Annual Report

Term IV, Year 3: July 1, 2017 – June 30, 2018

For Submittal to:
NC Department of Environmental Quality

Division of Energy, Mineral, and Land Resources

Submitted by:
NC Department of Transportation
NPDES Permit No. NCS000250

October 31, 2018

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Certification

"I certify, under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations."

James H. Trogdon, III, PE Secretary North Carolina Department of Transportation	30 Oct 18 Date

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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, 2017 – June 30, 2018. 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 3 of Permit Term IV (July 1, 2017 – June 30, 2018)

A few examples of accomplishments achieved by NCDOT during Year 3 of Permit Term IV to comply with the permit and streamline processes to support project delivery are outlined below:

- BMP Retrofit Program – NCDOT completed construction of 29 stormwater treatment best management practices (BMPs) during the reporting period. These BMP devices were retrofitted into the existing drainage system to provide enhanced stormwater treatment, correct a maintenance deficiency, and/or improve roadside aesthetics. Stormwater treatment retrofits were constructed across the state ranging from Madison County in the mountains to New Hanover County along the coast.
- BMP Toolbox Program – During the permit year, NCDOT developed a "Field Guide for Post-Construction Stormwater Best Management Practices." The field guide is a compact flip-style field reference intended to provide contractors, NCDOT inspection technicians, and Division staff guidance for construction of BMPs. The field guide is intended to reduce common construction errors, such as misunderstanding plans leading to incorrect outlet structure configurations and not providing adequate protection to filter media prior to final site stabilization.
- Stormwater Outfall Inventory Program – NCDOT completed its field inventory of stormwater outfalls along primary routes in the Lower Jordan Lake Sub-Watershed (New Hope River & Lower Haw River). 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 378 outfalls for evidence of illicit non-stormwater discharges and inappropriate dumping of trash with the goal of helping to protect the Towns of Cary, Apex, and surrounding communities' 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.
- Vegetation Management Program – NCDOT updated its policies for aesthetics and has increased dedicated funding for the right of way maintenance through its new Roadside Management Program. This new program has had, and will continue to have, a substantial

impact on water quality by having a more sustainable litter management program with dedicated annual funding used to clean up more roadways at increased frequencies. This new program will also improve water quality by increasing the vegetation management activities on NCDOT roadways across the state. Additionally, NCDOT has updated its Vegetation Management Manual and distributed it to Roadside Environmental Staff at the December 2017 Annual Training. Revisions to the manual included details on recent research results, including benefits of wildflower plantings for pollinator populations.

- Construction Program – NCDOT continues to maintain a robust Construction Program that governs development activities disturbing one or more acres of land surface by Department personnel or contractors. In accordance with the NPDES Permit, the Department has adopted appropriate elements from the statewide General Permit No. NCG010000 for "Construction Activities that are also Subject to the North Carolina Sediment and Pollution Control Act of 1973." Additional details on NCDOT's Construction Program conformance with NCG010000 has been included within this year's Annual Report.
- Industrial Activities (IA) Program – NCDOT maintained over 200 Stormwater Pollution Prevention Plans (SPPPs) for its industrial facilities, including four new plans developed for material storage yards in order to improve the stormwater management of the facilities separate from the main County Maintenance Yards. 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 – Annual training on identifying and reporting illicit discharges, performing inspection and maintenance on stormwater controls, and general housekeeping practices among other topics, is routinely provided to NCDOT staff. This year, contractors supporting the administration and maintenance of two large projects were also trained.
- External Education Program – Volunteers donated over 100,936 man-hours in the Adopt-A-Highway Program in 2017, resulting in 968,385 pounds of litter removal from NC's right of way. 2017 was the 29th year of the Adopt-A-Highway Program, with over 300 groups receiving recognition for having over 15, 20, and 25 years of service. Additionally, NCDOT engineers have led seven (7) workshops with elementary schools providing educational training to over 815 elementary aged students explaining the structural stormwater controls located on their school grounds and discussing stormwater pollution prevention, including what the students can do to support stormwater quality. Education materials will be disseminated to the public at our State Fair booth and through the mail via requests.
- Research Program – NCDOT continues to maintain a best-in-class research program, funding extensive research studies across a variety of scales from bench- to full-scale to test the effectiveness of various stormwater control measures (SCMs) to mitigate the effects of highway runoff on receiving waters. NCDOT recently completed studies on tillage to increase infiltration in SCMs, two studies on bioswales, and an evaluation of alternatives to emulsified asphalt as a tackifer to bind straw during grass establishment. It has also identified, evaluated and funded several new research projects.

Considerations for Permit Year 2019

On January 1, 2019 Build NC will become effective thereby ensuring that NCDOT can continue to provide strong delivery of roadway projects at Regional and Division tiers. Over the past year NCDOT has made significant progress towards the acceleration of project delivery which will continue and expand in permit year 2019. To support these efforts the Highway Stormwater Program will be evaluating its NPDES Permit Programs and optimizing them to support the Department's priorities while continuing its strong commitment to environmental stewardship and responsibility. Particular emphasis will be placed on evaluating the Post-Construction Stormwater Program to ensure it effectively supports project delivery and permit compliance, especially at the Division level. To achieve these goals, the effective delivery of NPDES permit compliance training across the state, often on demand, takes on renewed importance. Expanded use of information technologies to facilitate the rapid dissemination of business critical information will be essential. Use of technologies such as SharePoint and other cloud storage assets, geospatial information systems and Project Atlas, learning management systems, and mobile platforms for accessing information will greatly expand in the coming years. NCDOT'S stormwater Research Program and the creativity of staff from across the Department will be relied upon to spur innovation and delivery of an integrated transportation system that supports sustainable communities and a clean environment.

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Appendix

Appendix A Construction Program Conformance with NCG010000

Appendix B I-77 Mobility Partners Stormwater Management Program Report

AGOL	ArcGIS Online
AMP	Assessment and Monitoring Plan
BMP	Best Management Practice
BUA	Built Upon Area
CADD	Computer-Added Design and Drafting
CFR	Code of Federal Regulations
EE	External Education
EMC	Environmental Management Commission
ESC	Erosion and Sediment Control
ESM	Environmental Sensitivity Map
FHWA	Federal Highway Administration
FIP	Field Inventory Protocol
GIS	Geospatial Information System
GREEN	Guided Reduction of Excess Environmental Nutrients
HSP	Highway Stormwater Program
IA	Industrial Activities
I&M	Inspection and Maintenance
IDDEP	Illicit Discharge Detection and Elimination Program
I-77 MP	I-77 Mobility Partners
IE	Internal Education
IRMA	Industrial Roadway Maintenance Activities
LID	Low Impact Development
LMS	Learning Management System
LOS	Level of Service
MPE	Multi-Sensor Precipitation Estimates
NCAC	North Carolina Administration Code
NCAEP	North Carolina Association of Environmental Professionals
NCDA&CS	North Carolina Department of Agriculture & Customer Services
NCDEMLR	Division of Energy, Minerals and Land Resources
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 Load Accounting Tool
NCDEMLR	North Carolina Division of Energy, Mineral and Land Resources
NCSU	North Carolina State University
NCTA	North Carolina Turnpike Authority
NCVMA	North Carolina Vegetation Management Association
NCWRA	North Carolina Water Resources Association
NPDES	National Pollutant Discharge Elimination System
OEI	Office of Education Initiatives
PCSP	Post Construction Stormwater Program

PGR	Plant Growth Regulators
QAPP	Quality Assurance Project Plan
REU	Roadside Environmental Unit
RoF	Report of Findings
ROSS	Retrofit Opportunity Site Selection
ROW	Right of Way
SECREF	Sediment and Erosion Control Research and Education Facility
SELDM	Stochastic Empirical Loading and Dilution Model
SCMS	Stormwater Control Management System
SMP	Stormwater Management Plan
SPCA	Sedimentation Pollution Control Act
SPCC	Spill Prevention Control and Countermeasure
SPPP	Stormwater Pollution Prevention Plan
SSIP	Stormwater System Inventory and Prioritization
STEM	Science, Technology, Engineering, and Math
STORMDATA	Stormwater Research Monitoring Database
TMDL	Total Maximum Daily Load
TRB	Transportation Research Board
TS4	Transportation Separate Storm Sewer System
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WLA	Waste Load Allocation
WRRI	Water Resources Research Institute

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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 (see Appendix B).
- 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 implementation of the stormwater requirements for NCDOT 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 co-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 3 of permit Term IV, covering the period of July 1, 2017 through June 30, 2018.

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)
- 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)

2.0 Illicit Discharge Detection and Elimination Program

NPDES Permit Part II.A

Objectives and Measurable Goals

The program objectives are to:

i. Implement an Illicit Discharge Detection and Elimination Program (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 to NCDOT staff and contractors on performing inspections, identification of illicit discharges and illegal dumping, and reporting 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 identification of potential illegal dumping, spills, and discharges when performing other work on the NCDOT system, as well as instruction on reporting them to the HSP IDDEP Manager, who acts as the primary point of contact for the program.

