NCDOT ESC Erosion & Sediment CONTROL MANUAL

1 Chapter Introduction

Managing Erosion and Sediment Control (E&SC) on North Carolina Department of Transportation (NCDOT) Projects

Due to the magnitude of land-disturbing activity conducted by the NCDOT, the North Carolina Department of Environment and Natural Resources (NCDENR) has delegated authority to implement the Sedimentation Pollution Control Act of 1973 (SPCA) to the Division of Highways (DOH). NCDOT has been delegated authority over all aspects of its E&SC Program and is committed to reducing the stormwater impacts of transportation-related development on both linear (roadway, toll, rail and bridge projects) and nonlinear (vertical projects such as DOH office buildings and equipment shops) construction projects. The potential for widespread impacts due to improperly managed construction activities has led NCDOT to adopt the highest level of E&SC guidelines and standards.

In order to control soil erosion and sediment, the Roadside Environmental Unit (REU) Soil and Water Engineering Section that designs and reviews E&SC plans prepared for NCDOT contract projects, strictly follows the North Carolina SPCA. The purpose of the SPCA is to prevent and minimize visible off-site sediment from any land-disturbing activity.

This manual provides NCDOT designers and contractors guidance on how to evaluate, plan and conduct the State's transportation-related construction needs while controlling soil erosion and sediment.

How to Use This Manual

This manual has been compiled for NCDOT designers, consultants and contractors to present E&SC information for NCDOT construction activities beginning with regulatory drivers and planning requirements, then providing plan development guidelines for bridge and roadway design-bid-build and

design-build projects, as well as low impact bridge projects. Guidelines for NCDOT Operations projects are then provided, as well as nonlinear project guidance, E&SC for Reclamation Plans, construction site pollutants and finally ending with design and construction guidelines for E&SC Best Management Practices (BMPs). The BMP chapter is organized by the following categories (note that some BMPs are listed in more than one category as they perform multiple functions):

Site Preparations

- Provides guidance on installation of gravel construction entrance(s) and highly visible fencing (safety fence and jurisdictional flagging).

Perimeter Areas and Runoff Conveyance

- These BMPs are used to divert clean water away from the project site or trap and treat turbid water runoff from the project site. BMPs covered in this section include Temporary Silt Fence; Temporary Diversion; Temporary Silt Ditch; Silt Fence Breaks and Temporary Earth Berm.

Slope Protection

- Sloped areas within a project area are especially prone to erosion and require special considerations for proper protection. This section discusses the use of Temporary Slope Drains; Special Sediment Control Fence (SSCF); Rolled Erosion Control Products (RECP) and Wattle Barriers.

Runoff Conveyance Management

- BMPs in this section are used in channels, ditches and/or ditch outlets to trap sediment. The devices in this section include: Wattle; Temporary Rock Silt Check, Type A (TRSC-A) with Excelsior Matting and Flocculant; Temporary Rock Silt Check, Type B (TRSC-B); and Clean Water Diversion.

Drainage System Protection

- These devices are used at drop and pipe inlets to impound and settle sediment from the stormwater or in ditches to reduce stormwater velocity and trap sediment. Rock Inlet Sediment Traps (RIST), Types A, B and C; Rock Pipe Inlet Sediment Trap (PIST), Types A and B; and

Temporary Rock Silt Check (TRSC-A), Type A with Excelsior Matting and Flocculant, are the BMPs in this section.

Sediment Containment

- Some of the devices in this section are used to detain sediment-laden stormwater so that solids can settle and water may then be discharged and others are used at outlets or stream crossings to trap sediment before the water leaves a project site. BMPs for sediment containment include: Riser Basin; Silt Basin Type B; Skimmer Basin; Tiered Skimmer Basin; Infiltration Basin with Baffles; Temporary Rock Sediment Dam, Types A and B; Coir Fiber Baffle; Earthen Dam with Skimmer; and Stormwater Basin with Skimmer.

Managing the Watercourse

- BMPs in this section provide guidance for temporarily diverting watercourses while minimizing impacts to streams or adjacent wetlands. Measures used to manage the watercourse include Temporary Stream Crossing; Impervious Dikes; Stilling Basin; and Special Stilling Basin.

Soil Stabilization

- This section provides guidance on stabilizing disturbed areas of a project site. Topics covered are: Seeding and Mulching; Temporary Seeding; and Temporary Mulching.

