Annual Stormwater Report

Year 5—April 1, 2009—March 31, 2010

for the

North Carolina Department of Transportation

Highway Stormwater Program

For Submittal to

NC Department of Environment and Natural Resources

Division of Water Quality

NC Department of Transportation

NPDES Permit No. NCS000250

September 2010

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Roanoke Voyages Scenic Byway

Annual Stormwater Report

NC Department of Transportation

NPDES Permit Number NCS000250

Certification

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

Jim Trogdon, PE
Chief Operating Officer

9/1/2010
Date

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Annual Stormwater Report

NC Department of Transportation

NPDES Permit Number NCS000250

List of Acronyms

BMP	Best Management Practice
DENR	North Carolina Department of Environment and Natural Resources
DOT	North Carolina Department of Transportation
DREE	Division Roadside Environmental Engineer
DWQ	North Carolina Division of Water Quality
FHWA	Federal Highway Administration
FIP	Field Inventory Process
HSP	Highway Stormwater Program
HQW	High Quality Waters
ICID	Illicit Connections and Illegal Dumps
IDDE	Illicit Discharge Detection and Elimination
IECA	International Erosion Control Association
IRMA	Industrial and Roadway Maintenance Activities
MS4	Municipal Separate Stormwater Sewer System
NCDA	North Carolina Department of Agriculture
NCSU	North Carolina State University
NPDES	National Pollutant Discharge Elimination System
NSW	Nutrient Sensitive Waters
PAM	Polyacrylamide
PSH	Preformed Scour Hole
REU	Roadside Environmental Unit
ROW	Right-of-Way
RUSLE	Revised Universal Soil Loss Equation
SA	Saltwaters Waters— Class A
SCM	Stormwater Control Measure
SCMS	Stormwater Control Management System
SPCC	Spill Prevention, Control, and Countermeasures
SPPP	Stormwater Pollution Prevention Plans
TAC	Technical Advisory Committee
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
UNCC	University of North Carolina at Charlotte
USGS	US Geological Survey

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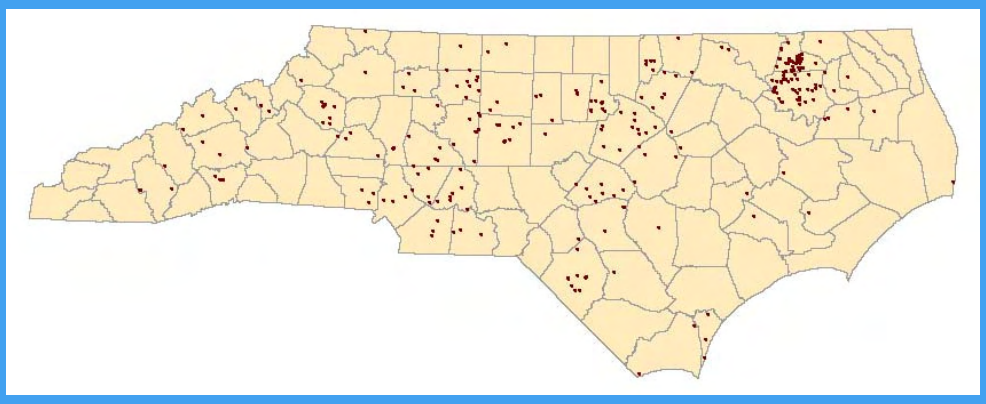
Illicit Discharge Detection and Elimination Program

DOT's NPDES Permit Part II.A

Program Objectives

Objectives established by DOT's Permit Part II.A

- Implement an Illicit Discharge Detection and Elimination Program to assure that the illicit discharges, spills and illegal dumping into the DOT municipal separate storm sewer system (MS4) are detected and eliminated.
- DOT shall implement appropriate procedures and actions to report illicit spills, discharges and illegal dumping for appropriate enforcement or other action by DENR.



Locations of illicit discharges reported statewide as of March 2010

26 Cases of Illicit Discharges and Dumps Found in Year 5

DOT has reported more than 346 illicit connections and illegal dumps (ICIDs) to DENR's Division of Water Quality (DWQ) Regional Offices during the course of the program, with 26 ICIDs reported during this permit year. Reports to DWQ Regional Offices (in accordance with **Management Measure d**) are made on a monthly basis and include a map and latitude and longitude coordinates for the reported site.

These IDDEP reports mainly cover three different types of IDDEs 1) Materials dumped along the highway right-of-way such as oil containers and medical waste; 2) Fuel spills from vehicles; and 3) Gray water being discharged from residential dwellings.

DOT also collaborates with municipalities to identify and report illicit discharges, such as a mobile vehicle detailer who was operating without authorization from DOT's property and discharging into the city's stormwater drainage system.

Ongoing Activities

- *DOT staff are regularly trained to identify and report IDDE observations through training in conjunction with the Stormwater Pollution Prevention Plan* (**Management Measure a**).
- *DOT staff across the state continue to identify and inspect illicit connections and illegal dumping* (**Management Measure b**).
- *DOT has maintained a standard point of contact and reporting format available to the public online at http://www.ncdot.gov/programs/environment/stormwater/awareness/involved.html#* (**Management Measure c**).
- *DOT continues to track illicit discharges in its internal database, available for coordination with the Division of Water Quality* (**Management Measure e**).

For more information about DOT's IDDE Program, Contact

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HSP Manager
919.733.2920
or
Bob Holman, PhD
IDDEP Manager
919.861.3779