From July 1, 2017, to June 30, 2018, NCDOT identified and followed up on 14 new illicit discharges and illegal dumps across the state.

Ongoing IDDEP Training – As required by Internal Education (IE) 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 PY2018, NCDOT HSP staff provided IDDEP training to 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 (EE) for additional details on other stormwater educational material distributions to the general public or Adopt-A-Highway volunteers. These materials are related to litter, illicit discharges, and illegal dumping, and help raise awareness on reporting illicit discharges and illegal dumping found on NCDOT roadways.

Tracking and Reporting Illicit Discharges – NCDOT continues to maintain its IDDEP website, which consists of a web-based tracking system and database for identified illicit connections and illegal dump sites found along NCDOT roadways. NCDOT implemented IDDEP identification and reporting as part of its Field Inventory Program in the Stormwater System Inventory and Prioritization Program. For the Jordan Lake Outfall Inventory Project completed in PY2018, 4 potential illicit discharges/dumps were identified.

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 illegally 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.

Roadside Spill Response Survey – NCDOT conducted a state-wide survey of staff in its fourteen Highway Divisions regarding their procedures for responding to roadside spills involving hazardous materials. Spills can occur after accidents involving commuter vehicles or commercial vehicles, or from materials illegally dumped along the right of way (ROW), rest areas or other NCDOT properties. The results to the 15-question survey were evaluated by HSP Staff. Survey results, which will be further evaluated to improve training and availability to response materials, indicate that:

- Notification about and response to spills or dumping is often coordinated with the Highway Patrol and other first responders.
- Dumped materials along the ROW are reported to NCDOT by the Highway Patrol, found during routine maintenance activities, or found by chance observation by NCDOT staff.

Typical actions taken should spills (such as fuel, oil, or antifreeze) reach the NCDOT drainage system include blocking ditches, closing valves (if present on nearby stormwater control measures [SCMs]), notifying appropriate personnel within NCDOT, notifying appropriate outside agencies, and contacting spill response contractors.

Considerations for Permit Year 2019

NCDOT will continue to maintain the established IDDEP procedures in Permit Year 2019. NCDOT plans to follow-up with Division staff by providing updated guidance based on results from the Spill Response Survey, which will include providing best practices for handling roadside spills. NCDOT plans to integrate the IDDEP Field Report form onto an existing web-based platform and to evaluate the use of video-based training for IDDEP. NCDOT will continue to routinely evaluate the program's internal processes for effectiveness and to help the HSP target certain areas that may need additional IDDEP education or coordination assistance.

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3.0 Stormwater System Inventory and Prioritization Program

NPDES Permit Part II.B.1

Objectives and Measurable Goals

The program objectives are to:

i. Maintain the statewide NCDOT stormwater 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/ 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 following three processes:

- Implicit outfalls are updated using geospatial processing to identify locations where roads cross streams.

- Industrial outfalls are updated using changes reported by NCDOT's industrial facilities.
- Field verified outfalls are captured using the FIP.

Table 1 lists the total number of outfalls inventoried by program cumulatively from its inception through PY2016, PY2017, and PY2018.

Table 1. Cumulative Outfalls Identified from PY2016 through PY2018

Outfall Type	Total Inventoried as of PY2016	Total Inventoried as of PY2017	Total Inventoried as of PY2018
Implicit Outfalls	117,661	118,024	118,154
Industrial Outfalls / Discharge Points	588	601	610
Field Verified Outfalls	250	949	1,327

Lower Jordan Lake Outfall Collection – In PY2018 the HSP completed an FIP Tier 1a collection of outfalls on primary routes in the Lower Jordan Lake Sub-Watershed (New Hope River & Lower Haw River). The Tier 1a inventory includes locations of true outfalls to waters of the state at or within the ROW boundary. This collection effort resulted in 378 explicit outfalls identified this permit year. This data collection effort also supports the Guided Reduction of Excess Environmental Nutrients (GREEN) Program discussed in more detail in Section 15.0.

Considerations for Permit Year 2019

NCDOT's Field Inventory Program anticipates performing additional data collection efforts in the Jordan Lake/Haw River watershed during PY2019. Additionally, NCDOT may identify a watershed with the potential for developing a "5R" plan. NCDEQ has recently developed a Category 5R protocol to encourage the development of an alternate management plan in lieu of a total maximum daily load (TMDL). Delivery of the FIP in a 5R watershed would contribute to the implementation of a 5R plan in subsequent years.

In its efforts for process improvement, NCDOT anticipates upgrading the FIP GIS database schema to streamline and expedite data collection. This will increase the efficiency of field staff while collecting Tier 1a outfall data. Towards this effort the HSP plans to choose a small "pilot area" within the priority areas to test ESRI's 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 Measurable 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 practice (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

Twenty-nine (29) BMP retrofits listed in Table 2 were completed during the reporting period from July 1, 2017 to June 30, 2018.

Table 2. BMP Retrofits Completed During the Reporting Period

Identification No.	BMP Type	County	Location
IM-3-10-SF-2872	Sand Filter	Brunswick	SR 1172 (Sunset Blvd.)
IM-3-10-IB-3422	Infiltration Basin	Brunswick	NC 906 at Intracoastal Waterway (mainland side)
IM-3-65-BB-3513	Bioretention Basin	New Hanover	17th Street
IM-3-65-BB-3515	Bioretention Basin	New Hanover	17th Street
IM-3-65-BB-3516	Bioretention Basin	New Hanover	17th Street
IM-3-65-BB-3517	Bioretention Basin	New Hanover	17th Street
IM-3-65-IB-3423	Infiltration Basin	New Hanover	McRae Street
IM-4-51-S-3408	Swale	Johnston	I-40 & I-95
IM-4-51-S-3409	Swale	Johnston	I-40 & I-95
IM-4-51-BS-3410	Bioswale	Johnston	I-40 & I-95
IM-4-51-BS-3411	Bioswale	Johnston	I-40 & I-95
IM-5-32-BS-3518	Bioswale	Durham	I-85 & SR 1637 (Redwood Rd)
IM-5-32-BS-3519	Bioswale	Durham	I-85 & SR 1637 (Redwood Rd)
IM-5-32-BS-3520	Bioswale	Durham	I-85 & SR 1637 (Redwood Rd)
IM-5-32-BS-3521	Bioswale	Durham	I-85 & SR 1637 (Redwood Rd)
IM-5-39-FB-3522	Filtration Basin	Granville	I-85 & NC 56
IM-5-39-PSH-3523	Preformed Scour Hole	Granville	I-85 & NC 56
IM-6-26-IB-3424	Infiltration Basin	Cumberland	NC-295 at Little Cross Creek
IM-6-26-IB-3425	Infiltration Basin	Cumberland	NC-295 at Little Cross Creek
IM-6-26-IMIMB-3426	Dry Detention Basin	Cumberland	NC-295 at Little Cross Creek
IM-6-26-FB-3427	Filtration Basin	Cumberland	NC-295 at Little Cross Creek
IM-6-26-O-3428	Energy Dissipator	Cumberland	NC-295 at Little Cross Creek
IM-6-26-O-3429	Energy Dissipator	Cumberland	NC-295 at Little Cross Creek
IM-12-49-IMIMB-3430	Dry Detention Basin	Iredell	I-77 at Patterson Creek
IM-12-49-BFC-3431	Bio-filtration Conveyance	Iredell	I-77 at Patterson Creek
IM-13-57-FB-3456	Filtration Basin	Madison	I-26 Welcome Center
IM-13-57-FB-3457	Filtration Basin	Madison	I-26 Scenic Overlook
IM-13-100-FB-3458	Filtration Basin	Yancey	Possum Trot Rd Park and Ride Lot
IM-4-96-WV-3510	Wet Vault	Wayne	West side of S. John St. (SR 1925)

Designs for the following BMP retrofits identified in Table 3 were completed and are now in the construction phase. The construction phase includes the Bidding and Letting process through construction completion.

Table 3. BMP Retrofits Currently Under Construction

Identification No.	BMP Type	County	Location
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-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.)

Additionally, HSP staff has identified and evaluated several potential site locations during the previous permit year for future installation of a BMP retrofit. 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 Control Management System (SCMS) along with other BMPs.

Retrofit Opportunity Site Selection (ROSS) – In PY2018, NCDOT developed a plan outlining the structure of the Retrofit Opportunity Site Selection Program (ROSS). ROSS is part of the Retrofit Project Cycle (RPC), which describes the process of locating potential retrofit sites through construction of retrofit BMPs. ROSS is designed to identify potential projects, the first step in the RPC, to meet the permit requirement of identifying a minimum of fourteen (14) potential projects per year (a total of 70 over the 5-year period of the permit). ROSS includes several phases, which includes a bulk identification of potential sites statewide, performing desktop assessment of potential sites, conducting field assessments of sites that show greatest potential for implementation based on the desktop assessment, and finally initiation of programming the best sites for construction.

