

# Annual Report

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Term IV, Year 2: July 1, 2016 – June 30, 2017



**For Submittal to:**

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

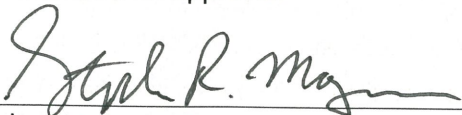
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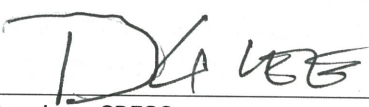
**NC Department of Transportation  
NPDES Permit No. NCS000250**


**October 31, 2017**

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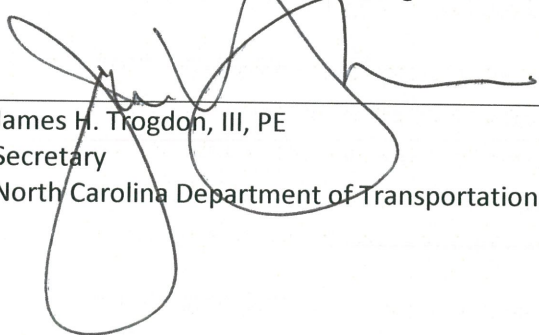
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James H. Trogdon, III, PE  
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Date 10/26/17

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This report is in compliance with NCDOT's National Pollutant Discharge Elimination System (NPDES) stormwater discharge permit (NCS000250) requirement under Part III Section A.1 to submit an assessment of the activities performed under the permit for the period July 1, 2016 – June 30, 2017. The NPDES permit authorizes NCDOT to discharge stormwater runoff from general roadways including weigh stations and tolling facilities, construction activities disturbing greater than one acre, borrow pits/waste piles, industrial facilities, office buildings, rest areas, and NCDOT-owned railways. Activities conducted by the North Carolina 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.

NCDOT integrates the environmental protection programs required by the permit with the Department's broader triple bottom line goals of accelerated delivery of the State Transportation Improvement Program (STIP), enhancing the appearance of roadway corridors, and working collaboratively with public and private sector partners to enhance the state's economic competitiveness.

#### **Select Accomplishments for Year 2 of Permit Term IV (July 1, 2016 – June 30, 2017)**

A few examples of accomplishments achieved by NCDOT during Year 2 of Permit Term IV to comply with the permit and streamline processes to support project delivery are outlined below:

- **Post-Construction Stormwater Program** – As a result of cooperative efforts between the NC Department of Environmental Quality and NCDOT, the NC Environmental Management Commission adopted updated state stormwater rules (15A NCAC 02H .1001) which became effective on January 1, 2017. The new rule consolidates stormwater management requirements for new NCDOT projects under the NPDES Post-Construction Stormwater Program (PCSP). This environmental streamlining initiative eliminates the requirement to obtain an individual state stormwater permit for projects in select areas across the state. Instead NCDOT's PCSP will provide automatic permit coverage thereby helping to facilitate accelerated delivery of the STIP.
- **BMP Retrofit Program** – During the permit year ten BMP retrofits were completed and construction was initiated on 38 additional retrofits across the state. Working in partnership with the Divisions, Highway Stormwater Program (HSP) staff identified retrofit opportunities along existing roadway corridors to protect water quality, minimize nuisance flooding, and correct maintenance issues within the drainage system.
- **Stormwater Outfall Inventory Program** – NCDOT completed its field inventory of stormwater outfalls along primary routes in the Falls Lake watershed. Outfalls are regulated under NCDOT's NPDES permit and represent locations where runoff is discharged from a pipe or open channel into a stream, reservoir, or other waterbody. NCDOT screened each of the 833 outfalls for evidence of illicit non-stormwater discharges and inappropriate dumping of trash with the goal of helping to protect the City of Raleigh's water supply. The outfall location data is also being used to identify and prioritize existing roadway areas for enhanced stormwater treatment via implementation of BMP retrofits.

- Industrial Activities Program – NCDOT implemented and maintained 197 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 pollution prevention measures to prevent spills and properly store chemicals and other materials.
- Internal Education Program – During the permit year HSP staff continued to place emphasis on educational initiatives targeting internal NCDOT staff and contractors. As the Divisions’ role in project delivery increases it becomes especially important for the Department to effectively distribute information to staff across the state. Recorded webinars, “quick start”-style references, posters, and live instructor-led workshops are a few examples of the educational formats used this permit year to deliver training.
- External Education Program – NCDOT also expanded its public environmental education efforts this year by leveraging partnership opportunities, such as with the Wake County Parks and Recreation Department. This partnership provides NCDOT with additional opportunities to interact one-on-one with the public to educate them on the wide range of environmental protection efforts NCDOT implements on projects. Again this year NCDOT tapped into expertise with the Department’s Office of Education Initiatives to host the summer Science, Technology, Engineering and Mathematics (STEM) session for select local teachers. The summer STEM program puts area educators in contact with a wide array of business and industry representatives to support STEM education in the classroom. By invitation, HSP staff taught lessons at area middle schools on how students can do their part to minimize stormwater pollution. Also again this year NCDOT partnered with the United States Marine Corps Society of American Military Engineers to provide instruction to students for a stormwater BMP design-build exercise at Marine Corps Base Camp Lejeune. The exercise included high school student participants from across the country being divided into teams and competing in a variety of engineering problem solving and leadership development activities.
- Research Program – In conjunction with its university partners, NCDOT continued research from last year on a wide variety of stormwater management technologies intended to enhance support for project delivery. Research projects ranged from improvements in erosion and sediment control practices to enhanced design guidance for post-construction stormwater management devices such as bioswales and innovative soil improvement practices to promote infiltration of runoff. The Department also advanced its investigations of various culvert rehabilitation technologies through a Federal Highway Administration Pooled Fund study with other state DOTs.

### Considerations for Permit Year 2018

NCDOT’s goals of accelerating the pace of project delivery and enhancing authority for project decision making at the Division level presents both challenges and opportunities for NPDES compliance programs. Under this business model delivering NPDES training across the state, often on demand, takes

on a renewed importance. Expanded use of information technologies to facilitate the rapid dissemination of business critical information will be essential. Use of technologies such as the Connect NCDOT Preconstruction SharePoint site, geospatial information systems, learning management systems, and mobile platforms for accessing information will greatly expand in permit year 2018. NCDOT's Research Program and the creativity of staff from across the Department will be relied upon to spur innovation and deliver an integrated transportation system with environmental stewardship.

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AMP	Assessment and Monitoring Plan
AU	Assessment Unit
BMP	Best Management Practice
BUA	Built Upon Area
CCCP	Centrifugally Cast Concrete Pipe
CFR	Code of Federal Regulations
CIPP	Cured In Place Pipe
DEMLR	Division of Energy, Minerals and Land Resources
EE	External Education
EMC	Environmental Management Commission
ESC	Erosion and Sediment Control
ESM	Environmental Sensitivity Map
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIP	Field Inventory Protocol
GIS	Geospatial Information System
GREEN	Guided Reduction of Excess Environmental Nutrients
HRDB	Highway Runoff Database
HSP	Highway Stormwater Program
I&M	Inspection and Maintenance
IDDEP	Illicit Discharge Detection and Elimination Program
IE	Internal Education
IRMA	Industrial Roadway Maintenance Activities
LMS	Learning Management System
LOS	Level of Service
NC	North Carolina
NCAC	North Carolina Administration Code
NCDA&CS	North Carolina Department of Agriculture & Customer Services
NCDENR	North Carolina Department of Environment and Natural Resources
NCDEQ	North Carolina Department of Environmental Quality
NCDOT	North Carolina Department of Transportation
NCDOT-JLSLAT	NCDOT Jordan Lake Stormwater Nutrient Loading Accounting Tool
NCDWR	North Carolina Department of Water Resources
NCHRP	National Cooperative Highway Research Program
NCSU	North Carolina State University
NCTA	North Carolina Turnpike Authority
NCVMA	North Carolina Vegetation Management Association
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
OEI	Office of Education Initiatives
PCSP	Post Construction Stormwater Program

QAPP	Quality Assurance Project Plan
RCP	Reinforced Concrete Pipe
REU	Roadside Environmental Unit
RoF	Report of Findings
SCMS	Stormwater Control Management System
SECREP	Sediment and Erosion Control Research and Education Facility
SELDM	Stochastic Empirical Loading and Dilution Model
SMP	Stormwater Management Plan
SOP	Standard Operating Procedure
SPCC	Spill Prevention Control and Countermeasure
SPPP	Stormwater Pollution Prevention Plan
SSIP	Stormwater System Inventory and Prioritization
STEM	Science, Technology, Engineering and Mathematics
STIP	State Transportation Improvement Project
STORMDATA	Stormwater Research Monitoring Database
TMDL	Total Maximum Daily Load
TS4	Transportation Separate Storm Sewer System
US	United States
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WLA	Waste Load Allocation

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## 1.0 Introduction

The Highway Stormwater Program (HSP) 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 North Carolina Department of Transportation (NCDOT) to discharge stormwater runoff from the following activities:

- General roadway including weigh stations and tolling facilities
- Construction activities disturbing greater than one acre
- Borrow pits/waste piles (including mines)
- Industrial facilities with the following activities
  - Ferry terminals and maintenance
  - Vehicle and equipment maintenance
  - Pesticide and fertilizer storage
  - Salt and deicing chemical storage
  - Material storage areas
  - Asphalt and concrete plants (NCDOT owned and operated only)
  - Rail maintenance
- Non-roadway non-industrial facilities (i.e., office buildings and rest areas)
- General railway

This permit also covers the following sub-organizations:

- All similar activities of the North Carolina Turnpike Authority (NCTA), for all NCTA projects across the state.
- All similar activities of the I-77 Mobility Partners, for the I-77 corridor.
- Public education requirements for the Global Transpark Authority's NPDES permit through a 2012 memorandum of agreement with that agency.

