly unique visitors to online website |
| 2/4/2014 | Star News Article: *Water cleanup takes considerable time, money* | Newspaper and online readers | Star News | Daily newspaper/ starnewsonline.com | Stats: -Daily print newspaper and online website -94,492 print readers -628,086 monthly unique visitors to online website |
| 2/11/2014 | Star News article: *Bioretention area part of plan for Hewletts Creek restoration* | Newspaper and online readers | Star News | Daily newspaper/ starnewsonline.com | Stats: -Daily print newspaper and online website -94,492 print readers -628,086 monthly unique visitors to online website |
| 2/13/2014 | Article on Coastal Review Online | Online readers | The NC Coastal Federation | article on nccoast.org | Article on collaborative effort to install a community rain garden |

| | | | | | |
|---|---|---|---|---|---|
| 4/29/2014 | WECT evening news story | General public | Heal Our Waterways/WECT news | 60 second news story on Tidal Creek Co-op rain garden project | Stats:<br>-WECT-TV6 reaches 176,000 homes/per wk<br>-WECT.com has 250,000 average unique visitors per month and 1,200,000 average page views per month |
| 9/7/2014 | Star News editorial: *Conservation Efforts Can Pay Off, Especially When Groups Come Together* | Newspaper and online readers | Star News | Daily newspaper/ starnewsonline.com | Stats:<br>-Daily print newspaper and online website<br>-94,492 print readers<br>-628,086 monthly unique visitors to online website |

***Distributing promos/giveaways***

| | | | | | |
|---|---|---|---|---|---|
| 4/26/2014 | Lower Cape Fear Earth Day Celebration at Hugh MacRae Park | Festival attendees, general public | Heal Our Waterways ( Earth Day Sponsor) | Display booth, interactive game, and giveaways distributed. Focus: Water Systems & Watersheds | Approx 4000 |
| Ongoing | Public meetings, presentations, events | Event attendees, general public | Heal Our Waterways | Pens, t-shirts, mailings, travel mugs, sticky-notes, brochures | Ongoing |

***Stormwater Staff / Employee Trainings***

| | | | | | |
|---|---|---|---|---|---|
| 11/12/2013 | BMP Design/Installation for High Water Tables | Stormwater employees, engineers, designers | NC Cooperative Extension | Power Point-High water table BMP design/placement | Approximately 35 participants |
| May 28-30, 2014 | Storm EZ Training | Stormwater employees, engineers, designers | NCDENR, NCSU, Withers and Ravenel | Power Point- Using new BMP modeling tool for site design, BMP placement | Approximately 30 participants |

***Grant Projects***

| | | | | | |
|---|---|---|---|---|---|
| Ongoing | NERRS Water Quality Improvement Grant | Watershed residents, general public | Heal Our Waterways, NERRS, UNCW, NCCF, Town of Wrightsville Beach | Residential BMP installations, Municipal BMP installations, Education and Outreach | 12 participating households (residential BMPs and outreach), 6 agencies in collaboration |
| Ongoing | Tidal Creek Co-op Community Rain Garden | General public | Heal Our Waterways, NCSU, Tidal Creek Co-op, UNCW, NCCF, Surfrider Foundation | Design and installation of community rain garden for volume reduction and education and outreach | 6 agencies, public/ volunteer participation |

***Citizen Contacts***

| | | | | | |
|---|---|---|---|---|---|
| Ongoing | Phone calls, email | General public | Heal Our Waterways | Educational materials, phone conversations, HOW website | Count ongoing |

