



NPDES Permit Annual Report

to

**NC Department of Environmental Quality
Division of Energy, Mineral, and Land Resources**

Term III, Year 5: September 1, 2014 – August 31, 2015

NC Department of Transportation

November 2015

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"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 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."

Walt Gray

Walt Gray
Chief Deputy Secretary
North Carolina Department of Transportation

11/23/2015

Date

This report documents the activities conducted by the North Carolina Department of Transportation (NCDOT) during the fifth and final year of its Term III National Pollutant Discharge Elimination System (NPDES) stormwater permit (NCS000250). The Clean Water Act permit was renewed by the NC Division of Energy, Mineral and Land Resources for a fourth five-year permit term effective October 1, 2015. The NPDES permit authorizes NCDOT to discharge stormwater runoff from construction sites, primary and secondary roadways, maintenance facilities, ferry terminals, rest areas, office buildings, and NCDOT-owned railways. Additionally wastewater discharges from borrow pits are also authorized. Activities conducted by the Turnpike Authority are covered under this permit, as well as the public education requirements for the Global Transpark Authority's NPDES permit through a 2012 memorandum of agreement with that agency. As allowed by 15A NCAC 02B .0271 (8)(c) and 15A NCAC 02B .0281 (11)(d) this report also summarizes NCDOT's implementation of the stormwater requirements for state and federal entities in the Jordan and Falls Reservoir watersheds.

Select Accomplishments During Permit Term III, Year 5 (September 1, 2014 – August 31, 2015)

Outlined below are a few of the notable accomplishments achieved by NCDOT during Term III, Year 5 to both protect the environment and streamline processes to support project delivery.

- During Year 5 NCDOT continued implementation of its NPDES Post-construction Stormwater Program (PCSP) approved by the NC Department of Environmental Quality (NCDEQ). Working in partnership with NCDEQ the PCSP helps streamline project delivery by consolidating state and federal stormwater management requirements into a single program and eliminates the need for state stormwater permits on individual projects.
- NCDOT launched several stormwater management education initiatives through the new NC Learning Center portal including training on the PCSP, Stormwater Best Management Practice Toolbox manual, and project Stormwater Management Plans. These training opportunities target both NCDOT staff and their consultants and provide guidance for complying with the NPDES permit through a combination of classroom training opportunities as well as 24/7 on-demand e-learning modules.
- The NC Environmental Management Commission has approved NCDOT's planned approach to comply with the Jordan Lake and Falls Lake Nutrient Load Reduction Strategy Rules through a process integrated with the Department's various NPDES programs including the PCSP. This approach employs a delegation management model with internal checks and balances to ensure compliance rather than depending on external regulatory project approvals which helps to reduce project delivery times. In Year 5 NCDOT complied with the nutrient load reduction requirements for both new projects as well as the existing development requirements via the construction of eleven (11) stormwater treatment retrofit projects in the Falls Lake watershed.

- In Year 5 NCDOT complied with the NPDES retrofit requirements and constructed twenty (20) stormwater treatment retrofit projects with a total of seventy (70) retrofits implemented across the span of permit Term III as required. Projects of note in Year 5 include a partnership with the Town of Wrightsville Beach to treat runoff from US 74 and US 76 on the Wrightsville Beach Municipal Complex property. The retrofit projects treat roadway runoff prior to discharge to estuarine waters classified by NCDEQ as Outstanding Resource Waters which are recognized as having exceptional ecological and recreational significance to the state.
- The Department in Year 5 worked in partnership with NCDEQ and the NC Sediment Control Commission to successfully renew its Erosion and Sediment Control Program delegation. Through this delegated program NCDOT complies with the requirements of the NPDES permit in lieu of applying for general construction permits for each individual project.
- Working in partnership with NCDEQ and the US Environmental Protection Agency (USEPA) the Department achieved concurrence on a watershed restoration plan in lieu of USEPA approval of a draft Clean Water Act Total Maximum Daily Load (TMDL). If approved this TMDL would have placed a limit on the amount of impervious surfaces allowed in the Little Alamance Creek watershed located in Alamance County. One of the first of its kind in the state as an alternative to a TMDL, the plan was developed as a joint initiative between NCDOT and the Cities of Burlington and Graham.
- In Year 5 the Department implemented and maintained 198 Stormwater Pollution Prevention Plans for its industrial facilities across the state. Each plan is customized to the facility and identifies numerous good housekeeping practices and other measures to avoid spills and properly store chemicals and other materials.

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BMP	Best Management Practices
BUA	Built Upon Area
CFR	Code of Federal Regulations
DEMLR	Division of Energy, Minerals and Land Resources*
DEO	Division Environmental Officers
DWR	Division of Water Resources*
DOT	Department of Transportation
DWQ	Division of Water Quality*
EE	External Education
EMC	Environmental Management Commission
ESC	Erosion and Sediment Control
ESM	Environmental Sensitivity Map
FHWA	Federal Highway Administration
FIP	Field Inventory Procedure
GIS	Geographic Information System
GPS	Global Positioning System
GREEN	Guided Reduction of Excess Environmental Nutrients
HQW	High Quality Waters
HSP	Highway Stormwater Program
I&M	Inspection and Maintenance
ICWLA	Impervious Cover Waste Load Allocation
IDDEP	Illicit Discharge Detection and Elimination Program
IE	Internal Education
IRMA	Industrial Roadway Maintenance Activities
JLSLAT	Jordan Lake Stormwater Nutrient Load Accounting Tool
KNCB	Keep North Carolina Beautiful
LMS	Learning Management System
MPN	Most Probable Number
NC	North Carolina
NCAC	North Carolina Administration Code
NCDA	North Carolina Department of Agriculture
NCDENR	North Carolina Department of Environment and Natural Resources*
NCDEQ	North Carolina Department of Environmental Quality*
NCDEHNR	North Carolina Department of Environment, Health and Natural Resources*
NCDOT	North Carolina Department of Transportation
NCSU	North Carolina State University
NPDES	National Pollutant Discharge Elimination System
NSAB	Nutrient Scientific Advisory Board
NTEP	National Turfgrass Evaluation Program

OEI	Office of Education Initiatives
ORW	Outstanding Resource Waters
PAM	Polyacrylamide
PCSP	Post Construction Stormwater Program
PDH	Professional Development Hours
PSH	Preformed Scour Hole
REU	Roadside Environmental Unit
SECREP	Sediment and Erosion Control Research Evaluation Facility
SCMS	Stormwater Controls Management System
SMP	Stormwater Management Plans
SPCC	Spill Prevention Control and Countermeasure
SPPP	Stormwater Pollution Prevention Plan
SSIP	System Inventory and Prioritization
STEM	Science, Technology, Engineering, Math
TMDL	Total Maximum Daily Load
TS4	Transportation Separate Storm Sewer System
TSS	Total Suspended Solids
UNC-G	University of North Carolina at Greensboro
US	United States
USEPA	United States Environmental Protection Agency
WLA	Waste Load Allocation

*Throughout the document, the current name of an agency is used except where language from the permit or a reference contains an older agency name.

1.0 Introduction

The Highway Stormwater Program was established in 1998 to manage the Department's compliance with its statewide Phase I National Pollutant Discharge Elimination System (NPDES) stormwater permit. The NPDES permit authorizes NCDOT to discharge stormwater runoff from construction sites, primary and secondary roadways, maintenance facilities, ferry terminals, rest areas, office buildings, and NCDOT-owned railways. Additionally wastewater discharges from borrow pits are also authorized. To ensure that these stormwater and wastewater discharges do not cause or contribute to a water quality standards violation the permit requires the Department to conduct numerous activities which are organized into fourteen (14) main program areas. The Hydraulics Unit and the Roadside Environmental Unit manage the Department's compliance activities within these programs which are implemented by business units across NCDOT.

This annual report describes the various achievements and compliance activities by program area conducted in Year 5 of permit Term III covering the period September 1, 2014 through August 31, 2015. Additionally, Section 16 at the end of this report includes a summary of NCDOT's implementation of the stormwater requirements for state and federal entities in the Jordan and Falls Reservoir watersheds in compliance with state nutrient load reduction rules. Inclusion of the annual reporting requirements for these two watersheds into NPDES annual reporting is allowed by 15A NCAC 02B .0271 (8)(c) and 15A NCAC 02B .0281 (11)(d).

2.0 Illicit Discharge Detection and Elimination Program

NPDES Permit Part II.A

Objectives and Measurable Goals

The program objectives are to:

- i. Implement an Illicit Discharge Detection and Elimination Program to assure that the illicit discharges, spills, and illegal dumping into the North Carolina Department of Transportation (NCDOT) transportation separate storm sewer system (TS4) are detected and eliminated.
- ii. NCDOT shall implement appropriate procedures and actions to report illicit spills, discharges and illegal dumping for appropriate enforcement or other action by North Carolina Department of the Environment and Natural Resources (NCDENR).

Management Measures	Measurable Goals
(a) Provide illicit discharge identification training.	NCDOT shall provide annual training for appropriate staff and contractors. Training shall include identification and reporting of illicit discharges and illegal dumping.
(b) Perform illicit discharge inspections.	NCDOT shall perform inspections for illicit discharges to the stormwater drainage system and illegal dumping activities when performing other work on the NCDOT system.
(c) Maintain a standard point of contact.	NCDOT shall maintain a standard reporting format and contact for all complaints and reports of illicit discharges.
(d) Report illicit discharges.	NCDOT shall investigate all reports of illicit discharges or illegal dumping. NCDOT shall report verified illicit discharges to the appropriate Division of Water Quality (DWQ) Regional Office within 30 days of verification.
(e) Maintain a tracking database.	NCDOT shall maintain a tracking database for reports of illicit discharges.

Program Overview

The Illicit Discharge Detection and Elimination Program (IDDEP) was developed and implemented to detect and eliminate illicit discharges/spills and illegal dumping into the NCDOT TS4. The program provides training of NCDOT staff and contractors on performing inspections, identification of illicit discharges and illegal dumping and reports them to NCDEQ. NCDOT maintains a tracking database and standard point of contact for the program.

Accomplishments

NCDOT continues to maintain its IDDEP to detect and eliminate illicit dumping, spills, and discharges along the state’s roadway system. NCDOT employees participate in training to help enable them to identify potential illicit dumping, spills, and discharges when performing other work on the NCDOT system. Employees report potential illicit discharges to the HSP IDDEP Manager, who acts as the primary point of contact for the program.

As summarized in Table 1, from September 1, 2014, to August 31, 2015, NCDOT identified 15 new illicit discharges across the state, which makes 451 total illicit discharges

Table 1. IDDEP Accomplishments in the Reporting Period

Accomplishments	
Number of illicit discharges identified since 1999	451
Number of illicit discharges identified during reporting period	15
Number of NCDOT staff trained during reporting period	434

reported since the initiation of the program in June 1999. Of those discharges reported over the past permit year, 27% were tractor trailer/ vehicle spills on NCDOT roadways, 33% were illegal discharges (primarily gray water discharges from residential dwellings), and 40% were illegal dumping sites. Five occurred within the Cape Fear River Basin, four within the Neuse River Basin, two each occurred in the French Broad and Catawba River Basins, and one each occurred within the Tar-Pamlico and Lumber River Basins. A few example IDDEP reports from this year are described below.

Diesel Fuel Spill – On June 16, 2015 a tractor-trailer driving on US Highway 1 northbound struck an object in the roadway causing a diesel fuel leak. When emergency responders arrived on scene they observed fuel leaking from the driver’s side fuel tank onto the roadway and flowing towards a nearby storm drain. However, most of the spill was prevented from entering the storm drain by the construction of a miniature hazardous spill basin using sandbags to block the drain. NCDOT had prepositioned the sandbags near the storm drain for incidents just like this. The sandbags placed around the storm drain stopped the majority of the fuel that had leaked onto the roadway causing it to pool along the roadside. The amount of fuel spilled on the roadway was estimated to be approximately 100 gallons. Emergency responders plugged the leak in the truck’s tanks and NCDOT personnel spread a truckload of sand to facilitate the removal of the spilled fuel.

Solids Spill – On July 2, 2015 a truck spilled iron oxide powder on Interstate 40 in the eastbound lane near Gorman Street in Raleigh, NC within a highway construction zone. The material, intended to be used to stain concrete blocks, stained the eastbound lanes with a red color. The spill also occurred during wet weather and stormwater runoff drained into the right of way which had existing erosion and sediment control measures in place due to the ongoing roadway construction project. Emergency response contractors cleaned up the spilled material.

Ongoing IDDEP Training – As required by Internal Education Program Management Measures (a) and (b) and IDDEP Management Measure (a), NCDOT Highway Stormwater Program (HSP) staff continues to

provide training to NCDOT employees on how to recognize and report illicit discharges and illegal dumping activities. IDDEP training is provided in conjunction with other training events, including the annual spring training workshops for each NCDOT Division, and during various Division meetings. In the spring of 2015, NCDOT HSP staff provided IDDEP training to 434 NCDOT employees as part of NCDOT's Stormwater Pollution Prevention Plan (SPPP) and Spill Prevention, Control and Countermeasures (SPCC) Level I and II Training Workshops. NCDOT continues to post Illegal Dumping educational posters and IDDEP brochures at maintenance facilities. Hardcopies of NCDOT's IDDEP Field Report and the "Illegal Discharge: Know What to Do" brochures are provided to NCDOT employees at various meetings. NCDOT also distributed 2,500 IDDEP brochures through the NC State Fair, and held more than 20 group presentations, event displays (Earth Day and local fairs) and field training sessions. See External Education for additional details on other stormwater educational material distributions to the general public or Adopt-A-Highway volunteers. These materials are related to litter, illicit discharges, and illegal dumping, and help raise awareness on reporting illicit discharges and illegal dumping found on NCDOT roadways.