In order to implement the permit, NCDOT has organized the HSP into thirteen (13) main NPDES program areas. The HSP also manages 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. Annual reporting requirements for these two watersheds can be found in Section 15 of this report and is allowed by 15A NCAC 02B .0271 (8)(c) and 15A NCAC 02B .0281 (11)(d).

Compliance activities associated with the NPDES permit and the Jordan and Falls Reservoir watersheds are managed by the Hydraulics Unit and the Roadside Environmental Unit and are implemented by business units across NCDOT.

This annual report describes the various achievements and compliance activities by program area for Year 2 of permit Term IV, covering the period of July 1, 2016 through June 30, 2017.

The Department's NPDES permit was reissued in the fall of 2015 (effective October 1, 2015). Since this is the fourth permit, NCDOT refers to it as the Term IV permit. With this reissuance, the reporting period for the annual report was changed to align with the Department's fiscal year to facilitate planning. Throughout this document, reporting years are referred to as Permit Year 20xx (or PY20xx) to denote the following time frames:

- PY2015: September 1, 2014 – August 31, 2015 (Year 5 of the previous Term III permit)
- PY2016: July 1, 2015 – June 30, 2016 (Year 1 of the Term IV permit; reporting period overlapped PY2015 by two months in order to synchronize with the fiscal year)
- PY2017: July 1, 2016 – June 30, 2017 (Year 2 of the Term IV permit)
- PY2018: July 1, 2017 – June 30, 2018 (Year 3 of the Term IV permit)

In PY2017, staff from NCDOT's HSP met with North Carolina Department of Environmental Quality (NCDEQ) staff to review selected program areas. These meetings are part of the HPS's ongoing collaboration with NCDEQ and provide opportunities for NCDEQ to review and confirm the compliance of NCDOT's programs. NCDOT programs reviewed by NCDEQ in PY2017 included:

- Illicit Discharge Detection and Elimination
- Stormwater Outfall Inventory and Prioritization
- BMP Retrofits
- BMP Inspection & Maintenance
- Vegetation Management
- Construction
- Industrial Activities
- Internal Education
- External Education
- Research
- Total Maximum Daily Load

NCDEQ followed up the meetings by providing NCDOT with written summaries of the compliance evaluations for each program area and indicated that NCDOT continues to implement effective programs and in some instances continues to exceed NCDEQ's expectations.

**2.0 Illicit Discharge Detection and Elimination Program**

**NPDES Permit Part II.A**

**Objectives and Measureable Goals**

The program objectives are to:

- i. Implement an Illicit Discharge Detection and Elimination Program (IDDEP) to detect illicit discharges, spills, and illegal dumping into the NCDOT transportation separate storm sewer system (TS4).
- 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 Quality (NCDEQ).

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. Inspections shall be documented when illicit discharges are verified.
(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 NCDEQ 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 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 illegal dumping, spills, and discharges along the state’s roadway system. NCDOT employees participate in training to help enable them to identify potential illegal dumping, spills, and discharges when performing other work on the NCDOT system, and report them to the HSP IDDEP Manager, who acts as the primary point of contact for the program.

As summarized in Table 1, from July 1, 2016, to June 30, 2017, NCDOT identified 27 new illegal discharges across the state, which makes 278 total illegal discharges reported since the initiation of the program in June 1999. For a breakdown of report

**Table 1. IDDEP Accomplishments for PY2017**

Accomplishments	
Total number of illicit discharges identified since 1999	278
Number of illicit discharges identified during reporting period	27
Number of NCDOT staff trained during reporting period	>100

locations: 18 occurred within the Neuse River Basin; two occurred each within the Tar-Pamlico River Basin, Cape Fear River Basin, and New River Basin; and one occurred each within the Catawba River Basin, Little Tennessee River Basin, and the Yadkin-Pee Dee River Basin.

**Ongoing IDDEP Training** – As required by Internal Education Program Management Measures (a) and (b) and IDDEP Management Measure (a), NCDOT 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 2017, NCDOT HSP staff provided IDDEP training to over 100 NCDOT employees as part of NCDOT’s Stormwater Pollution Prevention Plan and Spill Prevention, Control and Countermeasures 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 IDDEP brochures through the NC State Fair. See External Education for additional details on other stormwater educational materials 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. NCDOT implemented IDDEP identification and reporting as part of its Field Inventory Program in the Stormwater System Inventory and Prioritization program. For the Falls Lake Outfall Inventory Project completed in PY2017, 16 potential illicit discharges were identified - 4 in the Lower Falls Lake Watershed and 12 in the Upper Falls Lake Watershed.

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 Permit Year 2018**

The IDDEP is an established program and NCDOT plans to continue to maintain the IDDEP procedures in PY2018. Planned program enhancements include conducting a survey of the Divisions on existing protocols for handling of roadside spills and will use this information to share lessons learned for best practices across Divisions. NCDOT also plans to establish a mobile friendly website for reporting potential illicit discharges. NCDOT will continue to routinely 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. As an example, NCDOT will be evaluating workflows and drainage design guidance for projects in the vicinity of contaminated soils. Additionally, NCDOT will be evaluating improvements to electronic reporting and will test a mobile app-based data collection protocol for inclusion in the Field Inventory Procedure to be initiated in PY2018.

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**3.0 Stormwater System Inventory and Prioritization Program**

**NPDES Permit Part II.B.1**

**Objectives and Measureable Goals**

The program objectives are to:

- i. Maintain the statewide NCDOT stormwater outfall inventory for the purpose of supporting other permit programs.
- ii. Maintain a stormwater outfall geospatial information system (GIS) data layer to map and prioritize sensitive water crossings.
- iii. Maintain a field inventory procedure to be used for NCDOT/ Division of Energy, Minerals and Land Resources- (DEMLR) identified priority areas.

Management Measures	Measurable Goals
(a) Maintain a stormwater outfall inventory of existing stormwater outfalls to sensitive waters.	NCDOT will maintain a GIS-based implicit stormwater outfall inventory to include outfalls from primary and secondary roadways.
(b) Include in the inventory implicit outfalls from newly completed construction projects.	The stormwater outfall inventory shall be updated annually to include implicit outfalls from newly completed 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. The annual report shall document implementation of the procedure, identify future priority areas, and define a schedule for implementing the procedure within the identified priority areas.

**Program Overview**

NCDOT implemented a Stormwater System Inventory and Prioritization (SSIP) Program 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. During its Term II permit (April 2005-March 2010), 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 is updated using the three processes established for the HSP:

- Implicit outfalls are updated using geospatial processing to identify locations where roads cross mapped streams.
- Industrial outfalls are updated using changes reported by industrial facilities.
- Field verified outfalls are captured using the FIP.

Table 2 lists the total number of outfalls inventoried by the program from its inception through PY2017.

**Table 2. Total Number of Outfalls Identified by the SSIP**

Outfall Type	Inventoried
Implicit Outfalls	118,024
Industrial Outfalls	601
Field Verified Outfalls	949

**Upper Falls Lake Outfall Collection** – In June 2017 the HSP group completed an FIP Tier 1a collection of outfalls on primary routes in the Upper Falls Lake Sub-Watershed. This collection effort resulted in 711 explicit outfalls located within the ROW (Right-of-way). See the Guided Reduction of Excess Environmental Nutrients (GREEN) section for more on this effort.

**Considerations for Permit Year 2018**

Within the Jordan Lake watershed field inventory efforts in PY2018 will focus on the Upper and Lower New Hope River subwatersheds and lower section of Haw River subwatershed. The new hardware and upgraded software purchased and developed in PY2016 is expected to be used again to make the field work more efficient. Furthermore, the HSP will choose a small “pilot area” within the priority area to test Collector for ArcGIS along with their NCDOT-approved tablet hardware. This software is anticipated to complement the existing ArcPad software for collection efforts.

**4.0 BMP Retrofits Program**

**NPDES Permit Part II.B.2**

**Objectives and Measureable Goals**

The program objectives are to:

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

Management Measures	Measurable Goals
(a) Identify appropriate retrofit sites.	Identify a minimum of fourteen (14) potential retrofits per year.
(b) Implement retrofits.	Maintain a program to implement retrofits. Complete a total of seventy (70) retrofits over the 5-year period of this permit. The retrofits will be appropriate for the identified pollutants of concern. Include in the annual report the number of retrofits completed.