***Citizen Contacts- Public Interaction***

| | | | | | |
|---|---|---|---|---|---|
| 1/30/2014 | Public Meeting: Brookshire/Beasley capital improvement, Parley elementary school | Watershed residents | City of Wilmington | Power point presentation/ one- on-one: Stormwater impacts | Approximately 45 attendees |
| 3/1/2014 | Coastal Federation Shellibration, Total Creek Co-op | NC Coastal Federation members, volunteers, residents, | NC Coastal Federation/ Heal Our Waterways | Booth presence for Rain Garden Project | Approximately 200 attendees |
| 3/11/2014 | Public Meeting: Brookshire/Beasley capital improvement, Parsley elementary school | Watershed residents | City of Wilmington | Power point presentation/ one- on-one: Stormwater impacts | Approximately 50 attendees |
| 4/26/2014 | Earth Day Festival, Wilmington, NC | Residents, non-profits | Heal Our Waterways | Interactive booth | Approximately 2500 attendees |
| 4/28/2014 | Staff training on stormwater/BMPs, Tidal Creek Co-op | Tidal Creek Co-op staff | NC Cooperative Extension/ Heal our Waterways | One-on-one | 14 staff members |
| 5/2/2014 | Community rain garden planting, Wilmington, NC | General public | Heal Our Waterways, Surfrider Foundation, Tidal Creek Co-op | Hands-on participation | 10 volunteers/ 6 project team members |
| 6/25/2014 | Public meeting: Clear Run Branch Project, College Acres elementary school | General public affected by capital improvement project | City of Wilmington, Stormwater | Power point presentation/ one- on-one: Stormwater impacts | Approximately 60 attendees |

## APPENDIX I: REGULATORY ENFORCEMENT ACTIONS

In 13-14 the Public Services Department compliance Officer provided stormwater education and investigated approximately 102 requests. The majority were reports of illicit discharges to the storm drainage system followed by reports of violation of the Pet Waste section of the Stormwater Ordinance. The following table is a detail summary of the requests for compliance intervention for stormwater pollution issues.

### ENFORCEMENT ACTIONS 2013-2014

**Reporting period (FY14) July 1, 2013- June 30, 2014**

| Nature of Complaint | Number of Reports | Resolved thru Public Education | NOVs Incidents | Referred to DWQ | # Civil Penalties |
|---|---|---|---|---|---|
| Pet Waste | 7 | 100% | 0 | N/A | 0 |
| Outreach | 11 | | 0 | N/A | N/A |
| Illicit Discharge/Sediment | 40 | 92.5% | 3 | 8 | 1 |
| *Illicit Connection* | *0* | *0.0%* | *0* | *0* | *0* |
| *Dry Weather Flow* | *1* | *100.0%* | *0* | *0* | |
| *SSO* | *8* | *62.5%* | *3* | *5* | *1* |
| Totals for 1,2 and 3 | 58 | 95% | 3 | 8 | 1 |

### CIVIL PENALTIES 2013-2014

| Nature of Compliant | Responsible Party | Address of violation | Date of Violation | Total Penalty |
|---|---|---|---|---|
| SSO | CFPUA | PS# 34 Pine Grove | 7/29/2013 | $100.00 |

DEFINITIONS: Nature of Complaint

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

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

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

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

SSO (Part 1, Sec.12-24)

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

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

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

Blockages (Part 2, Sec. 12-29)