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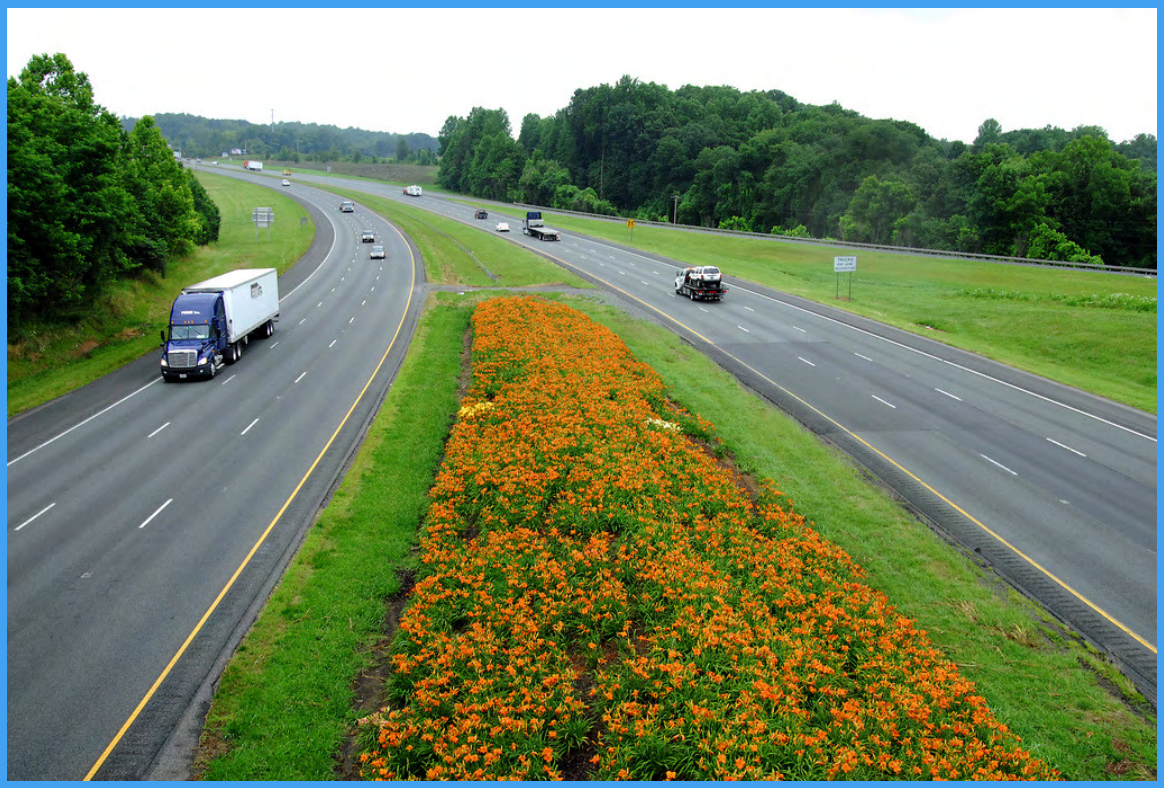
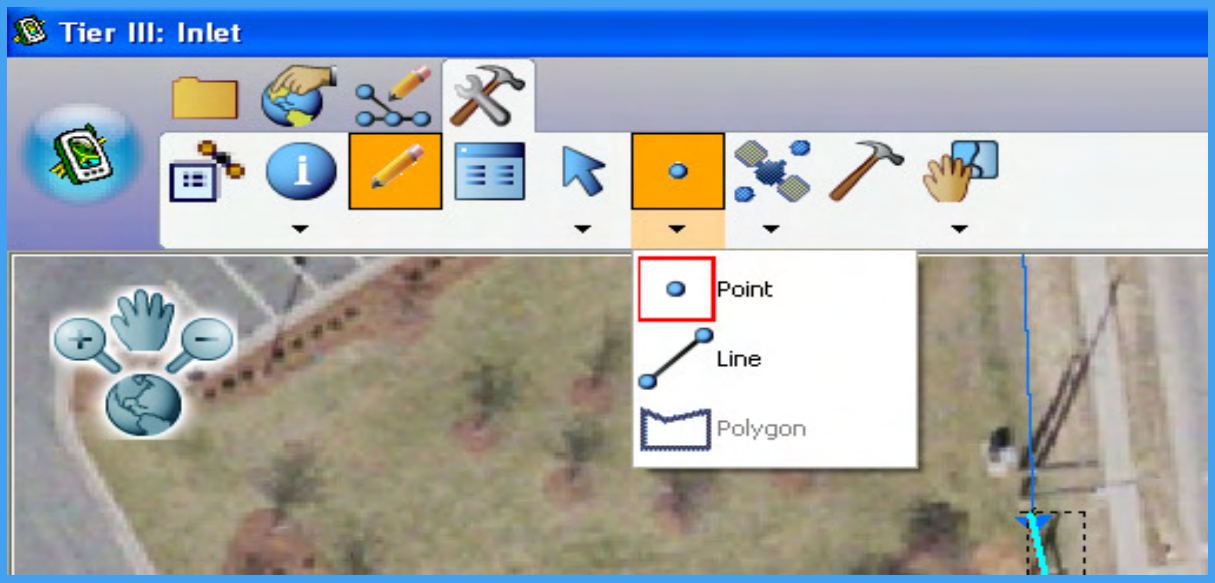


I-85 Near Yadkin River

Stormwater System Inventory Program

DOT's NPDES Permit Part II.B.1



Example of the in-field mapping capabilities of the FIP tool

Outfall Inventory Tool Updated

Under its NPDES permit, DOT has developed a Field Inventory Program (FIP). This FIP will facilitate the efficient collection and storage of physical data associated with the existing NCDOT open and closed stormwater system.

In Year 5, the tool was updated to allow mobile GIS mapping of the drainage system while in the field (see example screen shot above). Additional field testing of the tool was also performed.

Ongoing Activities

- DOT continued to maintain a GIS-based stormwater system inventory by updating over 20% of the state-wide roadway system, including new construction and industrial outfalls (**Management Measure a, b, and c).**
- DOT and DWQ continue to prioritize areas for potential field inventories. Falls Lake and Jordan Lake have been identified as high-priority areas. Other watersheds for which TMDLs are currently being developed are also potential high-priority areas (**Management Measure d).**

For more information about DOT's Stormwater System Inventory Program, Contact

Matt Lauffer, PE
HSP Manager
919.250.4100
or
Andy McDaniel, PE
SSIP Manager
919.250.4100

Program Objectives

Objectives established by DOT's Permit Part II.B.1

- Continue to build the statewide DOT stormwater system inventory for the purpose of supporting the Retrofit Program, Post-Construction Program, and Illicit Discharge Detection and Elimination Program.
- Maintain a stormwater system GIS map and prioritize sensitive water crossings.
- Develop a field inventory procedure to be used for DOT/DWQ-identified priority areas.

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Field Staff measuring the invert of a pipe during Field Inventory Protocol testing

BMP Retrofits Program

DOT's NPDES Permit Part II.B.2

Stream Bank Drop Structure at Lee Cline Road and Cline Creek North

Bridge Runoff Improvements at Cline Creek

DOT designed and constructed a stream bank drop structure retrofit to safely convey runoff in a non-erosive manner from a roadside ditch along Lee Cline Road into Cline Creek North. The drainage area for the stormwater control measure (SCM) is approximately 35 acres and includes the bridge deck crossing Cline Creek North, the right-of-way area associated with Lee Cline Road, and off-site drainage area. The stream bank drop structure is situated adjacent to and discharges alongside the bridge structure.

The design of the SCM consists of a riprap lined channel that conveys stormwater into a riprap lined basin. The basin is designed based on methods provided by FHWA in *Hydraulic Engineering Circular No. 14, Hydraulic Design of Energy Dissipators for Culverts and Channels*. Based on the numerous field visits conducted as part of the Bridge Stormwater Project, the implementation of stream bank drop structures and other energy dissipaters could potentially prevent overbank erosion at bridge sites. This project is an example of a retrofit that will prevent significant pollutant loading to the receiving stream (via overbank erosion) and a design that could be applied to other similar sites for low cost and potentially high benefit.

Retrofits Implemented in Year

Through its Retrofit Program, DOT identified retrofit locations to address potential pollutant loads from DOT roadway facilities and industrial activities (**Management Measure a**), which are suitable for the construction of a stormwater control measure (SCM). As a result of DOT's Bridge Stormwater Project, approximately 37 SCMs were designed and/or constructed during year 5 of the permit term (**Management Measure b**).

Retrofit types implemented this year include detention systems, filtration systems, grassed swales, stormwater wetlands, level spreaders, environmental site designs, and streambank drop structures.