Tracking and Reporting Illicit Discharges – NCDOT continues to maintain its IDDEP website, which consists of a web-based tracking system and database for identified illicit connections and illegal dump sites found along NCDOT roadways. When an illegal discharge is identified along NCDOT roadways, an IDDEP Field Report form is used to capture applicable information. The Division that identifies the discharge or dump site typically performs a preliminary investigation following NCDOT safety procedures to verify the identified illicit discharge or illegal dumped materials. Once the site has been investigated and verified, the Division notifies the IDDEP Manager, who then reports the discharge to the appropriate NCDEQ Regional Office within 30 days of the illicit discharge identification date.

Considerations for Fiscal Year 2016

NCDOT plans to continue to maintain the IDDEP procedures in Fiscal Year 2016. NCDOT will evaluate the program's internal processes to identify any new opportunities for improvement and to help the HSP target certain areas that may need additional IDDEP education or coordination assistance.

3.0 Stormwater System Inventory and Prioritization Program

NPDES Permit Part II.B.1

Objectives and Measurable Goals

The program objectives are to:

- i. Maintain the statewide NCDOT stormwater system inventory for the purpose of supporting other permit programs.
- ii. Maintain a stormwater system GIS to map and prioritize sensitive water crossings.
- iii. Maintain a field inventory procedure to be used for NCDOT/DWQ-identified priority areas.

Management Measures	Measurable Goals
(a) Maintain a stormwater system inventory of existing stormwater outfalls to sensitive waters.	NCDOT will maintain a geographic information system (GIS)-based implicit stormwater outfall inventory to include outfalls from primary and secondary roadways. The inventory shall be used to assist in the location of retrofits, among other purposes.
(b) Include in the inventory outfalls from new construction projects to all surface waters and wetlands.	The stormwater outfall inventory shall be updated annually to include outfalls from new construction projects.
(c) Include outfalls for NCDOT industrial facilities in the inventory.	The stormwater outfall inventory shall be updated annually to include changes or additions to previously inventoried NCDOT industrial facilities.
(d) Field outfall inventory procedure for priority areas.	NCDOT will maintain the field outfall inventory procedure, work with DWQ to identify priority areas and report annually on priority areas.

Program Overview

NCDOT implements a Stormwater System Inventory and Prioritization Program (SSIP) to support other permit programs with information regarding NCDOT’s TS4 system. SSIP activities include maintaining a stormwater system GIS map which prioritizes sensitive water crossings, and developing and implementing a field inventory procedure (FIP) for priority areas identified collaboratively by NCDOT and NCDEQ. In the first term of the permit, NCDOT developed a geospatial processing methodology to

estimate the locations of outfalls, establishing a baseline inventory. This inventory of implicit outfalls is updated annually.

Accomplishments

The stormwater outfall inventory continues to be updated and enhanced through various methods each year, including:

- Implicit outfalls are updated annually using geospatial processing to identify locations where roads cross streams.
- Industrial outfalls are updated annually using changes or additions reported by industrial facilities.
- Field verified outfalls are captured using the FIP which is undergoing upgrades to both its hardware and software components.
- The FIP manager successfully completed DWR’s stream identification class which will result in more accurate field outfall determinations.

Table 2 lists counts of outfalls by process used to identify them.

Table 2. Outfalls Identified as of 2015

Outfall	Inventoried
Implicit Outfalls	117,423
Industrial Outfalls	588
Field Verified Outfalls	128

The FIP was originally developed during NCDOT’s second permit term (2005 – 2010). The focus in 2015 has been on upgrading the hardware and software platforms to remain current with technology advancements. A Windows-based tablet was selected for the next phase of the inventory program. The product is portable, making it especially useful for field engineers and survey techs. Software alternatives are being evaluated.

Considerations for Fiscal Year 2016

Field inventory efforts in FY16 will focus on the lower Falls Lake sub-watershed defined as the portion of the watershed below NC 50. A field outfall inventory data collection plan for primary routes will be prepared. Implementation of the plan will begin upon completion of the hardware and software upgrades.

To remain abreast of emerging technologies the program intends to evaluate Esri’s *Collector for ArcGIS* software for tablets and smartphones to determine if this product might play a future role in the program. Using software which can run on smartphones has the potential to reduce costs and improve efficiency.

4.0 BMP Retrofits Program

NPDES Permit Part II.B.2

Objectives and Measurable Goals

The program objectives are to:

- i. Develop, implement and support the NCDOT program to be consistent with NPDES post-construction control measures.
- ii. Use retrofits to address pollutant loading from existing NCDOT activities.
- iii. Retrofits should not be associated with meeting the requirements of any other DWQ program, unless otherwise allowed.

Management Measures	Measurable Goals
(a) Identify appropriate retrofit sites.	Locate a minimum of fourteen (14) sites per year that are appropriate for retrofit installation. Appropriate sites are those identified as having the potential to contribute significant pollutant loading to a receiving stream and possessing suitable characteristics for installation or implementation of an appropriate retrofit.
(b) Implement /Install BMP Retrofits.	Implement a minimum of five (5) retrofit projects per year, with a total of seventy (70) retrofits implemented over the 5-year period of this permit. The retrofits will be appropriate for the identified pollutants of concern. Submit annual report on the number of retrofits identified, implemented, and in progress.

Program Overview

NCDOT has implemented a BMP retrofit program that is consistent with NPDES post-construction control practices. It incorporates both structural and non-structural stormwater retrofits to address pollutant loading from existing NCDOT activities and to evaluate new stormwater controls. Retrofits implemented under the program are not associated with meeting the requirements of any other NCDEQ (DWQ) program, unless otherwise allowed. Each year, potential sites are evaluated and selected for retrofits under this program. The Retrofit Program collaborates with the Research and BMP Toolbox Programs to design, construct, and assess new and innovative BMP types or components.

Accomplishments

NCDOT completed 20 BMP retrofits in this reporting period and has completed the 70 BMP retrofits required by the Term III permit. Twenty-one potential site locations were identified for future installation of a BMP. Target areas for potential future retrofits included the Falls Lake watershed, the Little Alamance watershed and impaired waters in the coastal, piedmont, and mountain regions. Table 3 summarizes the BMPs completed in the past year. After construction, retrofits are tracked in NCDOT’s Stormwater Control Management System (SCMS) for inspection and maintenance along with other non-retrofit BMPs.

Table 3. BMP Retrofits Completed During the Reporting Period

BMP ID	BMP Type	County	Location
IM-14-45-DDB-2576	Dry Detention Basin	Henderson	US 176 & SR 1783 (Upward Road)
IM-7-41-LS-2884	Level Spreader	Guilford	SR 1601 (Shimer Drive)
IM-3-65-IB-3198	Infiltration Basin	New Hanover	US 74 & US 76
IM-3-65-IB-3199	Infiltration Basin	New Hanover	US 74 & US 76
IM-3-65-IB-3200	Infiltration Basin	New Hanover	US 74 & US 76
IM-3-65-FB-3201	Filtration Basin	New Hanover	US 74
IM-3-65-CD-3203	Check Dams in	New Hanover	US 74
IM-5-92-DDB-3237	Dry Detention Basin	Wake	Wake County Maintenance Yard
IM-3-65-IC-3253	Infiltration Chamber	New Hanover	Waynick Blvd & Iula St
IM-5-92-BS-3300	Bio-Swale	Wake	NC 50 & NC 98
IM-5-92-BS-3301	Bio-Swale	Wake	NC 50 & NC 98
IM-5-92-BS-3302	Bio-Swale	Wake	NC 50 & NC 98
IM-5-92-BS-3303	Bio-Swale	Wake	NC 50 & NC 98
IM-5-92-BS-3304	Bio-Swale	Wake	NC 50 & NC 98
IM-5-92-BS-3305	Bio-Swale	Wake	NC 50 & NC 98
IM-5-92-FB-3306	Filtration Basin	Wake	NC 50 & NC 98
IM-5-92-DDB-3307	Dry Detention Basin	Wake	NC 50 & NC 98
IM-5-92-DDB-3308	Dry Detention Basin	Wake	NC 50 & NC 98
IM-5-92-S-3309	Swale	Wake	NC 50 & NC 98
IM-5-92-S-3310	Swale	Wake	NC 50 & NC 98

Some notable retrofit projects are described below.

Dry Detention Basin at Wake County Maintenance Yard – NCDOT constructed a new dry detention basin at the Wake County Maintenance Yard in the fall of 2014 to treat runoff from Blue Ridge Road and the maintenance facility. The Wake County Maintenance Yard is located in an urbanized area approximately four (4) miles west of downtown Raleigh at the intersection of Blue Ridge Road and Trinity Road. The maintenance yard is approximately 11 acres and is primarily covered in impervious surface. It contains administrative and industrial buildings, vehicle parking areas, a fuel station, wash bay, and equipment and material storage areas. Because of the facility’s age, no structural stormwater

BMPs previously existed onsite to address stormwater quality. Runoff from the site discharges to an unnamed tributary to Richland's Creek.

A dry detention basin was selected as the water quality treatment BMP in order to reduce potential loss of sediment off site and manage peak discharges.

Wrightsville Beach Partnership – NCDOT partnered with the NC Coastal Federation and the Town of Wrightsville Beach to install a number of stormwater BMPs around the Wrightsville Beach Municipal Complex to treat runoff from US 74 and US 76. The project also included an additional site located on Waynick Boulevard at Lula Street, which treats runoff from US 76. The Town of Wrightsville Beach is located in one of the twenty counties designated as a "Coastal County" by NCDEQ. The project sites are all located in areas draining to surface waters with an Outstanding Resource Waters (ORW) classification. Per NCDEQ, the ORW classification is intended to "protect unique and special waters having excellent water quality and being of exceptional state or national ecological or recreational significance."

At the Wrightsville Beach Municipal Complex, a total of five structural retrofit BMPs were constructed: three infiltration basins, one filtration basin and a swale with earthen check dams. The infiltration basins were designed to take advantage of the highly permeable sandy soils in the area by adding curb cuts and small drainage systems to direct small storm flows into these areas to infiltrate into the natural ground. The existing natural areas and swales were enhanced with addition of short risers or earthen check dams to encourage shallow ponding and increase the volume of stormwater that infiltrates into the ground, thus greatly reducing runoff to Motts Channel and Lees Cut. In addition to reducing runoff volume, these infiltrative BMPs also reduce total suspended solids (TSS), nutrients (nitrogen and phosphorus), metals and bacteria. The filtration basin was installed in an area where the seasonal high water table was too high and infiltration could not be used. However, filtration basins remove similar pollutants of concern. The existing drainage systems were maintained to allow larger storm flows to be safely conveyed (to bypass treatment) and reduce the potential roadway flooding.

At Waynick Boulevard and Lula Street, an underground pipe infiltration system was constructed. The system intercepts runoff for treatment where previously it directly discharged into Banks Channel. Underground pipe infiltration can provide significant storage volume advantages over traditional surface systems in sites where available area is constrained or where little relief is available to provide storage. In addition to reducing runoff volume through infiltration, these systems have been shown to significantly reduce bacteria concentrations. Bacteria can be a significant pollutant of concern in coastal areas since it can detrimentally impact the intended uses of these areas.

Overall, the partnership of NCDOT with the NC Coastal Federation and the Town of Wrightsville Beach resulted in the implementation of six retrofits that will help protect the outstanding resource waters of the community.

Considerations for Fiscal Year 2016

The Retrofits Program has prepared a Project Cycle document. The document guides retrofit project development from site selection to design and construction based on a reoccurring cycle extending over a period of two years. During FY16 potential sites will be located and new project designs initiated. Project designs initiated during FY15 will be finalized and construction contracts administered with actual construction commencing in the third and fourth quarters of FY16.

5.0 BMP Toolbox for Post-Construction Runoff Program

NPDES Permit Part II.B.3

Objectives and Measurable Goals

The program objectives are to:

- i. Maintain and update as necessary a BMP Toolbox to aid in the siting, design, and construction of stormwater quality BMPs with guidance on the suitability of each for NCDOT applications.
- ii. Evaluate BMPs for applicability to a linear highway system.
- iii. Implement new and innovative technology on an experimental basis and in keeping with the current DWQ policy on new stormwater treatment technologies (“Permitting New Stormwater Treatment Technologies”, DEHNR, November 24, 1997, or as amended), provided as an appendix to the Fact Sheet.

Management Measures	Measurable Goals
(a) Maintain a BMP Toolbox.	Maintain a stormwater BMP Toolbox to provide internal guidance on design of post-construction stormwater control measures. The BMP Toolbox will include appropriate uses/anticipated applications, design criteria, materials specifications, and pollutant removal potential. Innovative or proprietary BMPs will be evaluated in keeping with the DWQ policy for permitting new/innovative technologies (“Permitting New Stormwater Treatment Technologies”, DEHNR, November 24, 1997, or as amended) provided as an appendix to the Fact Sheet.
(b) Evaluate design-related BMPs.	Investigate and document the impacts associated with addressing stormwater during the planning phase of a project by evaluating design related BMPs such as reduced pavement widths, eliminating curb and gutter, providing diffuse flow, etc. The investigation may consist of pilot studies, monitoring, literature research, and other appropriate resources. Documentation of the investigation shall include characterization of pollutant reduction for each measure and recommendations on the feasibility of incorporating these measures into the NCDOT planning process. Documentation and progress reports shall be provided to DWQ in the annual reports.
(c) Submit proposed BMP Toolbox revisions to DWQ for approval.	New guidance on proposed BMPs will be submitted for DWQ approval as they are developed and approved prior to implementation.