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

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

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

## APPENDIX J: MAJOR OUTFALL LOCATIONS AND DESCRIPTION TABLE

| Watershed | Latitude | Longitude | Size | Material | Number | Classification | Map Date | Condition |
|---|---|---|---|---|---|---|---|---|
| Barnards Creek | 34.15865 | -77.91188 | 6.0 X 8.0 | RCP | Double | NPDES outfall found | 2/20/2012 | Good |
| Barnards Creek | 34.16482 | -77.92585 | 60 | RCP | Double | NPDES outfall found | 2/20/2012 | Good |
| Barnards Creek | 34.16657 | -77.92957 | 60 | RCP | Triple | NPDES Industrial outfall found | 11/21/2011 | Good |
| Barnards Creek | 34.16113 | -77.93105 | 42 | RCP | Single | NPDES outfall found | 11/2/2011 | Good |
| Barnards Creek | 34.16134 | -77.93815 | 18 | RCP | Quad | NPDES Industrial outfall found | 11/14/2011 | Good |
| Bradley Creek | 34.20898 | -77.83556 | 3.0 X 5.0 | RCP | Single | NPDES outfall found | 1/6/2012 | Good |
| Bradley Creek | 34.21320 | -77.82715 | 2.0 X 4.0 | RCP | Single | NPDES outfall found | 8/29/2000 | Good |
| Bradley Creek | 34.21952 | -77.84568 | 90 | CAP | Double | NPDES outfall found | 1/13/2012 | Good |
| Bradley Creek | 34.21911 | -77.85177 | 72 | CMP | Double | NPDES outfall found | 1/13/2012 | Good |
| Bradley Creek | 34.20939 | -77.83654 | 54 | RCP | Single | NPDES outfall found | 1/6/2012 | Good |
| Bradley Creek | 34.23066 | -77.85234 | 54 | CMP | Double | NPDES outfall found | 1/13/2012 | Good |
| Bradley Creek | 34.23284 | -77.84028 | 54 | CMP | Double | NPDES outfall found | 1/13/2012 | Good |
| Bradley Creek | 34.21585 | -77.82498 | 48 | CMP | Single | NPDES outfall found | 1/31/2012 | Good |
| Bradley Creek | 34.21997 | -77.86130 | 42 | CMP | Single | NPDES outfall found | 1/13/2012 | Good |
| Bradley Creek | 34.22630 | -77.85231 | 42 | CMP | Single | NPDES outfall found | 1/13/2012 | Good |
| Bradley Creek | 34.20829 | -77.83101 | 36 | RCP | Single | NPDES outfall found | 1/6/2012 | Fair |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bradley Creek | 34.20899 | -77.83554 | 36 | CMP | Single | NPDES outfall found | 1/6/2012 | Poor |
| Bradley Creek | 34.20900 | -77.83553 | 36 | CMP | Single | NPDES outfall found | 1/6/2012 | Fair |
| Bradley Creek | 34.21669 | -77.83399 | 30 | CMP | Single | NPDES outfall found | 1/31/2012 | Fair |
| Bradley Creek | 34.21427 | -77.83470 | 24 | RCP | Single | NPDES outfall found | 1/13/2012 | Good |
| Bradley Creek | 34.21440 | -77.83926 | 24 | RCP | Double | NPDES outfall found | 1/13/2012 | Good |
| Bradley Creek | 34.22066 | -77.83784 | 24 | RCP | Single | NPDES outfall found | 1/31/2012 | Good |
| Burnt Mill Creek | 34.22878 | -77.90517 | 11.0 X 12.0 | RCP | Double | NPDES outfall found | 2/28/2012 | Good |
| Burnt Mill Creek | 34.22870 | -77.88923 | 5.0 X 6.0 | CMP | Double | NPDES outfall found | 2/28/2012 | Good |