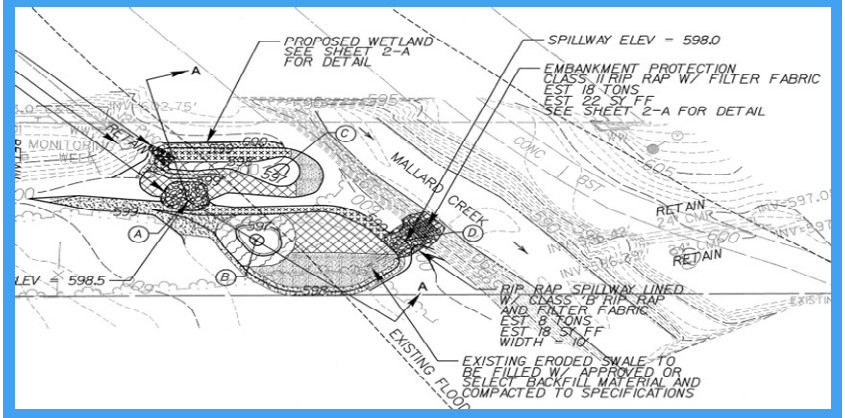
Program Objectives

Objectives established by DOT's Permit Part II.B.2

- Develop, implement and support the DOT program to be consistent with NPDES post-construction control measures.
- Use Retrofits to address pollutant loading from existing DOT activities.
- Retrofits should not be associated with meeting the requirements of any other DWQ program.

Stormwater Wetlands SCM at I-85 and Mallard Creek

DOT designed and constructed a stormwater wetland SCM retrofit at the I-85 bridge crossing over Mallard Creek in Mecklenburg County. The SCM was designed to control and treat runoff from approximately 1.86 acres of drainage area, including 1.23 acres of impervious bridge deck and roadway area associated with I-85. The SCM consists of two wetland cells operating in series, which ultimately discharge treated stormwater into Mallard Creek through a riprap lined spillway. Design for the SCM required hydrologic and hydraulic calculations, consideration of floodplain encroachment, and preparation of a detailed planting plan for wetlands species. Implementation of retrofits like this project will provide valuable information on design practices, constructability, and applicability for incorporation into a future chapter in the BMP Toolbox on stormwater wetlands.



Plans for the Stormwater Wetlands treating bridge deck and roadway runoff from I-85 over Mallard Creek

The Stormwater Wetlands after construction.

For more information about DOT's Retrofit Program, Contact

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HSP Manager
919.250.4100
or
Brian Lipscomb, PE
Retrofit Manager
919.250.4100

BMP Toolbox for Post- Construction Runoff

DOT's NPDES Permit Part II.B.3

Researcher from UNCC placing a flow meter at a swale outlet in the Jordan Lake Watershed

Program Objectives

Objectives established by DOT's Permit Part II.B.3

- Develop 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 DOT applications.
- Evaluate BMPs for applicability to the linear highway system.
- Implement new and innovative technology on an experimental basis.

Study of Swale Performance in Secondary Roadways Complete

Management Measure a requires DOT to include information about stormwater control measures (SCMs) including design criteria, material specifications, and pollutant removal potential in its BMP Toolbox. **Management Measure c** allows that these investigations can be performed as research studies and monitoring. Researchers at the University of North Carolina at Charlotte recently submitted draft findings on the performance of swales to treat runoff from secondary roadways by the removal of nutrients and total suspended solids (TSS). The draft study, entitled *Evaluation of Nutrient Loading Rates and Effectiveness of Roadside Vegetative Connectivity for Managing Runoff from Secondary Roadways*, was submitted to NCDOT in January 2010. Final results will be provided in the fall of 2010.

In the study, monitoring data was collected at the edge of the paved portion of the roadway and at the outlet of a swale at three secondary roadways located in the piedmont. Results show that for sites without disturbed land in the vegetated right-of-way, swales perform well at reducing the concentration of TSS and total nitrogen, even when influent concentrations of these parameters are well below those found in typical development and primary roadway sites. In addition, reductions in loading rates can be significant due to a reduction in runoff volume from infiltration. The report results suggest that roadside swales located along secondary roadways are important treatment options for solids and nutrients in sensitive watersheds.

Information such as this will be included in the Toolbox periodically, when updates to the manual are performed.

Ongoing use of the BMP Toolbox:

DOT continues to use its BMP Toolbox (March 2008 version) and requires contractors to implement the guidance manual also for use in designing BMPs (also known as SCMs) for linear systems. The Toolbox can be downloaded from DOT's website at www.ncdot.org/doh/preconstruct/highway/hydro/BMP/default.html.

Environmental Site Design SCM Installed at Dillingham Creek

In Years 4 and 5, DOT initiated the use of environmental site design (ESD) components as part of its efforts to implement design-related SCMs. Controls which implement ESD components endeavor to take advantage of existing areas, either natural or previously disturbed, to treat stormwater with little or no modification. The objective of ESD is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to its source and promote the natural movement of water within a watershed. The ESD designation can be used to further qualify other SCMs if components of the SCM are existing features. For example, a dry detention basin created using a naturally-existing depressed area may be described as an *environmental site design basin*.

Key considerations for the installation of an ESD include: 1) additional right-of-way may be required, 2) the natural topography should match the final grade needs of the SCM, 3) in most cases, a minor retrofit would be required at the site, such an energy dissipation upstream or slight modification of the outlet structure, and 4) an ESD reduces overall costs through less construction effort and maintenance in most cases.

One such ESD basin was utilized to treat bridge deck runoff at State Route 2173 over Dillingham Creek in Buncombe County. The runoff is routed through a preformed scour hole (PSH) then into a wooded area. The natural depression in the wooded area has a volume of 2,365 cubic feet [cf], which was greater than the water quality volume (WQv). Initial observations of the ESD basin after installation in 2009 indicate it is functioning as desired by retaining runoff and promoting infiltration in lieu of a more abrupt discharge into the receiving stream.

Natural wooded area used as ESD to treat bridge deck drainage prior to discharge at Dillingham Creek

For more information about DOT's Toolbox Program, Contact

Matt Lauffer, PE
HSP Manager
919.250.4100
or
Brian Lipscomb, PE
Toolbox Manager
919.250.4100

BMP Inspection and Maintenance Program

DOT's NPDES Permit Part II.B.4

Program Objectives

Objective established by DOT's Permit Part II.B.4.

- Develop and implement a BMP Inspection and Maintenance Program to aid in the inspection, operation, and maintenance of BMPs.
- Include the BMP Inspection and Maintenance Program in the BMP Toolbox.

DOT Continues to Implement the I&M Program

As a continuation of the Inspection and Maintenance Program (**Management Measure c),** DOT updated its BMP Inspection and Maintenance Manual and continued to improve its Stormwater Control Management System (SCMS).