Program Overview

NCDOT developed the BMP Toolbox to aid in the siting, design, and construction of stormwater quality BMPs with guidance on the suitability of each for NCDOT applications. New guidance developed for inclusion in the BMP Toolbox must be approved by NCDEQ. The original version of the Toolbox was completed in 2008 and updates were published in 2014. Since that time, efforts have been focused on evaluating other BMP technologies to assess their practical need in the NCDOT TS4 and inclusion in the BMP Toolbox. The Toolbox Program evaluates new and innovative technology on an experimental basis and in keeping with the current NCDEQ policy on new stormwater treatment technologies, and works collaboratively with the Research and Retrofit programs to do so.

Accomplishments

The BMP Toolbox was approved and posted on the internet in September 2014 (see 2014 Annual Report). Training on the new BMP Toolbox was developed and provided to the Hydraulics Unit in the spring of 2015 (see discussions under PCSP and Internal Education). Contractors and employees were directed to use it for design work performed for NCDOT. NCDOT's design engineers and stormwater managers assessed if any new BMPs needed to be added and determined none were needed at this time.

NCDOT staff participated in DENR's Minimum Design Criteria development committee. While this collaboration did not necessitate changes to the Toolbox at this time, NCDOT will continue to evaluate the need to update the toolbox as new design criteria are deemed appropriate to linear conditions by the State Hydraulics Engineer.

Considerations for Fiscal Year 2016

Through its Research Program, NCDOT plans to evaluate current, on-going research studies on vegetated swale design comparing triangular versus trapezoidal typical sections and their ability to reduce TSS, nutrients and other parameters of concern. In addition to varying cross-sectional geometry, NCDOT is also evaluating addition of various design features to encourage infiltration and increase hydraulic residence time. NCDOT is also planning to evaluate completed research studies on various asphalt pavements that may provide benefits for water quality, water quantity, and safety relative to beneficial performance and life cycle costs. These topics will be evaluated for the need to include them in future editions of the Toolbox.

6.0 BMP Inspection and Maintenance Program

NPDES Permit Part II.B.4

Objectives and Measurable Goals

The program objectives are to:

- i. Maintain a BMP Inspection and Maintenance Program to aid in the inspection, operation and maintenance of BMPs.
- ii. Maintain and update as necessary the BMP Inspection and Maintenance Manual.

Management Measures	Measurable Goals
(a) Evaluate new BMP inspection and maintenance needs.	Evaluate new BMPs included in the BMP Toolbox for inspection and maintenance needs. The evaluation will include consideration of the BMP type, siting conditions, and State Stormwater Program requirements.
(b) Evaluate BMP Inspection and Maintenance Manual.	Evaluate written procedures outlining the inspection and maintenance requirements for various types of stormwater BMPs. Written procedures will outline the regular inspection frequency, and include an inspection checklist, “how-to” instructions for regular maintenance, evaluation and reporting procedures for non-routine maintenance, and an inspection and maintenance tracking mechanism. As modifications are needed, update the Manual to address needed changes to inspection and maintenance techniques.
(c) Implement a BMP Inspection and Maintenance Program.	Implement a BMP Inspection and Maintenance Program. The program will include training for appropriate NCDOT staff, and contractors.
(d) BMP Inspection and Maintenance information.	Inspection and Maintenance information will be made available upon request to DWQ.

Program Overview

NCDOT implemented a BMP Inspection and Maintenance (I&M) Program to aid in the inspection, operation, and maintenance of BMPs. As part of the program, NCDOT maintains and updates the BMP Inspection and Maintenance Manual. The Manual includes written procedures outlining the inspection and maintenance of stormwater BMPs, including the inspection frequency. It also includes inspection checklists and provides instructions for routine and non-routine maintenance. The program oversees

maintenance of a comprehensive database system, SCMS, which maintains inventory of the stormwater BMPs and tracks their inspection and maintenance records. The program also evaluates new BMPs that are included in the BMP Toolbox or constructed through the BMP Retrofit Program for inspection and maintenance needs and develops new chapters for the I&M Manual if needed. The program coordinates training for staff and contractors with other program areas, as necessary.

Accomplishments

Two new chapters were added to the NCDOT’s Stormwater Control Inspection and Maintenance Manual this year, one for permeable pavements and another for preformed scour holes.

Permeable Pavements Chapter – In the fall of 2014, NCDOT developed a chapter for Inspection and Maintenance of Permeable Pavements and added it to the manual for Division staff to implement. Permeable Pavements are an alternative to conventional asphalt and concrete paving materials for sidewalks and other pedestrian area applications. The system allows infiltration of stormwater into a storage area with void spaces providing detention and settling of pollutants. However, to prevent clogging and attain maximum benefit from the practice, proper inspection and maintenance is essential. Figure 1 shows an example illustration from the chapter.

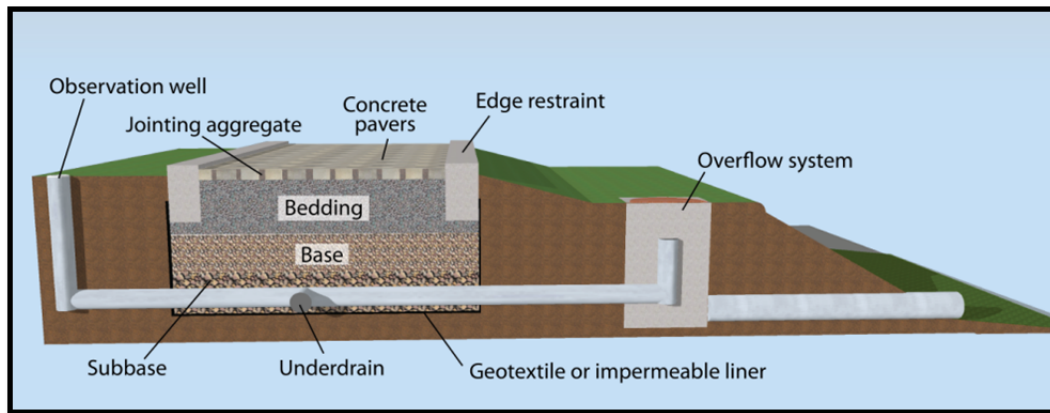


Figure 1. A Cross Section of a Permeable Interlocking Concrete Paver Installation

Preformed Scour Hole Chapter – This chapter describes the proper inspection and maintenance techniques for this BMP which is constructed at pipe outlets for the purpose of dissipating energy and converting concentrated flow into diffuse flow.

In addition to the two chapters, a new maintenance form was also developed for Division staff to document and report any maintenance activities that were performed at a device.

Stormwater BMPs Inventory - The program continues to maintain an inventory of stormwater BMPs in the state. Table 4 lists the number of completed BMPs by NCDOT Division. Table 5 lists the number of BMPs by type.

Table 4. Number of Stormwater BMPs per NCDOT Division

NCDOT Division	Number of Stormwater Devices
1	70
2	177
3	129
4	205
5	545
6	49
7	117
8	119
9	44
10	47
11	49
12	46
13	71
14	32
Total	1,700

Table 5. Number of Each Type of Stormwater BMPs

Stormwater BMP Type	Number of Stormwater BMPs
Bio-Embankment	1
Bio-Swale	6
Biofiltration Conveyance	2
Bioretention Basin ¹	21
Bridge Drainage System	6
Buffer	10
Catch Basin Insert ¹	24
Check Dam	2
Cistern	6
Dry Detention Basin ¹	83
Filtration Basin	26
Floating Wetland	1
Forebay	4
Grade Control Structure	4
Green Roof	1
Hazardous Spill Basin	192
Infiltration Basin	72

Table 5. Number of Each of Type of Stormwater BMPs, cont.

Stormwater BMP Type	Number of Stormwater BMPs
Infiltration Chamber	25
Level Spreader	104
Permeable Pavement	3
Pet Waste Station	157
Preformed Scour Hole ¹	639
Rain Garden	7
Stormwater Wetland	20
Swale ¹	212
Swirl Separator	3
Wet Detention Basin	16
Wet Vault ¹	2
Other ²	51
Total	1,700

1 Some of these BMPs have been removed. All BMPs installed by NCDOT are shown in this table, including those later removed when determined to be ineffective.

2 “Other” BMPs include energy dissipater basins/pads, enhanced wetland, inlet protection, and wash pads.

Considerations for Fiscal Year 2016

In the coming year, an upgraded version of the SCMS will be rolled out. The new version is simpler and more user-friendly with additional features to record maintenance activities. The entire Inspection and Maintenance Manual is being reviewed to identify needed updates and a revised version of the manual is expected to be published in the coming year.

7.0 Post-Construction Stormwater Program

NPDES Permit Part II.B.5

Objectives and Measurable Goals

The program objectives are to:

- i. In cooperation with NCDENR, implement a post-construction stormwater program to regulate stormwater from new NCDOT development and redevelopment for new built upon area (BUA) by requiring structural and non-structural best management practices to protect water quality, reduce pollutant loading, and minimize post-construction impacts to water quality.

Management Measures	Measurable Goals
(a) Post Construction Stormwater Control Measures	Implement post-construction stormwater control measures for discharges in accordance with the Post-Construction Stormwater Program.
(b) Implement a Post-Construction Stormwater Program.	Implement a Post-Construction Stormwater Program (PCSP) to control runoff from new NCDOT development and redevelopment. The PCSP shall define implementation of the approved NCDOT BMP Toolbox, define a training program for appropriate NCDOT staff, and contractors to implement the Toolbox and incorporate watershed quality strategies.
(c) Submit revisions to the Post-Construction Stormwater Program to DWQ for approval.	NCDOT updates and/or revisions shall be submitted to the DWQ for approval prior to implementation.

Program Overview

The Post-Construction Stormwater Program (PCSP) was implemented to regulate stormwater from new NCDOT development and redevelopment for new built upon area (BUA). The PCSP requires structural and non-structural best management practices to protect water quality, reduce pollutant loading, and minimize post-construction impacts to water quality. An updated PCSP guidance document was approved by NCDENR in 2014. The PCSP defines how post-construction controls in the approved BMP Toolbox should be implemented for projects, and describes a training program for NCDOT staff and contractors to implement the BMP Toolbox and to incorporate watershed quality strategies.

Accomplishments

Major accomplishments this year were the distribution of the updated PCSP guidance document and the development of procedures for collection and archiving of Stormwater Management Plans (SMPs) in a

central repository. SMPs document water quality-related aspects of a project, such as location, watershed and stream classification, as well as the BMPs and minimum measures implemented on the project. Training on the PCSP guidance document and SMP collection procedure were provided to NCDOT staff.

PCSP, BMP Toolbox, and SMP Training – NCDOT updated the PCSP guidance document *Post-Construction Stormwater Controls for Roadway and Non-Roadway Projects* to reflect current compliance practices related to post-construction stormwater management, as well as to reflect changes in the regulatory environment. The PCSP guidance document was submitted to NCDENR for approval in April 2014. After receiving approval in September of 2014, NCDOT began developing materials to support training activities with NCDOT staff. NCDOT took advantage of this opportunity to also train staff on recent updates made to the BMP Toolbox and SMP form.

NCDOT held two training sessions for Hydraulics Unit staff in April 2015 and one session for the Division Environmental Officers in June 2015. Some key features of the training sessions included:

- Explanation of how NCDOT’s Guidelines for Drainage Studies and Hydraulic Design, the PCSP guidance document, and the BMP Toolbox are designed to work as a system to identify and address water quality management concerns.
- Review of workflows for both roadway and non-roadway projects describing compliance requirements.
- Review of new compliance requirements with the Falls and Jordan Lake nutrient management rules, which require nutrient load reductions for applicable projects within those watersheds.
- Review of changes to state stormwater permitting for projects discharging stormwater runoff in High Quality Waters (HQW) and Outstanding Resource Waters (ORW) watersheds, and projects located within the 20 coastal counties.
- Description of the minimum measures to be applied to all roadway and no-roadway projects.

The SMP training covered recent updates to the SMP and provided guidance to Hydraulics Unit staff on completing the form and the information that should be included. The importance of documentation compliance to the PCSP process was stressed. Decisions are made throughout the project workflow that impact stormwater and the SMP tool provides a standard format for recording these decisions.

The Toolbox training addressed some of the minor and miscellaneous changes that are scattered throughout the document as well as the significant changes in Chapter 2 - NCDOT Stormwater BMPs, Chapter 9 - Bridge BMPs, and the new chapters associated with the four new BMPs added in 2014 (Year 4 of the current permit).

SMP Collection Procedures – NCDOT is required by the permit to retain copies of SMPs submitted for compliance with the PCSP. SMPs are required on all projects that contain new built-upon area and will be submitted by Hydraulics staff, private engineering firms, and NCDOT division staff. To assist in submittal and archiving of the required SMPs, NCDOT created a standard procedure and a service email account where NCDOT staff and consultants can submit completed SMPs for archiving. The service email account is: NCDOT_Hydraulics_SMP@ncdot.gov.

NCDOT's standard procedure includes archiving all SMP files on a secure server which is backed up nightly. Once SMPs are archived, file metadata is updated to include important information, such as project number, BMP device types, and project type. This information can aid in document retrieval and provide data for program management and development.

Considerations for Fiscal Year 2016

For FY16 the emphasis for the PCSP will be to expand training opportunities for NCDOT staff and contractors. Additional classroom based training sessions will be provided as well as e-learning training opportunities through the NC Learning Center portal.