An Overview of the Keys to E&SC Planning and Design

The goal of the E&SC designer should be to develop a plan to contain all sediment within the construction site or right-of-way for all phases of construction and minimize impacts to water quality. Implementing the ten keys in Table 1.1 is the first step in reaching this goal. More information on these keys, along with associated E&SC BMPs can be found in Chapter 4, E&SC BMPs.

Erosion control
▪ Minimize disturbed area and protect natural features and soil ▪ Phase construction activities ▪ Control stormwater run-on ▪ Stabilize soils ▪ Protect slopes
Sediment control
▪ Protect inlets ▪ Establish perimeter controls ▪ Retain sediment on site ▪ Establish stabilized construction exits ▪ Maintenance of controls

Table 1.1 Keys to E&SC planning and design

Unique Elements of Managing E&SC on Linear Projects

There are many unique challenges that arise with roadway and bridge construction projects as erosion and sedimentation is possible at each stage.

Generally, the greatest potential for erosion occurs during clearing, grubbing, grading and culvert/structure installation (AASHTO, accessed 9-2013)

The ten key E&SC concepts mentioned in Table 1.1 may serve as an initial step in creating an E&SC plan, but there are additional considerations that must be addressed:

- A roadway system may include several drainage areas and convey significant off-site runoff. This often results in intensive inspection requirements for multiple drainage outlets or stormwater discharge outfalls (SDOs).

- Roads within several watersheds may be subject to different stormwater regulations. Careful planning and knowledge of regulations (see Chapter 2 for regulatory guidance) is critical.
- The linear nature of the highway network prevents the use of some land-intensive sediment control devices. Designers are tasked with implementation of BMPs that are suitable given limited right-of-way and geographic constraints; however, applicable easements may be obtained.
- Roadway drainage systems are designed to collect and convey runoff from impervious areas to maintain the structural integrity of the roadway and protect public safety. Designers need to select appropriate erosion and sediment control measures that are effective and applicable to the roadway design, but safe to the public as well.

Regulatory Considerations

Overview

The E&SC designer should be aware of the regulatory considerations that govern construction stormwater management. There are federal and North Carolina regulations that must be followed and NCDOT has been delegated authority to administer the SPCA requirements.

On the federal side, the Clean Water Act (CWA) defined a national goal of eliminating the discharge of pollutants into navigable waters of the United States by the year 1985. This law influenced many states to pass stormwater management and sediment control legislation. The implementation of this law was strengthened by the formation of the U. S. Environmental Protection Agency (EPA) in 1972. The focus in the 1970's began to shift from a non-point source, rural, soil loss problem, to a point source, urban, pollutant discharge problem. Additionally, the focus of the CWA turned from agricultural practices to the rapid growth in land-disturbing activities associated with homebuilding, highway construction and shopping center development. Revisions to the CWA in the 1990's have resulted in the creation of the National Pollutant Discharge Elimination System (NPDES) permit program. In response to this federal initiative, the North Carolina General Assembly passed the NC SPCA of 1973. The SPCA is the main driver for the required E&SC Plans; however, the NPDES program also regulates stormwater associated with construction activities.

North Carolina SPCA of 1973

The SPCA of 1973 authorizes the State and its delegated local authorities to enforce the North Carolina Sedimentation Control Law. The Sedimentation Control Commission and the Division of Energy, Mineral, and Land Resources, a division of NCDENR, exercises this delegation authority. The delegation process enables the state to grant authority to municipalities and other localized government agencies to establish programs to regulate erosion and sediment control activities within their own jurisdiction. The NCDOT is the only state-wide program originally delegated in 1974. A re-delegation in 1991 granted authority to NCDOT to operate and manage its current E&SC program.

NCDOT has the authority of administering the only state-wide delegated E&SC program and must uphold and maintain high design and field performance standards.

The law does allow the designer to use discretion as to a unique and innovative design specific to the individual site conditions based upon four principal factors:

- Soils
- Surface Cover
- Topography
- Climate

The designer will manage these four factors to meet the SPCA's mandate that prohibits off-site sedimentation from construction activities.

CWA

The objective of the Federal Water Pollution Control Act, commonly referred to as the CWA, is to restore and maintain the chemical, physical, and biological integrity of the nation's waters. The goal is that this will be accomplished by:

- preventing point and non-point pollution sources,

- providing assistance to publicly owned treatment works for the improvement of wastewater treatment, and
- maintaining the integrity of wetlands.