| Burnt Mill Creek | 34.24617 | -77.93366 | 72 | SMP | Single | NPDES outfall found | 2/28/2012 | Fair |
| Burnt Mill Creek | 34.23148 | -77.91302 | 66 | RCP | Single | NPDES outfall found | 11/24/2010 | Good |
| Burnt Mill Creek | 34.24430 | -77.92571 | 60 | RCP | Single | NPDES outfall found | 9/29/2010 | Good |
| Burnt Mill Creek | 34.23402 | -77.91972 | 54 | RCP | Single | NPDES outfall found | 10/26/2010 | Good |
| Burnt Mill Creek | 34.23232 | -77.91568 | 42 | RCP | Double | NPDES outfall found | 11/9/2010 | Good |
| Burnt Mill Creek | 34.23397 | -77.91877 | 42 | RCP | Single | NPDES outfall found | 11/24/2010 | Good |
| Burnt Mill Creek | 34.23989 | -77.92258 | 36 | RCP | Single | NPDES outfall found | 10/5/2010 | Good |
| Burnt Mill Creek | 34.24025 | -77.92318 | 36 | RCP | Single | NPDES outfall found | 10/5/2010 | Good |
| Burnt Mill Creek | 34.25344 | -77.92354 | 30 | RCP | Double | NPDES outfall found | 3/2/2012 | Good |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Drains directly to ICW | 34.19570 | -77.83301 | 48 | RCP | Single | NPDES outfall found | 1/6/2012 | Good |
| Drains directly to ICW | 34.19629 | -77.82915 | 48 | RCP | Single | NPDES outfall found | 1/6/2012 | Good |
| Drains directly to ICW | 34.22229 | -77.81978 | 48 | IRON | Single | NPDES outfall found | 1/17/2012 | Good |
| Drains directly to ICW | 34.22234 | -77.81985 | 48 | IRON | Single | NPDES outfall found | 1/17/2012 | Good |
| Drains directly to ICW | 34.19503 | -77.83000 | 36 | RCP | Single | NPDES outfall found | 11/22/2011 | Good |
| Drains directly to ICW | 34.19904 | -77.82758 | 36 | RCP | Single | NPDES outfall found | 1/6/2012 | Good |
| Drains directly to ICW | 34.22121 | -77.81566 | 36 | RCP | Single | NPDES outfall found | 1/17/2012 | Good |
| Drains directly to ICW | 34.22432 | -77.81658 | 30 | CMP | Single | NPDES outfall found | 1/17/2012 | Good |
| Drains directly to ICW | 34.22433 | -77.81659 | 30 | CMP | Single | NPDES outfall found | 1/17/2012 | Good |
| Drains directly to ICW | 34.22432 | -77.81658 | 24 | CMP | Single | NPDES outfall found | 1/17/2012 | Good |
| Drains directly to ICW | 34.16461 | -77.85628 | 2.5 X 5.0 | CMP | Single | NPDES outfall found | 7/19/2011 | Fair |
| Greenfield Lake | 34.19852 | -77.93558 | 4.0 X 6.0 | CMP | Triple | NPDES outfall found | 2/22/2012 | Good |
| Greenfield Lake | 34.20094 | -77.93381 | 60 | RCP | Double | NPDES outfall found | 2/22/2012 | Good |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Greenfield Lake | 34.21255 | -77.93161 | 60 | CMP | Quad | | 2/22/2012 | Good |
| Greenfield Lake | 34.21429 | -77.93563 | 48 | RCP | Single | NPDES outfall found | 2/23/2012 | Good |
| Greenfield Lake | 34.20127 | -77.93568 | 42 | RCP | Double | NPDES outfall found | 2/22/2012 | Good |
| Greenfield Lake | 34.19964 | -77.93615 | 36 | RCP | Single | NPDES outfall found | 2/22/2012 | Good |
| Greenfield Lake | 34.20462 | -77.93537 | 36 | RCP | Single | NPDES outfall found | 2/22/2012 | Good |