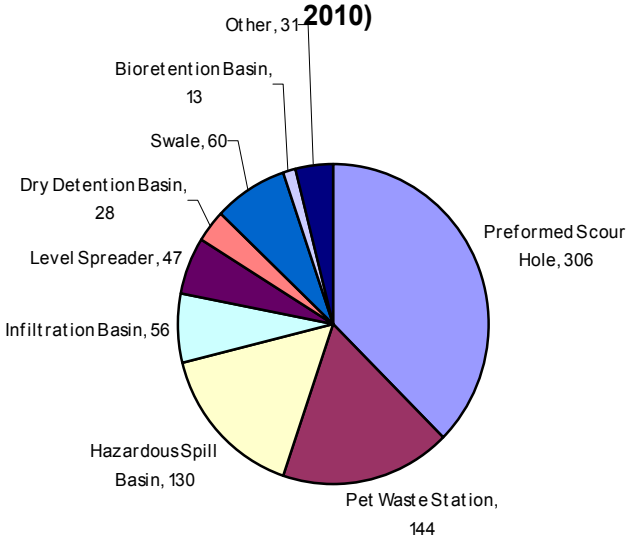
Originally developed in years 1 and 2 of the permit term under **Management Measure b**, the I&M Manual was distributed statewide to Division Roadside Environmental Engineers (DREEs) in February 2010. The manual provides detailed inspection guidelines and maintenance requirements for nine of DOT's most common structural stormwater controls. Improvements to the manual were made after field testing and review by DREEs in three divisions. In addition to being distributed in hard copy, the manual is also available on SCMS, DOT's internal website for tracking structural stormwater controls.

SCMS now has the functionality to track retrofit stormwater controls through the design and construction phases. DOT design engineers can use the website to run reports and centrally store plans, regulatory information and roadway design information for these controls. Division personnel can utilize SCMS to track their stormwater control inventories, record inspections, and document maintenance needs and maintenance performed. Numerous reports are available to assist DOT personnel in managing inspection due dates and accessing chronological records on each control.

Hundreds of Stormwater Control Measures Inspected in 2010.

Every two years, DOT verifies the condition of assets in the Department's inventory. As a result, 477 new and existing structural stormwater control measures (SCMs) have been inspected since January 2010. Division 5 (Durham, Granville, Franklin, Person, Vance, Wake, and Warren counties) has the largest number of devices (229), while the most prevalent device is preformed scour hole, or PSH (306). The PSH, shown below, is designed to dissipate energy and promote diffuse flow. The graphic shown here breaks down the SCM device type and numbers inspected. Through this process, DOT continues to assess its BMP inspection and maintenance needs (**Management Measure a).**

Device Type and Numbers Inspected (since Jan. 2010)



The Inspection and Maintenance Program is a shared responsibility across the Department. Most SCMs are inspected and maintained by DREEs or other DOT personnel located in each division. However, SCMs such as Pet Waste Stations, Buffers, Bridge Drainage Systems, and proprietary SCMs, such as Swirl Separators and Wet Vaults, are maintained by the Bridge Maintenance Unit, Ferry Division, contractors, and other groups within DOT.

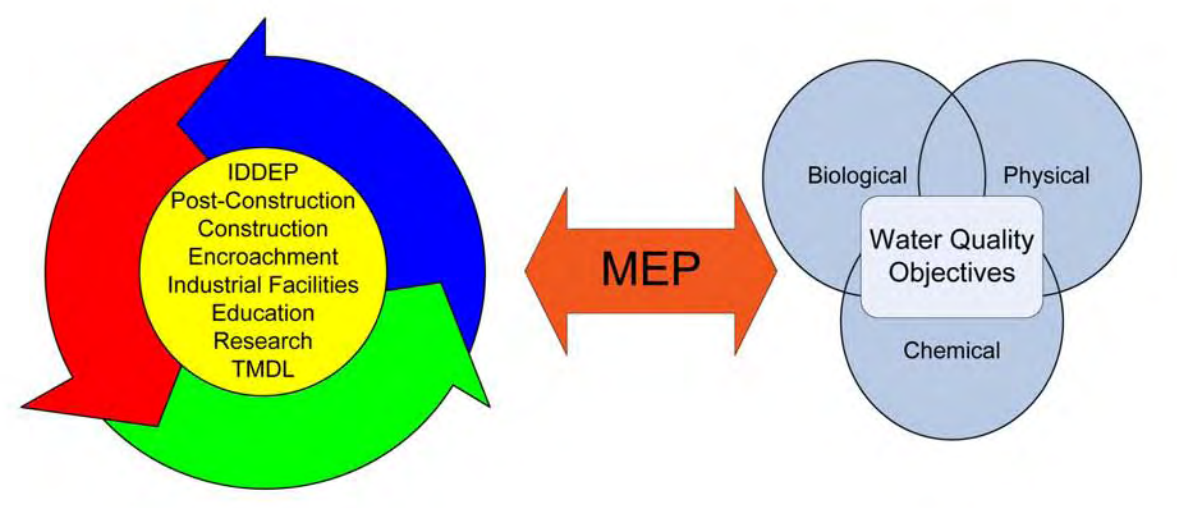
A typical Preformed Scour Hole

For more information about DOT's Inspection and Maintenance Program, Contact

Ken Pace, PE
HSP Manager
919.733.2920
or
Johnie Marion
I&M Manager
919.861.3770

Post-Construction Stormwater Program

DOT's NPDES Permit Part II.B.5



Maximum Extent Practicable (MEP) Provides Effective Water Quality Protection with Available Management Practices and is documented through the Stormwater Management Plans

Stormwater Management Plans Continuous Process Improvement

During transportation project development many environmental concerns are addressed with water quality being one of them. By permit, NCDOT is required to install stormwater control measures (SCMs) to the maximum extent practicable (MEP). MEP is the system and method used to implement and manage effective controls to meet water quality objectives. The Hydraulics Engineer documents MEP through the Stormwater Management Plan (SMP). The SMP identifies impacts to receiving waters, addresses the magnitude of those impacts and documents control measures to meet water quality objectives. With the changes in stormwater requirements statewide and additional needs to track stormwater controls for inspection and maintenance, engineers began implementing improvements to the SMP. Current improvements that have begun and will be continued into next year include: (1) More effective integration with ESM, (2) Summary of SCMs on a plan sheet along with design metrics, (3) Development of standardized and more flexible SMP format, and (4) Staff training.

DOT and DWQ Continue Development of PCSP:

During Year 5, DOT updated the PCSP approach and resubmitted it to DWQ for review and approval, which was gained in December 2009. The update addressed requirements for structural stormwater control measures to maximum extent practicable (MEP) for development. Session Law 2006-246 and Session Law 2008-211, which were enacted since NCDOT's last permit provide the control and treat targets to be applied to linear transportation projects.

Program Objectives

Objectives established by DOT's Permit Part II.B.5

- In cooperation with DENR, develop and implement a post-construction runoff program to regulate stormwater runoff by requiring structural and non-structural best management practices to protect water quality, reduce pollutant loading, and minimize post-construction impacts to water quality.
- Submit the Post-Construction Program for review by DWQ.