In 1987, the CWA was amended to require EPA to establish a program to address stormwater discharges. In response, EPA promulgated the NPDES stormwater permit application regulations (EPA, 2013). North Carolina has been delegated authority from the EPA to implement these regulatory requirements. Figure 1.1 shows the history of the federal water pollution control regulations along with the North Carolina-specific water pollution control rules and regulations.

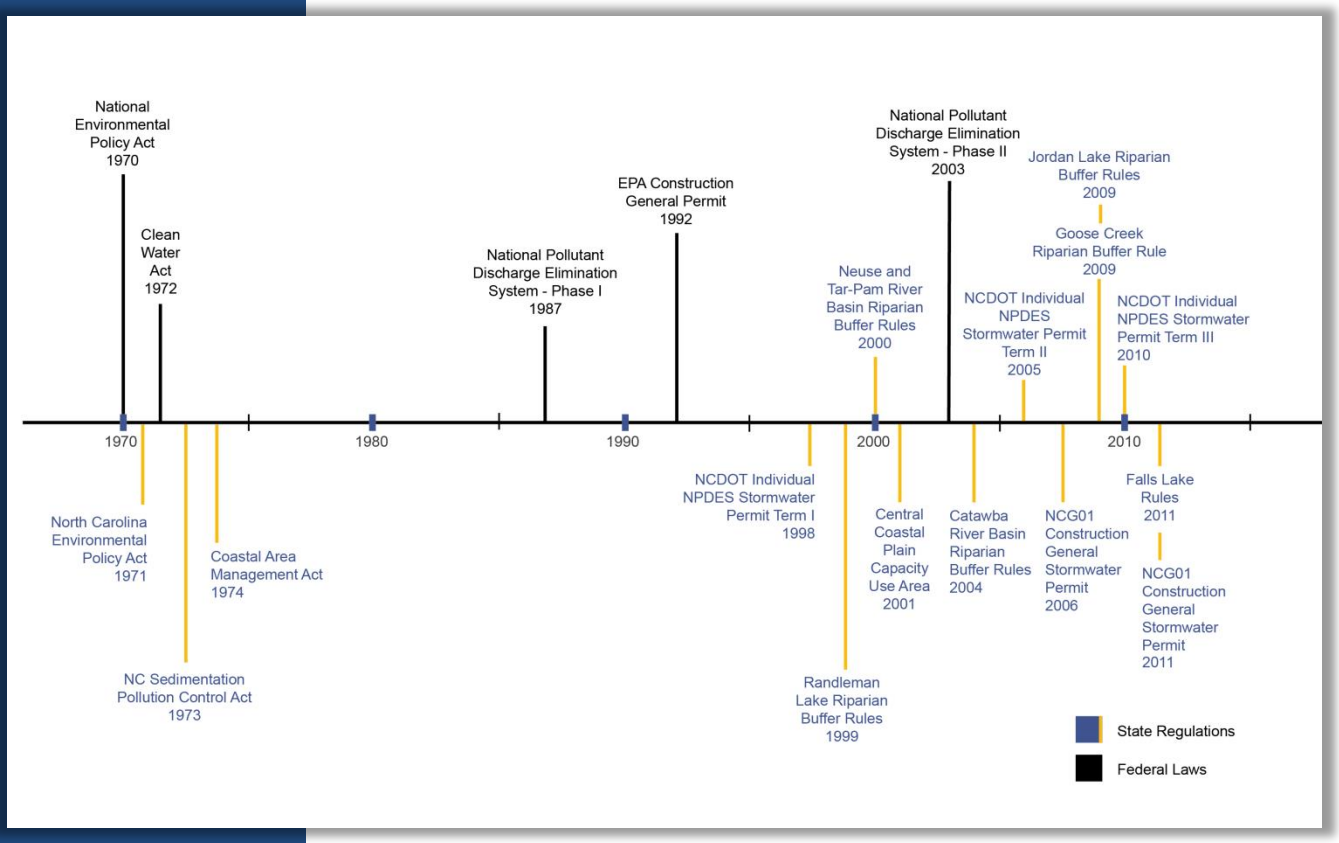

Figure 1.1 Federal and NC water quality regulatory overview

CWA Section 401 and Section 404

Although there are numerous federal and state laws that affect wetlands, the CWA is the primary regulatory tool. Refer to Table 1.2 for a summary of wetland, stream or open water permits and permitting authorities. There are two sections of the CWA that are of particular significance:

- Section 404 of the Clean Water Act enables the Army Corps of Engineers (Corps) to grant permits for certain activities within waterways and wetlands. Construction projects affecting wetlands in any state cannot proceed until a Section 404 permit has been issued. In deciding whether to grant or deny a permit, the Corps must follow certain guidelines.
- Section 401 of the Clean Water Act gives EPA the authority to prohibit an activity, including a construction project, if it can impact water quality or have other unacceptable environmental consequences. For most states including North Carolina, EPA has delegated this authority to state environmental agencies.

These two regulatory activities are usually conducted cooperatively through use of a joint application form. The Corps reviews permit applications to determine if practical alternatives to the project exist. They also impose mitigation requirements on the developer and perform a public interest review. In addition to Corps stream mitigation requirements, NCDENR Division of Water Resources (DWR) has Section 401 stream mitigation requirements that should be referenced. The Corps also determines if other environmental laws must be addressed, including the National Environmental Policy Act, Endangered Species Act, and the National Historic Preservation Act. If the Corps' review reveals that the project should not proceed, they have the authority to either deny or condition the project. Then, using their Section 401 authority, state agencies review the permit application, looking closely at potential water quality impacts. When warranted, the states grant Section 401 certification, which is needed before a Section 404 permit can be issued by the Corps (CICA, http://www.cicacenter.org/wetpermits.html, 8-6-13).

NCDENR's Transportation Permitting Unit works with the NCDOT to assist with the planning, permitting and design of projects. The Unit's responsibilities include the review of NCDOT's Section 401 certification applications, wetland and stream mitigation plans, buffer determinations, as well as conducting relevant NCDOT site visits. Unit staff represents the DWR on the 404/NEPA Merger Team (NCDENR, accessed 8-16-13, http://portal.ncdenr.org/web/wq/ws/tpu).

The following summarizes who issues stream, wetlands or open water permits in North Carolina.
Federal permits are issued by the Corps. ▪ Section 10 permits (Rivers & Harbors Act) are required for all work or structures in or affecting navigable waters. ▪ Section 404 permits (CWA) are required for discharging into or filling streams, wetlands or open waters.
Coastal Area Management Act (CAMA) permits are issued by the N.C. Division of Coastal Management (DCM). ▪ CAMA permits are required for development projects within one of the twenty coastal counties in or affecting an Area of Environmental Concern.
State certifications and permits are issued by the NC DWR. ▪ 401 Water Quality Certifications (CWA) correspond with the permits issued by the Corps and DCM. They are required for any federally permitted or licensed activity that may result in a discharge to or filling of streams, wetlands or open waters. ▪ Isolated and Other Non-404 Jurisdictional Wetlands and Waters Permits are required for impacts to isolated and other non-404 wetlands, isolated streams or other isolated waters.
There are more than 16 types of wetlands in North Carolina that are regulated under three categories: ▪ 404 wetlands are regulated under Section 404 of the federal CWA. ▪ Isolated/non-404 wetlands are regulated under North Carolina Administrative Codes. ▪ Coastal (CAMA) wetlands are regulated under CAMA. (NCDENR 401 Fact Sheet, accessed 8-6-13)

Table 1.2 NC water permits

NPDES Program

The NPDES program was established under the authority of the CWA, Section 402, and includes two phases. Phase I of the NPDES stormwater program was established in 1990. It focused on site and operations planning to reduce pollutant sources. Phase I covered industrial activities in 10 categories, construction activities that disturbed five or more acres and municipalities with populations of 100,000 or more that owned or operated a municipal separate storm sewer system (MS4). Phase II of the program expanded permit requirements to construction disturbing an acre or more and smaller communities (< 100,000 population) and public entities that own or operate an MS4 (NCDENR, 2013, http://portal.ncdenr.org/web/wq/ws/su/npdessw). There are six Phase I communities in North Carolina. Phase II of the NPDES program expanded upon Phase I to incorporate smaller communities of less than 100,000.