**Program Overview**

NCDOT has implemented a best management practices (BMP) Retrofits 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 program, unless otherwise allowed. Each year, potential sites are evaluated and selected for retrofits under this program. The Retrofits Program collaborates with the Research and BMP Toolbox Programs to design, construct, and assess new and innovative BMP types or components.

### Accomplishments

Ten (10) BMP retrofits listed in Table 3 were completed during the reporting period from July 1, 2016 to June 30, 2017.

**Table 3. BMP Retrofits Completed During the Reporting Period**

Identification No.	BMP Type	County	Location
IM-1-28-IB-3509	Infiltration Basin	Dare	NC 12 & E. Dogwood Trail
IM-3-65-BS-3435	Bioswale	New Hanover	US 117 (Shipyard Blvd.) at Pickard Rd.
IM-3-65-BS-3508	Bioswale	New Hanover	US 117 (Shipyard Blvd) at Stonewall Jackson Dr.
IM-7-1-FB-3397	Filtration Basin	Alamance	I-40 & NC 49
IM-7-41-FB-3030	Filtration Basin	Guilford	I-40 & SR 4121 (W. Gate City Blvd.)
IM-13-59-HSB-3398	Hazardous Spill Basin	McDowell	I-40 EB Rest Area
IM-14-50-FB-3399	Filtration Basin	Jackson	US 23, US 74 & US 24 business Interchange
IM-14-50-FB-3400	Filtration Basin	Jackson	US 23, US 74 & US 24 business Interchange
IM-14-56-FB-3401	Filtration Basin	Macon	US 23/441 Park and Ride Lot
IM-14-56-FB-3402	Filtration Basin	Macon	US 23/441 Park and Ride Lot

Designs for 38 additional BMP retrofits identified in Table 4 were completed and are now in the construction phase. The construction phase includes the bidding and letting process through construction completion.

**Table 4. BMP Retrofits Currently Under Construction**

Identification No.	BMP Type	County	Location
D-3-10-SF-2872	Sand Filter	Brunswick	SR 1172 (Sunset Blvd.)
D-3-10-IB-3422	Infiltration Basin	Brunswick	NC 906 at Intracoastal Waterway (mainland side)
D-3-65-IS-3405	Infiltration Swale	New Hanover	NC 132 (College Rd)
D-3-65-IS-3406	Infiltration Swale	New Hanover	NC 132 (College Rd)
D-3-65-BB-3513	Bioretention Basin	New Hanover	17th Street
D-3-65-BB-3514	Bioretention Basin	New Hanover	17th Street
D-3-65-BB-3515	Bioretention Basin	New Hanover	17th Street
D-3-65-BB-3516	Bioretention Basin	New Hanover	17th Street
D-3-65-BB-3517	Bioretention Basin	New Hanover	17th Street
D-3-65-IB-3423	Infiltration Basin	New Hanover	McRae Street
D-4-51-S-3408	Swale	Johnston	I-40 & I-95
D-4-51-S-3409	Swale	Johnston	I-40 & I-95

**Table 4. BMP Retrofits Currently Under Construction, continued**

Identification No.	BMP Type	County	Location
D-4-51-BS-3410	Bioswale	Johnston	I-40 & I-95
D-4-51-BS-3411	Bioswale	Johnston	I-40 & I-95
D-5-32-BS-3518	Bioswale	Durham	I-85 & SR 1637 (Redwood Rd)
D-5-32-BS-3519	Bioswale	Durham	I-85 & SR 1637 (Redwood Rd)
D-5-32-BS-3520	Bioswale	Durham	I-85 & SR 1637 (Redwood Rd)
D-5-32-BS-3521	Bioswale	Durham	I-85 & SR 1637 (Redwood Rd)
D-5-39-FB-3522	Filtration Basin	Granville	I-85 & NC 56
D-5-39-PSH-3523	Preformed Scour Hole	Granville	I-85 & NC 56
D-5-92-FB-3389	Filtration Basin	Wake	I-540 & SR 1005 (Six Forks Rd.)
D-5-92-FB-3390	Filtration Basin	Wake	I-540 & SR 1005 (Six Forks Rd.)
D-5-92-FB-3391	Filtration Basin	Wake	I-540 & SR 1005 (Six Forks Rd.)
D-5-92-DDB-3392	Dry Detention Basin	Wake	I-540 & SR 1005 (Six Forks Rd.)
D-5-92-BS-3393	Bioswale	Wake	I-540 & SR 1005 (Six Forks Rd.)
D-5-92-BS-3394	Bioswale	Wake	I-540 & SR 1005 (Six Forks Rd.)
D-5-92-FB-3395	Filtration Basin	Wake	I-540 & SR 2000 (Falls of Neuse Rd.)
D-5-92-FB-3396	Filtration Basin	Wake	I-540 & SR 2000 (Falls of Neuse Rd.)
D-6-26-IB-3424	Infiltration Basin	Cumberland	NC-295 at Little Cross Creek
D-6-26-IB-3425	Infiltration Basin	Cumberland	NC-295 at Little Cross Creek
D-6-26-DDB-3426	Dry Detention Basin	Cumberland	NC-295 at Little Cross Creek
D-6-26-FB-3427	Filtration Basin	Cumberland	NC-295 at Little Cross Creek
D-6-26-O-3428	Energy Dissipator	Cumberland	NC-295 at Little Cross Creek
D-6-26-O-3429	Energy Dissipator	Cumberland	NC-295 at Little Cross Creek
D-12-49-DDB-3430	Dry Detention Basin	Iredell	I-77 at Patterson Creek
D-12-49-BFC-3431	Bio-filtration Conveyance	Iredell	I-77 at Patterson Creek
D-13-57-FB-3456	Filtration Basin	Madison	I-26 Welcome Center
D-13-57-FB-3457	Filtration Basin	Madison	I-26 Scenic Overlook

HSP staff identified over fifty (50) site locations during the permit year for potential future installation of a BMP retrofit. All potential sites are stored within files on the NCDOT Hydraulics Unit servers. Target areas for new BMP retrofits included the Falls Lake Watershed and various impaired waters located within the three geographic regions of North Carolina. After construction, BMP retrofits are tracked in NCDOT’s Stormwater Management System (SCMS) along with other BMPs.

**Considerations for Permit Year 2018**

The BMP Retrofits Program will continue to identify potential sites and deliver projects which meet the program's objectives. The BMP Retrofits Program is also developing a **RetrOfit Site Selection (ROSS)** program to aid in future potential site locating. The ROSS program is intended to provide a framework whereby private engineering firms can assist NCDOT in identifying and evaluating potential retrofit sites.



**5.0 BMP Toolbox for Post-Construction Runoff Program**

**NPDES Permit Part II.B.3**

**Objectives and Measureable 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.

Management Measures	Measurable Goals
(a) Maintain a BMP Toolbox.	Maintain a stormwater BMP Toolbox to provide design guidance for post-construction stormwater control measures. The BMP Toolbox will include appropriate uses/anticipated applications and design criteria. Proprietary BMPs will be evaluated in keeping with DEMLR requirements for permitting new stormwater technologies.
(b) Update the toolbox as necessary	As necessary, evaluate new BMP types or design components for potential updates to the BMP Toolbox. If applicable to NCDOT applications, the BMP Toolbox will be updated to include this new information.
(c) Submit proposed BMP Toolbox revisions to DEMLR for approval.	New guidance on proposed BMPs will be submitted for DEMLR approval 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 PY2015. 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 works collaboratively with the NCDOT’s Research and Retrofits Programs to evaluate research on existing and new BMP types for potential inclusion in the manual. If considered for inclusion, proprietary BMPs will be evaluated in keeping with the current NCDEQ policy on new stormwater treatment technologies.

**Accomplishments**

NCDOT continues to maintain its BMP Toolbox Manual on its publicly available *Connect NCDOT* website. The document is readily available to NCDOT staff and private engineering firms performing stormwater design for NCDOT, as well as for other linear transportation projects as allowed by S.L. 2014-1.

Through the Post-Construction Stormwater Program, the HSP provides on-call training on an as needed basis when engineers and designers have questions regarding the design of Toolbox BMPs. The HSP provided training and information sessions on bioswales, an emerging BMP, for both internal design staff and NCDEQ staff, which is described in greater detail in the Internal Education Program section. Research is continuing on bioswales constructed at NC 50 and NC 98 in Wake County as well as at the Sediment and Erosion Control Research and Education Facility (SECREP) at North Carolina State University (NCSU). Additional bioswales are under construction at I-40 and I-95 in Johnston County that will be included in this research project. Pending results of this research, consideration will be given for developing design guidance and inclusion into the Toolbox in the future. See the Research section for more details.

In addition, NCDOT staff assessed the need to include additional BMP types in the Toolbox. After reviewing current Toolbox content, recent research results, and NCDOT's needs to address post-construction stormwater treatment at the facility types covered by the permit, it was determined that no new BMPs need to be added at this time.