Lake Norman/I-77 SB Rest Area Stormwater Wetland -Pilot Study for Off-site Stormwater Mitigation to Achieve MEP

Lake Norman Rest Area Stormwater Wetland under Construction

A stormwater wetland retrofit has been designed and construction initiated at the rest area off of I-77 near Lake Norman. The constructed wetland was designed to control approximately 5 acres of DOT impervious surface and a total drainage area of 23 acres. This project provides an excellent example of a retrofit in a non-linear (non-roadway) environment where not only a large parking lot will be treated, but linear (roadway) surfaces will be treated due to the large land area available for SCM construction. It also highlights the opportunity for off-site stormwater mitigation, which is the practice of utilizing a stormwater control at an alternative site to compensate for the lack of on-site treatment because on site treatment is not practicable or where more stromwater could not be mitigated for the resources allocated. The proximity of the stormwater wetland to Lake Norman represents a logical application of the mitigation concept due to the quantity of bridges on and near the lake in the vicinity of the mitigation site. For example, the stormwater wetland could treat the equivalent impervious surface associated with 16 bridges in the Lake Norman area at a 1:1 impervious surface ratio.

Location of the Lake Norman Rest Area Stormwater Wetland Off-site Mitigation and Associated Bridges

For more information about DOT's Post-Construction Stormwater Program, Contact

Matt Lauffer, PE
HSP Manager
919.250.4100

Vegetation Management Program

DOT's NPDES Permit Part II.B.6

DOT Continues Coordination with NCDA and training:

*As ongoing portions of the Vegetation Management Program, DOT confers annually with the North Carolina Department of Agriculture (NCDA) to verify that approved vegetation management materials are being used in approved rates (**Management Measures a and b.**) Additionally, DOT staff responsible for the application of pesticides, fertilizers, and other vegetation management materials are trained and certified for their positions. Other staff involved in vegetation management are trained on pollution prevention practices associated with vegetation management.*

Program Objectives

Objectives established by DOT's Permit Part II.B.6

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

For more information about DOT's Vegetation Management Program, Contact

Ken Pace, PE
HSP Manager
919.733.2920
or
Derek Smith
Vegetation Management Manager
919.733.2920

Freeways to Fuel Evaluated to Reduce Chemical Use

DOT sponsored research through NCSU to evaluate the potential for utilizing right-of-way (ROW) areas for the production of bioenergy crops. Sunflower and canola plots have been planted in Duplin, Rutherford, Surry, Columbus, and Wake Counties in 2009 and 2010 using conventional tillage practices such as, rotary tilling (4-6 inches deep), deep chisel plow techniques (8-10 inches deep), and no-till techniques. The various tillage practices were evaluated for impact on crop production, soil compaction and aeration, and costs, among other criteria.

Canola test plots on DOT Right-of-Way

While the research is still ongoing, preliminary results indicate that approximately 105 gallons of biodiesel could be produced from a 10 foot wide to a one mile long strip when using optimum equipment. Additionally, the crops require less mowing than conventional grass covers, resulting in a savings of approximately $300 per mile per year for areas that can be placed into crop production.

Freeways to Fuel biodeisel production requires a soil slope of less than 10%, a minimum 12 foot ROW and at least 15 inches of annual rainfall. Initial GIS evaluations indicate that the studied counties may have approximately 10,000 miles of eligible ROW.

Encroachment Program

DOT's NPDES Permit Part II.C

Program Objectives

Objectives established by DOT's Permit Part II.C

- Assist DENR to ensure all discharges to DOT's roadway drainage are properly permitted under applicable laws and rules.
- Coordinate with DENR the reporting of non-permitted or under-permitted private dischargers that adversely impact or have the potential to adversely impact DOT's discharges, including discharges that result from direct or indirect stormwater discharged entering its system from new development or redevelopment.

Encroachments on the ROW from the installation of third party utilities can affect NCDOT's drainage system

DOT Continues Its Encroachment Program

Independent entities regularly connect to DOT's roadway and drainage systems during the construction of new driveways or other facilities along DOT's right of way. Additionally, other entities may disturb DOT's ROW during installation of water lines, power lines, and other utilities. These connections and disturbances have the potential to discharge pollutants into DOT's drainage system or to disrupt DOT's stormwater control measures, such as soil disturbances which may be abandoned without repair as shown in the photo above.

Therefore, DOT has continued its established Encroachment Program. In order to connect or work within the right of way, an entity must apply to DOT. Part of this application is a certification that the planned activity is appropriately permitted for stormwater discharges by DWQ, and are in compliance with those permits. This process meets the **Management Measures a and b** required in DOT's stormwater permit and assists the DWQ in identifying potential new dischargers.

For more information about DOT's Encroachment Program, Contact

Ken Pace, PE
HSP Manager
919.733.2920
or
Matt Lauffer, PE
HSP Manager
919.250.4100

NCDOT Highway Stormwater PROGRAM

Construction Program

DOT's NPDES Permit Part II.D

Program Objectives

Objectives established by DOT's Permit Part II.D.1—*Sediment and Erosion Control*

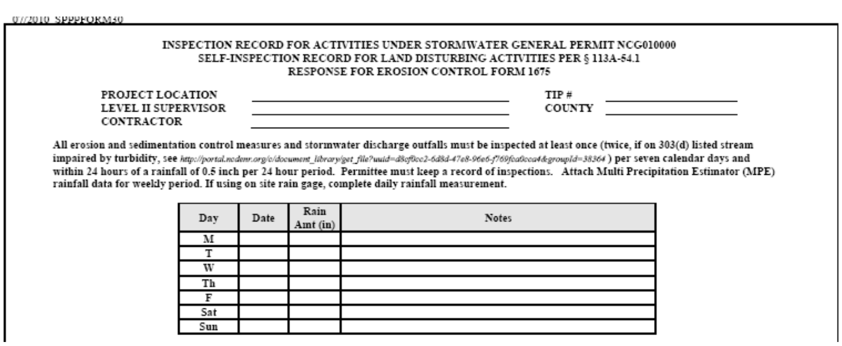
- Continue to control development activities disturbing one or more acres of land surface including activities by DOT contractors.
- Require construction site operators to implement appropriate erosion and sediment control practices.
- Require site inspection and enforcement of control measures.
- Establish 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.

Objectives established by DOT's Permit Part II.D.2—*Borrow Pit and Waste Pile Activities*

- 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 DOT projects in keeping with the sediment and erosion control program established by the NC Sediment Control Commission.

New Inspection Form for Contractors Implemented

All construction sites greater than one acre are required to be inspected weekly. Those on a stream impaired for turbidity must be inspected twice a week. NCDOT has implemented a new inspection form to be used by contractors and NCDOT staff responsible for on-site erosion and sediment control inspections and corrective actions. The form documents the frequent observations of outfalls and treatment systems. Requirements to inspect for turbidity or sediments in discharges and the receiving stream are also recorded. Pictured below is a portion of the new inspection form for construction activities.