NCDOT plans to utilize geographical information systems (GIS) technologies to support ROSS initiatives. Existing databases, including the stormwater system inventory, will be cross referenced and used to identify potential retrofit sites. By looking at stream data, road data, and existing outfall information, among other datasets, NCDOT can find locations with the characteristics most likely to support a BMP installation. As the ROSS process progresses through the detailed assessment phase, NCDOT may utilize ArcGIS Online (AGOL), Collector, and Survey 123 to gather and store field data, and maintain a database of comprehensive data. The ROSS program will help NCDOT meet minimum retrofit site identification requirements as well as manage site data throughout the RPC process.

Considerations for Permit Year 2019

The BMP Retrofits Program will continue to identify potential sites and deliver projects which meet the program's objectives. The BMP Retrofits Program also plans to initiate development of the information technology components of the ROSS program to support the future full implementation of this new site selection initiative.

5.0 BMP Toolbox for Post-Construction Runoff Program

NPDES Permit Part II.B.3

Objectives and Measurable Goals

The program objectives are to:

i. Maintain and update as necessary a BMP Toolbox to aid in the siting, design, and construction of stormwater quality BMPs with guidance on the suitability of each for NCDOT applications.
ii. Evaluate BMPs for applicability to a linear highway system.

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 NCDEMLR 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 NCDEMLR for approval.	New guidance on proposed BMPs will be submitted for NCDEMLR 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. Recent efforts have included developing tools to aid personnel involved in the construction of BMPs in order to promote successful implementation of Toolbox BMPs. Additional 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 manual inclusion. If considered for inclusion, proprietary BMPs will be evaluated in keeping with the current NCDEQ policy on new stormwater treatment technologies.

Accomplishments

In PY2018, NCDOT's Toolbox Program made progress in developing tools used during the design of BMPs which are included in the BMP Toolbox Manual. These tools include the Field Guide and standardized Computer-Added Design and Drafting (CADD) drawings, as described below.

Field Guide for Post-Construction Stormwater Best Management Practices – The Toolbox Program began developing a "Field Guide for Post-Construction Stormwater Best Management Practices" in PY2017. The field guide is a compact flip-style field reference intended to provide contractors, NCDOT inspection technicians, and Division staff guidance for construction of BMPs. NCDOT is taking lessons learned from years of implementation experience and making them available to appropriate personnel to improve compliance with construction plans and permit requirements. The field guide is intended to reduce common construction errors, such as incorrect outlet structure configurations or not providing adequate protection to filter media prior to final site stabilization, for example.

Each structural BMP included in the Toolbox is covered in an individual section of the Field Guide. Additionally, a separate section for basin components specifically addresses common issues found in basin-based BMPs. Each section provides an overview of the BMP, common structural components, and critical issues to consider during construction. Schematic diagrams are also provided. Potential issues are illustrated by real-world NCDOT construction photographs with brief descriptions of the issue, and what was done properly or improperly. Proper implementation is indicated with a green 'thumbs up' icon and poor implementation is indicated with a red 'thumbs down' icon. NCDOT is in the process of finalizing the field guide and anticipates distribution to contractors, NCDOT inspection technicians, and division staff in early PY2019.

BMP Toolbox Design Standard Gap Analysis – NCDOT designers and consulting engineers utilize CADD libraries of standard construction details to develop design plans, including those which include structural BMPs. During the current permit period, NCDOT performed a gap analysis on the existing BMP-related CADD standard details to determine differences with current Toolbox standards. Recommendations for improvement of construction details were also included in the review. NCDOT will use the gap analysis to update and improve the CADD libraries. This effort will improve the quality of design plans and, ultimately, the implementation of BMPs.

Considerations for Permit Year 2019

NCDOT will continue its focus on improvement of Toolbox implementation practices by distributing the Field Guide for designers, contractors, and inspectors involved in BMP construction. NCDOT will also work towards finalizing the CADD standards. Training and implementation of the Toolbox will continue under the Post-Construction Stormwater Program. Results and findings of current research being completed will be taken into consideration for revision of existing or addition of new Toolbox chapters.

6.0 BMP Inspection and Maintenance Program

NPDES Permit Part II.B.4

Objectives and Measurable Goals

The program objectives are to:

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

Management Measures	Measurable Goals
(a) Evaluate new BMP inspection and maintenance needs.	Evaluate new BMPs included in the BMP Toolbox 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 NCDEMLR.

Program Overview

NCDOT implemented a BMP Inspection and Maintenance (I&M) Program to aid in the inspection, operation, and maintenance of BMPs (also referred to as SCMs). As part of the program, NCDOT maintains and updates a Stormwater Control Inspection and Maintenance Manual as needed. The Manual includes written procedures outlining the inspection and maintenance of stormwater BMPs, including establishing the inspection frequency for each BMP type. 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 if needed. The program also oversees a comprehensive database system called Stormwater Control Management System (SCMS), which maintains 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

Table 4 shows the total number of BMPs currently in place in each Division in NCDOT's SCMS inventory. Approximately 26 new stormwater devices were added and several were removed due to site changes resulting from new construction in PY2018. NCDOT continues to add new controls as new projects are built or as part of the Retrofits Program.

Table 4. NCDOT's Inspection and Maintenance Program Inventory Update

NCDOT Division	Number of Stormwater Devices*
1	84
2	179
3	136
4	210
5	584
6	55
7	134
8	119
9	41
10	73
11	50
12	67
13	75
14	36
Total	**1,843**

*Includes structural and non-structural BMPs in maintenance phase as of June 30, 2018

Division personnel are responsible for conducting field inspections of those stormwater control measure types requiring inspection, and assigning a Level of Service (LOS) for each device. This year the HSP staff, along with their consultant, assisted Divisions 4 and 5 in conducting more than 200 inspections using SCMS on a mobile platform. The pilot study tested filling out the inspection and maintenance forms electronically while in the field to increase efficiency and reduce the possibility of data entry errors. Field training on how to conduct inspections using the mobile platforms was also provided to Division 3 and 8 staff. A total of 378 BMPs were inspected in PY2018Inspections of non-structural stormwater controls (e.g., pet waste stations at NCDOT Rest Areas or Ferry Terminals) are conducted outside of SCMS, and approximately 750 pre-formed scour holes included in SCMS are not required to be inspected annually. Based on the 2018 LOS assessment, NCDOT continues to maintain an overall rating of B for its BMPs on both primary and secondary roadways.

This permit year Roadside Environmental Unit staff, in collaboration with their consultant staff, also visited select stormwater devices in each Division to conduct an independent assessment. The consultant team visited a percentage of BMPs in each division and compared the results of the independent assessments to those performed by NCDOT's division staff. Results of the study indicate that assessments performed by division staff are generally on target and consistent across the state, indicating the level of training and experience of these staff are adequate for the needs of the program.

NCDOT also initiated a swale inspection frequency study. The goal of this ongoing effort is to investigate the status of swale maintenance and assess if an annual inspection frequency is appropriate. NCDOT anticipates continuing to evaluate swale maintenance frequencies and collecting sufficient data before proposing a change.

As part of another project, Roadside Environmental Unit staff are in the process of reviewing the BMP inventory in the SCMS database to locate and upload electronic construction drawings so they are more readily available to staff. This is to support the division staff in the event of a roadside spill entering a device or other damage to a device caused by storms, inadvertent vehicle collisions, or vandalism so they can quickly and accurately identify the construction details associated with each BMP and take appropriate actions. This effort is ongoing.

Considerations for Permit Year 2019

A significant update to the I&M Manual is anticipated in PY2019. This will include a new chapter on bioswales and a new comprehensive chapter with one or two-page factsheets containing inspection and maintenance guidance for any devices that are in the ground but do not yet have a dedicated chapter in the manual. This will include, but is not limited to, green roofs, floating wetlands, bio-embankments, etc. The goal is to provide Division staff with guidance on how to inspect these devices. Additionally, NCDOT will continue with its ongoing evaluation of swales and ongoing uploading of construction drawings to SCMS as well as continue to inspect and maintain stormwater control devices.

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7.0 Post-Construction Stormwater Program

NPDES Permit Part II.B.5

Objectives and Measurable Goals

The program objectives are to:

i. In cooperation with 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 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 NCDEMLR for approval.	NCDOT updates and/or revisions shall be submitted to NCDEMLR for approval prior to implementation.

Program Overview

The PCSP was implemented to mitigate stormwater from 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 the BMP Toolbox and to incorporate watershed quality strategies.

Accomplishments

The focus of the program in PY2018 has been to improve the documentation of PCSP implementation on projects. Refer to the IE Program for information related to training activities.

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 BUA. Briefly, steps associated with applying the PCSP include: evaluating the stormwater management needs of a project site; implementing minimum measures, drainage design for conveying runoff in a diffuse and non-erosive manner, and if needed, additional structural BMPs to treat stormwater pollutants; communication between engineers, designers, regulatory agents, and other stakeholders to discuss the intended approach; and documentation of the process through the Stormwater Management Plan (SMP). NCDOT

updated the submittal instructions for SMP documentation and archival in PY2018 to be in accordance with current project practices. SMPs will now be stored on the Department's web-based platforms used to manage projects.

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 developed four infographic posters in PY2018 that highlight minimum measures. These infographic posters will be distributed to PCSP stakeholders and used at seminars and conferences to promote understanding of minimum measures and their application in projects.