### **Considerations for Permit Year 2018**

NCDOT will focus on improvement of Toolbox implementation practices by developing a field guide for designers, contractors, and inspectors involved in BMP construction. Additionally NCDOT plans to modify and improve current BMP CAD standards used by designers to develop construction plans. NCDOT will also continue to review the Toolbox and research to identify additional BMPs or changes to existing BMP designs that should be added to the manual. Currently, bioembankment controls are being evaluated for future testing and potential inclusion in the Toolbox in subsequent years. Training and implementation of the Toolbox will continue under the Post-Construction Stormwater Program.

**6.0 BMP Inspection and Maintenance Program**

**NPDES Permit Part II.B.4**

**Objectives and Measureable 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 or otherwise needed for inspection and maintenance needs. The evaluation will include consideration of the BMP type, typical siting conditions, and expected function.
(b) Maintain BMP Inspection and Maintenance Manual.	Maintain 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 annual training for appropriate NCDOT staff and contractors.
(d) BMP Inspection and Maintenance information.	BMP Inspection and Maintenance Program information will be made available upon request to DEMLR.

**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 assists NCDOT in better managing their stormwater infrastructure assets. When new BMPs are added to the BMP Toolbox, the I&M Program will evaluate them for inspection and maintenance needs and develop new chapters for the I&M Manual, as appropriate. The program also oversees the Stormwater Control Management System (SCMS) which houses an inventory of NCDOT’s stormwater BMPs and tracks their

inspection and maintenance records. The I&M Program coordinates training for staff and contractors with other program areas, as necessary.

**Accomplishments**

Approximately 112 new stormwater devices were added and a few were removed from the BMP inventory due to site changes resulting from new construction in PY2017 as shown in Table 5. NCDOT continues to add new controls as new projects are built and as part of the Retrofits Program.

**Table 5. NCDOT’s Inspection and Maintenance Program Inventory**

NCDOT Division	Number of Stormwater Devices*
1	84
2	179
3	131
4	207
5	608
6	49
7	134
8	121
9	42
10	80
11	52
12	58
13	72
14	37
<b>Total</b>	<b>1,854</b>

\*Includes structural and non-structural BMPs in maintenance phase as of June 30, 2017

Division personnel are responsible for conducting field inspections of stormwater control measures and assigning a Level of Service (LOS) for each device. This permit year Roadside Environmental Unit staff visited randomly-selected stormwater devices and conducted an independent review and LOS assessment. Based on the 2016 LOS assessment, NCDOT continues to maintain an overall rating above 90.0 for both primary and secondary roadways. NCDOT conducted a follow-up Preformed Scour Hole Study in early 2017 to evaluate the effectiveness of the Department’s current inspection and maintenance policy for preformed scour holes that was originally developed in December 2011 and published in April 2013. The 2017 study included a selection of 66 sites for field examination, statistical analysis, report preparation, and final recommendations. The 2017 follow-up study corroborated the April 2013 findings and determined that the current inspection and maintenance policy appears to be effective for preformed scour hole sites that are appropriately placed and constructed. In addition, the study verified that there is no significant connection between the age of a preformed scour hole and the rate of failure.

**Considerations for Permit Year 2018**

NCDOT will continue to inspect and maintain stormwater control devices. In addition to completing the I&M Manual and SCMS updates to include the updated preform scour hole study results in the upcoming permit year, the HSP staff plans to explore modifying SCMS to make it available on a mobile platform. The goal is to be able to fill out the inspection and maintenance forms electronically while in the field, which will increase efficiency and reduce data entry errors. Additionally, DOT plans to review its practices for inspections of roadside swales and to update the I&M Manual in PY2018.

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**7.0 Post-Construction Stormwater Program**

**NPDES Permit Part II.B.5**

**Objectives and Measureable Goals**

The program objectives are to:

- i. In cooperation with NCDEQ, 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 (BMPs) to protect water quality, reduce pollutant loading, and minimize post-construction impacts to water quality.

Management Measures	Measurable Goals
(a) 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 and post-construction stormwater control measures.
(b) Submit revisions to the Post-Construction Stormwater Program to DEMLR for approval.	NCDOT updates and/or revisions shall be submitted to the DEMLR for approval prior to implementation.

**Program Overview**

The PCSP was implemented to regulate stormwater from new NCDOT development and redevelopment for new 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 NCDEQ 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 of the BMP Toolbox and to incorporate watershed quality strategies.

**Accomplishments**

The focus for the PCSP in PY2017 has been to expand PCSP training practices within and outside of NCDOT, and continue the development of a model to predict pollutant loads from discharges and subsequent reductions after implementation of BMPs (see SELDM discussion below). PCSP training and outreach activities in PY2017 have included presentations to select Division staff, the North Carolina Interagency Leadership Team, one-on-one training for NCDOT staff, and delivery of a Department-wide technical training webinar. Refer to the Internal Education and External Education sections for more information on accomplishments related to training activities.

**Applying the PCSP.** NCDOT continues to apply the PCSP through the routine use of its PCSP Manual and BMP Toolbox to influence the selection, design and documentation of BMPs. The PCSP is implemented on all roadway and non-roadway projects initiated by the NCDOT that increase built-upon area (BUA).

Briefly, steps associated with applying the PCSP include evaluating the stormwater management needs of a project site; implementing minimum measures, designing drainage for conveying runoff in a diffuse and non-erosive manner, and if needed, providing additional structural BMPs to treat stormwater pollutants; communicating between engineers, designers, regulatory agents, and other stakeholders to discuss the intended approach; and documenting the process through the Stormwater Management Plan (SMP). Minimum measures are actions taken on every project, during both planning and design phases, that protect water quality, minimize pollutant loading, and minimize post-construction impacts to water quality, such as avoiding sensitive areas, minimizing side slopes, and maximizing vegetative cover.

NCDOT implements a wide variety of projects, and each one presents a set of unique post-construction stormwater design-related challenges. These challenges often provide training opportunities for individuals, internal design groups, and consultants on implementation of the PCSP. Also, conferences, seminars, and workshops frequently attended by civil design professionals provide chances to promote the PCSP. The HSP utilizes these opportunities to raise awareness of the PCSP as well as provide targeted training.

**SELDM** – NCDOT is currently working with the United States Geological Survey (USGS) to modify the Stochastic Empirical Loading and Dilution Model (SELDM) with North Carolina-specific stream flow, precipitation, and water quality data. As part of this initiative, NCDOT compiled hydrological data at 71 roadway sites, and evaluated water quality characterization of 132 analytes associated with these precipitation events, which resulted in the compilation of about 30,000 new event mean concentrations in PY2016. The data is currently undergoing final quality checks before being incorporated into the Federal Highway Administration (FHWA) Highway Runoff Database (HRDB). Streamflow statistics were updated for 266 continuous-record streamgages through 2015, which will be incorporated into the StreamStatsDB (accessible to users using the USGS StreamStats website) and where appropriate, into the NC-enhanced SELDM model. USGS also developed a total of 70 water quality transport curves for 10 constituents including sediment and select nutrients and metals. For training purposes six demonstration sites were finalized to model the impacts of stormwater runoff on downstream water quality and the effectiveness of implementing BMPs.

### **Considerations for Permit Year 2018**

The planned focus for the PY2018 will be on continuing to identify and deliver opportunities to raise awareness and provide training. In support of these goals NCDOT has initiated development of infographic posters describing the function and appropriate uses of minimum measures. These posters are intended to support improvements to stormwater management plans utilizing minimum measures. Additionally, the program will work towards completion of the NC-enhanced SELDM model and plan training for select NCDOT and DEQ staff.



**8.0 Vegetation Management Program**

**Objectives and Measureable Goals**

**NPDES Permit Part II.B.6**

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 methods and practices.	Continue to consult with North Carolina Department of Agriculture and Consumer Services (NCDA&CS) and North Carolina State University (NCSU), as needed, 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 adopted by NCDOT.
(b) Use appropriate vegetation management materials as identified in the measureable goal.	Restrict pesticide and fertilizer usage to those materials approved by USEPA/NCDA&CS. 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) and NCSU, using appropriate vegetation management materials (only those approved by the US 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

**NCDOT Pesticide Recertification Training** – The central Roadside Environmental Unit (REU) sponsored regional pesticide license recertification training sessions in the spring of 2016; this training for a two-year certification is provided every-other year so no pesticide recertification training sessions were sponsored in PY2017. NCDOT REU staff did participate in various vegetation management training efforts (such as seminars, conferences, and webinars that included related pesticide and fertilizer usage training) throughout the permit year.

**Continued Use of Approved Materials** – NCDOT continues to use materials and practices that are approved by the USEPA and NCDA&CS. It was not necessary to consult with these agencies in PY2017 as NCDOT's practices and methods had not changed.

**Collaboration with Pesticide Industry for Training and Techniques** – For several years, NCDOT has worked closely with the Vegetation Management scientist at Bayer Chemical to hone techniques and products to maintain rights-of-way beside roads and railways. In the fall of 2016, NCDOT supported a presentation by Bayer to USEPA staff regarding national practices for weed control on rail lines. The workshop allowed USEPA staff to understand why vegetation must be removed from the railways for safety purposes (to reduce the risk of fires sparked by train wheels and the risk of debris on the rail that can contribute to derailments), the equipment and products used to limit pesticide applications to the intended footprint, and the training applicators undergo.