| Greenfield Lake | 34.20751 | -77.92997 | 30 | RCP | Triple | NPDES outfall found | 2/22/2012 | Good |
| Hewletts Creek | 34.18153 | -77.86851 | 5.0 X 16.0 | OTHER | Other | NPDES outfall found | 11/17/2011 | Good |
| Hewletts Creek | 34.18020 | -77.87198 | 90 | CMP | Single | NPDES outfall found | 11/3/2011 | Good |
| Hewletts Creek | 34.19421 | -77.85211 | 60 | CMP | Single | NPDES outfall found | 11/21/2011 | Fair |
| Hewletts Creek | 34.17296 | -77.85090 | 48 | RCP | Double | NPDES outfall found | 7/28/2011 | Good |
| Hewletts Creek | 34.18735 | -77.85761 | 48 | RCP | Single | NPDES outfall found | 11/3/2011 | Good |
| Hewletts Creek | 34.19359 | -77.85549 | 48 | RCP | Triple | NPDES outfall found | 11/18/2011 | Good |
| Hewletts Creek | 34.17112 | -77.85107 | 42 | RCP | Single | NPDES outfall found | 7/19/2011 | Good |
| Hewletts Creek | 34.17879 | -77.86842 | 42 | RCP | Single | NPDES outfall found | 2/16/2001 | Good |
| Hewletts Creek | 34.19498 | -77.85447 | 42 | RCP | Double | NPDES outfall found | 11/18/2011 | Good |
| Hewletts Creek | 34.19680 | -77.84352 | 42 | CMP | Single | NPDES outfall found | 11/22/2011 | Fair |
| Hewletts Creek | 34.20042 | -77.86258 | 42 | CMP | Single | NPDES outfall found | 11/8/2011 | Fair |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Hewletts Creek | 34.18468 | -77.85373 | 36 | RCP | Single | NPDES outfall found | 2/26/2001 | Good |
| Hewletts Creek | 34.17878 | -77.86844 | 30 | RCP | Single | NPDES outfall found | 11/7/2011 | Good |
| Hewletts Creek | 34.19419 | -77.85209 | 18 | RCP | Single | NPDES outfall found | 2/6/2001 | Good |
| Hewletts Creek | 34.19430 | -77.88617 | 2.0 X 4.4 | RCP | Single | NPDES outfall found | 2/24/2011 | Good |
| Hewletts Creek | 34.19471 | -77.88822 | 6.0 X 8.0 | RCP | Triple | NPDES outfall found | 2/2/2011 | Good |
| Hewletts Creek | 34.19793 | -77.88484 | 7.7 X 15.0 | CAP | Single | NPDES outfall found | 2/24/2011 | Good |
| Howe Creek | 34.24536 | -77.82717 | 7.0 X 9.0 | RCP | Double | NPDES outfall found | 5/16/2007 | Good |
| Howe Creek | 34.25450 | -77.82624 | 72 | RCP | Single | NPDES outfall found | 2/1/2012 | Good |
| Howe Creek | 34.24701 | -77.82334 | 66 | CMP | Single | NPDES outfall found | 2/1/2012 | Good |
| Howe Creek | 34.24211 | -77.82454 | 60 | RCP | Single | NPDES outfall found | 1/31/2012 | Good |
| Howe Creek | 34.24226 | -77.82714 | 48 | RCP | Single | NPDES outfall found | 1/31/2012 | Good |
| Howe Creek | 34.24700 | -77.82333 | 48 | CMP | Single | NPDES outfall found | 2/1/2012 | Good |
| Howe Creek | 34.26158 | -77.82611 | 48 | RCP | Single | NPDES outfall found | 2/1/2012 | Good |
| Howe Creek | 34.24225 | -77.82718 | 42 | RCP | Single | NPDES outfall found | 1/31/2012 | Good |
| Howe Creek | 34.25029 | -77.82655 | 42 | RCP | Single | NPDES outfall found | 2/1/2012 | Good |
| Howe Creek | 34.25030 | -77.82655 | 42 | RCP | Single | NPDES outfall found | 2/1/2012 | Good |
| Howe Creek | 34.24083 | -77.82759 | 36 | RCP | Single | NPDES outfall found | 5/16/2007 | Good |