8.0 Vegetation Management Program

NPDES Permit Part II.B.6

Objectives and Measurable Goals

The program objectives are to:

- i. Manage application of pesticides, fertilizers, and other vegetation management materials to minimize pollutant potential of stormwater runoff.
- ii. Use only approved vegetation management materials.

Management Measures	Measurable Goals
(a) Implement appropriate pest control practices.	Continue to consult with NCDA and NCSU in selecting appropriate pest control methods and implementation practices. NCDOT will maintain and update the NCDOT Roadside Vegetation Management Manual as new technology and procedures are developed.
(b) Use appropriate vegetation management materials.	Restrict pesticide and fertilizer usage to those materials approved by USEPA/NCDA. Pesticide and fertilizer shall be used in accordance with label restrictions.
(c) Provide training on vegetation management.	Provide annual training for vegetation management personnel and contractors, or require equivalent training for contractors. The training shall consist of appropriate uses and applications of pest control methods used by NCDOT. This training shall be designed to increase awareness of proper mowing techniques, release of biological and chemical agents, appropriate spill response, the correct use and handling of products and the potential for water quality impacts.

Program Overview

Through the Vegetation Management Program, NCDOT manages application of pesticides, fertilizers, and other vegetation management materials to minimize pollutant potential of stormwater runoff. Management measures of the permit include implementing appropriate pest control practices through consultation with the North Carolina Department of Agriculture and Customer Services (NCDA&CS, NCDA’s new name) and North Carolina State University (NCSU), using appropriate vegetation management materials (only those approved by the Environmental Protection Agency (USEPA) or the NCDA&CS), updating NCDOT’s Vegetation Management Manual as new technology and procedures are developed, and providing training to staff and contractors regarding the appropriate uses and applications of pest control methods used by NCDOT.

Accomplishments

Warm and cool season turfgrass species are the primary ground cover utilized by NCDOT to stabilize soil from land disturbing operations. Based upon the latest National Turfgrass Evaluation Program (NTEP) data, NCDOT revised its approved turfgrass cultivars list in November of 2014. Additionally, NCDOT provided training for its staff to maintain their personal pesticide application certifications.

Updated Turfgrass Cultivars – Agronomists at NCDOT focused on the data from NCSU and Virginia Polytechnic Institute and State University to revise its approved cultivars for state force and contract highway project utilization. The approved cultivars are updated regularly but this particular update focused entirely on lower growing turfgrass cultivars to reduce mowing cycles and improve sight distance. Specifically, the alterations focused on Kentucky bluegrass, tall fescue, and hard fescue cultivars. These cultivars produce seed heads that grow to a lower overall height and do not require as frequent mowing schedule when compared to varieties such as Kentucky 31 Tall Fescue. The reduced maintenance and mowing helps preserve the grasses in a healthier condition to provide permanent groundcover on NCDOT rights of way and reducing soil erosion potential.

Pesticide Application Certification Training – During the December 2014 annual Roadside Environmental Unit (REU) Vegetation Management Conference in Greensboro, numerous seminars and workshops regarding vegetation management were offered. Approximately 100 Roadside Environmental Unit employees from the Central Office and Divisions received credits applicable to recertification of their pesticide application certifications.

Considerations for Fiscal Year 2016

The Vegetation Management program plans to continue turfgrass and pesticide evaluation and research to provide and maintain permanent groundcover on NCDOT roadsides throughout the state. The annual REU Vegetation Management Conference is planned for December 2015 which will offer pesticide recertification credits to NCDOT Roadside Environmental staff. Regional pesticide training by REU Central staff is planned for the 2016 for Roadside Environmental Division employees.

9.0 Encroachment Program

NPDES Permit Part II.C

Objectives and Measurable Goals

The program objectives are to:

- i. Assist DENR to ensure all discharges to NCDOT’s roadway drainage are properly permitted under applicable laws and rules.

Management Measures	Measurable Goals
(a) Require certification of stormwater program coverage and compliance.	NCDOT shall require that all facilities requesting to connect to NCDOT roadway drainage submit a certification of appropriate NPDES and State Stormwater Program coverage and are compliance at the time of the request.

Program Overview

NCDOT implements the Encroachment program to assist NCDEQ in ensuring that all discharges to NCDOT’s roadway drainage are properly permitted under applicable laws and rules. NCDOT accomplishes this objective by requiring that all facilities requesting to connect to NCDOT roadway drainage submit a certification of appropriate NPDES and State Stormwater Program coverage and are in compliance at the time of the request.

Accomplishments

The NCDOT State Encroachment Coordinator reviews encroachment applications and keeps track of the submitted NPDES certification forms. During review of applications, the Coordinator also identifies projects where an NPDES certification form should have been provided, but was not. For these instances, the Coordinator will notify the encroaching party or District Engineer that review cannot proceed until the completed certification form has been received. While the Coordinator reviews applications and checks that the certification forms are complete, he/she is not required to confirm that the information provided on the forms is correct (i.e., whether the facility requires an NPDES permit or not), which is the purpose of requiring certification by a duly authorized representative of the facility.

Figure 2 shows the number of NPDES certifications received with encroachment applications and number of those certifications that required an NPDES permit over the last eight years.

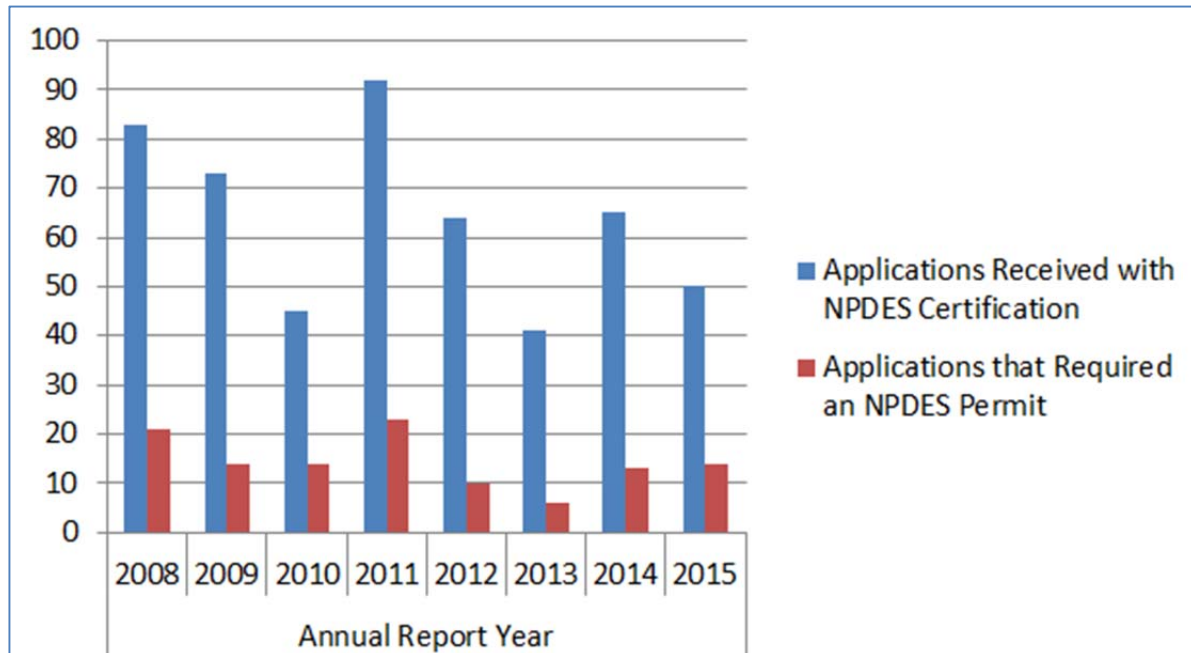


Figure 2. Applications for Encroachment Permit

Statewide, for the fiscal year July 1, 2014 thru June 30, 2015, the NPDES Stormwater Permit Compliance Certification was included in fifty (50) encroachment agreement applications. Fourteen (14) of these applications did require an NPDES permit. The remaining thirty six (36) applications certified that the permit was not required.

Considerations for Fiscal Year 2016

The Encroachment program was removed from the Term IV permit because the original objective is being met by the IDDEP.

10.0 Construction Program

NPDES Permit Part II.D.1 (Sediment and Erosion Control Program)

NPDES Permit Part II.D.2 (Borrow Pit/Waste Pile Activities)

Objectives and Measurable Goals

The program objectives are to:

- i. Continue to control development activities disturbing one or more acres of land surface including activities by NCDOT contractors.
- ii. Require construction site operators to implement appropriate erosion and sediment control practices,
- iii. Require site inspection and enforcement of control measures.
- iv. Establish requirements for construction site operators to control waste that may cause adverse impacts to water quality such as discarded building materials, concrete truck washout, chemicals, litter, and sanitary waste at the construction site.
- v. Continue to implement sediment and erosion control measures and reclamation plans on all borrow pit and waste pile projects, including activities at Ferry Terminals associated with dredging activities and contractor owned or leased borrow pits associated with NCDOT projects in keeping with the sediment and erosion control program established by the North Carolina Sediment Control Commission.

Management Measures	Measurable Goals
(a) Maintain the delegation agreement with NCDENR DEMLR Erosion and Sediment Control (ESC) Program on an annual basis.	Implementation of the NCDENR Division of Land Resources Erosion and Sediment Control Program delegated to NCDOT by the Sedimentation Control Commission in February, 1991, and as may be subsequently amended, for NCDOT construction projects and implementation of the General Permit NCG010000 effectively meets the objectives above 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.
(b) Maintain compliance with the applicable	NCDOT shall incorporate the requirements of NCG010000, the North Carolina General Permit to Discharge Stormwater under the National

Management Measures	Measurable Goals
requirements of the General Permit NCG010000.	Pollutant Discharge Elimination System (NPDES) associated with construction activities issued October 1, 2001 and as may be subsequently amended, into its delegated Erosion and Sediment Control Program, pursuant to “Guidance on Complying with the Applicable Requirements of NCG01” in the memorandum dated September 9, 2009 or as updated.
(c) Implement erosion and sediment control measures on all non-commercial borrow pits/waste piles.	NCDOT shall implement erosion and sediment control measures on all non-commercial borrow pit and waste pile projects. The measures utilized shall be in keeping with the Erosion and Sediment Control Program established by the North Carolina Sedimentation Control Commission.
(d) Implement approved reclamation plans on all borrow pits/waste piles.	NCDOT shall implement the approved reclamation plan on all borrow pit/waste pile projects. The reclamation measures utilized shall be in keeping with the reclamation program established by the North Carolina Mining Commission.
(e) Borrow Pit Discharge Management Program	<p>NCDOT in coordination with DWQ will implement the Borrow Pit Discharge Management Program. This process will consist of the following tasks:</p> <ul style="list-style-type: none"> • Implement appropriate management measures to treat borrow pit wastewater for given conditions. • Implement an inspection and maintenance program. • Maintain training material and instruct field personnel overseeing borrow pit operations. • Evaluate and implement appropriate new/innovative technologies.

Program Overview

NCDOT implemented the Construction Program with the purpose of controlling the potential impacts to water quality from land disturbance at construction sites and from borrow pit and waste pile activities. The Erosion and Sediment Control Program, which was delegated to NCDOT by the Sedimentation Control Commission in February 1991, incorporates the requirements of General Permit NCG010000. The program manages implementation of appropriate erosion and sediment controls on construction projects, site inspections and enforcement, procedures for public input, review of erosion and sediment control plans, and control of other waste on construction sites that may cause adverse impacts to water quality. For all non-commercials borrow pit and waste piles, NCDOT also implements erosion and sediment control measures and reclamation plans. NCDOT operates the Borrow Pit Discharge Monitoring Program, which includes measures to treat borrow pit wastewater, an inspection and maintenance program, training material for field personnel, and evaluates and implements new/innovative technologies.

Accomplishments

Over the past year, NCDOT developed three new design specifications to protect water quality during construction activities: a concrete washout structure for projects where excess concrete or concrete wash water are generated, and two types of perimeter sediment retaining measures (one for projects in the piedmont and mountain area involving rock blasting and the other a barrier to trap wind-borne sediment on coastal highway projects). Although the retaining measures were developed for specific projects on opposite regions of the state, they can be applied to other NCDOT projects for similar applications to preserve water quality statewide.

Concrete Washout Structure Specification and Details – Concrete washout structures are designed to contain concrete waste on NCDOT construction sites. The primary purpose of the washout structures is to capture excess concrete and wash water used in concrete mixing vehicles and prevents these pollutants from coming into contact with jurisdictional surface waters, wetlands, and buffers of the state. NCDOT developed detailed drawing and construction specifications for concrete washout structures to facilitate use of the structures by contractors and NCDOT staff.

Reinforced Silt Fence Sediment Retaining Measure – For repairs being done to NC 12 on the North Carolina Outer Banks, NCDOT Roadside Environmental Unit developed a reinforced silt fence designed to withstand high wind velocities and trap wind-borne sediment particles. The installation of the Reinforced Silt Fence is the same installation as standard silt fence with the geotextile buried in a trench and the fabric attached to steel posts, but additional requirements of the reinforcement are a reduced steel post spacing of 6 feet from 8 feet and the new detail requires the wire backing to be installed against the geotextile. Figure 3 shows details of the design. The Reinforced Silt Fence is utilized on projects along the Outer Banks corridor and other future NCDOT coastal projects such as the Mid-Currituck and Topsail Island bridges. The enhanced silt fence BMP will provide additional protection for coastal water quality.