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 and BMP Toolbox. Also, conferences, seminars, and workshops frequently attended by civil design professionals provide chances to promote the PSCP. The HSP utilizes these opportunities to raise awareness of the PCSP as well as provide targeted training. NCDOT attended several conferences and workshops during PY 2018 to promote PCSP awareness, as well as provided specific technical training related to the BMP Toolbox. Additional discussion about training on the PCSP can be found in the IE Program and EE Program sections (Sections 11.0 and 12.0).

Considerations for Permit Year 2019

The planned focus for the PY2019 will be on continuing to identify opportunities to raise awareness and provide training. NCDOT will distribute infographic posters of selected minimum measures to PCSP stakeholders. Additionally, efforts to update the PCSP to align with evolving project processes and to improve workflows related to post-construction stormwater management will continue.

NCDOT has been collaborating with the US Geological Survey (USGS) to enhance their Stochastic Empirical Loading and Dilution Model (SELDM) with North Carolina-specific stream flow, precipitation, and water quality data. NCDOT anticipates completion of this project in PY2019, and will begin to implement the model to estimate water quality impacts on major design projects in the future. NCDOT anticipates using this model to create a catalog of typical project scenarios to be used as a quick tool for project stormwater planning.

8.0 Vegetation Management Program

Objectives and Measurable 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 measurable goal.	Restrict pesticide and fertilizer usage to those materials approved by the US Environmental Protection Agency (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 NCDA&CS and NCSU, using appropriate vegetation management materials (only those approved by 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

Release of Updated Vegetation Management Manual – NCDOT updated their Vegetation Management Manual in 2017 and presented updates to Roadside Environmental Staff at the December 2017 Annual Training. Revisions to the manual include updated language and graphics with more details, and an update on recent practices and research results, including:

- Sprigging Zoysia grass beside guardrails in experimental plots to assess manpower and cost savings;
- A Research & Development paper was released on July 31, 2017 entitled "Economic Analysis of Vegetation Management Practices." The report concluded that $2.5 million could be saved if Plant Growth Regulator (PGR) could be applied to secondary routes across North Carolina, which would reduce required mowing frequency; and,
- Benefits of wildflower plantings on the pollinator populations.

NCDOT Aesthetics Policy – The Chief Engineer has approved and signed an updated policy for aesthetics on new construction projects. The policy, which originated back in 1988, provides guidance to Divisions on allocation of construction funds for the purposes of adding landscape enhancements to a project. The original formula allowed for 0.5% for Rural Construction projects, 0.75% for Urban Construction Projects and 1.0% for Interstate projects and Divisions could decide what they wanted to plant along the new project. The new policy streamlines the process by allowing up to 1.5% of the construction estimate of cost to be used for aesthetic improvements. However, values above 1% will need to be reviewed and approved by the Chief Engineer. These changes in the funding for the aesthetic policy will allow additional funding for extended establishment and maintenance of projects. NCDOT anticipates that this will in turn have a positive impact on water quality.

NCDOT Roadside Management Program – NCDOT's Roadside Management Program is a new concept that consists of 4 primary objectives: funding, implementation, inspection, and reporting. The program provides dedicated funding for the purpose of litter control and mowing operations; implementation involves the coordination of project delivery through vendor contracts; inspections will provide quality control measures for desired program delivery; and periodic reporting consists of contract compliance, LOS ratings and program delivery goals. In July 2017, legislative action reallocated $104 million of traditional DOT funding for roadside activities (rest area maintenance, mowing, litter removal, stationary objects and brush control). NCDOT appropriated an additional $20 million to bolster this initiative. Four regional meetings with Division personnel and one meeting with contract mowing companies followed this funding reallocation. The initiative is targeting major holidays as keystone dates to meet the targets described in this initiative. This new program has had a substantial impact on water quality by improving stormwater runoff from NCDOT rights-of-way by having a more sustainable litter management program with dedicated annual funding used to clean up more roadways at increased frequencies. Additionally, this new program will improve water quality by increasing the vegetation management on NCDOT roadways across the state.

Considerations for Permit Year 2019

In the coming permit year, NCDOT will continue to implement its Vegetation Management Program to minimize associated impacts on water quality. While training NCDOT staff is routinely performed, NCDOT anticipates collaborating next year with the North Carolina Cooperative Extension to offer training on NCDOT's program to vegetation management staff working for municipalities that have cooperative agreements with the Department to maintain NCDOT ROWs. The annual Roadside Environmental Unit (REU) Vegetation Management Conference is planned for December 2018, which will offer pesticide recertification credits to NCDOT Roadside Environmental 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 Measurable Goals

The program objectives are to:

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

Management Measures	Measurable Goals
(a) Maintain the delegation agreement with NCDEQ NCDEMLR 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
(a) 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 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.
(b) 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.
(c) 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.
(d) Borrow Pit Discharge Management Program	NCDOT in coordination with NCDEMLR will implement the Borrow Pit Discharge Management Program. This process will consist of the following tasks: • Implement appropriate management measures to treat borrow pit wastewater for given conditions. • Implement an inspection and maintenance program. • Maintain training material and instruct field personnel overseeing borrow pit operations. • Evaluate and implement appropriate new/innovative technologies.

Program Overview

NCDOT implemented the Construction Program with the purpose of controlling the potential impacts to water quality from land disturbance at construction sites and from borrow pit and waste pile activities. The Erosion and Sediment Control (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. Refer to Appendix A of this report for a more detailed description of NCDOT's Construction Program conformance with the NCG010000 permit.

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

Erosion and Sediment Control Training Videos – NCDOT developed a series of short videos on silt fence training for possible use in various training courses. The videos include footage of silt fence installation at field sites and discussion of best practices. NCDOT is currently soliciting internal feedback on this series and possible changes to presentation approach. Once these videos are finalized, NCDOT intends for them to be a template for future training videos that could be deployed in a variety of avenues.

Ongoing Erosion and Sediment Control Training Updates – Following updates to its Erosion and Sediment Control Level I and II course materials last permit year, NCDOT initiated updates to the Level III (Design of Erosion and Sediment Control Plans) materials this permit year. A key consideration was to incorporate more of the planning considerations into the training. With the development of ESC plans increasingly being provided by private engineering firms, the Department plans to strengthen the concepts of phasing ESC Plan design over the lifespan of a project and allow greater flexibility for the design approach. To this end, NCDOT developed a draft syllabus in PY2018 that is going through internal review.

Continued Implementation of the Program – NCDOT continues to operate under its delegated authority granted by the NC Sedimentation Control Committee for 2018. 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 construction-related 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. Two keystones of the program include ongoing training certifications and inspections:

Certifications - The Biological & Agricultural Engineering and Soil Science Departments at NCSU are partnering with NCDOT to offer an ESC / 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. Three different levels of certifications are available, as listed below, and each one must be renewed every three years. As of June 30, 2018, active certificates for each level include: 999 Level I certified ESC stormwater inspectors/installers; 4,629 Level II certified ESC stormwater site managers; and 736 Level III certified ESC designers.

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 permit, 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

Considerations for Permit Year 2019

NCDOT's near-term goal is to finalize the pilot videos for silt fence installation, finding the right tone and level of complexity to relay the information. Based on deployment of these videos and feedback, NCDOT plans to identify additional training videos for development. NCDOT also plans to complete its update of the Level III ESC Certification Program for Designers, in collaboration with NCSU.

With NCDOT's update of its Standard Specifications for Roads and Structures in 2018, the Department plans to update its 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.

10.0 Industrial Activities Program

NPDES Permit Part II.D.1 and 2

Objectives and Measurable 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 (IA) 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 Title 40 of the Code of Federal Regulations, part 112 (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

During PY2018 NCDOT continued to implement and refine various program activities including 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 over 200 site-specific SPPPs at its industrial facilities, which include 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 qualitative monitoring requirements and documentation of the resulting observations at its industrial stormwater discharge points/outfalls in the SPPPs.

During the permit year, SPPP updates were performed for various NCDOT industrial facilities because of changes to the facilities, such as new buildings or changes in covered activities and staffing. Additionally, new SPPPs were developed for the Durham County (Old Roxboro Road) Material Storage Yard, Wake County (NC42) Material Storage Yard, Wake County (NC50-NC98) Material Storage Yard, and Wake County (Greshams Lake) Material Storage Yard in order to improve the stormwater management of the facilities separate from the main Durham and Wake County Maintenance Yards. The material storage facilities are used for equipment parking and material stockpiling. Additionally, two material storage facilities were removed, due to transfer of property ownership.

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 40 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 followed by written BMP recommendations. 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 receive.

Level I General Awareness Training & Level II Advanced Training - NCDOT HSP staff continues to provide annual SPPP/SPCC training for NCDOT's Division personnel, which includes regional training workshops and individual training sessions. Baseline BMPs such as good housekeeping, preventative maintenance, and spill prevention practices were reviewed with attendees. Other topics, such as qualitative monitoring, innovative BMPs, and lessons learned are also covered during training.

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.