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|---|---|---|---|---|---|---|---|---|
| Howe Creek | 34.24304 | -77.82263 | 36 | RCP | Double | NPDES outfall found | 2/1/2012 | Good |
| Howe Creek | 34.24519 | -77.82714 | 36 | RCP | Single | NPDES outfall found | 2/1/2012 | Good |
| Howe Creek | 34.24551 | -77.82710 | 36 | RCP | Single | NPDES outfall found | 2/1/2012 | Good |
| Howe Creek | 34.24749 | -77.82369 | 36 | CMP | Single | NPDES outfall found | 2/1/2012 | Good |
| Cape Fear River | 34.20807 | -77.95086 | 10.0 X 10.0 | RCP | Single | NPDES outfall found | 3/15/2011 | Good |
| Cape Fear River | 34.21225 | -77.94608 | 5.8 X 8.4 | RCP | Triple | NPDES outfall found | 3/25/2011 | Good |
| Cape Fear River | 34.19774 | -77.95482 | 66 | RCP | Single | NPDES Industrial outfall found | 11/14/2011 | Good |
| Cape Fear River | 34.20913 | -77.94735 | 48 | RCP | Double | NPDES outfall found | 4/1/2011 | Good |
| Cape Fear River | 34.18028 | -77.95095 | 36 | RCP | Single | NPDES Industrial outfall found | 11/14/2011 | Good |
| Cape Fear River | 34.16995 | -77.94822 | 30 | RCP | Single | NPDES Industrial outfall found | 11/29/2011 | Good |
| Cape Fear River | 34.21504 | -77.94755 | 24 | RCP | Single | NPDES Industrial outfall found | 3/21/2011 | Good |
| Cape Fear River | 34.17135 | -77.94984 | 18 | RCP | Single | NPDES Industrial outfall found | 2/21/2012 | Good |
| Cape Fear River | 34.17294 | -77.94902 | 18 | RCP | Single | NPDES Industrial outfall found | 11/29/2011 | Good |
| Cape Fear River | 34.18391 | -77.95205 | 18 | RCP | Single | NPDES Industrial outfall found | | Good |
| Cape Fear River | 34.24197 | -77.95273 | 3.0 X 10.0 | RCP | Single | NPDES outfall found | 6/10/2011 | Good |
| Cape Fear River | 34.21631 | -77.94661 | 54 | RCP | Single | NPDES Industrial outfall found | 3/15/2011 | Good |
| Cape Fear River | 34.21646 | -77.94663 | 54 | RCP | Single | NPDES Industrial outfall found | 4/11/2011 | Good |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Cape Fear River | 34.22374 | -77.95034 | 54 | RCP | Single | NPDES outfall found | 9/28/2009 | Good |
| Cape Fear River | 34.23969 | -77.95146 | 48 | RCP | Single | NPDES outfall found | 5/27/2011 | Inaccessible |
| Cape Fear River | 34.24087 | -77.95156 | 42 | RCP | Single | NPDES outfall found | 6/8/2011 | Good |
| Cape Fear River | 34.24089 | -77.95155 | 42 | RCP | Single | NPDES outfall found | 6/8/2011 | Good |
| Cape Fear River | 34.24333 | -77.95131 | 36 | RCP | Single | NPDES outfall found | 6/10/2011 | Good |
| Cape Fear River | 34.24991 | -77.95037 | 36 | RCP | Single | NPDES outfall found | 6/14/2011 | Good |
| Cape Fear River | 34.25033 | -77.94992 | 36 | RCP | Single | NPDES outfall found | 6/14/2011 | Good |
| Cape Fear River | 34.25729 | -77.94434 | 36 | RCP | Single | NPDES Industrial outfall found | 6/10/2011 | Good |
| Cape Fear River | 34.24314 | -77.95131 | 30 | CPP | Single | NPDES outfall found | 6/10/2011 | Good |
| Cape Fear River | 34.24977 | -77.95055 | 30 | RCP | Single | NPDES outfall found | 6/14/2011 | Good |
| Cape Fear River | 34.25050 | -77.94980 | 30 | RCP | Single | NPDES outfall found | 6/14/2011 | Good |
| Cape Fear River | 34.22764 | -77.95054 | 24 | CMP | Single | NPDES outfall found | 5/16/2011 | Good |
| Cape Fear River | 34.22889 | -77.94994 | 24 | CMP | Single | NPDES outfall found | 9/28/2009 | Fair |
| Cape Fear River | 34.24200 | -77.95272 | 24 | RCP | Single | NPDES outfall found | 6/10/2011 | Good |
| Cape Fear River | 34.24319 | -77.95121 | 24 | CMP | Single | NPDES outfall found | 6/10/2011 | Fair |
| Cape Fear River | 34.24964 | -77.95067 | 24 | RCP | Single | NPDES outfall found | 6/14/2011 | Good |
| Cape Fear River | 34.25245 | -77.94726 | 24 | RCP | Single | NPDES Industrial outfall found | 6/14/2011 | Good |
| Cape Fear River | 34.25728 | -77.94432 | 24 | RCP | Single | NPDES Industrial outfall found | 6/10/2011 | Good |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Cape Fear River | 34.24335 | -77.95138 | 12 | RCP | Single | NPDES outfall found | 6/10/2011 | Poor |
| Cape Fear River | 34.25565 | -77.94679 | 12 | VCP | Single | NPDES Industrial outfall found | 6/14/2011 | Poor |
| Cape Fear River | 34.23014 | -77.94946 | Inaccessible - submerged | RCP | Single | NPDES outfall | 5/25/2011 | Inaccessible |
| Smith Creek | 34.25505 | -77.87846 | 6.8 X 8.0 | RCP | Single | NPDES outfall found | 2/21/2012 | Good |
| Smith Creek | 34.25536 | -77.87357 | 9.0 X 11.0 | RCP | Double | NPDES Industrial outfall found | 2/21/2012 | Good |
| Smith Creek | 34.25739 | -77.94108 | Not Found | UNKNOWN | Single | NPDES outfall submerged | 2/28/2012 | Unknown |
| Smith Creek | 34.25711 | -77.90656 | 7.0 X 8.0 | RCP | Single | NPDES outfall found | 2/21/2012 | Good |
| Smith Creek | 34.25756 | -77.91249 | 6.0 X 7.0 | RCP | Single | NPDES Industrial outfall found | 2/21/2012 | Good |
| Smith Creek | 34.25718 | -77.90675 | 72 | RCP | Triple | NPDES outfall found | 2/21/2012 | Good |
| Smith Creek | 34.25403 | -77.89263 | 66 | RCP | Single | NPDES outfall found | 2/21/2012 | Good |
| Smith Creek | 34.25297 | -77.93964 | 48 | RCP | Single | NPDES outfall found | 2/28/2012 | Good |
| Smith Creek | 34.25437 | -77.90027 | 48 | RCP | Single | NPDES outfall found | 2/21/2012 | Good |
| Smith Creek | 34.25718 | -77.88761 | 42 | RCP | Single | NPDES outfall found | 2/21/2012 | Fair |
| Smith Creek | 34.25761 | -77.91556 | 42 | RCP | Single | NPDES Industrial outfall found | 2/21/2012 | Good |
| Whiskey Creek | 34.16376 | -77.86289 | 72 | CMP | Single | NPDES outfall found | 3/27/2001 | Good |
| Whiskey Creek | 34.16654 | -77.86775 | 42 | RCP | Single | NPDES outfall found | 7/18/2011 | Good |