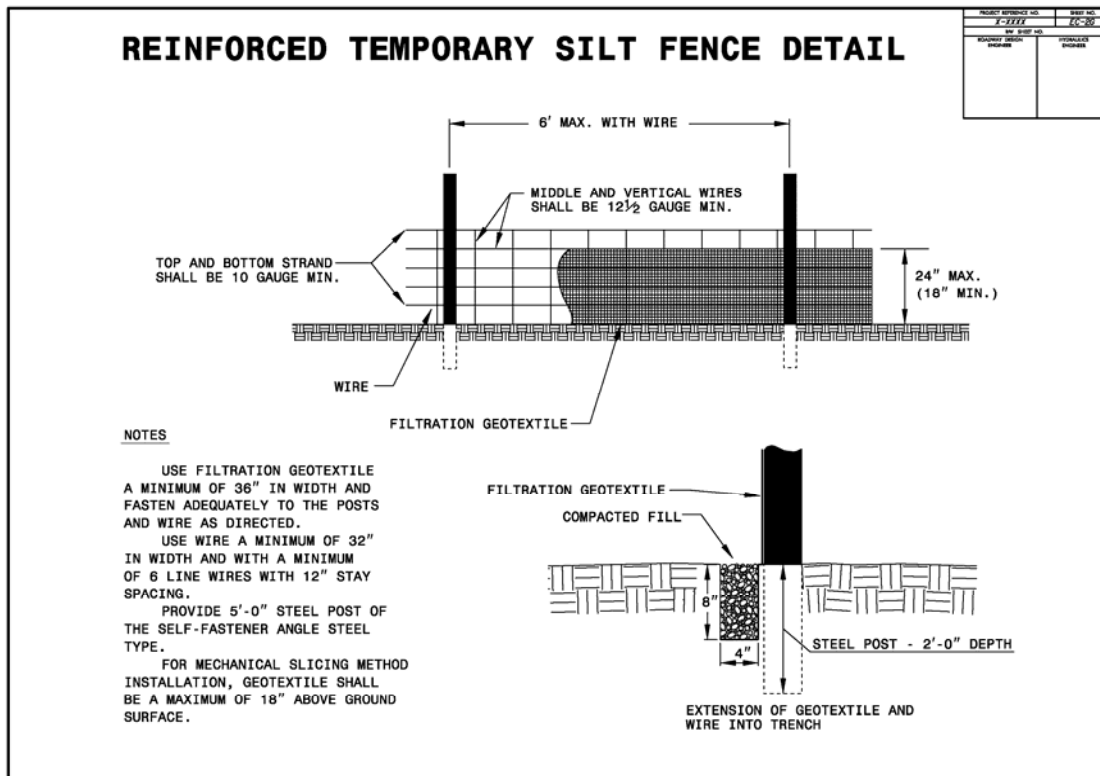


Figure 3. Reinforced Silt Fence for Coastal Areas

Rigid Sediment Barrier for Areas of Blasting – In areas on NCDOT projects where blasting of natural rock occurs, the shot rock and debris has the potential to enter a sensitive stream or wetland. The force of the blasted debris can damage traditional perimeter sediment fence or bypass the designed sediment barrier altogether. The rigid sediment barrier developed by the REU consists of concrete Jersey barrier wrapped in Type 2 geotextile and placed between the blasting area and jurisdictional resource as illustrated in Figure 4. Careful consideration had to be given as to which type of Jersey barrier to specify in the detail because the barrier is prone to impacts by the blasted stone. A barrier with a high center of gravity is more likely to tip over if debris strikes the concrete wall near the top of the barrier. Therefore, a Type 4 Double Faced Concrete Barrier was selected due to its lower center of gravity, yet it still provides approximate three feet of height to minimize the displacement of shot rock and other particles. The base is approximately two feet in width so it can be placed on a narrow road shoulder or along the top of stream bank and not impede public or construction vehicle traffic. The barrier can be utilized from existing NCDOT stock yards or rented for the duration of the project. In other uses, the Rigid Sediment Barrier can be used along stream banks where bedrock prevents the installation of traditional silt fence. This robust barrier provides greater protection of trout streams and other impaired waters from potential impacts from blasting operations.

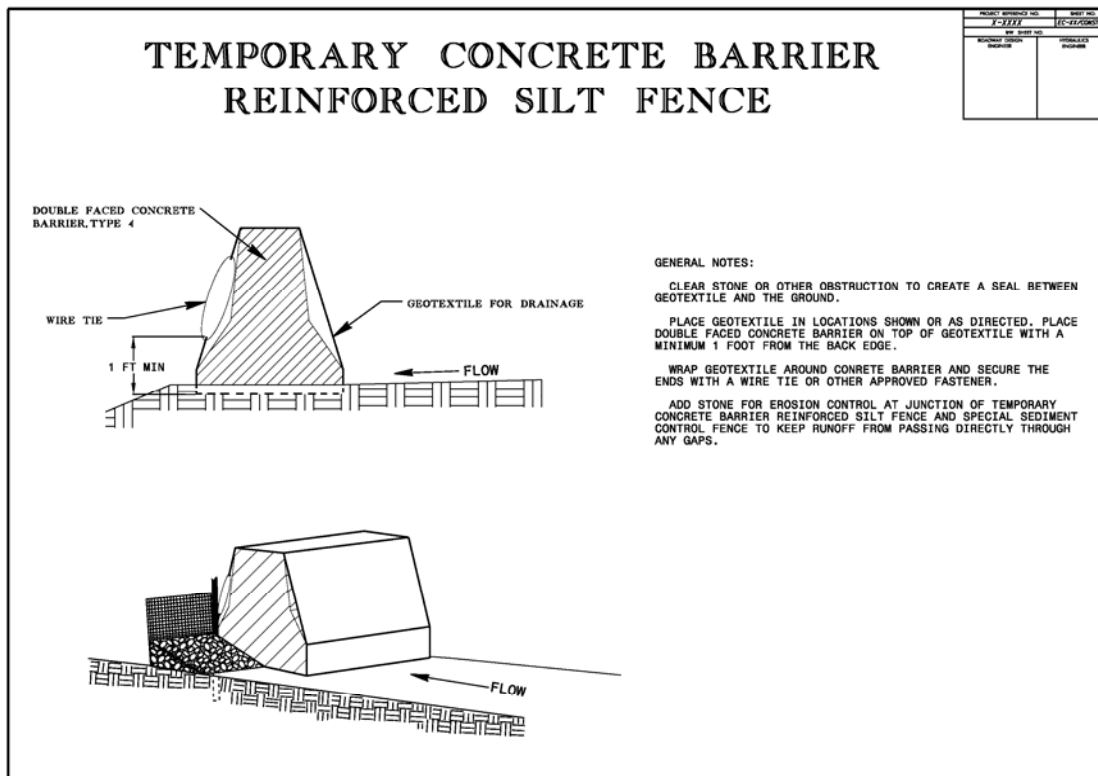


Figure 4. Concrete Barrier Reinforced Silt Fence

Considerations for Fiscal Year 2016

NCDOT will continue to develop new permanent stormwater and temporary erosion and sediment control BMP details as needed to address unique needs. Where these new controls are found to be beneficial and applicable to other projects, they may become standard details and specifications that can be applied to other future projects. Considerations for new BMP measures may include, but not be limited to pollutant capture devices, temporary erosion and sediment control measures and turbidity reduction methods.

11.0 Industrial Activities Program

NPDES Permit Part II.E.1 and 2

Objectives and Measurable Goals

The program objectives are to:

- i. Maintain and implement a Stormwater Pollution Prevention Plan (Plan) for each facility with an industrial activity that is covered by this permit.
- ii. Develop and implement a Plan prior to operation of any new industrial facilities.
- iii. Evaluate the effectiveness of the industrial Stormwater Pollution Prevention Plans (SPPP) for each industrial facility.
- iv. Perform required qualitative monitoring at stormwater outfalls identified in the SPPPs and during supplemental inspections for new sources and discharges as required.

Management Measures	Measurable Goals
(a) Maintain and implement a SPPP for each covered industrial activity and related facility.	NCDOT shall maintain and implement a site specific Stormwater Pollution Prevention Plan (SPPP) for each covered facility with an industrial activity. For new activities or facilities, the SPPP shall be developed and implemented prior to operation.
(b) Perform visual monitoring at each facility.	Qualitative monitoring shall be performed at each industrial stormwater outfall twice per year, once in the spring (April - June) and once in the fall (September - November). Qualitative monitoring requires an inspection of each stormwater outfall for the parameters listed below. Qualitative monitoring is for the purpose of evaluating the effectiveness of the SPPP. No analytical tests are required. NCDOT will pursue correction of stormwater quality where qualitative monitoring indicates degradation of quality in comparison to previous monitoring events.

Program Overview

As part of the Industrial Activities Program, NCDOT maintains and implements a SPPP for each facility with an industrial activity that is covered by the NPDES permit. Specific requirements for the SPPPs are provided in Part II.E of the NPDES permit. NCDOT SPPPs describe potential pollution sources at each facility and provide BMPs to minimize potential impacts on stormwater from on-site industrial activities. The Spill Prevention Control and Countermeasure (SPCC) Plan requirements of 40 CFR 112 have been fully integrated into the SPPPs to emphasize oil spill prevention and response practices at NCDOT industrial facilities. In addition, NCDOT must conduct qualitative monitoring for each stormwater

discharge point or outfall through site inspections at each industrial facility at least twice per year, once in the spring and once in the fall.

Accomplishments

The pollution prevention tasks performed under the Industrial Activities Program are implemented and refined annually. Most activities focus on maintaining SPPPs, conducting audits, and providing the on-going education needed to keep employees aware of the requirements. A summary of the key activities completed in the past year is provided in Table 6.

Table 6. Industrial Activities Program Accomplishments in the Reporting Period

Accomplishment	Total Number
SPPPs maintained and implemented	198
SPPPs updated	8
New SPPPs prepared	0
SPPP/SPCC Plan Implementation Training Workshops	13

SPPP Implementation – NCDOT continues to maintain and implement site-specific SPPPs at its industrial facilities, which includes county maintenance yards, equipment shops, ferry terminals and a ferry maintenance facility, roadside environmental shops, traffic services shops, bridge maintenance yards, a rail maintenance facility, and remote salt and material storage locations. NCDOT SPPPs describe potential pollution sources and structural BMPs at each facility and provide non-structural BMPs to minimize potential impacts on stormwater from on-site industrial activities. NCDOT continues to incorporate the SPCC requirements from 40 CFR 112 into the appropriate facility SPPPs as part of its Industrial Activities program. NCDOT SPCC Plans describe spill prevention measures, inspections of SPCC-regulated oil containers, and spill response and notification procedures. Additionally, NCDOT includes quantitative monitoring requirements and documentation of the resulting observations at its industrial stormwater discharge outfalls in the SPPPs.

During the permit year, SPPP updates were performed for various NCDOT industrial facilities because of changes to the facilities, such as new buildings or changes in covered activities and staffing. No new facilities were constructed in this permit year.

NCDOT emphasizes employee training to meet part of the SPPP requirements, utilizing many unique approaches to train Division personnel on stormwater pollution prevention, good housekeeping, and spill prevention. NCDOT uses videos for initial or annual refresher training, individual or group training sessions, posters and handouts for program reminders, and NCDOT’s Industrial & Roadway Maintenance Activities (IRMA) BMP Guidance Manual for training briefings at the Division level. NCDOT conducted 13 SPPP/SPCC Implementation Training Workshops with both Level I (introductory review of SPPP/ SPCC Plans) and Level II (advanced SPPP/SPCC update and review) sessions in the spring of 2015 that provided new training for Division Equipment Shop staff and advanced level training to NCDOT SPPP Team Leaders and team members.

NCDOT continues to utilize its SPPP website to help manage and track SPPP/SPCC implementation at each industrial facility. The SPPP website allows Industrial Activities program managers and Division-level engineers to track the overall program implementation and also allows personnel at each facility to document SPPP/ SPCC task completion, including qualitative monitoring of stormwater discharges, facility inspections, employee training, and BMP implementation.

Ongoing Internal Maintenance Yard Review – NCDOT continues to conduct internal reviews of NCDOT maintenance yards throughout the state, including six internal reviews performed during this permit year. Each internal review includes an evaluation of the facility's SPPP/SPCC Plan, review of documentation of completed tasks, an interview with the SPPP Team Leader and discussion of site-specific changes or needs for the facility, and an in-depth site inspection of the maintenance yard. Verbal BMP recommendations are provided during the internal review and written BMP recommendations are provided later. The internal reviews also serve as an opportunity to gather appropriate site data to fully update the SPPP/SPCC Plans when needed.

The primary goals of the internal maintenance yard reviews are to help the Divisions identify potential stormwater pollution concerns, evaluate their SPPP/SPCC Plan implementation, and provide additional BMP recommendations if needed. The internal reviews also aid Division management in prioritizing any major stormwater related expenditures. The internal reviews also serve as additional one-on-one stormwater pollution prevention training for facility staff which supplements other annual training they perform.

Level I Training for Roadside Environmental Staff & Level II Advanced Training - NCDOT HSP staff continues to provide annual SPPP/SPCC training for NCDOT's Division personnel. NCDOT held 13 training workshops across the state in the spring 2015. Baseline BMPs such as good housekeeping, preventative maintenance, and spill prevention practices were reviewed with all attendees. For the fourth straight year, two different training workshop levels were provided each day.