Outlined in the NPDES program are six minimum control measures (MCM) that must be met under Phase I and Phase II of the NPDES program. The E&SC regulatory drivers are generated from the Construction Site Stormwater Runoff Control measure. The six measures are shown in Figure 1.2:

Figure 1.2 NPDES minimum control measures

Anyone who discharges or proposes to discharge water into the surface waters of the state must obtain an NPDES permit prior to the initiation of the discharge. There are two types of NPDES permits: general and individual permits.

NPDES General Permit

General permits are issued for a given state-wide activity. Regarding construction activities, all development projects in North Carolina that disturb an acre or greater of land require a local or state-approved E&SC plan. The project will be automatically covered by an NPDES Stormwater General Permit NCG010000 (NCG01) for construction-related activities, provided that the ground stabilization and basin design requirements in that permit are included in the E&SC Plan (NCDENR, 2013).

In North Carolina, the approved E&SC plan for the site, and the NCG01 Construction General Permit are considered the Stormwater Pollution Prevention Plan (SWPPP) for that site.

NCDOT's Individual NPDES Permit

Individual permits are issued on a case-by-case basis when the activities proposed do not qualify under the permitted uses of the general permit.

NCDOT has an individual NPDES permit. The NCDOT individual permit (NCS000250) authorizes NCDOT to discharge stormwater from roadway drainage systems, construction activities, borrow pits and industrial sites. Included as part of this permit are the six minimum control measures shown in Figure 1.2.

Part II, Section D - Construction, provides the objectives for NCDOT's E&SC Program as described in Table 1.3:

NCDOT Individual NPDES Permit – Part II, Section D - Construction	
	1. Continue to control development activities disturbing one or more acres of land surface including activities by NCDOT contractors.
	2. Require construction site operators to implement appropriate E&SC practices.
	3. Require site inspection and enforcement of control measures.
	4. 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.

Table 1.3 ES&C construction objectives

NCG010000

NCG01 is an NPDES general permit. The NCG01 is applicable to point source discharges from construction activities disturbing one or more acres of land. Figure 1.3 shows key components of the NCG01 permit. NCDOT's individual permit states that the requirements of NCG01 shall be incorporated within NCS000250.

Approved E&SC Plan	Monitoring & Inspections	Operation & Maintenance
• Plans will comply with 7 and 14 day ground stabilization requirements.	• Conduct weekly E&SC measure inspections and within 24 hours after any storm event greater than one half inch during a 24-hour period. • Inspect all outlets where stormwater discharges offsite and maintain records of inspections.	• Install, implement and maintain BMPs and control and restoration measures that minimize pollutants in the discharge.

Figure 1.3 Key components of the NCG01 permit

In addition to the above requirements, the NCG01 NPDES permit also outlines stabilization timeframes. Table 1.4 outlines these timeframes.

Table 1.4. Stabilization Timeframes

Site Area Description	Stabilization	Timeframe Exceptions
Perimeter dikes, swales, ditches and slopes	7 days	None
High Quality Water (HQW) Zones	7 days	None
Slopes steeper than 3:1	7 days	If slopes are 10 feet or less in length and are not steeper than 2:1, 14 days are allowed.
Slopes 3:1 or flatter	14 days	7 days for slopes greater than 50 feet in length
All other areas with slopes flatter than 4:1	14 days	None except for perimeter and HQW Zones

Table 1.4 NCG01 NPDES permit stabilization timeframes

Threatened and Endangered (T&E) Species Regulations

The Endangered Species Act requires that federally-listed species and habitat not be adversely affected during any activity with federal involvement or subject to federal oversight (i.e., projects that require a NPDES stormwater permit for construction). If project activities could impact these species or habitats, the development of mitigation strategies to minimize the impacts may be required (EPA, accessed 8-16-2013, EPA305-F-03-007).

Private landowners, corporations, state or local governments or other non-federal landowners who wish to conduct activities on their land that might incidentally harm (or "take") a species listed as endangered or threatened must first obtain an incidental take permit from the U.S. Fish and Wildlife Service.

When compiling the E&SC Plan base map (see Chapter 2, E&SC Planning), impacts on T&E species (plant and animal) should be considered. For Transportation Improvement Projects (TIP), the Project Development and Environmental Analysis (PDEA) branch will review and include T&E information in the environmental documents (Chapter 2). Currently, there are 52 federally T&E species known to occur in North Carolina. Fact sheets for each of the known species are listed on the US Fish and Wildlife Service website located at http://www.fws.gov/raleigh/es_tes.html.