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

## APPENDIX K: DEFINITIONS

Act
See Clean Water Act.

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

Built-upon Area
That portion of a development project that is covered by impervious or partially impervious surface including, but not limited to, buildings; pavement and gravel areas such as roads, parking lots, and paths; and recreation facilities such as tennis courts. "Built-upon area" does not include a wooden slatted deck, the water area of a swimming pool, or pervious or partially pervious paving material to the extent that the paving material absorbs water or allows water to infiltrate through the paving material.

Clean Water Act
The Federal Water Pollution Control Act, also known as the Clean Water Act (CWA), as amended, 33 USC 1251, et. seq.

Common Plan of Development
A construction or land disturbing activity is part of a larger common plan of development if it is completed in one or more of the following ways:

- In separate stages
- In separate phases
- In combination with other construction activities

It is identified by the documentation (including but not limited to a sign, public notice or hearing, sales pitch, advertisement, loan application, drawing, plats, blueprints, marketing plans, contracts, permit application, zoning request, or computer design) or physical demarcation (including but not limited to boundary signs, lot stakes, or surveyor markings) indicating that construction activities may occur on a specific plot. It can include one operator or many operators.

Department
Department means the North Carolina Department of Environment and Natural Resources

Division (DWQ)
The Division of Water Quality, Department of Environment and Natural Resources.

Director
The Director of the Division of Water Quality, the permit issuing authority.

Dry Weather Flow
Any flow in the MS4 that occurs after a 72 hour period without rain.

EMC
The North Carolina Environmental Management Commission.