This permit term NCDOT conducted a new Level I training morning course specific for Roadside Environmental operations, including fertilizer use and storage, pesticide use and storage, erosion repair, rest area management, and good housekeeping and pollution prevention for construction activities. As part of the training, NCDOT Field Operations staff instructors also provided an update on erosion and sediment control measures at industrial facilities. New training materials were specifically developed for the Level I training and 167 new posters (shown in Figure 5) were provided to Division Roadside Environmental staff and other appropriate Division staff. Additionally, 153 new pet waste station signs were provided to Roadside Environmental staff and Ferry Division staff to replace existing faded signs at rest areas and ferry terminals throughout the state.

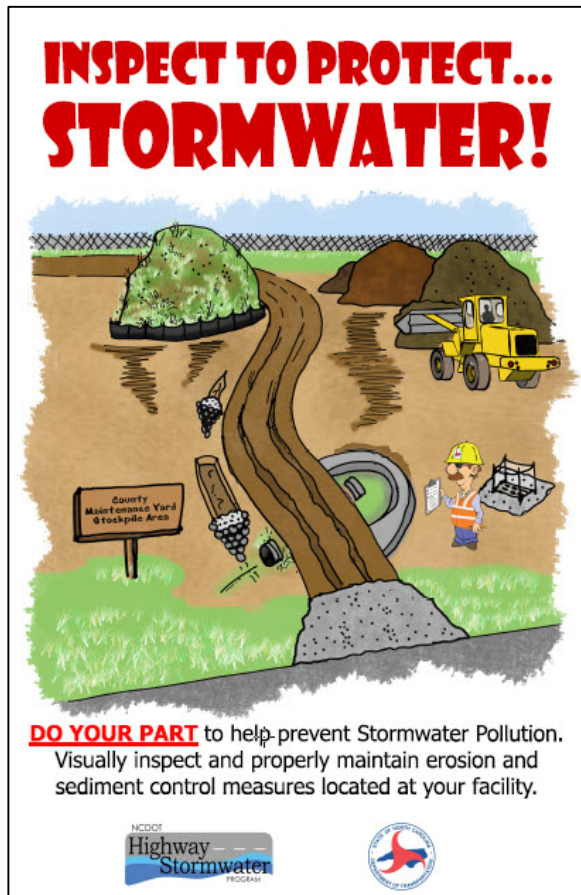


Figure 5. New Poster Provided for Display at NCDOT Industrial Facilities

Considerations for Fiscal Year 2016

NCDOT will continue to maintain and implement site-specific SPPPs at its industrial facilities in Fiscal Year 2016. NCDOT staff will also continue to assist Division personnel by conducting training workshops, providing guidance on structural SPPP BMPs at industrial facilities, performing site reviews at selected facilities, and supporting the divisions with other aspects of the Industrial Activities Program as needs arise.

Level II Advanced SPPP/SPCC Training was provided in the afternoons to SPPP Team Leaders (typically County Maintenance Engineers) for each NCDOT industrial facility and other key team members. The topics vary each year for the advanced training. This year, attendees were provided with summary updates on the SPPP/SPCC program, SPPP website, and other SPPP/SPCC implementation issues relevant to Team Leaders. The instructors also reviewed IRMA BMP Guidance Manual topics, spill prevention and cleanup updates, IDDEP procedures, and nutrient management guidance for Division staff located in Jordan Lake and Falls Lake watersheds.

Training was provided for 434 individuals, including 180 in the morning sessions and 254 in the afternoon sessions. The afternoon session included 76 individuals from Divisions 5, 7, and 8 who received the additional nutrient management training. The Level I and II training approach adopted by NCDOT HSP over the last few years has been extremely effective by providing more targeted training to address where it is needed most.

12.0 Internal Education Program

NPDES Permit Part II.F.1

Objectives and Measurable Goals

The program objectives are to:

- i. Implement a program to train NCDOT staff and contractors about the importance of stormwater quality.
- ii. The training should include topics such as spill control, chemical application, illicit discharges and illegal dumping, etc.

Management Measures	Measurable Goals
(a) Provide pollution prevention awareness training for construction workers.	NCDOT shall provide annual stormwater pollution awareness training for appropriate NCDOT personnel and contractors involved in construction and maintenance activities. NCDOT may require contractors to have equivalent training in lieu of NCDOT-provided training. Training shall include general stormwater awareness, NPDES stormwater permit NCG010000 implementation, identification of stormwater pollution potential, appropriate spill response actions and contacts for reporting spills and illicit discharges/illegal dumping.
(b) Provide pollution prevention awareness training for maintenance workers.	NCDOT shall maintain a program of annual stormwater pollution awareness training for appropriate NCDOT maintenance staff. NCDOT shall also maintain an ongoing program for training Adopt-A-Highway volunteers and prison inmate laborers. NCDOT may require contractors to have equivalent training in lieu of NCDOT-provided training. Training shall include general stormwater awareness, identification of stormwater pollution potential, and appropriate contacts for reporting spills and illicit discharges/illegal dumping.
(c) Provide pollution prevention awareness training for NCDOT staff.	NCDOT shall provide annual Stormwater Pollution Prevention Plan training for appropriate NCDOT staff. Training shall include general stormwater pollution awareness, site-specific Stormwater Pollution Prevention Plan awareness, and reporting/documentation procedures.
(d) Develop and submit an Internal Education and Involvement Plan	NCDOT shall develop the Internal Education and Involvement Plan to DWQ in Year 1 of the permit. The plan shall include the requirements for the measureable goals above, and other training required by the permit. The plan will be initiated within 6 months after receiving DWQ approval.

Program Overview

The Internal Education (IE) Program was implemented to provide planning, oversight and tracking of stormwater quality training for NCDOT staff and contractors. The NPDES permit requires training for construction and maintenance workers along with general pollution prevention training, specifying several education topics for each. Additionally, selected other programs have specific educational requirements which are supported by the IE Program. The IE Program works closely with other HSP program areas to monitor training activities and to provide support for training development.

Accomplishments

Over the reporting period, HSP team members both provided training to NCDOT employees and contractors and attended training related to stormwater. Table 7 summarizes the types of training received by NCDOT staff and provided by NCDOT. Additional information about each of the training activities listed below, such as date, place, and number of participants, are available upon request.

Table 7. Summary of Internal Education Training Activities

Training / Trainee(s)	Description	Training Provider
Strategies for Reducing Runoff in Wrightsville Beach / HSP staff	Presentations on the design and construction of stormwater BMP retrofits in Wrightsville Beach	ASCE and N.C. Coastal Federation
Microstation and Geopak Training / HSP staff	Basic Geopak, Microstation training, importing and using survey files in Geopak	NCDOT
PCSP Training / Hydraulics Unit staff and DEOs	Post-Construction Stormwater Program, BMP Toolbox, and Stormwater Management Plan Basics – multiple classroom sessions	NCDOT
NPDES Training / Division 6	Multiple presentations over several days and locations	NCDOT
Hydraulics Unit Training / HSP staff	Sessions in stormwater quality management, floodplain management, hydraulic challenges, bridge and culvert replacements and alternative hydraulic models	NCDOT, Hydraulics Unit
Roadside Conference / Division Engineers and Supervisors	Discussed strategies on how to develop budgets for maintaining BMPs and provided handouts that discussed costs associated with various BMPs	NCDOT, REU
Rethinking Swale and Filter Strip Design / HSP staff	Workshop reviewed the most innovative designs for swales.	NCSU Biological and Agricultural Engineering
BMP Inspection and Maintenance Certification / HSP staff	Specialized training to perform inspection and maintenance on water quality treatment devices	NCSU Biological and Agricultural Engineering Cooperative Extension

Table 7. Summary of Internal Education Training Activities, cont.

Training	Description	Training Provider
NC Green Industry Council Water Symposium	The symposium featured key presentations on advanced stormwater management techniques	Several speakers from universities, government, and private sector
Long-Term Performance and Life-Cycle Costs of Stormwater BMPs	TRB webinar discussing information and demonstrating (spreadsheet) tools for the selection and maintenance of highway-related stormwater BMPs based on long-term performance and life-cycle costs.	Transportation Research Board
SELDM training	Three day webinar training on the Stochastic Empirical Loading and Dilution Model covering model theory, operation, and interpretation.	USGS, FHWA

One of the goals documented in the 2012 Internal Education Plan was to “institutionalize stormwater education as an important and seamless part of NCDOT’s way of doing business.” The HSP IE program made significant progress towards this goal this year with the completion of a pilot study to evaluate the usefulness of the state’s Learning Management System (LMS) for the HSP’s training delivery and documentation. NCDOT currently uses the state’s LMS to provide schedules, track classroom training, and to deliver online training to NCDOT employees and contractors.

For the pilot study, HSP staff worked with a NCDOT Training Coordinator to add into the LMS previously developed materials, such as the Environmental Sensitivity Maps (ESM) videos, PCSP training presentation (for Hydraulics Unit staff), SPPP/SPCC training, and DEO training.

Pushing the majority of the HSP recurring internal training to the State’s LMS is expected to provide several benefits:

- The LMS will keep track of NCDOT employees and contractors who take training in the HSP curriculum. The HSP staff will be able to use the LMS to produce reports that document the training.
- Training can be assigned to NCDOT employees or contractors based on their job category or other attributes, making it easier to track who should be trained and when they receive training. New employees can be assigned relevant modules of stormwater related training in the onboarding process and compliance can be tracked through the LMS.
- HSP training can also be made available (i.e., discoverable through the LMS search function) to either all NCDOT employees and contractors, or certain selected groups.

- Professional Development Hours (PDHs) can be assigned to certain training courses, making the training more attractive on a voluntary basis and thereby promoting expanded HSP education.

Once the LMS configuration has been completed and is in routine use, the labor costs to the HSP for tracking and managing HSP internal education will be reduced.

In addition to the formal training events, team members continued internal outreach efforts within NCDOT. For example, a team member attended the REU conference in December 2014 and presented strategies for developing budgets for maintaining BMPs and provided handouts that discussed costs associated with various BMPs. Additional details on internal education and training are described in the Accomplishments sections for the PCSP, Industrial Activities, Vegetation Management, and TMDL Programs.

Considerations for Fiscal Year 2016

The LMS pilot only included videos and classroom training. Future expansion of the LMS is expected to include e-learning modules that employees and contractors can access online at any time. With increasing responsibility being pushed to the Divisions, these improvements in the delivery of training will make it easier for statewide employees and contractors to access the training they need. Efforts in 2016 will focus on developing e-Learning modules for PCSP and SMP training that can be offered through the LMS.

13.0 External Education Program

NPDES Permit Part II.F.2

Objectives and Measureable Goals

The program objectives are to:

- i. Implement a program to educate the public about the importance of stormwater quality, including chemical application, illicit discharges and illegal dumping, etc.
- ii. Maintain diverse educational materials to engage and educate the public from different social, economic and age groups.
- iii. Public involvement in NCDOT stormwater quality programs.

Management Measures	Measurable Goals
(a) External Education and Involvement Plan.	Maintain the External Education and Involvement Plan. The plan shall include the requirements for the measurable goals below.
(b) Provide pollution prevention awareness educational materials to general public.	Provide stormwater pollution prevention awareness information to the general public through the distribution of educational brochures at significant events, public involvement workshops and/or locations throughout the state. Audiences may include school-age children, the vacationing public, and commercial users.
(c) Maintain a public education website	Maintain a public education website to document NCDOT pollution prevention programs and promote stormwater quality. The website will include articles on stormwater, information on water quality, stormwater projects and activities, and ways to contact stormwater management program staff.
(d) Develop educational partnerships.	Work with DENR and other agencies to promote and distribute public education materials annually.
(e) Continue public involvement programs.	Continue the Adopt-a-Highway Program, including illicit discharge training for volunteers. Additional programs may also be developed.

Program Overview

NCDOT implemented the External Education (EE) Program to educate the public about the importance of stormwater quality, including awareness of the impacts of chemical application, illicit discharges and illegal dumping and other activities that may add pollutants to stormwater runoff. The EE Program

encourages public involvement in NCDOT stormwater quality programs and maintains diverse educational materials to engage and educate the public from different social, economic and age groups. As part of the EE Program, NCDOT maintains an External Education and Involvement Plan, a public education website, and an area on its website, *Connect NCDOT*, to distribute stormwater educational materials. The program actively seeks partnerships with other NCDOT departments, other state agencies, and organizations with shared outreach goals.

Accomplishments

In the past year, the HSP management team discussed and developed recommendations on ways to enhance the EE Program. New activities this year focused on enhancing the program while maintaining on-going efforts started in previous years.

Education Partnerships – Based on the results of a self-assessment, HSP management felt that while the EE Program was meeting permit requirements, a more self-sustaining approach to public education was needed. Based on input from external reviewers as well as a self-assessment of past educational outreach activities, the EE Program launched a new effort to develop a strategy for a program that will achieve the following objectives:

- expand the HSP's reach to a larger and more diverse audience
- be self-sustaining
- enhance current partnerships and build a growing network of new partners
- cost-effectively leverage other educational or outreach programs
- be sufficiently flexible that new technologies, communication channels, and information can easily be incorporated without major reworking of existing systems

NCDOT determined that partnerships that leverage the resources and skills of museums, STEM (science, technology, engineering and math) educational organizations, and North Carolina educators provide an excellent option for growing the HSP EE Program. In the summer of 2015, EE partnered with NCDOT's recently created Office of Education Initiatives (OEI) to kick-off this new initiative by participating in the NCDOT Summer STEM Session on July 16, 2015. Ten math and science teachers from Wake County attended the one-day immersion in four NCDOT subject matter areas. Andy McDaniel and Chris Niver presented on NCDOT's stormwater program during the Environmental session. Various educational materials developed by HSP over the past decade and sample lesson plans prepared by OEI aimed at stormwater education for different age groups were provided to the teachers (posted on the OEI website: <http://www.ncdot.gov/careers/edu/initiatives/stormwater.html>)

Websites Update and Maintenance – The program continued to make progress on updates to HSP websites. The original HSP public website (ncdot.gov) was completed in 2003 and was used to distribute documents as well as to provide public information. When *Connect NCDOT* was established, NCDOT promoted its use for distributing electronic documents. HSP established a subsite for the HSP under the Hydraulics Unit's tab and has been using that site to share documents such as the BMP Toolbox with the public.