## Considerations for Permit Year 2018

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. NCDOT's Vegetation Management staff plan to attend relevant training workshops and conferences such as the National Roadside Vegetation Management Conference in Springfield, Missouri in fall 2017. NCDOT REU staff also plan to participate in various public education and outreach efforts throughout the permit year such as the State Fair (fall 2017), where NCDOT works to familiarize over 1 million attendees of the Department's efforts regarding stormwater and vegetation management issues. NCDOT's annual REU Vegetation Management Conference is planned for December 5, 2017 which will offer pesticide recertification credits to NCDOT Roadside Environmental staff. Additionally, NCDOT plans to release an update of its Vegetation Management Manual in 2018. In addition, vegetation managers representing NCDOT's 14 Divisions will attend the North Carolina Vegetation Management Symposium in Greensboro on December 6 and 7, 2017. NCDOT REU also plans to sponsor regional pesticide license recertification training sessions in the spring of 2018 for Division staff.

**9.0 Construction Program**

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

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

**Objectives and Measureable 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 delegated by the North Carolina Sediment Control Commission.

Management Measures	Measurable Goals
(a) Maintain the delegation agreement with NCDEQ DEMLR Erosion and Sediment Control (ESC) Program on an annual basis.	Implementation of the NCDENR Division of Energy, Mineral and 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 applicable requirements of 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 is authorized under the Sediment Pollution Control Act of 1973 and Chapter 4 of Title 15A of the North Carolina Administrative Code. 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. This program has been delegated to and implemented by NCDOT.

Management Measures	Measurable Goals
(b) Maintain compliance with the applicable requirements of the General Permit NCG010000.	NCDOT shall incorporate the applicable requirements of NCG010000, the North Carolina General Permit to Discharge Stormwater under the National Pollutant Discharge Elimination System (NPDES) associated with construction activities issued August 3, 2011 and as may be subsequently amended, into its delegated Erosion and Sediment Control Program, pursuant to “NCDOT Applicable Requirement from NPDES General Permit No. NCG010000 for Construction Activities and Guidance for Complying with Those Applicable Requirements” in the memorandum dated June 9, 2014 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 non-commercial borrow pits/waste piles.	NCDOT shall implement the approved reclamation plan on all non-commercial borrow pit/waste pile projects. The reclamation measures utilized shall be in keeping with the reclamation program established by the North Carolina Mining and Energy Commission.
(e) Borrow Pit Discharge Management Program	<p>NCDOT in coordination with DEMLR will implement the Borrow Pit Discharge Management Program. This process will consist of the following tasks:</p> <ul style="list-style-type: none"> <li>● Implement appropriate management measures to treat borrow pit wastewater for given conditions.</li> <li>● Implement an inspection and maintenance program.</li> <li>● Maintain training material and instruct field personnel overseeing borrow pit operations.</li> <li>● Evaluate and implement appropriate new/innovative technologies.</li> </ul>

**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 (ESC) Program, which was delegated to NCDOT by the Sedimentation Control Commission in February 1991, incorporates the requirements of General Permit NCG010000 and includes implementation of appropriate erosion and sediment controls on construction projects. The delegation agreement allows for the Department to review and approve ESC plans based on compliance with Sedimentation Pollution Control Act (SPCA), water quality regulations, and permit conditions associated with each project. The agreement also authorizes the Department to perform compliance inspections for land disturbing activities associated with highway construction. Although the

Commission delegates compliance inspection to the Department, it did not grant enforcement authority. Since the Department cannot issue a fine to itself, a series of policies and procedures were developed to correct compliance issues with highway and maintenance construction projects. These include procedures for public input, daily and monthly project inspections, and corrective actions.

NCDOT operates under its exemption from the Mining Act for borrow pits provided all materials are used “in connection with the construction, repair, and maintenance” of our road system. Therefore, all provisions for ESC and stabilization with ground cover for waste/borrow sites fall under the conditions of NCDOT’s delegated program under the Mining Act and SPCA. Currently, NCDOT requires reclamation plans for all waste/borrow sites. These plans address temporary erosion control, staged seeding and mulching, fertilizer topdressing, and permanent stabilization. Final inspections are conducted on all waste/borrow sites at project completion or prior to project completion if property owners elect to resume/commence agricultural land disturbing activities on the site(s). Reclamation sites that require dewatering operations will require an evaluation to determine setbacks to minimize the risk of impacts to adjacent jurisdictional areas. Effluent from dewatering operations will be monitored and the appropriate management procedures will be used to make sure NCDOT is in compliance with the applicable regulations.

**Accomplishments**

**Certification** - The Biological & Agricultural Engineering and Soil Science Departments at NCSU are partnering with NCDOT to offer an Erosion and Sediment Control/Stormwater Certification Program. The certification program provides the required personnel training to ensure compliance with erosion and sediment control/stormwater provisions on NCDOT projects.

NCDOT requires all contractors and consultants to have a certified supervisor and foreman to oversee operations on NCDOT projects to ensure compliance with SPCA as well as other environmental regulations. Certification must be renewed every three years.

**Certification Levels**

- Level I: Erosion & Sediment Control/Stormwater Inspector/Installer  
Currently Certified - 3,254 persons
- Level II: Erosion & Sediment Control/Stormwater Site Management.  
Currently Certified - 8,130 persons
- Level III: Design of Erosion and Sediment Control Plans  
Currently Certified – 1,031 persons

**Inspections** - NCDOT is responsible for two types of inspections on each project: NPDES Self-Monitoring and SPCA Self-Inspections. NPDES Self-Monitoring and SPCA Self-Inspections are conducted at least weekly by a project inspector from the office of the resident engineer for design-build or contract construction, or from the office of the county or district engineer for maintenance projects. If needed, construction activities on-site can be halted to address ESC issues. REU Field Operations staff inspects

NCDOT projects monthly. The weekly project inspections and monthly REU inspections are reviewed for each project. Field data is collected on ESC measure installation, maintenance, and effectiveness. Timely provision of ground cover, adequacy of right-of-way, phasing of grading, field revisions, and sedimentation damage are also evaluated. Each project is evaluated for overall compliance with the NPDES, NCG010000, and SPCA.

**Inspections Performed Annually** - The following represents the typical range of inspections performed annually during the fiscal year (July 1 – June 30) for each category of land disturbing activity.

- Contract Construction Projects      4,750 – 5,500
- Maintenance Projects                    900 – 1,200
- Vertical Construction Projects        45 – 55
- Bridge Maintenance Projects         300 – 500
- Resurfacing Projects                    300 – 400

**Stormwater Inspection Log Updates** – In August of 2016, NCDEQ reissued the NCG01 construction stormwater permit. In response, NCDOT updated its construction stormwater inspection record log. The log is used by construction site personnel to record water quality observations and ESC conditions. The updates included providing additional guidance on inspection frequencies for idle projects, completed projects, and for those projects discharging into 303(d) listed waters for turbidity. The Department used the NCDOT Erosion and Sediment Control/ Stormwater Certification Training as a means to train personnel on updates to the inspection record log.

**New Training Materials Development** – Beginning in February 2017, NCDOT, in cooperation with NCSU, initiated an effort to update the Department’s Erosion and Sediment Control/ Stormwater Certification Program training materials for the Level I and Level II programs. The updated training was launched in June 2017 and uses interactive devices allowing attendees to poll or vote on classroom questions. Attendees participating in the training conducted at NCSU’s SECREP are exposed to hands-on ESC stormwater control measure demonstration activities.

**Continued Implementation of the Program** – NCDOT continues to operate under its delegated authority granted by the NC Sedimentation Control Committee for 2017. NCDOT continues to implement its Construction Program, which includes reviewing and approving ESC plans, implementing and maintaining standard specifications and project special provisions, providing guidance on ESC/stormwater issues, performing inspections and monitoring of construction projects, maintaining NCDOT’s reclamation process, and providing ESC/stormwater training materials to contractors/ consultants. NCDOT continues to identify new technologies to improve the effectiveness of current stormwater control measures. Additionally, NCDOT continues to invest substantial financial resources into research efforts that will improve existing practices and procedures associated with NCDOT’s Construction Program.

**Considerations for Permit Year 2018**

NCDOT will continue to maintain the Construction Program's existing policies and procedures for inspections, reclamation process, training, and research in Permit Year 2018.

NCDOT has initiated development of new ESC training videos for the Construction Program. A pilot program will be launched to provide short educational and informational videos available for viewing from YouTube. The training videos target installation and maintenance tips for some of the commonly used construction stormwater control measures. The intent is that the videos can be used in the field on handheld devices (e.g., during tailgate safety meetings, pre-construction conferences, prior to or during installation of ESC measures in routine or environmentally sensitive areas to assist contractors and technicians.

NCDOT also plans to update the Erosion and Sediment Control/ Stormwater Certification Program for Level III Designers, in collaboration with NCSU. This certification is required of all engineers and advanced technicians developing ESC Plans and Reclamation Plans. With the design of ESC plans increasingly being provided by private engineering firms, the Department will adapt the approach to phase ESC design through the lifespan of project development and allow greater flexibility for the design approach.