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 2019

NCDOT will continue to maintain and implement site-specific SPPPs at its industrial facilities in PY2019. 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. NCDOT will continue to routinely evaluate the program to identify any new opportunities for improvement and to help the HSP target certain areas that may need additional assistance, including updating the IRMA BMP Guidance Manual, developing IA programmatic videos, and providing educational posters and other materials.

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11.0 Internal Education Program

NPDES Permit Part II.E.1

Objectives and Measurable Goals

The program objectives are to:

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

Management Measures	Measurable Goals
(a) Provide pollution prevention awareness training for construction workers.	NCDOT shall provide annual stormwater pollution awareness training for appropriate NCDOT personnel and contractors involved in construction and maintenance activities. NCDOT may require contractors to have equivalent training in lieu of NCDOT-provided training. Training shall include general stormwater awareness, NPDES stormwater permit NCG010000 implementation, identification of stormwater pollution potential, appropriate spill response actions and contacts for reporting spills and illicit discharges/illegal dumping.
(b) Provide pollution prevention awareness training for maintenance workers.	NCDOT shall maintain a program of annual stormwater pollution awareness training for appropriate NCDOT maintenance staff. NCDOT shall also maintain an ongoing 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 measurable goals above.

Program Overview

The 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, webinars and technical trainings. Table 5 summarizes the types of training received by NCDOT staff and others as well as the training provider.

Table 5 Summary of Internal Education Training Activities

Training / Trainee(s)	Description	Training Provider
SPPP-SPCC Plan Implementation Training/ Division Staff	Conducted five (5) workshops in PY2018. 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. 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. This training was tracked through NCDOT's Learning Management System (LMS).	NCDOT REU
HSP and NPDES Awareness and Compliance / I-77 Mobility Partners Staff	Training conducted August 24, 2017 on several NCDOT Highway Stormwater Programs including IDDEP, SCM I&M, and IA programs. IDDEP topics discussed included IDDEP procedures and I-77 Mobility Partners' (I-77 MP) responsibilities, as well as examples of typical illicit discharges and past illegal dumping incidents on NCDOT ROW. I&M Program discussions focused on inspection and maintenance procedures for applicable SCMs to be maintained by I-77 MP. Stormwater pollution prevention awareness training included a review of SPPP BMPs, oil and hazardous substances material management, and general stormwater pollution prevention for typical operations at the I-77 MP Administration and Maintenance Facility.	NCDOT REU and Hydraulics Unit

Training / Trainee(s)	Description	Training Provider
TMDL Alternatives: Category 4B Success Stories / HSP Staff and other members of the public	NC Water Resources Association (NCWRA) and NC Association of Environmental Professionals (NCAEP) held a joint workshop on November 2, 2017 on alternatives for addressing impaired waters without a full TMDL development and implementation, and where such alternatives have been successfully implemented. USEPA presented on alternative restoration approaches. NCDWR presented on tools and strategies for addressing impaired waters and NCDOT presented on the Little Alamance Creek 4b Restoration Plan.	USEPA, NCDWR and NCDOT Hydraulics Unit
IDDEP, SPPP, Spill Prevention and Response Training 2017 / NCDOT Divisions 10 and 12 and I-77 MP contractors	During two sessions in November and December 2017, NCDOT conducted IDDEP, SPPP, and Spill Prevention and Response training at two large project site locations. Training included how to observe and report stormwater compliance, as well as good housekeeping and maintenance requirements. Those attending included NCDOT Division 10 and 12 employees and contractors affiliated with the I-40/I-77 Project and I-85 Widening Project.	NCDOT and Non-NCDOT Professionals
Annual Roadside Environmental Unit Training / REU staff from Divisions state wide	On December 5th, 2017, members of the Central Office REU staff provided the updated Vegetation Management Manual to NCDOT attendees. Training necessary for recertification under the NCDA&CS Pesticide License was presented. An update was also provided on NCDOT's NPDES Stormwater Permit requirements, including stormwater control inspection and maintenance, SPPP/SPCC Plans for industrial activities, IDDEP, and Litter Management.	NCDOT REU
NCVMA Conference / REU staff and Contractors	On December 6 – 7, 2017, 80 NCDOT staff attended the North Carolina Vegetation Maintenance Association (NCVMA) Conference. NCDOT personnel licensed through NCDA&CS to apply pesticides obtained pesticide recertification credits.	Non-NCDOT Professionals
United State Geological Survey (USGS) Streamgaging, Storm Event Rapid Response and StreamStats Update Workshop / NCDOT Hydraulics Unit staff	This workshop, held April 30, 2018, discussed the history of the USGS Streamgaging Program including the measurements that a USGS stream gage gathers as well as how gage sites are selected. Presentation also covered the Rapid Response Data Collection at Ungaged Sites specifically Rapid Deployment Gages and Storm Tide Sensors that are deployed before the storm and how high water marks are captured and recorded after the storm. An update on where to find USGS Data and the available internet tools such as StreamStats was provided.	USGS

Training / Trainee(s)	Description	Training Provider
What's Happening in Hydro? Hydraulics Unit Conference / NCDOT Hydraulic Unit staff	On April 30, 2018 presenters at the Hydraulics Unit Conference gave an overview and update of statewide programs, including the NPDES permit, PCSP, buffer rules, GREEN program, and floodplain programs. Operations and design case studies were presented with a field tour of stormwater BMPs in Chatham Park development. Current research being conducted under the NCDOT Research Program was presented. A Transportation Research Board (TRB) Webinar on stream restoration and channel stability was presented as part of this conference.	Hydraulic Unit, NCDOT Project Management, Non-NCDOT Professionals
Wildflower Program Implementation / NCDOT Division staff	On May 16, 2018, REU staff presented to 52 NCDOT staff on new herbicide applications for weed control, Wildflower Program implementation, funding, species review and availability.	NCDOT REU
Root Dendrogeomorphology / NCDOT Hydraulics Unit staff	Hydraulics Unit staff participated in a technical training entitled, “Root Dendrogeomorphology and Getting to the Root of Erosion” presented at NCSU Hunt Library. The training discussed assessing the annual growth rings of roots to tell how long it's been exposed as part of an erosion and sediment control assessment of a stream.	Non-NCDOT Professionals
Miscellaneous Webinar training / NCDOT staff and contractors	NCDOT staff and contractors reviewed numerous other webinars or training opportunities, including topics such as: Permeable Concrete Pavements, Volume Reduction of Highway Runoff in Urban Areas, stormwater modeling, stream assessments, etc.	Non-NCDOT Professionals
SCM Construction Inspection Training and Certification	Three Hydraulic Unit engineers attended the workshop focusing on proper techniques and materials used in SCM construction, including proper phasing of construction, inspection of materials upon delivery, proper construction practices, and field testing and verification to verify green infrastructure and low impact development (LID) practices are properly constructed and function as they are designed.	NCSU

In addition to the formal training events, team members continued internal outreach efforts within NCDOT. Additional details on IE and training are described in the Accomplishments sections for IDDEP, Industrial Activities, Vegetation Management, Construction, and Research Programs.

Considerations for Permit Year 2019

In PY2019 NCDOT will continue its suite of reoccurring pollution prevention trainings. NCDOT plans to enhance existing PCSP training through the development of e-Learning modules for PCSP and

Stormwater Management Plans (SMP). 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 training videos for other HSP program areas, including SPPP and ESC. Training on Project Atlas, which is envisioned as a replacement for the Environmental Sensitivity Map web application, is expected within the forthcoming permit year.

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12.0 External Education Program

NPDES Permit Part II.E.2

Objectives and Measurable 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 EE and Involvement Plan as well as areas on its *Connect NCDOT* website and its *Students & Youth Initiatives* website, to distribute stormwater educational materials to the public. The program actively seeks partnerships with other NCDOT Divisions, other state agencies, and organizations with shared outreach goals.

Accomplishments

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

Education Partnerships – HSP staff had an eventful year and saw fruitful evidence that their engagement with schools, which included providing educational sessions to over 815 elementary aged students, is making an impact on stormwater awareness. Activities performed in PY2018 which targeted youth education include:

- Ballentine Elementary School (Fuquay Varina, NC) - HSP staff provided an overview of NCDOT and key aspects of the Highway Stormwater Program on September 8, 2017, including stormwater pollution prevention and how NCDOT addresses stormwater runoff. Presenters also provided NCDOT operation-specific examples that were applicable to the 16 Missions of the First Lego League Robotics Team "Hydrodynamics" Challenge project.
  On October 27, 2017 NCDOT assisted at Ballentine by helping judge their Lego Robotics Challenge competition. This included watching the eight student teams compete with their robots and present on their water-related real world problem including each team's solution to the problem, and how they incorporated the Lego League core values into their project. One of the Ballentine student teams created an "Adopt-A-Drain" project solution which included: (1) designing a storm drain stencil that incorporated a new catch phrase, "What You Dump - Is What You Drink," and (2) establishing a Drain Smart program that involves painting storm drain murals. They then contacted local government officials and the Art Council, and began performing community outreach at the local level where they applied their new storm drain stencils and Drain Smart artwork to storm drains throughout the Fuquay-Varina area.
- On September 14, 2017, as a follow up to NCDOT's Office of Education Initiatives (OEI) Summer STEM Workshop in July 2017, HSP staff conducted another session which included a site walk down at Root Elementary School (Raleigh, NC). NCDOT staff led inspections of the school's storm drainage system, identified areas of erosion at the school, and provided recommendations for stormwater best management practices.
- Additionally, on October 4, 2017, HSP staff presented consecutive sessions at the school to three 4th grade classes. The presentations described NCDOT's Highway Stormwater Program and general stormwater pollution awareness with an emphasis on erosion and sediment control. The sessions included each class breaking up into smaller groups and conducting scavenger hunt-type investigations around the school grounds to identify various erosion problems and potential stormwater pollution sources at the school.
- Lincoln Heights Elementary School (Fuquay-Varina, NC) – Seeds Kickoff Event, February 9, 2018 - NCDOT REU staff conducted nine educational sessions for Lincoln Heights Elementary School students that reviewed NCDOT erosion control and seed cultivation. These sessions trained students who were working on a plan to assist residents of St. Croix with the repopulation of a diverse range of plants after Hurricane Maria.