Partnership with Office of Beautification – In addition to the new activities launched in the past year, HSP continued to build on successful on-going activities. HSP’s first partner in external education was the Office of Beautification, collaborating on existing public involvement programs, and that partnership continued to be strong in 2015. Through various on-going programs, we distributed the following stormwater-related items:

- Distributed 2,500 IDDEP brochures through the 2014 NC State Fair, and at more than 20 group presentations, event displays (Earth Day and local fairs) and field training;
- Hundreds of Stormwater worksheets, Stormwater Flash Facts, Secure Your Load and Litter Law Fliers given out at the state fair;
- More than 8,600 students received Stormwater worksheets, Stormwater Flash Facts, Secure Your Load flier, Litter Law fliers, Swat-A-Litterbug Cards, car litterbags with a stormwater litter prevention message and “No litter” bumper stickers;
- Provided more than 4,500 pairs of gloves for NC Big Sweep volunteers for roadside litter removal;
- Provided 5,370 tarps to Keep North Carolina Beautiful (KNCB) for distributing to the residential patrons of landfills and convenience centers to help the motorists better secure their cargoes; and
- Distributed more than 22,000 car litterbags having a stormwater litter prevention message through various NC Welcome centers.

HSP team members continued to participate in conferences, presentations, and other public opportunities to share stormwater management knowledge with stormwater practitioners, researchers, and the general public.

Considerations for Fiscal Year 2016

The External Education Program plans to continue fostering relationships with education partners such as the Office of Education Initiatives in order to leverage their expertise and resources. HSP will also continue to partner with the Office of Beautification’s outreach initiatives and NCDOT’s Office of Communications to update the HSP’s stormwater website page.

14.0 Research Program

NPDES Permit Part II.G

Objectives and Measurable Goals

The program objectives are to:

- i. Conduct research with faculty and staff at state universities or other designated institutions that result in independent quantitative assessment of stormwater from NCDOT permitted activities and/or measure structural BMP effectiveness.
- ii. Conduct research to enhance or improve existing practices or develop new methods or processes to meet future permit requirements.

Management Measures	Measurable Goals
(a) Research Plan	<p>Maintain a Research Plan. The Plan shall be in keeping with the guidelines established by the Federal Highway Administration (FHWA) Evaluation and Management of Highway Runoff Water Quality Manual (FHWA-PD-96-032) and FHWA’s National Highway Runoff and Data methodology Synthesis (FHWA-EP-03-054, or any updates.</p> <p>The Research Program will include:</p> <ul style="list-style-type: none"> 1) A description of the Research Program and process for requesting funding. 2) A process to evaluate the pollutant removal effectiveness of the structural BMPs identified by DWQ and NCDOT. 3) A process that identifies research needs that will evaluate program improvement areas.
(b) Submit the Research Plan to DWQ for approval.	Proposed modifications to the NCDOT Research Program shall be submitted to DWQ for approval.
(c) Implement the Research Plan	NCDOT shall continue to perform and sponsor research to fulfill the Research Plan.

Program Overview

The Research Program’s primary mission is to support all aspects of the HSP through development of immediate and practical solutions to stormwater management information needs. NCDOT conducts research with faculty and staff at state universities or other designated institutions that result in independent quantitative assessment of stormwater from NCDOT permitted activities and/or measure

structural BMP effectiveness. NCDOT also conducts research to enhance or improve existing practices or develop new methods or processes to meet future permit requirements. As part of the program, NCDOT maintains a Research Plan that describes the processes to request funding, to evaluate effectiveness of structural BMPs and to identify research needs.

Accomplishments

NCDOT has continued to implement research projects in collaboration with various universities as required by the permit and described in Table 8. Several elements of the HSP have been guided by research data, from updates to the BMP Toolbox to the development of NCDOT-specific stormwater load accounting tools for the Jordan Lake and Falls Lake watersheds. NCDOT continues to evaluate data gaps in its program and identify research projects to close these gaps both through the Department’s annual research cycle, through out-of-cycle funding and using technical assistance agreements, as detailed in the NCDOT Research Plan.

Table 8. Summary of Research Projects Ongoing or Completed in Year 5 of Permit

Research Project	Project Summary
RP2011-35-5 Evaluating the Effectiveness of Biofiltration Conveyance Systems (BFC) in Treating Highway Stormwater Runoff	This project involves performance monitoring of biofiltration conveyance (BFC) SCMs at two sites, one in Brunswick county and the other in Alamance county. The monitoring and data analysis is complete and NCSU and NCDOT are finalizing the final report.
RP2011-35-6 Determining Roadway PSDs and Contribution of Gross Solids for Swale Design	This project evaluates vegetative treatment effectiveness, which includes the collection and evaluation of particle size distribution (PSD) data and characterization of gross solids in roadway runoff and in the effluent from swales. The monitoring and data analysis is complete and NCSU and NCDOT are finalizing the final report.
RP 2014-17 Water Quality Benefits Associated with Retrofitting Swales and Roadside Ditches with Check Dams	The project involves monitoring selected swales before and after installation of check dams. The monitoring and data analysis is complete and NCSU is working on the draft report.
RP 2014-18 Investigation of Tillage and Soil Amendments to Increase Infiltration in Vegetated Stormwater Controls	This project assesses the impact of tillage on infiltration rates at various sites with different underlying soils. The sites are treated with different types and depths of tillage, and different amendments like compost, polyacrylamide (PAM), etc. The project will also determine the life expectancy of treatments at sites before there is a need for re-treatment, and provide guidance to construction and maintenance staff on incorporating tillage into their practices. Data collection is ongoing.

Table 8. Summary of Research Projects Ongoing or Completed in Year 5 of Permit, cont.

Research Project	Project Summary
RP 2016-18 Swale Design Optimization for Enhanced Application and Pollutant Removal	This project will conduct pilot testing of multiple swale design parameters/configurations in controlled plots to optimize swale design for implementation in the linear environment. Initial experimental design and site selection is currently underway.

In the last permit term, NCDOT initiated or continued several research projects that address construction and post-construction stormwater, including evaluating check dams as a retrofit to improve swale performance, bioswale monitoring, tillage practices to improve infiltration in post-construction BMPs, low-cost ditch stabilization, and developing new monitoring procedures and equipment. Some of these projects are discussed below.

Bioswales to Reduce Bacterial Contamination – NCDOT has been testing the effectiveness of a bioswale on US 211 in the Lockwood Folly watershed which is impaired for shellfish harvesting due to fecal coliform contamination. The bioswale was constructed by retrofitting an existing swale with a 200-ft linear strip of proprietary media three feet deep. Results indicate the bioswale was able to reduce the concentrations of enterococci by half, fecal coliforms three-fold (effluent concentrations were typically below the water quality standard of 200 MPN/100 mL) and TSS by an order of magnitude.

Preformed Scour Holes to Maintain Anuran Diversity – One of the valuable tools in the NCDOT BMP Toolbox to protect against erosion in post-construction settings is the preformed scour hole (PSH). Now it appears PSHs may also provide habitat for amphibians in urban areas. Using sites provided by NCDOT, UNC-G researchers surveyed anuran species in PSH in the piedmont region of North Carolina and correlated species richness with local and regional factors associated with PSH. As expected, total species richness was adversely affected by urbanization. However, PSH surface area was positively associated with total species richness, implying that PSH (and similar BMPs) may help to mitigate anuran diversity loss due to urbanization.

Applying PAM at Construction Sites – NCDOT has been conducting a variety of research on using polyacrylamide (PAM) at construction sites. One of these initiatives is testing two doser devices used to apply set rates of liquid PAM at construction sites at the I-840 Urban Loop extension project around Greensboro, NC. Both the New Zealand doser and the floating valve doser have performed well and resulted in effluent with significantly lower turbidity and TSS than during control periods when the dosers were turned off.

NCDOT also conducted an evaluation of the potential toxicity of flocculated sediment on freshwater mussels. 24-day chronic toxicity tests were performed on juvenile fatmucket (*Lampsilis siliquoidea*) over a range of turbidities to evaluate the relative toxicity of suspended sediment, settled sediment, and sediment with the addition of polyacrylamide. Preliminary results indicate there was no apparent chronic toxicity to the juvenile mussels from sediment exposures.

Considerations for Fiscal Year 2016

In 2015, NCDOT has initiated new research projects that will be implemented in addition to projects that continue from 2014. One new project is a systematic evaluation of swales and bioswales both in a controlled setting at the NCSU Sediment and Erosion Control Research Evaluation Facility (SECREF) and in two field sites. The project will evaluate the effect of specific design variables like swale geometry or bioswale length or media depth on SCM performance.

15.0 Total Maximum Daily Load Program

NPDES Permit Part III.C

Objectives and Permit Requirements

The program objectives are:

- i. Address impaired waters identified in Total Maximum Daily Loads (TMDLs) in which NCDOT is named as a significant contributor of the pollutant and an assigned Waste Load Allocation (WLA)

Permit Requirements

- 1) If NCDOT is in compliance with a TMDL that expresses NCDOT’s WLA as a percent of impervious cover (“ICWLA”), then this section (Section C) shall not apply and NCDOT shall follow the terms of Section III.D of this permit.
 - 2) At any time during the effective dates of this permit, NCDOT will develop and implement a program (“Program”) to address impaired waters identified in TMDLs in which NCDOT is named as a significant contributor of the pollutant addressed by the TMDL and that assigns NCDOT a wasteload allocation (WLA) separate from other point sources. Similarly, NCDOT will also develop a Program in watersheds in which NCDOT is not in compliance with an ICWLA TMDL.
 - 3) NCDOT’s Program shall summarize the locations of NCDOT outfalls that are identified in its implicit Stormwater Outfall Inventory that have the potential to discharge the TMDL pollutant of concern into the impaired segments, to their tributaries, and to segments and tributaries within the watershed contributing to the impaired segments.
 - 4) NCDOT’s Program shall implement an Assessment & Monitoring Plan (“Plan”). The Plan shall include an evaluation of the need for additional data collection related to the NCDOT’s discharge of the TMDL pollutant of concern. Additional data collection to be evaluated may include (but does not require) a supplemental inventory of NCDOT outfalls, monitoring, an assessment of the effectiveness of existing BMPs, and an assessment of non-NCDOT discharges entering NCDOT’s conveyance system and negatively impacting the quality of NCDOT stormwater discharge. If the Plan proposes analytical monitoring, then it shall include a description of the sample types, frequency, and seasonal considerations, if applicable. Where appropriate, NCDOT may reduce its monitoring burden by monitoring outfalls that the DWQ considers substantially similar to other outfalls. The Plan may be adjusted as additional outfalls are identified.
 - 5) The Plan shall include a schedule for implementing the proposed assessment and monitoring activities. The Plan shall be submitted to DWQ for comments no later than 12 months after notification by DWQ that NCDOT has been assigned a WLA or that NCDOT has exceeded a ICWLA as a result of new NCDOT impervious area. DWQ shall complete its review of the Plan within 6 months of receiving the plan from NCDOT.
 - 6) NCDOT shall initiate implementation of the Plan within 6 months of receiving Plan approval from DWQ. In accordance with the Plan implementation schedule, NCDOT shall provide a summary of the assessment and monitoring activities performed within a reporting period in subsequent annual reports.
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Permit Requirements

- 7) Within 6 months of completing the assessment and monitoring activities outlined in the Plan, NCDOT shall submit a report of its findings to DWQ. The report shall include an assessment of whether additional structural and/or non-structural BMPs are necessary to meet NCDOT's WLA. The report shall include a schedule for implementing such BMPs. Upon approval by DWQ, NCDOT shall implement any necessary and approved BMPs in accordance with the schedule. Subsequent annual reports will provide data regarding the effectiveness of installed BMPs.

Program Overview

As part of the Total Maximum Daily Load (TMDL) Program, NCDOT has developed and implemented a program to address impaired waters identified in TMDLs in which NCDOT is named as a significant contributor of the pollutant and is assigned a WLA. The program includes preparation of assessment and monitoring plans, schedules for plan execution and submittal of findings reports to NCDEQ. The TMDL Program relies heavily on data that is collected under the Research Program to inform pollutant loading and water quality and watershed modeling decisions. TMDL compliance is supported through the Retrofit Program and its efforts to identify suitable locations for stormwater retrofits and successfully implement controls that achieve NCDOT waste load allocations.

Accomplishments

No TMDLs were developed and approved by USEPA during this annual reporting period. However, the TMDL Program remained active and achieved a significant milestone this year with the USEPA approval of the Little Alamance Creek Category 4b Demonstration Plan. NCDOT also partnered with the North Carolina Division of Water Resources (NCDWR) to develop the significant contributor protocol.