With the rollout of the 2018 Standard Specifications for Roads and Structures, NCDOT plans to update the 2015 Erosion and Sediment Control for Design and Construction Manual to provide minor editorial related revisions and to achieve conformity with the 2018 Specifications Book.

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**10.0 Industrial Activities Program**

**NPDES Permit Part II.D.1 and 2**

**Objectives and Measureable Goals**

The program objectives are to:

- i. Maintain and implement a Stormwater Pollution Prevention Plan (SPPP or 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 discharge points or outfalls identified in the SPPPs or 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. New activities and facilities shall be identified in the annual report and include a brief description and location information.
(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 or discharge point for the following parameters: color, odor, clarity, floating solids, suspended solids, foam, oil sheen, and erosion at or immediately below the stormwater discharge point or outfall, and other obvious indicators of stormwater pollution. 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. 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

This is a mature program with well-defined activities that 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 below:

**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 SPCC Plans which were incorporated into SPPPs, 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 points/outfalls in the SPPPs.

During the permit year, major and minor SPPP updates were performed for numerous NCDOT industrial facilities to address changes to the facilities, such as new buildings or changes in covered activities and staffing. Additionally, a new SPPP was developed for the Anson County Material Storage Yard in order to improve the stormwater management of the facility separate from the main Anson County Maintenance Yard. The material storage facility is used for equipment parking and material stockpiling.

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 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 22 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 five (5) training workshops across the state in the spring 2017. Baseline BMPs such as good housekeeping, preventative maintenance, and spill prevention practices were reviewed with all attendees. For the fifth straight year, two different training workshop levels were provided each day.

This permit year NCDOT incorporated a new training module specific to qualitative monitoring for industrial stormwater discharge outfalls into the Level I training sessions. Training on qualitative monitoring included information related to sample location, sample assessment, outfall area assessment, and potential pollutant identification in stormwater discharges.

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.

NCDOT follows the train-the-trainer approach. The SPPP/SPCC Training workshops were provided for over 100 individuals, primarily supervisors who then provide annual training to Division staff at their respective facilities. The Level I and II training approach adopted by NCDOT HSP over the last several years has been extremely effective by providing more targeted training to address where it is needed most.

### **Considerations for Permit Year 2018**

NCDOT will continue to maintain and implement site-specific SPPPs at its industrial facilities in Permit Year 2018. 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.

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**11.0 Internal Education Program**

**NPDES Permit Part II.E.1**

**Objectives and Measureable 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 awareness program for 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) BMP Implementation Training	NCDOT shall provide training to appropriate NCDOT personnel on implementation of post-construction BMPs in keeping with the Toolbox, Inspection and Maintenance Manual, and the Post-Construction Stormwater Program. NCDOT may require contractors to have equivalent training in lieu of NCDOT-provided training.
(e) Maintain Internal Education and Involvement Plan.	Maintain the Internal Education and Involvement Plan. The plan shall include the requirements for the measureable goals above.

**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 as noted above. 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 provided training to NCDOT employees and contractors, and continued to develop their knowledge of stormwater management through participation in conferences and training. Table 6 summarizes the types of training received by NCDOT staff and provided by NCDOT.

**Table 6. Summary of Internal Education Training Activities Performed in the Permit Year**

Training / Trainee(s)	Description	Training Provider
SPPP-SPCC Plan Implementation Training/ Division Staff	Conducted five (5) workshops in PY2017. Workshops included Level I sessions for general stormwater pollution prevention, good housekeeping, and spill prevention and response training; and Level II advanced training sessions for SPPP Team Leaders. This training was tracked through NCDOT’s Learning Management System (LMS)	NCDOT REU
Vegetation Management and Stormwater Training Workshop / Roadside Environmental Unit Staff	Held in conjunction with the 2017 Wildflower Awards Program, 46 REU staff from Divisions 1-14 were training on the HSP SCM I&M Program and provided a Litter Management update on May 3, 2017.	NCDOT REU
National Roadside Vegetation Management Conference	National Roadside Vegetation Management Conference held on August 31, 2016 in Franklin, Tennessee. NCDOT REU staff attended this conference along with Division Roadside Environmental staff. The conference included numerous sessions addressing vegetation management issues, application methods, and new products.	Various professionals (non-NCDOT)
NCVMA 2016 Annual Symposium/ REU staff and Contractors	North Carolina Vegetation Management Association Conference held on December 7-8, 2016. Annual conference with presentations, displays, vendor demonstrations on various vegetative management techniques, application methods, and products.	Various professionals (non-NCDOT)

Training / Trainee(s)	Description	Training Provider
Erosion and Sediment Control Level III (Designer) / Hydraulic Unit HSP members and other NCDOT Staff	Eighteen Hydraulics Unit staff members who generally perform post-construction design attended the ESC Level III training to gain a better understanding of ESC techniques and how they might be used in post-construction controls. Additionally, other NCDOT employees and contractors routinely involved with ESC attended.	NCSU
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
Various publically available webinars / HSP staff	<p>HSP staff routinely participate in training through nationally or regionally sponsored webinars. Topics attended this year include:</p> <ul style="list-style-type: none"> <li>● Controlling dissolved metals through SCMs</li> <li>● Volume Reduction of Highway Runoff in Urban Areas sponsored by the Transportation Research Board</li> <li>● Concrete enhanced synthetic turf used for high-traffic or high water velocity conditions</li> </ul>	Various professionals (non-NCDOT)
Division 11 staff training	Technical training and an overview of the PCSP were provided to Division 11 staff over a series of consultation meetings regarding stormwater controls for the Watauga County Maintenance Yard fuel station	NCDOT Hydraulics Unit
Department-wide Technical Training/ NCDOT staff from all Divisions, including REU and Hydraulics Unit	A series of technical training including an overview of the PCSP and SCM design techniques, and informing participants of available resources. Additional topics presented by other NCDOT staff include Federal Emergency Management Agency (FEMA) and National Environmental Policy Act (NEPA) permitting, and public involvement.	NCDOT Hydraulics Unit
Swale Research Half Day Workshop / Hydraulic Unit Staff	Hydraulics Unit staff viewed plots as NCSU’s SECREF and were provided with an overview of ongoing research to evaluate design components, infiltration, and water quality benefits associated with swales.	NCDOT Hydraulics Unit, REU & Natural Environment Section

In addition to the formal training events, team members continued internal outreach efforts within NCDOT. Additional details on internal education and training are described in the Accomplishments sections for IDDEP, Industrial Activities, Vegetation Management, Research, and Total Maximum Daily Load (TMDL) Programs.

**Considerations for Permit Year 2018**

Efforts in PY2018 will focus on finalizing the e-Learning modules for PCSP and SMP training. Additional PCSP and BMP Toolbox classroom training will be developed for specialized audiences as their particular needs are identified. NCDOT is exploring the development of additional videos as a means of training staff and contractors for Stormwater Pollution Prevention Plans, Erosion and Sediment Control, and the PCSP.



**12.0 External Education Program**

**NPDES Permit Part II.E.2**

**Objectives and Measureable Goals**

The program objectives are to:

- i. Implement a program to educate the public about the importance of stormwater quality, and what they could do to support it..
- ii. Maintain diverse educational materials to engage and educate the public from different social, economic and age groups.
- iii. Encourage 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.
(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 information on stormwater quality, stormwater projects and activities, and ways to contact stormwater management program staff.
(d) Develop educational partnerships.	Work with NCDENR and other agencies to promote and distribute public education materials.
(e) Continue public involvement programs.	Continue the Adopt-a-Highway Program. 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 Divisions, other state agencies, and organizations with shared outreach goals.

## Accomplishments

The HSP EE activities this year continued to strengthen the Department’s educational partnerships while maintaining on-going efforts started in previous years.

**Education Partnerships** – The HSP continued to build on its initiative launched in 2016 to partner closely with teachers and other organizations focused on youth education. The goal of this initiative is to establish a self-sustaining and perpetuating outreach program by providing teachers with information and tools for stormwater education, and to help foster increased interest in Science, Technology, Engineering, and Math (STEM) careers. Activities performed in PY2017 which targeted youth education include:

- Participation in NCDOT’s Office of Education Initiatives (OEI) Summer STEM Workshop in July 2016, in which elementary and middle school teachers learned about the Highway Stormwater Program and participated in breakout sessions to develop methods to impart this knowledge unto their students.
- An engineer from the HSP presented customized stormwater programs to students at Holly Springs Elementary School and Mill’s Park Elementary School. The presentation included discussions about the stormwater SCMs present at each school and how they help protect water quality starting at a local ditch and connecting to the ocean. HSP team members also gave teachers and students a guided tour of stormwater BMPs on their school campuses.
- Supplied more than 8,000 students with Stormwater worksheets, Stormwater Flash Facts, Litter Law fliers, Swat-A-Litterbug Cards, car litterbags with a stormwater litter prevention message and “No litter” bumper stickers through packages requested by teachers. Over 138,000 students have received these materials over the 13 years NCDOT has provided these teacher kits.
- For the second year in a row, HSP staff also partnered with the US Marine Corps Society of American Military Engineers (SAME) to provide instruction to 40 high school students for a Stormwater BMP design-build exercise as part of SAME’s Construction Camp at Camp Lejeune on June 21, 2017. The high school students from across the country were divided into teams and competed in the Stormwater BMP event, as well as other engineering, team building, leadership development, and problem solving events.