07/2010 SPPPFORM30

INSPECTION RECORD FOR ACTIVITIES UNDER STORMWATER GENERAL PERMIT NCG010000
SELF-INSPECTION RECORD FOR LAND DISTURBING ACTIVITIES PER § 113A-54.1
RESPONSE FOR EROSION CONTROL FORM 1675

PROJECT LOCATION ______ TIP # ______
LEVEL II SUPERVISOR ______ COUNTY ______
CONTRACTOR ______

All erosion and sedimentation control measures and stormwater discharge outfalls must be inspected at least once (twice, if on 303(d) listed stream impaired by turbidity, see http://portal.ncdenr.org/c/document_library/get_file?uuid=d8cf0cc2-6d8d-47e8-96e6-f769fca0cca4&groupId=38364) per seven calendar days and within 24 hours of a rainfall of 0.5 inch per 24 hour period. Permittee must keep a record of inspections. Attach Multi Precipitation Estimator (MPE) rainfall data for weekly period. If using on site rain gage, complete daily rainfall measurement.

Day	Date	Rain Amt (in)	Notes
M			
T			
W			
Th			
F			
Sat			
Sun			

DOT Continues Erosion and Sediment Control Program Delegation

Delegation for DOT's Erosion and Sediment Control Program has been continued by DENR's Division of Land Resources and the Sedimentation Control Commission, covering projects that disturb one or more acres of land surface. DOT's delegation has been continuous since 1983.

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

NCDOT Highway Stormwater PROGRAM

Biopolymer socks being inserted into applicator

New Research in Biopolymers

DOT is performing research on a new approach to reducing turbidity when dewatering borrow pits and construction sites. Biopolymer, a new product using polylacrylamides (PAMs) and chitosan (a material made from crustaceans), is able to reduce turbidity from approximately 1300 NTU to 16 NTU when applied in sequence. Water from borrow pits is pumped through a special PVC piping which allows contact with the "socks" containing the two ingredients. Water then flows into a siltbag to collect the solids before the water is discharged. If final testing continues to be successful, DOT anticipates using this new technology to meet the anticipated lower turbidity standards expected under the new Effluent Limitation Guidelines for Construction Activities.

Water discharged through the biopolymer system has turbidity as low as 16 NTU.

ErCon Database Improved with New Inspection Form

DOT monitors and inspects construction sites and locations where soil, stone, or other construction materials are stored, and borrow pits from where these materials may be mined. In order to track these locations, DOT's Roadside Environmental Unit (REU) continues to use its ErCon database, developed in 2005. Inspections of these locations are performed on an approximately monthly basis. To improve the data collection and documentation, DOT's erosion and sediment control inspectors are using a new form during Year 5. The ErCon Database includes construction activities for all state-forces construction and reclamation sites, ranging from roadway construction to "vertical construction" such as office buildings and maintenance facilities. In Year 5, DOT documented 6,400 site inspections and reviews of over 400 erosion and sediment control plans in the ErCon Database.

DOT Recognized as IECA Organization of the Year

Annually, the International Erosion Control Association (IECA) recognizes one organization for its efforts to improve the level of erosion and sediment control in its projects. NCDOT's efforts to train staff and contractors in a three-tiered education program based at NSCU and the incorporation of the Revised Universal Soil Loss Equation (RUSLE) desktop application into its design for linear projects earned NCDOT the IECA "Organization of the Year" award. DOT was regocnized at IECA's international conference in Dallas, Texas.

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Industrial Activities Program

DOT's NPDES Permit Part II.E

Educational poster promoting environmental awareness and pollution prevention at DOT industrial facilities

DOT Maintains SPPP/SPCC Implementation

DOT continues to maintain and implement site-specific Stormwater Pollution Prevention Plans (SPPPs) at all industrial facilities, including county maintenance yards, ferry terminals, and remote salt storage locations. The SPPPs include regular inspections to evaluate the effectiveness of facility BMPs and requirements to train DOT personnel in stormwater pollution prevention and spill response practices. During Year 5, SPPP updates were performed for several DOT industrial facilities which had been modified and Plans were discontinued at two locations where operations have ceased this year (the Mecklenburg County Salt Storage Yard and the Washington County Asphalt Plant). The SPPP program includes semi-annual inspections of the facilities and ongoing application of BMPs to reduce potential impacts on stormwater from on-site activities such as salt storage, soil and stone stockpiles, and vehicle maintenance.

As part of DOT's ongoing Industrial Activities Program, Spill Prevention Control and Countermeasure (SPCC) Plan requirements at 40 CFR 112 continue to be incorporated into the SPPP process.

In year 5, DOT also initiated a project to update the Department's Industrial Activities SPPP Website to incorporate general improvements in the SPPP and SPCC program. These included the addition of electronic SPPP-SPCC site plans to the website and improving the ability to track training activities conducted at DOT industrial facilities. Electronic site plans allow the individual facilities to make modifications to their SPPPs more easily. The SPPP Website training tracking tool will allow DOT personnel to post training rosters onto the website, track trained personnel, and generate summary training reports.

Program Objectives

Objectives established by DOT's Permit in Part II.E

- Maintain and implement a Stormwater Pollution Prevention Plan (SPPP) for each facility with an industrial activity that is covered by this permit.
- Develop and implement a Plan prior to operation of any new facilities.

Pollution Prevention Training Continues

During this permit term, DOT focused efforts on developing new tools for Division-level personnel to train employees involved in industrial activities.

In year 5, DOT completed an update to the *Stormwater Pollution Prevention Training Video* used by DOT Divisions to conduct annual training for DOT personnel. The training video revision essentially updated the original video developed in 2000 by incorporating new information and modifying the narration. The revision also included the creation of a separate video module titled *Spill Prevention and Response*. Copies of the Stormwater Pollution Prevention and Spill Prevention and Response video modules were provided to Divisions in both VHS and DVD formats and are shown to applicable personnel upon hiring, and annually to individuals or in group training sessions as part of the SPPP/SPCC training requirements. The two modules are designed such that they can be viewed either consecutively or in separate training sessions.

DOT continued to develop its Industrial and Roadway Maintenance Activities (IRMA) Best Management Practice Guidance Manual which will provide additional training materials for DOT personnel involved in a wide variety of activities. Chapters developed in year 5 focused on industrial facilities and include topics such as Spill Prevention and Response, Good Housekeeping, Vehicle and Equipment Fueling, and Vehicle and Equipment Cleaning.

For example, the Fueling Chapter describes how fuels should be stored and handled to reduce the risks of stormwater pollution. BMPs are recommended for personnel that use or supply fuel to a DOT industrial facility or remote fuel station. The chapter also includes guidance information related to the proper design of Fuel Stations, the use of proper fueling techniques, and procedures for bulk fuel delivery.

The IRMA BMP Guidance Manual will be an ongoing project with new chapters added periodically to address other stormwater topics, such as maintenance for roadside shoulders, bridge drainage systems, etc. The initial chapters for industrial facilities are scheduled to be distributed to DOT personnel later in 2010.