Little Alamance Creek Category 4b Demonstration Plan – In January 2015, USEPA approved a Category 4b Demonstration Plan for Little Alamance Creek. NCDOT, together with the Cities of Burlington and Graham as local partners, developed this watershed recovery plan outlining ongoing and future efforts to restore the aquatic life in Little Alamance Creek and submitted it to NCDENR and USEPA in Year 4 of the permit. The watershed plan is an alternative management approach to restore water quality in lieu of TMDL limits and includes a detailed review of available water quantity and quality data for the entire watershed; an overview of potential stressors; and an implementation plan including structural and non-structural BMPs to be implemented across the watershed.

NCDOT Significant Contributor Protocol – NCDOT has partnered with NCDWR to support modeling and the evaluation of NCDOT's pollutant contribution as part of TMDL development for several years. Using this experience, NCDOT and NCDWR developed a protocol that provides a framework for future collaboration between the agencies to help determine when NCDOT is deemed a significant contributor and to provide options for calculating NCDOT's wasteload allocation. The protocol provides a straightforward, transparent process that is based on best available science and information and can be used to address a wide range of pollutants, waterbody types, and water quality models used for TMDL

development. Documentation and implementation of the approved significant contributor protocol will streamline the TMDL development process, allowing NCDWR and NCDOT to more effectively allocate resources to improving impaired waters across the state.

Considerations for Fiscal Year 2016

NCDOT will continue to work cooperatively with NCDEQ as the agency develops TMDLs across the state. The TMDL Program will remain involved in the High Rock Lake nutrient modeling study and technical advisory and public stakeholder processes, which are currently in process. NCDOT will continue supporting NCDEQ as it proceeds with implementation of its nutrient criteria development plan through participation on the Criteria Implementation Committee and other working groups. NCDOT will enhance its TMDL tracking database to report on load reductions associated with stormwater and nutrient controls used to meet TMDL waste load allocations as well as NCDOT requirements in Jordan and Falls Lake watersheds. NCDOT will continue to partner with the Cities of Burlington and Graham to implement the Category 4b Plan through identifying and implementing pollution controls, management practices, and other strategies and activities designed to mitigate the stressors of biological impairment in the Little Alamance Creek watershed.

16.0 Falls and Jordan Lake GREEN Programs

Jordan Lake Rules:

15A North Carolina Administration Code (NCAC) 02B .0262-.0273, .0311, and NC Session Laws 2009-216, 2009-484

Falls Lake Rules:

15A NCAC 02B .0275—.0282

Requirements

Watershed	Rule Requirements
Jordan Lake	<p>Identify NCDOT stormwater outfalls from Interstate, US, and NC primary routes.</p> <p>Identify and eliminate illegal discharges into the NCDOT's stormwater conveyance system.</p> <p>Implement a Nutrient Management Education Program for NCDOT staff and contractors engaged in the application of fertilizers on highway rights of way.</p> <p>Meet riparian buffer and diffuse flow requirements on new and widening road projects.</p> <p>Achieve sub-watershed specific nutrient reduction targets on new non-road development projects using the NCDOT version of the Jordan/Falls Lake Stormwater Load Accounting Tool (NCDOT-JLSLAT) or through another calculation method that is acceptable to NCDWR.</p> <p>Provide an estimate of, and plans for offsetting, nutrient load increases from lands developed subsequent to the baseline period but prior to implementation of the new development program (currently stayed, see below).</p> <p>Implement three stormwater retrofit BMPs per year in the Jordan Lake watershed to reduce nutrient loads until NCDOT has either achieve the nutrient load goals in 15A NCAC 02B .0262 or the lake’s designated uses are restored (currently stayed, see below).</p>
Falls Lake	<p>Identify NCDOT stormwater outfalls from Interstate, US, and NC primary routes.</p> <p>Identify and eliminate illegal discharges into the NCDOT's stormwater conveyance system.</p> <p>Implement a Nutrient Management Education Program for NCDOT staff and contractors engaged in the application of fertilizers on highway rights of way.</p> <p>Meet riparian buffer and diffuse flow requirements on new and widening road projects.</p>

Watershed	Rule Requirements
	<p>Achieve nutrient reduction targets on new non-road development projects using NCDOT-JLSLAT or through another calculation method that is acceptable to NCDWR.</p> <p>Provide an estimate of, and plans for offsetting, nutrient load increases from lands developed subsequent to the baseline period but prior to implementation of the new development program.</p> <p>Implement six stormwater retrofit BMPs per year in the Falls Lake watershed to reduce nutrient loads until NCDOT’s existing development load reduction requirements are achieved or the lake’s designated uses are restored.</p>

Program Overview

The NC Environmental Management Commission (EMC) adopted permanent nutrient management rules for Jordan Lake and Falls Lake which became effective in 2009 and 2011, respectively. In response, NCDOT initiated the Guided Reduction of Excess Environmental Nutrients (GREEN) Program to integrate and enhance NCDOT’s stormwater and nutrient management practices and to support NCDOT’s compliance with the Jordan and Falls Lake Rules.

The Jordan Lake GREEN outlines the Department’s approach to managing nutrients from new development, including new and widened roads and new non-road developments. The EMC approved the Jordan Lake GREEN Program on November 8, 2012. The Rules also include retrofit requirements to reduce nutrient loads from existing NCDOT development; however, SL 2013-395 delayed this requirement for a period of three years. If notified by NCDEQ in March 2017 that a program to address nutrients from existing development is required, NCDOT must submit the program within 6 months (September 2017) and begin implementing the program two months following approval by the NC EMC. NCDOT may comply with the existing development rule through implementation of three stormwater retrofit BMPs per year.

The Falls Lake GREEN addresses the Department’s approach to managing nutrients from new and existing developments consisting of new and widened roads, new non-road development, and existing road and non-road development. The EMC approved the Falls Lake GREEN Program on January 9, 2014. Among other things, these regulations require NCDOT to implement new training for staff and contractors, calculate nutrient loads resulting from projects and devise controls to reduce the increased loads. Both GREEN programs are currently in effect. A notable requirement of the Falls Lake rules is the mandate for the Department to construct six retrofits per year in the watershed.

Accomplishments

The roll-out of the JLSLAT and the development of associated training was the main achievement this year. This and other activities are summarized below.

Nutrient Accounting Tool Training Videos – A series of six training videos were prepared by NCDOT to support staff and contractors when using the NCDOT nutrient accounting tool, NCDOT-JLSLAT, on new non-road development projects. The 8-12 minute videos cover topics such as an introduction to the GREEN Program, an overview of NCDOT-JLSLAT, model routing scenarios, simple and complex site examples and how to “set-up” a new project using NCDOT-JLSLAT. The videos are made available to staff and contractors as needed and it is anticipated that they will soon be available on the NCDOT YouTube channel.

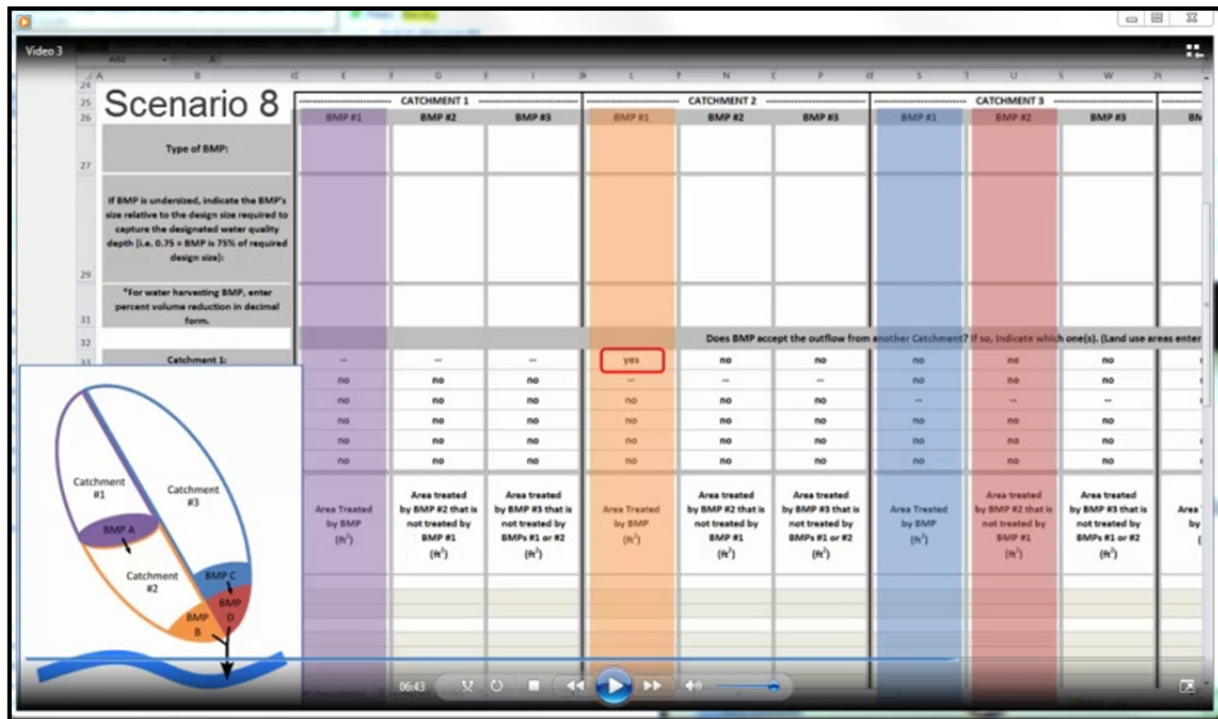


Figure 6. JLSLAT Videos Use Color Coded Diagrams to Illuminate Calculations

New Non-Road Development Projects in 2015 – Over the past year NCDOT did not complete any new projects in the Jordan Lake or Falls Lake watersheds that would be subject to the non-road development rules. Future annual reports that are used to document new non-road development subject to the rules will include a list of certified projects, descriptions of the projects and stormwater control measures, project-specific copies of the NCDOT–JLSLAT and other supporting calculations, and a summary of changes in nutrient loads associated with these activities.

Retrofit Projects to meet Falls Lake Existing Development Requirements – Eleven (11) stormwater BMP retrofits were constructed during the summer of 2015 in the N.C. Highway 98 and N.C. Highway 50 interchange. The interchange is located in the Lower Falls Lake Watershed in northwestern Wake County. Existing concrete-lined ditches inside all four (4) of the intersection loops were removed to decrease impervious area. These lined ditches were replaced with two (2) grassed swales and six (6) bio-swales. The bio-swales constructed include a trapezoidal grassed swale surface with the addition of a

minimum two foot depth of engineered filtration media and underdrains. False sumps were provided to create ponding and encourage infiltration. Two of the bio-swales incorporate internal water storage.

The TN and TP treatment characteristics of a bio-swale should more closely resemble a bio-retention cell than a grassed swale. NCDOT does not presently have data to quantify the treatment capabilities of these BMPs; however, research may be conducted at this location to determine the reduction in TN and TP loads.

One (1) filtration basin and two (2) dry detention basins were also installed. The filtration basin was constructed in the same manner as a bio-swale but with a larger footprint. The dry detention basins were installed to attenuate storm flows because of severe erosion in deeply incised receiving channels outside of NCDOT rights-of-way. At present there is no approved credit methodology for sediment load reduction. When a method is approved NCDOT may amend the accounting procedure accordingly.

In the absence of performance data for the bio-swales and filtration basin NCDOT conservatively modeled them in the Jordan/Falls Lake Stormwater Nutrient Load Accounting Tool as grassed swales. Also, NCDOT has limited data from actual NCDOT installed and maintained dry detention basins. As with the bio-swales future research will better define influent and effluent event mean concentrations (EMCs) and TN and TP load reductions for these BMPs.

Modeling these BMPs in their as-built conditions in the Jordan/Falls Lake Stormwater Nutrient Load Accounting Tool resulted in reducing the load of TN from 5.67 pounds per acre per year to 2.91 pounds per acre per year, a load reduction of 49%. TP was reduced from 0.58 pounds per acre per year to 0.51 pounds per acre per year, a load reduction of 12%.

If future research proves that these BMPs perform differently than assumed in the current NCDOT approved Jordan/Falls Lake Stormwater Nutrient Load Accounting Tool NCDOT will amend the accounting procedure accordingly.

Rehabilitation of Existing Stormwater Controls – NCDOT’s SCMS is used to track inspection and maintenance of structural BMPs located within the Jordan Lake and Falls Lake watersheds. NCDOT Division REU Engineers actively maintain BMPs in the Jordan and Falls Lake watersheds. In 2015, no significant rehabilitation needs were identified or reported. As such, no nutrient load reduction/performance changes associated with significant BMP maintenance or rehabilitation are known to have occurred during this reporting year.

Summary of Outfalls from Primary Roads in the Falls Lake Watershed – Using the implicit outfall inventory procedure developed for the NPDES program there are an estimated 425 likely outfall locations draining primary routes in the Falls Lake watershed. NCDOT plans to initiate field verification of these outfall locations in 2016 following a field inventory data collection plan now under development. The initial phase of field work will target the lower Falls Lake sub-watershed.

Nutrient Scientific Advisory Board (NSAB) Support – NCDOT remained an active member of the NSAB in 2015 and supported NCDEQ and the Board through participating in meetings, review and comments on

watershed modeling, nutrient measures for existing development stormwater, and the nutrient rules re-adoption process. NCDOT continues to work closely with NCDEQ to develop defensible jurisdictional loads for tracking rule implementation.

Considerations for Fiscal Year 2016

NCDOT will continue to implement the Department's GREEN Program and achieve requirements set forth for new and existing (Falls only) road and non-road development in the Jordan Lake and Falls Lake watersheds. NCDOT will continue to engage staff and contractors on nutrient-related requirements and watershed goals through educational tools and training opportunities.