**Website Maintained** – The HSP maintained its publically facing website on *Connect NCDOT*, which was updated in PY2016. The site provides information intended to educate public users about the HSP’s various program areas. Separate pages were created for key products of the program. Products include many documents – such as the Erosion and Sediment Control Manual – which are provided to the public through this site. Links to related websites such as the sample lesson plans prepared by OEI as part of the Summer STEM workshop (mentioned previously) and posted on the OEI website are included under the Educational products. Also, through this site, NCDOT is providing public access to the Environmental Sensitivity Maps (ESM). The ESM website was originally developed as an internal tool for use by the HSP team to analyze and identify areas of concern for water quality. However, because of the site’s usefulness to roadway designers and others to help identify environmental impacts of proposed

projects, the site is now available to any interested user. The *Connect NCDOT* subsite includes links to YouTube videos with short tutorials for users. NCDOT is currently redesigning their *ncdot.gov* website, and updates to the HSP pages have been submitted.

**Environmental Festivals** – For the first time in PY2017, the HSP teamed with the Wake County Parks and Recreation to participate in two environmental festivals. The Songbird Celebration on April 29, 2017 at the Blue Jay Point County Park, presented opportunities to talk about NCDOT’s efforts to minimize impacts to water quality in creeks, rivers, and lakes, keeping sediment out of the streams, which allowed for larger populations of benthic organisms, giving the birds more to eat. HSP staff also discussed how homeowners could implement rain gardens to reduce sediment loading from their property. Information on rain gardens and their similarity to NCDOT’s SCMs providing stormwater infiltration was distributed.

The Pollinator Festival held at the Crabtree Lake on June 17, 2017, was a way for NCDOT to celebrate Pollinator Week with like-minded participants. NCDOT’s efforts for vegetation management, especially the Department’s programs to promote pollinator populations, reduce pesticides and use targeted pesticides only when needed, were major topics of the day. At both festivals, HSP staff distributed information on reporting illicit discharges and litter bugs, and participate in the Adopt-A-Highway program, as well as providing coloring books with a stormwater message.

**Partnership with Office of Beautification** – HSP continued to build on successful on-going activities with HSP’s first partner in external education – the Office of Beautification. Through various on-going programs, NCDOT distributed the following stormwater-related items:

- Gave out hundreds of stormwater worksheets, Stormwater Flash Facts, Secure Your Load and Litter Law fliers at the State Fair.
- Provided over 21,260 pairs of gloves to NCDOT Maintenance Offices to be distributed to Adopt-A-Highway volunteers and Litter Sweep participants.
- Provided approximately 1,500 trash bags to the Clean Jordan Lake and Little Alamance Creek stream cleanup groups.
- Coordinated over 110,278 man-hours from volunteers in the Adopt-a-Highway program in PY2017, resulting in 1,040,876 pounds of litter removal.
- Continued to issue Swat-A-Litterbug letters to offenders who were spotted littering by the public. The table below summarized the mailings over the past few years.

**Table 7. Summary of Swat-A-Litterbug Letters Mailed through Public Involvement Notifications**

Calendar Year	Number of Swat-A-Litterbug Letters Mailed
2016	9,250
2015	8,416
2014	7,800
2013	10,503

**Table 8. Summary of Other External Education Training Activities Performed in the Permit Year**

Training / Trainee(s)	Description	Training Provider
North Carolina GIS Conference / Attendees	NCDOT shared its accomplishments and approaches used in the Field Inventory Protocol under the Stormwater System Inventory Program.	NCDOT Hydraulics Unit and Consultant
Transportation Research Board / Attendees	At the TRB Conference in July 2016, NCDOT REU staff presented on NCDOT’s Pollinator Program (part of NCDOT’s Vegetation Management Program). NCDOT Hydraulics Staff presented an overview of NCDOT’s Research Program.	NCDOT REU and Hydraulics Unit
Interagency Meeting	NCDOT staff gave presentations on the PCSP, SMPs, BMP Retrofits, Toolbox and the Research programs to the interagency project partners	NCDOT Hydraulics Unit
NCAPWA Conference/Attendees	Presented on NCDOT’s Stormwater Control Inspection and Maintenance Program and the SELDM model. The HSP presentations were attended by approximately 100 individuals.	NCDOT Hydraulics Unit and REU
HSP Summary Workshop / NCDEQ’s Division of Water Resources (NCDWR)	The NCDWR staff, who review NCDOT projects for 401 permitting and erosion and sediment control statewide, attended a half-day workshop for an overview of the program, and more detailed information about the HSP’s collaboration with the US Geological Survey to develop a NC-specific SELDM model (see the PCSP and Research Programs for more details). The intent of the training was to provide a background on the HSP so NCDWR staff could assist in identifying and collaborate on resolutions to NPDES concerns if found during their review of NCDOT projects. Additionally, the HSP staff were able to answer questions NCDWR staff had regarding the design and water quality capabilities of swales.	NCDOT Hydraulics Unit and REU

**Considerations for Permit Year 2018**

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. In addition to strengthening the relationship with Wake County schools, the EE program will evaluate options for extending the educational opportunities to other parts of the state. HSP will also continue to partner with outside agencies to participate in various outreach activities including the promotion of Category 4b watershed restoration planning and partnerships. Finally, the HSP is working on updating the materials included in the student packages distributed to teachers to include an updated coloring book and children’s activities.

**13.0 Research Program**

**NPDES Permit Part II.F**

**Objectives and Measureable 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"> <li>1) A description of the Research Program and process for requesting funding.</li> <li>2) A process that identifies research needs that will evaluate program improvement areas.</li> </ul>
(b) Submit the Research Plan to DEMLR.	Modifications to the NCDOT Research Program shall be submitted to DEMLR.
(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 identify and implement research projects in collaboration with various universities as required by the permit. Several elements of the HSP have been guided by research data, such as the development of NCDOT-specific stormwater load accounting tools for the Jordan Lake and Falls Lake watersheds (NCDOT-JLSLAT discussed in the TMDL section). 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.

**Ongoing Research** – Each year, NCDOT identifies potential research gaps, solicits calls for proposals and awards research grants. Some active research projects of interest include:

- **Swale Design Optimization for Enhanced Application and Pollutant Removal, RP 2016-18.** NCDOT is working with NCSU to optimize the design of standard swales and bioswales based on research evidence on efficacy of various design parameters. NCSU has initiated hydrology testing on controlled field plots of bioswales at the SECREf. This work will be validated with monitoring at field bioswale sites in the Piedmont and Coastal Plain ecoregions. The Piedmont sites have been instrumented and monitoring was initiated in the summer of 2017. The Coastal Plain sites have been selected and construction is currently ongoing. NCDOT and NCSU are currently working on the design of the controlled pilot testing for standard swales at SECREf.
- **Investigation of Tillage and Soil Amendments to Increase Infiltration in Vegetated Stormwater Controls, RP 2014-18.** NCSU has been continuing research on tillage with and without amendments to enhance the infiltration capacity of post-construction stormwater BMPs. Controlled field tests in SECREf were completed and NCSU has been monitoring tillage enhancements at two field sites along I-40 and I-85. The field site results indicate similar trends to the pilot sites, with marked improvement in infiltration rates for the tilled with compost compared to the tilled site, and both significantly greater than the control plot.
- **Stormwater Infiltration and Pollinator Habitat Zones Along Highways, RP 2017-27.** NCSU has also been evaluating the effectiveness of using pollinator-friendly plant mixes in lieu of grass for stormwater BMPs, compared to adjacent untilled control areas. This type of effort would not only support NCDOT's stormwater management goals, it could also support healthy bee colonies which offer important ecosystem services. The study also evaluated the effectiveness of compost amendment and found greater grass biomass at one site (SECREf) but not another (Clayton) with compost. NCSU intends to study the effects of wildflower plots in both amended soils over a period of three years.

- **The Effects of Contaminated Soil and Groundwater on Subsurface Utilities, Surface Water and Drainage, RP 2017-08.** Another research project is looking into the risk to stormwater and other water resources from contaminated soil and groundwater, specifically looking for alternate stormwater drainage pipes and methods to prevent leaching from contaminated soils.
- **NCHRP Pooled Funds Programs 1399 and 1426.** NCDOT is a key partner in a pooled-funding study with other state DOTs and the National Cooperative Highway Research Program to explore the short and long term environmental, structural, and hydraulic conveyance implications of CIPP (cured in place pipe) and CCCP (centrifugally cast concrete pipe) restoration methods. The project includes investigating materials used in CIPP in order to reduce the amount of styrene used in the process.

**Stormwater Sampling SOP for Dissolved Metals** – During PY2018 NCDOT initiated a study in partnership with NCSU, DEQ, and with support from a private engineering firm to evaluate standard operating procedures (SOPs) for conducting stormwater sampling for dissolved metals. The objective of the study is to develop a DEQ recognized SOP for implementation in future NCDOT research projects to facilitate the collection of comparable dissolved metals data.