Typical DOT Fuel Station with covered canopy and fuel dispensing island. Covered canopies at DOT fuel stations provide protection of the refueling area from stormwater runoff. Fuel Station design recommendations are included in the IRMA Guidance Manual

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Internal Education Program

DOT's NPDES Permit Part II.F.1

Ongoing Training Activities

Throughout its Highway Stormwater Program, DOT continues to implement staff training to meet the requirements in **Management Measure a, b, and c**, namely to provide pollution prevention awareness training to construction workers, maintenance workers, and other DOT staff, along with selected contractors and volunteers. The following are examples of this ongoing training:

- Erosion and Sediment Control/Stormwater Certification for DOT Projects is implemented through NCSU. DOT has developed a three-tiered training course for their staff. Additionally, contractors responsible for the design, implementation or inspection of erosion and sediment control practices are to be trained.
- General stormwater pollution prevention awareness, identification of pollutant potential, reporting illicit connections and illegal dumping (ICID) are topics covered in conjunction with training associated with the Stormwater Pollution Prevention Plans. Additionally, Adopt-A-Highway volunteers are informed of ICID reporting protocols when performing trash pickup.
- Training on SPPP , reporting and documentation is also provided to appropriate DOT staff.

Additional training on calibrating salt spreaders, vegetation management, shoulder and ditch maintenance and other topics are available to DOT staff. A video for calibrating salt spreaders can be seen here: http://www.ncdot.gov/programs/srmu/videos/default.html.

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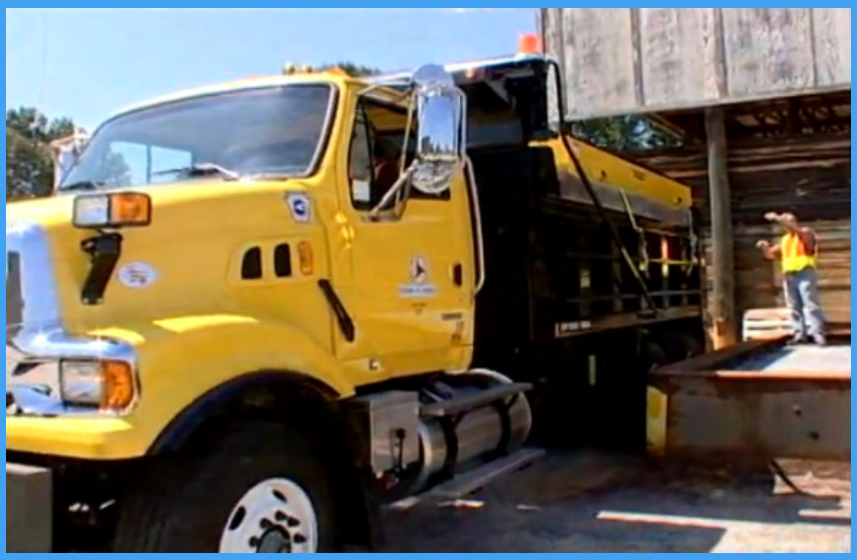

A still photo from the salt spreader calibration training video

Program Objectives

Objectives established by DOT's Permit Part II.F.1:

- Develop and implement a program to train DOT staff and contractors about the importance of stormwater quality.
- The training should include topics such as spill control, chemical application, illicit connections and illegal dumping, etc.

External Education Program

DOT's NPDES Permit Part II.F.2

Program Objectives

Objectives established by DOT's Permit Part II.F.2

- Develop and implement a program to educate the public about the importance of stormwater quality, including chemical application, illicit connections and illegal dumping, etc.
- Develop diverse educational materials to engage and educate the public from different social, economic and age groups.

Ongoing External Education Efforts:

During year 5, DOT continued the Department's ongoing efforts for public education including:

- *Distribution of handouts such as the brochure below and teachers' flash cards at the State Fair, rest areas, and other events.* ***Management Measure b.***
- *Distribution of general pollution prevention awareness materials through its website at http://www.ncdot.org/programs/environment/stormwater/, including the location of available recreational vehicle and marine dump stations. Contact information and other pollution prevention information are also posted.* ***Management Measure c.***

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Collaborative Public Education

For several years, DOT has collaborated with DWQ to produce and distribute the pamphlet, "Pollution…. What's your connection?" This year, the pamphlet has been updated to provide more information, including how to report illicit discharges and illegal dumping. Approximately 15,000 copies of the new brochure, entitled "Stormwater Pollution: What's our connection?" have been produced this year for distribution. See the cover at left. **Management Measure b and d.**

Research Program

DOT's NPDES Permit Part II.G

Program Objectives

Objectives established by DOT's Permit Part II.G

- Conduct research with faculty and staff at state universities or other designated institutions that results in independent quantitative assessment of pollutant loads from DOT permitted activities and/or measure structural BMP effectiveness.
- Conduct research to enhance or improve existing practices or develop new methods or processes with state of the art technology to meet future permit requirements.

Evaluation of Nutrient Loading and Roadside Vegetation

The draft final report for Research Project 2007-04, entitled *Evaluation of Nutrient Loading Rates and Effectiveness of Roadside Vegetative Connectivity for Managing Runoff from Secondary Roadways*, was submitted to DOT in January 2010. The project, conducted by Drs. Jy Wu and Craig Allen of the University of North Carolina at Charlotte (UNCC), investigated the solids and nutrient loading characteristics of secondary roadways in two Piedmont watersheds. Results of the project show that, in general, pollutant loading rates from secondary roadways may be considerably lower than those measured in primary roadways as part of a previous study conducted by the same UNCC team (Research Project 1999-06). However, land disturbances in the vegetated right-of-way due to encroachments (such as the installation of utilities) can increase total suspended solids and associated-parameters above those measured in primary roadways. The results of this study may have an impact on the pollutant loading rates assigned to DOT in watersheds primarily comprised of secondary roadways. The UNCC team is currently addressing DOT comments; a final report is expected in early fall 2010.

Secondary roadway monitoring site in the Jordan Lake Watershed

DOT Continues to Sponsor Research:

In an effort to develop science-based solutions to real world problems, DOT continues to partner with researchers from Universities and the US Geological Survey to assess the DOT's impact on the environment and to identify effective controls to reduce the impacts. Research sponsored by DOT under ***Management Measure b*** *addresses all phases of DOT's activities from planning and location selection, through construction, post-construction stormwater controls. Examples of sponsored research are included herein.*

Ongoing Research: Assessment of Bridge Deck Runoff

As reported last year, DOT initiated the Bridge Stormwater Project (BSP), partnering with the US Geological Survey (USGS) and DWQ to comply with Session Law 2008-107 which resulted in the collection of over 100,000 data points. Data collected included chemical analysis of bridge deck runoff and sediments, and in-stream water and sediment samples, time-variable chronic toxicity test, and biological habitat assessments.

Data collected in the monitoring program were evaluated using a weight-of-evidence approach, similar to approaches used by DWQ to determine the ability of streams to support their aquatic life use. By considering results from each monitoring regime concurrently, the BSP team concluded that while several parameters from bridge deck run-off were elevated, the analyses associated with aquatic toxicity, biological assessments, and sediment data did not indicate long-term adverse impacts from untreated bridge deck discharges. Results from the evaluation will be provided to the Joint Legislative Transportation Oversight Committee in the fall of 2010.