- Multiple Stormwater Educational Sessions at the following schools covered NCDOT stormwater management practices, stormwater pollution prevention, detrimental impacts of litter and tangible ways students can reduce stormwater pollution and littering:
    - Rolesville Middle School (Rolesville, NC) – Stormwater Educational Sessions – On April 6, 2018, NCDOT HSP staff conducted four educational sessions for Rolesville Middle School 7th grade students. These sessions included walking tours of the school grounds and of the on-site stormwater control measures located at the school (including a wet detention basin, several filtration basins, and a level spreader). NCDOT staff explained the purpose of each stormwater control measure and how each functions during various storm events.
    - Green Elementary School (Raleigh, NC) – In partnership with NCDEQ and as part of a broader Green Elementary School project named "It's Our Litter," NCDOT REU staff conducted four educational sessions for Green Elementary School 1st grade students.
    - Angier Elementary School (Angier, NC) - NCDOT REU staff conducted educational sessions for Angier Elementary School 5th grade students on June 4, 2018.
- Supplied 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 143,500 students have received these materials over the 14 years NCDOT has provided these teacher kits.

Roadside Ecology Discussion at NCSU – NCDOT's Roadside Environment Unit presented on NCDOT's use of pesticides, Plant Growth Regulators, wildflowers, NCDOT's use of stormwater devices to mitigate/control runoff, research projects funded by NCDOT at NCSU, and the importance of wetland/stream mitigation sites to a class of 48 students at NCSU. The subject of NCDOT's protection of federally threatened and endangered plant species was also discussed.

Water Resources Research Institute (WRRI) Conference Presentations – NCDOT frequently shares information about its program with the public through conferences like WRRI. This year, two presentations were made:

- NCDOT's Hydraulic Unit presented the Department's ongoing comparison of sampling techniques for dissolved metals. Paired samples were collected using current practices of composite samples (which are filtered and preserved about 12 to 24 hours later) and grab samples using EPA's "clean hands" sampling techniques (which includes filtering and preserving samples immediately in the field). Preliminary results presented at the WRRI Conference in March 2018 indicate there are differences in dissolved copper measurements for flows into the stormwater control devices. Yet there are no differences in results for dissolved copper, lead, or zinc for the outlet (effluent) samples. The study is ongoing.
- Researchers at NCSU also provided updates on research sponsored by NCDOT. Please see the Research Program for additional information.

Website Maintained – The HSP maintained its publically facing website on *Connect NCDOT,* which was refreshed in PY2016 and is periodically updated with new information. 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), are posted on the OEI website and 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. In PY2018 NCDOT was working on redesigning the ncdot.gov website, which includes updates to the HSP pages, which is expected to rollout in the next year.

Roadside Environmental – Litter Management – HSP continued to build on successful on-going activities with NCDOT's Litter Management Section. 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 gloves, safety vests, and garbage bags to NCDOT Maintenance Offices to be distributed to Adopt-A-Highway volunteers and Litter Sweep participants. The garbage bags are reversible with orange and blue sides, so that recyclables can be collected in bags with blue exteriors.
- Coordinated over 100,936 man-hours from volunteers in the Adopt-A-Highway Program in 2017, resulting in 968,385 pounds of litter removal.
- Posted "Keep NC Clean & Green" litter prevention signs along state roadways and at various Rest Areas and Welcome Centers. In addition to the "Keep NC Clean & Green" signs, there are "Littering Is Illegal" signs posted across the state.
- Managed NCDOT's Sponsor-A-Highway Program, which provides organizations and individuals the opportunity to sponsor litter removal on North Carolina roadsides while also advertising their company name.
- 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 6. Summary of Swat-A-Litterbug Letters Mailed through Public Involvement Notifications

Year	Number of Swat-A-Litterbug Letters Mailed
2017	10,660
2016	9,250
2015	8,416
2014	7,800
2013	10,503

Adopt-A-Highway Program – The Adopt-A-Highway (AAH) Program began its 29th year of operation in 2017. Each year the AAH groups are recognized for their consecutive years of service beginning with 10-years and at years 15, 20 and 25. In 2017, more than 300 AAH groups received awards for their years of volunteer service to the program.

Considerations for Permit Year 2019

The EE Program plans to continue fostering relationships with education partners such as the Office of Civil Rights Education Initiatives' Program in order to leverage their expertise and resources. In addition to strengthening the relationship with Wake County schools, the EE program will continue to evaluate options for extending the educational opportunities to other parts of the state. Finally, the HSP is working on updating the materials included in the student packages distributed to teachers, include updated stormwater-related educational information, bookmarks, and rulers.

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13.0 Research Program

NPDES Permit Part II.F

Objectives and Measurable Goals

The program objectives are to:

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

Management Measures	Measurable Goals
(a) Research Plan	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. The Research Program will include: 1) A description of the Research Program and process for requesting funding. *2)* A process that identifies research needs that will evaluate program improvement areas.
(b) Submit the Research Plan to NCDEMLR.	Modifications to the NCDOT Research Program shall be submitted to NCDEMLR.
(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 TMDL Section 14.0). 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, which are typically span 2-4 years. The table below provides a list of research projects that were active during the permit year. A complete list of current and ongoing research projects can be found in NCDOT's Research Plan.

Table 7. Research Projects Active in PY 2018

Research Project Number and Name	Project Objective
NCDOT 2014-18 *Investigation of Tillage and Soil Amendments to Increase Infiltration in Vegetated Stormwater Controls*	This project compares the impact of tillage on infiltration rates at various sites with different underlying soils and is discussed further in section below on recently completed studies.
NCDOT 2014-21 *Comparing Low-Cost Methods to Stabilize Temporary Diversions and Ditches*	This project evaluates four low-cost liners – jute matting, jute matting + polyacrylamide, excelsior matting, and a spray-on concrete product to reduce erosion in temporary ditches.
NCDOT 2015-16 *Evaluation of Flocculants: Optimizing Characteristics & Screening Methods*	This project evaluates the effectiveness of various flocculants to coagulate a variety of different sediment types that may be used in road construction.
NCDOT 2015-17 *Performance of Alternative Straw Mulch Binding Agents*	This project evaluated the effectiveness of potential tackifiers to withstand wind and rain events, and to determine if they had any effects on grass growth. Additional information on the project is available below.
NCDOT 2016-18 *Swale Design Optimization for Enhanced Application and Pollutant Removal*	This project involves pilot testing of multiple swale and bioswale design parameters/configurations in controlled plots and field sites to optimize swale and bioswale design for implementation in the linear environment. The bioswale part of the study is discussed further below.

NCDOT 2017-27 *Storm Water Infiltration and Pollinator Habitat Zones Along Highway*	This study evaluates the differences in infiltration rates in tilled areas planted with grass versus a pollinator-friendly plant mixture, and evaluates the effects of plantings on pollinator populations, species richness, and how long infiltration improvements from tillage lasts.
NCDOT 2018-02 *Selection, Installation and Evaluation of Zoysiagrass*	This project evaluates breeding lines from the NCSU breeding program with promising commercially available zoysiagrass cultivars and evaluates potential establishment methods that require lower water during sodding than traditional methods.
NCDOT 2018-03 *Dry Retention Optimization for Enhanced Application and Pollutant Removal*	This project involves field testing and controlled plots at SECREF for evaluating the performance of dry detention basins and determining appropriate effluent concentrations. The study will also test the effectiveness of various enhancements to the design.
NCDOT 2017-08 The Effects of Contaminated Soil and Groundwater on Subsurface Utilities, Surface Water and Drainage	This project evaluates the risk to stormwater drainage infrastructure from contaminated soils and methods to mitigate that risk by using appropriate pipe treatments applied to concrete culverts.
NCDOT 2018-34 Updates and Maintenance of the Precipitation Alert and Visualization Tool in Support of NCDOT Stormwater Quality Monitoring	Develop enhancements to NCDOT's Multi-sensor Precipitation Estimate (MPE) tool, including incorporating precipitation frequency estimates from the NOAA Atlas 14 to facilitate alerts when an n-year storm is reached at a project site. The enhancements also allow NCDOT to evaluate historical rainfall data on a map to identify that a given storm exceeded an n-year storm at that location.