**Research Data Repository** – NCDOT has continued the development of a new database solution to house research data called STORMDATA (Stormwater Research Monitoring Database). The schema for STORMDATA is based on a modified version of the Federal Highway Administration’s Highway Runoff Database. NCDOT is adding additional tables to allow BMP performance data (the FHWA database is designed to be a repository for edge-of-pavement runoff data only) and a front-end user interface that will allow users to query the dataset.

**Considerations for Permit Year 2018**

In the next permit year, the Research Program will continue to monitor active research projects, including continuing monitoring of bioswales and swales both at SECREP and in field sites, tillage investigations on I-85, and continuing the pollinator study. The HSP will be initiating several new research projects that will be starting in August 2017, including optimization of dry detention basin design, identifying high risk areas during precipitation events for stormwater monitoring, and research on new methods to establish zoysiagrass on filter strips and swales. The dry detention basin research is particularly worth highlighting, as it addresses the small dataset available on the performance of dry detention basins that impacts the viability of these SCMs in nutrient-impaired watersheds. The study will validate the event mean concentrations in the NCDOT-JLSLAT. It will also investigate the effectiveness of various design enhancements, including outlet structure changes, porous baffles, and shallow gravel beds with underdrains.

A major focus of the HSP in the upcoming years is anticipated to be implementing the new programmatic quality assurance project plan (QAPP) requirements for post-construction projects, working with researchers to develop project specific QAPPs and integrate data collection with

STORMDATA. As part of this, researchers will be populating several new electronic data deliverables (project data spreadsheets) to provide digital data and allow better documentation of study parameters and variables for future analysis.



**14.0 Total Maximum Daily Load Program**

**NPDES Permit Part III.C**

**Objectives and Measureable Goals**

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

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**Permit Requirements**

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- 1) 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.
- 2) 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.
- 3) 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 DEMLR considers substantially similar to other outfalls. The Plan may be adjusted as additional outfalls are identified.
- 4) The Plan shall include a schedule for implementing the proposed assessment and monitoring activities. The Plan shall be submitted to DEMLR for comments no later than 12 months after notification by NCDENR that NCDOT has been assigned a WLA DEMLR shall complete its review of the Plan within 6 months of receiving the plan from NCDOT.
- 5) NCDOT shall initiate implementation of the Plan within 6 months of receiving Plan approval from DEMLR. 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

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- 6) Within 6 months of completing the assessment and monitoring activities outlined in the Plan, NCDOT shall submit a report of its findings to DEMLR. The report shall include an assessment of whether additional structural and/or non-structural BMPs are necessary to meet NCDOT's WLA. If necessary, the report will also document why BMPs are infeasible to meet the WLA and discuss BMPs to reduce the load to the maximum extent practicable. The report shall include a schedule for implementing such BMPs. Upon approval by DEMLR, NCDOT shall implement any approved BMPs in accordance with the schedule. Subsequent annual reports will provide updates on the implementation of the Plan.
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### Program Overview

As part of the 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 Waste Load Allocation (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 Retrofits Program and its efforts to identify suitable locations for stormwater retrofits and successfully implement controls that achieve NCDOT waste load allocations.

### Accomplishments

In addition to the key PY2017 accomplishments described below, NCDOT continued implementation of its Protocol for Determining Contributor Status in North Carolina TMDLs, assessment of WLA-compliance activities in the Southeast White Oak River watershed and ongoing involvement in nutrient and watershed modeling studies.

**NC TMDLs Approved in 2017** – USEPA approved a TMDL to address turbidity in a portion of Muddy Creek (stream assessment unit number 12-94-(0.5)b2b) in the Yadkin River Basin in July 2016. This TMDL was included as an addendum to a TMDL report approved by the USEPA in 2011 for three waterbodies (Muddy Creek and two segments of the Yadkin River) impaired due to elevated turbidity. The new TMDL segment includes portions of Muddy Creek from Silas Creek to State Road 2995, located upstream of the 2011 Muddy Creek TMDL reach. Potential sources of turbidity listed in the TMDL source assessment include nonpoint sources of forests, agricultural lands, land disturbance, urban runoff, and stream channel erosion and point sources of stormwater.

The 2016 Muddy Creek TMDL does not identify NCDOT as a significant contributor and does not assign a WLA to NCDOT. The 2011 Muddy Creek TMDL also did not assign a WLA to NCDOT and states that “[t]he NCDOT, Village of Clemmons, and Winston-Salem are currently in compliance with their NPDES stormwater permits, and will continue to implement measures required by their permits.” For these reasons, NCDOT is not required to develop a Program (per Part III, Section C.1.) specific to this waterbody.

**Southeast White Oak TMDL Compliance Update** – Boathouse Creek (AU# 20-31), Hills Bay embayment (AU# 20-(18)c4) and Dublin Creek (AU# 20-30) in the White Oak River Basin were identified as impaired due to elevated fecal coliform bacteria on the North Carolina 2002 Impaired Waterbody List. In 2009, NCDEQ prepared a TMDL report to address the impairment. Two of these TMDLs, Boathouse Creek and Hills Bay embayment, identified NCDOT as a contributor to impairment and assigned NCDOT a unique WLA. As required under Part III, Section C of NCDOT’s NPDES permit, NCDOT prepared an Assessment and Monitoring Plan (AMP) in 2011 which described NCDOT’s strategy for field assessing assets and identifying load reduction opportunities in the Boathouse Creek and Hills Bay watersheds. This plan was followed by a Report of Findings (RoF) in 2013, which describes the results of NCDOT’s AMP implementation activities, including field exercises and BMP retrofit feasibility studies.

Since submitting the RoF in 2013, NCDOT has continued to seek options for implementing BMPs to address fecal coliforms, as summarized in NCDOT’s 2016 Annual Report. During 2017, renewed investigations to identify bacteria-reducing opportunities in Hills Bay watershed have unfortunately resulted in no feasible options. NCDOT will continue to evaluate watershed strategies, to seek opportunities to collaborate with local municipal and watershed-based organizations and partners, and to evaluate the feasibility of future BMP technologies as they become available and show potential for reducing bacteria.

### **Considerations for Permit Year 2018**

NCDOT will continue to support NCDEQ in the development of TMDLs statewide and assessments of NCDOT loading as part of those TMDLs. NCDOT intends to compile and document implementation efforts to date towards addressing bacteria loadings in Boathouse Creek and Hills Bay watersheds. Further development and improvements to the TMDL tracking database will also be implemented in PY2018.

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**15.0 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 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> <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</p>

Watershed	Rule Requirements
	<p>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 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, Session Laws 2013-395 and 2015-241 delayed this requirement for a combined period of six years.

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**

NCDOT continued to develop and implement nutrient management training programs for NCDOT staff and contractors and began construction on fourteen stormwater retrofits. These and other activities are summarized below.

**GREEN Training** – NCDOT continues to offer online training videos, first introduced in PY2016, to support staff and contractors when using the NCDOT nutrient accounting tool, NCDOT-JLSLAT, on new non-road development projects. These videos are available on the NCDOT YouTube channel. In-person nutrient management training, encompassing an overview of the GREEN Program, nutrient rules, fertilizer usage and other nutrient topics was also provided in 2017 to Division staff in the Jordan Lake and Falls Lake watersheds for staff in Divisions 5, 7, and 8.

**New Non-Road Development Projects in 2017** – 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. In the future, should new non-road development be constructed subject to the rules, the annual

report at that time 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 Existing Development Requirements** – Fourteen (14) stormwater BMP retrofits are currently under construction, including:

- Four (4) bioswales at the I-85 and SR 1637 (Redwood Rd) interchange in Durham County.
- One (1) filtration basin and one (1) preformed scour hole In Granville County, at the intersection of I-85 and NC 56.
- Three (3) filtration basins, one (1) dry detention basin and two (2) bioswales at the intersection of I-540 and SR 1005 (Six Forks Road) in Wake County.
- Two (2) filtration basins at the intersection of I-540 and SR 2000 (Falls of Neuse Road) in Wake County.

Upon construction completion of these retrofit projects nutrient load reductions will be calculated and documented in next year’s annual report. If future research shows that these BMPs perform differently than assumed in the current NCDOT approved Jordan/Falls Lake Stormwater Nutrient Load Accounting Tool, NCDOT will work with NCDEQ to amend the accounting procedure accordingly.

NCDOT is not required to implement stormwater retrofits under the Jordan Lake GREEN program at this time.

**Rehabilitation of Existing Stormwater Controls** – NCDOT’s SCMS database 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 2017, 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** – NCDOT completed a Tier 1a outfall inventory in portions of the Lower Falls Lake watershed in summer 2016 and Upper Falls Lake watershed in spring 2017. The Tier 1a inventory includes locations of true outfalls to waters of the state at or within the right-of-way boundary. NCDOT’s latest field inventory procedure that was developed by NCDOT for priority areas such as Falls Lake was used to identify outfall along all primary route locations. Additional information is provided under the SSIP section of this report.

**Considerations for Permit Year 2018**

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