In-stream biosurvey sample collection performed in conjunction with DOT's Bridge Stormwater Project.

Innovative Costal SCMs

As land development puts additional pressure on our coastal towns and cities, DOT is collaborating with communities to implement additional innovative methods to mitigate increased stormwater runoff. Runoff from developments may need to be routed into sensitive water bodies, the same ones that attract visitors and new residents. To protect beaches and sounds from degradation and to protect people from pollutants that cause beach closures, the Town of Kure Beach, the DOT, and NCSU researchers have been partnering since 2005 on the design and development of a Dune Infiltration System that diverts stormwater from ocean outfalls to infiltration systems installed beneath the beach. The system has reduced stormwater inflows to the ocean at two of the demonstration sites by more than 95% since 2006. Associated fecal bacteria is the primary pollutant reduced by the project. Bacteria is filtered from the stormwater through the sand, reducing the amounts discharged into the ocean areas. Based on these numbers, a third demonstration site was constructed in 2009 near a more heavily populated area and is currently being studied.

The Sand Filtration system has been popular because of its beach location, innovative nature, and its success. DOT has used the demonstration sites to educate professional, citizen, and student groups through site tours and volunteer efforts.

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TMDL Program

Total Maximum Daily Load Program

DOT's NPDES Permit Part III.C

DOT Continues to Participate in TMDL Development

Over the past year, DOT's participation in TMDL-related activities has continued to grow through our involvement in TMDL stakeholder meetings, technical conferences, and through internal reports and white papers aimed at improving our understanding of pollutants in the highway environment. The following projects highlight a few of DOT's ongoing activities in year 5 of its permit.

Lockwood Folly TMDL for Fecal Coliform (2008—2010):

Over the past two years, DOT has joined with DWQ, Brunswick County, and the North Carolina Coastal Federation to address the presence of high levels of bacteria in the Lockwood Folly River through a TMDL for fecal coliform and a watershed management plan. The Lockwood Folly River is located in south central Brunswick County, south of Wilmington, NC within the Lumber River Basin. Several segments of the river were listed on the 2008 303(d) list as impaired due to fecal coliform and as a result these areas are either Prohibited, Conditionally Approved Open, or Conditionally Approved-Closed for shellfish harvesting. The tributaries of Mill Creek, Mullet Creek, Lockwood Creek and portions of Montgomery Slough and the Intracoastal Waterway are also Prohibited for shellfish harvesting. This project was funded through Section 319 funds and a matching grant provided by the DOT.

As a member of the Lockwood Folly Technical Advisory Committee, DOT staff provided data and information specific to DOT's right-of-way that were used to develop watershed and receiving waterbody models (HEC-HMS and Tidal Prism Model). These models were used by DWQ to set the bacteria reduction requirements in the watershed. DOT also participated through a review of the draft fecal coliform TMDL which was completed in August 2010.

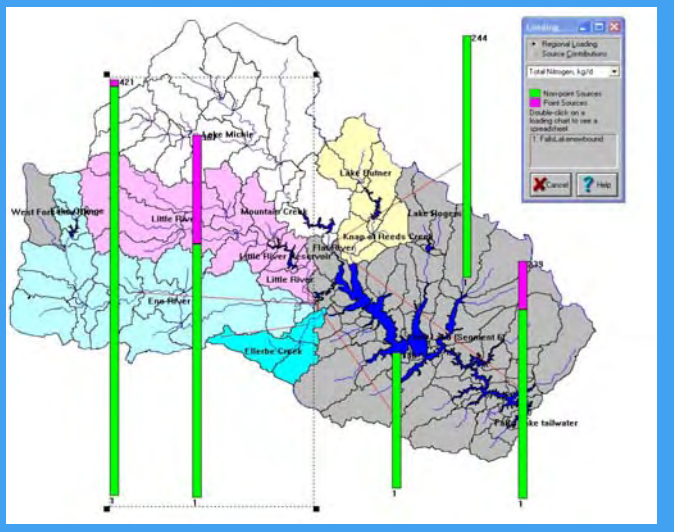
Lockwood Folly Watershed in the Lumber River Basin, NC

Year 5 Program Highlights

- *Participated as a Technical Advisory Committee member for Nutrient Rule Development in Falls Lake and TMDL development in High Rock Lake.*
- *Developed an Assessment and Monitoring Plan to address fecal coliform load from roadways in the Southeast White Oak River Watershed.*
- *Completed a white paper that summarizes sources of nitrogen within the DOT Right-of-Way and defines the relative fraction of nitrogen originating at each source.*
- *Reviewed and provided comment on impervious cover-based TMDLs for impaired aquatic life in Swift Creek, Williams Creek, and Perry Creek.*
- *Collaborated with NCDWQ modelers in developing TMDLs through developing nutrient loading, atmospheric deposition, land use, and climate model input parameters.*
- *Maintained a database of research applicable to the TMDL Program.*

Falls Lake Modeling and Legislative Rule Development

In February 2005, DWQ initiated a special study to evaluate water quality and the need for reductions in nutrient loads delivered to Falls Lake, near Raleigh, NC. Over the course of the 5-year study, DOT participated as a member of the Technical Advisory Committee (TAC) responsible for guiding data collection and modeling decisions and as a participant in the stakeholder process that was involved in guiding the nutrient rulemaking process. As a TAC member, DOT worked closely with DWQ modelers and other TAC members to identify, collect, and incorporate the best available data into the watershed and lake models, including data on DOT field activities (e.g. fertilizer application within the watershed) and information from the DOT research program on nutrients in the highway environment, such that the models defined nutrient loads as accurately as possible. During the model development phase, DOT also funded an independent, third-party review of the lake model with the purpose of providing DWQ and the TAC with a list of recommendations for improving the calibration and accuracy of the models. As a result of this review, several important changes were made to the lake model prior to its use in supporting regulatory decisions and legislative rules. To date, the watershed and lake models developed by DWQ in Falls Lake, with DOT's assistance, represent the most comprehensive review and assessment of DOT's nutrient load contribution in a North Carolina watershed.



Falls Lake Watershed Model showing point and nonpoint sources of total nitrogen

Assessment and Monitoring Plan for Bacteria in DOT's ROW

In 2009, DOT was identified as a significant contributor to impairment in the Southeast White Oak River Basin fecal coliform TMDL. Part III, Section C of the DOT's NPDES permit requires the Department to implement a program in the drainage areas of those TMDLs which name DOT as a significant contributor of the pollutant of concern, and assigns DOT a wasteload allocation explicit from other point sources. In response to this TMDL, DOT developed an Assessment and Monitoring Plan (Plan) that builds on the conclusions and recommendations of the 2009 TMDL and watershed restoration plan. The Plan identifies field surveys, geotechnical and other appropriate engineering evaluations to be conducted at three locations in the watershed. In addition to the inventory, the Plan calls for identification of illicit discharges, a fecal coliform source assessment, an inventory of existing structural BMPs, and investigation into the feasibility of additional stormwater controls.

Southeast White Oak River showing NCDOT field investigation locations.

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