Illicit Discharge
Any discharge to a MS4 that is not composed entirely of stormwater except .discharges pursuant to an NPDES permit (other than the NPDES MS4 permit), allowable non-stormwater discharges, and discharges resulting from fire-fighting activities.

Industrial Activity
For the purposes of this permit, industrial activities shall mean all industrial activities as defined in 40 CFR 122.26.

Large or Medium Municipal Separate Storm Sewer System
All municipal separate storm sewers that are either:

(a) Located in an incorporated place with a population of 100,000 or more as determined by the Decennial Census by the Bureau of Census; or
(b) Located in the counties with unincorporated urbanized populations of 100,000 or more, except municipal separate storm sewers that are located in the incorporated places, townships or towns within such counties; or
(c) Owned or operated by a municipality other than those described in paragraph (a) or (b) and that are designated by the Director as part of the large or medium separate storm sewer system.

Major municipal separate storm sewer outfall (or "major outfall")
Major municipal separate storm sewer outfall (or "major outfall") means a municipal separate storm sewer outfall that discharges from a single pipe with an inside diameter of 36 inches or more or its equivalent (discharge from a single conveyance other than circular pipe which is associated with a drainage area of more than 50 acres); or for municipal separate storm sewers that receive storm water from lands zoned for industrial activity (based on comprehensive zoning plans or the equivalent), an outfall that discharges from a single pipe with an inside diameter of 12 inches or more or from its equivalent (discharge from other than a circular pipe associated with a drainage area of 2 acres or more).

Municipal Separate Storm Sewer System (MS4)
Pursuant to 40 CFR 122.26(b)(8) means a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains):

(a) Owned or operated by the United States, a State, city, town, county, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under Section 208 of the Clean Water Act (CWA) that discharges to waters of the United States or waters of the State.

(b) Designed or used for collecting or conveying stormwater;
(c) Which is not a combined sewer; and
(d) Which is not part of a Publicly Owned Treatment Works (POTW) as defined in 40 CFR 122.2

Non-stormwater Discharge Categories
The following are categories of non-stormwater discharges that the permittee shall address if it identifies them as significant contributors of pollutants to the storm sewer system: water line flushing, landscape irrigation, diverted stream flows, rising groundwater, uncontaminated groundwater infiltration, [as defined in 40 CFR 35.2005(20)], uncontaminated pumped groundwater, discharges from potable water sources, foundation drains, air conditioning condensation, irrigation water, springs, water from crawl space pumps, footing drains, lawn watering, individual residential car washing, flows from riparian habitats and wetlands, dechlorinated swimming pool discharges, and street wash water (discharges or flows from fire fighting activities are excluded from the definition of illicit discharge and only need to be addressed where they are identified as significant sources of pollutants to waters of the United States).

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

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

Permittee
The owner or operator issued this permit.

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

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

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

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

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

Stormwater Management Program (SWMP)
The term Stormwater Management Program (SWMP) refers to the stormwater management program that is required by the Phase I and Phase II regulations to be developed by MS4 permittees.

Stormwater Plan
The Stormwater Plan is the written plan that is used to describe the various control measures and activities the permittee will undertake to implement the stormwater management program. The Stormwater Plan is a consolidation of all of the permittee's relevant ordinances or other regulatory requirements, the description of all programs and procedures (including standard forms to be used for reports and inspections) that will be implemented and enforced to comply with the permit and to document the selection, design, and installation of all stormwater control measures.

Stormwater Runoff
The flow of water which results from precipitation and which occurs immediately following rainfall or as a result of snowmelt.

Total Maximum Daily Load (TMDL)
A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources. A TMDL is a detailed water quality assessment that provides the scientific foundation for an implementation plan. The implementation plan outlines the steps necessary to reduce pollutant loads in a certain body of water to restore and maintain water quality standards in all seasons. The Clean Water Act, Section 303, establishes the water quality standards and TMDL programs.

Watershed Restoration Plan
For purposes of this permit, a Watershed Restoration Plan is any plan developed in consultation with the Division for voluntary implementation with the intent of enhancing water quality and/or implementing stormwater BMPs within 303(d) listed waters.