Recently Completed Studies

The following research projects had monitoring completed and/or draft or final reports submitted in the current permit year.

- Research project NCDOT 2014-18 on the effects of tillage on infiltration rates was completed by NCSU, both at experimental plots at the Sediment and Erosion Control Research Education Facility (SECREF) and in field plots adjacent to highways. The sites were treated with different types and depths of tillage, and different amendments like compost,

polyacrylamide (PAM), etc. The study found that deep tillage significantly increased infiltration rates, independent of if the sites were trafficked or not. Compost amendment had mixed results, appearing to be most beneficial when the sites had coarse media and to mitigate impacts from traffic. On highway sites, application of tillage and compost was shown to reduce runoff volume by 38-48%.

- NCSU also finalized the research reports for biofiltration conveyance (under NCDOT 2011-35), which has been reported on previously. This SCM involves a series of step pools with riffle weirs for flood mitigation and conversion of overland flow to subsurface flow. The results indicate this SCM could be effective at nutrient reduction and is a valuable option for steep slopes. NCDOT will be evaluating options for reducing the cost and will be considering this SCM along with other potential new chapters during the next round of Toolbox updates.

- NCSU and Coastal Carolina University finalized a research report on bioswale monitoring in Brunswick County (conducted as a part of NCDOT 2014-17), focused primarily on bacterial load reduction. The study showed bioswales are effective at reducing concentrations of a variety of indicator species and at converting surface flow to subsurface underdrain flow (undergoing filtration).

- NCSU also completed the bioswale part of the swale optimization studies (RP 2016-18) and is finalizing the draft report. The research study monitored plots at SECREF and at highway sites and resulted in guidance on optimal bioswale sizing. NCDOT will be using this information to develop design guidance on bioswales during the next round of updates to its BMP Toolbox.

- NCSU completed a study (NCDOT 2015-17) on alternatives to emulsified asphalt as a binding agent for straw during mulching for grass establishment. The study found that hydromulch products, made from paper and/or wood fiber, were as effective as asphalt for resisting failure, at lower cost and with little impact to grass establishment. Lower application rates than recommended by the manufacturer has a significant impact on tackifier performance.

Programmatic Improvements – The HSP has implemented various programmatic improvements including training researchers on the HSP programmatic Quality Assurance Project Plan (QAPP), requiring project-specific QAPPs for post-construction research projects and electronic data collection using standardized spreadsheets. NCDOT also recently completed a field study of metals sampling procedures and is in the process of analyzing the data. This dataset will be used to develop a Metals QAPP which will be included as an addendum to the programmatic QAPP.

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 in the final stages of development, compiling historical data to import into the database.

Considerations for Permit Year 2019

In the next permit year, NCDOT will continue its Research Program. Several new projects are being initiated, with results expected in 2-4 years, including:

- NCDOT's drainage manual requires engineers to design BMPs without causing downstream impacts, but it lacks specific assessment methods. A new research project by NCSU will inspect 40-50 sites in the Piedmont and 20 sites in the Mountain ecoregion to assess downstream conditions from NCDOT-managed outlets and identify what factors influence downstream impacts. Impacts will be quantified by visual observation and for a subset of sites, water quality and hydrology monitoring. These will then be used to develop an outlet analysis protocol based on a numerical scoring system. NCSU will also recommend outlet design standards and develop an Excel-based design tool.

- UNC Charlotte will be studying amendments like wood chips, iron filings, etc. to traditional filtration media to improve the performance of filtration-based BMPs. Up to 25 amendments will be screened using a batch test. These will then be winnowed down through a series of different laboratory experiments to three promising amendments which will be studied in laboratory columns. The column experiments will look at a variety of factors such as the impacts of media aging, antecedent dry conditions, and variable concentrations/loads on amended media performance.

- NCDEQ recently recognized soil improvement as a stormwater BMP for nutrient reduction; however, there have been concerns that existing guidelines may not be cost effective. NCDOT is funding a research study by NCSU to optimize compost application for stormwater treatment and cost reduction. NCSU will first conduct a laboratory screening assessment using five soil textures representative of NC soils, a range of compost rates and two sources to determine hydraulic conductivity and water retention of the mixtures. Based on the results of this screening, NCSU will perform column tests of compost-amended media to study breakthrough curves for select nutrients and metals. In parallel, greenhouse plots of the same mixtures will be used to determine vegetation establishment over a period of 6-8 weeks. This will then be used to optimize design of field plots in SECREF to investigate impacts of compost amendment.

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14.0 Total Maximum Daily Load Program

NPDES Permit Part III.C

Objectives and Measurable 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 given an assigned Waste Load Allocation.

Permit Requirements	
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 NCDEMLR 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 NCDEMLR for comments no later than 12 months after notification by NCDENR that NCDOT has been assigned a WLA NCDEMLR 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 NCDEMLR. 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.

Permit Requirements	
6)	Within 6 months of completing the assessment and monitoring activities outlined in the Plan, NCDOT shall submit a report of its findings to NCDEMLR. 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 NCDEMLR, NCDOT shall implement any approved BMPs in accordance with the schedule. Subsequent annual reports will provide updates on the implementation of the Plan.

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 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 WLAs.

Accomplishments

Key PY2018 accomplishments included continued collaboration with NCDWR's Modeling and Assessment Branch, implementation of its Protocol for Determining Contributor Status in North Carolina, reevaluation of bacteria-reducing opportunities in the Southeast White Oak watershed, and updates to the TMDL tracking database. In addition to the accomplishments described below, NCDOT remains involved in nutrient and watershed modeling studies throughout the state.

NC TMDLs Approved in 2018 –No TMDLs listing NCDOT as a significant contributor were approved by USEPA in PY2018.

NCDOT Right-of-Way and Impervious Areas in Hanna Creek and Calico Creek Watersheds – In August 2017, NCDWR notified NCDOT of upcoming water quality modeling and potential TMDL development in Hanna Creek and Calico Creek watersheds. Hanna Creek is in the Upper Neuse River Basin and is included on North Carolina's 303(d) Impaired Waters List due to dissolved oxygen impairment. Calico Creek is in the White Oak River Basin and is included on North Carolina's 303(d) Impaired Waters List due to copper, chlorophyll a, dissolved oxygen and turbidity water quality standard exceedances. In an effort to support the NCDWR, NCDOT developed GIS datasets of state maintained right-of-way and impervious areas. These GIS datasets, along with a memorandum summarizing the procedures used to develop the information, were provided to NCDWR in January 2018.

Southeast White Oak TMDL Compliance Update – In 2009, NCDEQ prepared a TMDL report to address fecal coliform impairments in Boathouse Creek (ID# 20-31), Hills Bay embayment (ID# 20-(18)c4) and Dublin Creek (ID# 20-30) in the White Oak River Basin. 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, followed by a Report of Findings (RoF) in 2013, which describes the results of NCDOT's AMP implementation activities, including field exercises and SCM retrofit feasibility studies.

Over the past five years, NCDOT has continued to evaluate retrofit and new SCM opportunities within the Southeast White Oak watershed. During 2018, NCDOT prepared a report titled "Southeast White Oak River Bacteria TMDL Report of Findings Update" which documents the status of impairment and the feasibility associated with various bacteria-reducing options. The report provides a summary of actions taken to address bacteria impairment, challenges and constraints associated with treating stormwater runoff from the NCDOT right-of-way, an assessment of potential options for reducing bacteria loads, and recommendations for next steps in the watershed. This report concluded that there are limited options available to construct a stormwater retrofit for treating bacteria in runoff in the Hills Bay Watershed. Despite this challenge, NCDOT is considering opportunities presented in the report, including additional water quality monitoring, a reevaluation of sources within the NCDOT ROW, continued partnering with local municipal and watershed-based organizations, and exploring innovative technologies.

TMDL Tracking Database – NCDOT's TMDL tracking database serves to inventory pollutant-reducing activities that support NPDES and nutrient management strategy rule compliance. In PY2018, NCDOT updated and improved the database to include additional information on North Carolina TMDLs and NCDOT's WLA-related responsibilities in TMDL watersheds, and load reduction assignments associated with stormwater controls used to support compliance with nutrient rules and TMDLs.

Considerations for Permit Year 2019

NCDOT will continue to support NCDEQ in the development of TMDLs statewide and assessments of NCDOT loading as part of those TMDLs. NCDOT anticipates evaluating the TMDL prepared by NCDWR to address the fecal coliform bacteria impairment in portions of Reedy Fork in the Cape Fear River Basin for applicability to the Department. NCDOT will also continue to develop and implement our strategy for addressing bacteria loadings in Boathouse Creek and Hills Bay watersheds in PY2019. Additionally, NCDOT will monitor DEQ's developing 5R program and participate as appropriate.

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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	Identify NCDOT stormwater outfalls from Interstate, US, and NC primary routes.
	Identify and eliminate illegal discharges into the NCDOT's stormwater conveyance system.
	Implement a Nutrient Management Education Program for NCDOT staff and contractors engaged in the application of fertilizers on highway rights of way.
	Meet riparian buffer and diffuse flow requirements on new and widening road projects.
	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.
	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).
	Implement three stormwater retrofit BMPs per year in the Jordan Lake watershed to reduce nutrient loads until NCDOT has either achieved the nutrient load goals in 15A NCAC 02B .0262 or the lake's designated uses are restored (currently stayed, see below).
Falls Lake	Identify NCDOT stormwater outfalls from Interstate, US, and NC primary routes.
	Identify and eliminate illegal discharges into the NCDOT's stormwater conveyance system.
	Implement a Nutrient Management Education Program for NCDOT staff and contractors engaged in the application of fertilizers on highway rights of way.
	Meet riparian buffer and diffuse flow requirements on new and widening road projects.

Watershed	Rule Requirements
	Achieve nutrient reduction targets on new non-road development projects using NCDOT-JLSLAT or through another calculation method that is acceptable to NCDWR.
	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.
	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.

Program Overview

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

The Jordan Lake GREEN outlines the Department's approach to managing nutrients from new development, including new and widened roads and new non-road developments. The EMC approved the Jordan Lake GREEN Program on November 8, 2012. The Rules also include retrofit requirements to reduce nutrient loads from existing NCDOT development; however, various Session Laws have delayed this requirement.

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 or implement equivalent nutrient load reduction measures.

Accomplishments

NCDOT continued to develop and implement nutrient management training programs for NCDOT staff and contractors, completed construction on six stormwater retrofits, and continues with construction on an additional eight 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.

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 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.

Litter Removal Support – In addition to its state-wide liter abatement programs discussed in the External Education section of this report, NCDOT continues to support the Clean Jordan Lake organization by providing 5 cases of trash bags for their annual litter sweep on Jordan Lake.

Retrofit Projects to meet Existing Development Requirements – Six (6) stormwater BMP retrofits in the Falls Lake watershed were completed in 2018, 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.

While bioswales are considered to provide TN and TP reductions similar to that of bioretention basins, NCDOT does not currently have data to quantify their treatment efficiency. In the absence of bioswale performance data, NCDOT conservatively modeled them as grassed swales using NCDOT-JLSLAT for the purposes of this annual report. As described in the Research Program summary (Section 13.0) and BMP Inspection and Maintenance Program summary (Section 6.0), NCDOT is working with NCSU researchers to perform bioswale optimization experiments and modeling. This information will be used to support the addition of a bioswale chapter in the I&M Manual in PY2019.

Modeling the 4 bioswale BMPs as grass swales in their as-built condition resulted in a net reduction in load of TN from 6.05 pounds per acre per year to 2.71 pounds per acre per year, a load reduction of 55% and a net reduction in load of TP from 0.91 pounds per acre per year to 0.52 pounds per acre per year, a load reduction of 43%. Modeling the filtration basin and preformed scour hole BMPs using NCDOT-JLSLAT resulted in a net reduction in load of TN from 7.50 pounds per acre per year to 4.63 pounds per acre per year, a load reduction of 38% and a net decrease in load of TP from 1.01 pounds per acre per year to 0.81 pounds per acre per year, a load reduction of 20%.

Eight (8) additional stormwater BMP retrofits in the Falls Lake watershed are currently under construction, including:

- 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 statewide, including those located within the Jordan Lake and Falls Lake watersheds. NCDOT Division REU Engineers maintain BMPs in the Jordan and Falls Lake watersheds. In PY2018, 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 – As discussed in Section 3.0, NCDOT completed a Tier 1a outfall inventory in portions of the Lower Jordan Lake watershed in summer 2018. The inventory was conducted along primary roadways in portions of the New Hope River subwatershed and Lower Haw River subwatershed and resulted in the identification of 378 explicit outfalls. The Tier 1a inventory includes locations of true outfalls to waters of the state at or within the right-of-way boundary.

Considerations for Permit Year 2019

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.

Appendix A

Construction Program Conformance with NCG010000

NCDOT has a robust Construction Program that governs development activities disturbing one or more acres of land surface by Department personnel or contractors. As required in Section C.1.b NCDOT's NPDES permit, the Department has adopted appropriate elements from the statewide General Permit No. NCG010000 for "Construction Activities that are also Subject to the North Carolina Sediment and Pollution Control Act of 1973." NCDOT's program is generally consistent with the proposed draft revisions of the NCG010000 dated August 10, 2018. The following section discusses these elements, and proposed variations from the draft general permit. The variations generally relate to NCDOT's role as a delegated authority, in terms of reporting to DEMLR.

NCDOT develops a project-specific erosion and sediment control (ESC) plan adhering to the applicable requirements of the NCG010000 permit, the NC Sediment Pollution Control Act and 15A NCAC 04B .0101-.0132. These plans are not submitted to DEMLR; rather, NCDOT serves as the reviewing and plan approval agency. NCDOT tracks proposed regulated activities using its ERCON database and lists all ongoing construction projects on its public website NCDOT.gov via a Construction Progress Report database instead of the NCG010000 proposed electronic Notice of Intent (NOI) process. NCDOT maintains this roster of all construction projects and their status, including projects disturbing over one acre.

ESC plans developed include location information, general site features such as property lines, project limits, site drainage features, existing and proposed facilities and other features similar to the NCG01000 guidelines. The plans, detail drawings, and project special provisions also feature locations of the temporary and permanent ESC measures and specifications for ground and vegetative stabilization. Calculations for peak discharges of runoff from each outlet and other design calculations are contained in the master project ESC files. The plans do not contain contact information for the person responsible for maintenance, as this is generally achieved using Department resources consistent with the NCDOT Standard Specifications and NCDOT *Erosion and Sediment Control Design and Construction Manual*. They also do not include design calculations for culverts and storm sewers and discharge and velocity calculations for ditch flows as these are housed in NCDOT Hydraulics Unit master project files. Documentation under Section A, part 8 of the NCG010000 permit is not relevant to the NCDOT program and is not included.

The design standards presented in the NCG01000 permit are incorporated into the NCDOT *Erosion and Sediment Control Design and Construction Manual*. NCDOT also complies with the rules on buffer, ground stabilization, and materials handling in the NCG010000 permit.

Consistent with other elements of its reporting protocol, NCDOT reports bypasses of ESC measures or oil spills to DEQ when impacting jurisdictional waters or private property. NCDOT conforms with the self-inspection requirements, including maintaining a rain gauge or alternative device, inspecting ESC measures after a qualifying rain event, and inspecting stormwater outfalls and the site perimeter. NCDOT has obtained permission from DEMLR to use the Multi-sensor Precipitation Estimates (MPE) hosted by the State Climate Office in lieu of rain gauges for remote site locations. The MPE combines radar-based precipitation estimates with hourly surface gages to develop a higher-accuracy precipitation dataset and has been validated and applied successfully by NCDOT for many years.

Appendix B

I-77 Mobility Partners Stormwater Management Program Report

Stormwater System Report

Date of Report:	Scope of Report:	Area(s) Reported:
September 4, 2018	I-77 Mobility Partners Stormwater Management Program	I-77 Mobility Partners Facility Stormwater System & I-77 Corridor

I	Report
	1 Section – Overview/Summary In accordance with I-77 Mobility Partners Stormwater Management Program and in compliance with the Comprehensive Agreement. I-77 Mobility Partners herein provides its annual report under NCDOT's NPDES permit. This report is for a 26 mile portion of the I-77 corridor and an approximately one-third mile portion of I-277 in the City of Charlotte, and in Mecklenburg and Iredell Counties, North Carolina. From approximately MM 11 to MM 37 on I-77 both northbound and southbound. In addition, this report includes Administration & Maintenance building (Facility) which became operational on November 1, 2018 located at: 8015 W. WT Harris Blvd. Charlotte, NC 28216 **2 Section – Illicit Discharge Detection and Elimination Plan (IDDEP)** No illicit charges were detected and no dumping occurred during the report period July 1, 2017 to June 31, 2018. **3 Section – Program For Encroachment** Encroachment is no longer a required section based on the new NPDES permit. If required, encroachments are responsibilities of NCDOT's, all encroachments are managed by NCDOT's Division Office. **4 Section – Construction Program** The project is currently under construction and all temporary erosion control measures have been implemented per the approved ESPC plans. **5 Section – Industrial Facilities** I-77 Mobility Partners has developed the Stormwater Pollution Prevention Plan (SPPP) in accordance with NCDOT's NPDES permit for the Administration and Maintenance building (Facility). I-77 Mobility Partners maintenance staff successfully completed the SPPP training. In addition, the SPPP is being develop at the same time some of the SPPP best management practice recommendations are currently being implemented.

II	Conclusion
	Overall the I-77 Mobility Partners Stormwater Management Program is in the implementation phase. In addition, I-77 corridor stormwater controls are still under construction.

Q&E Director/Designee: Luis J. Torres	Signature:	Date: 09/03/2018
Approver Manager: David Hannon	Signature:	Date: 09/03/2018