NCDOT Post-Construction Stormwater Program
Post-Construction Stormwater Controls for Roadway and Non-Roadway Projects

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List of Acronyms

BMP	Best Management Practice
BUA	Built-Upon Area
CAMA	Coastal Area Management Act
CE	Categorical Exclusion
CWA	Clean Water Act
DCM	Design, Construction, and Maintenance
EA	Environmental Assessment
EIS	Environmental Impact Statement
EMC	Environmental Management Commission
FHWA	Federal Highway Administration
GREEN	Guided Reduction of Environmental Excess Nutrients
HQW	High Quality Waters
HSP	Highway Stormwater Program
IRVM	Integrated Roadside Vegetation Management
I&M	Inspection and Maintenance
LID	Low Impact Development
NCAC	North Carolina Administrative Code
NCDENR	North Carolina Department of Environment and Resources
NCDLR	North Carolina Division of Land Resources
NCDOT	North Carolina Department of Transportation
NCDOT-JLSLAT	NCDOT-Jordan Lake Stormwater Load Accounting Tool
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
MEP	Maximum Extent Practicable
ORW	Outstanding Resource Waters
PCN	Pre-construction Notification
PCSP	Post-Construction Stormwater Program
PDEA	Project Development and Environmental Analysis
POC	Pollutant of Concern
REU	Roadside Environmental Unit

List of Acronyms, cont.

ROW	Right-of-Way
SEPA	State Environmental Policy Act
SMP	Stormwater Management Plan
SPPP	Stormwater Pollution Prevention Plan
TIP	Transportation Improvement Project
TMDL	Total Maximum Daily Load
TS4	Transportation Separate Storm Sewer System
USACE	United States Army Corps of Engineers
USEPA	United State Environmental Protection Agency

Selected Definitions

Built-Upon Area (BUA): impervious surface and partially impervious surface to the extent that the partially impervious surface does not allow water to infiltrate through the surface and into the subsoil. Built-upon area does not include a wooden slatted deck, the water area of a swimming pool, or gravel (refer to G.S. 143-214.7). Built-upon area includes paved and unpaved state maintained travelways.

New BUA: a net increase in built-upon area within a project boundary. The project boundary includes all areas associated with a project where surface coverage is permanently modified.

Coastal Counties: include Beaufort, Bertie, Brunswick, Camden, Carteret, Chowan, Craven, Currituck, Dare, Gates, Hertford, Hyde, New Hanover, Onslow, Pamlico, Pasquotank, Pender, Perquimans, Tyrrell, and Washington (refer to 15A NCAC 02H .1002(4)).

Non-Roadway Project: for the purposes of this guidance, a non-roadway project is any new NCDOT facility or any modification to an existing facility that results in a net increase in BUA and that does not otherwise qualify as new road development. New non-roadway development projects are generally not located within the linear NCDOT ROW. These projects can include new construction or upgrades to existing maintenance yards, rest areas, welcome centers, office buildings, training facilities, parking lots, or other non-roadway facilities. Any ingress or egress drives or streets within the NCDOT owned project boundaries are also considered part of the non-roadway project and should not be separated out as a roadway project.

Roadway Project: for the purposes of this guidance, a roadway project is any new roadway construction, new weigh stations, roadway widening, or other roadway-related activity occurring within the NCDOT right-of-way (ROW) or easement which results in a net increase in built upon area. Examples of new roadway development include new location roadway projects, addition of new acceleration and deceleration lanes, new bridges and culverts, new median crossovers, and new sidewalks within the NCDOT ROW.

Travel Lane: for the purposes of this guidance, a travel lane is a lane of 10 feet minimum width, designed for automobile/truck traffic and to increase the capacity of the transportation facility. Travel lanes do not include turn lanes as turn lanes are intended to increase the safety and level of service of the transportation facility as opposed to increasing capacity. Travels lanes also do not include acceleration or deceleration lanes.

Vegetated Buffer: means an area of natural or established vegetation directly adjacent to surface waters. The width of the buffer is measured horizontally from the normal pool elevation of the impounded structures, from the bank of each side of streams or rivers, and from the mean high water line of tidal waters, perpendicular to the shoreline. Riparian buffer rules may apply to vegetated buffer areas and the appropriate authorizations must be acquired where applicable. In areas not located in riparian buffer areas, the vegetated buffer may be cleared or graded, but must be planted with and maintained in grass or any other vegetative or plant material.

Executive Summary

The North Carolina Department of Transportation (NCDOT) implements a Post Construction Stormwater Program (PCSP) in accordance with Part II Section B.5 of the Department's National Pollutant Discharge Elimination System (NPDES) permit. The primary objective of the PCSP is to regulate stormwater from new NCDOT development and re-development for new built upon area (BUA) by requiring structural and non-structural practices to protect water quality, reduce pollutant loading, and minimize post-construction impacts to water quality. As part of the PCSP, NCDOT implements post-construction best management practices (BMP) for discharges, controls runoff from new development and redevelopment, and implements the approved NCDOT Best Management Practices Toolbox as well as defining Toolbox implementation and training.

This document presents an update to the PCSP that is intended to provide more detailed guidance on the processes and procedures NCDOT uses to facilitate permit compliance and reinforce the protection of water quality standards. There are many stakeholders or participating groups engaged in NCDOT activities and decision making that impact post-construction stormwater management; these participating groups include NCDOT project managers and staff, consultants, and regulatory agencies. In addition, NCDOT implements many different types of projects which can originate from the Transportation Improvement Program (TIP), the division level, or from one of many other business units. Therefore, post construction stormwater management required to protect water quality and maintain permit compliance is established on a project-by-project basis through a collaborative process involving the applicable participating groups. This document provides guidance to participating groups on the general decision-making process, applicable regulatory programs, minimum measures, and documentation required to achieve compliance with the PCSP for projects that involve new BUA.

Section 1.0 of this guidance document introduces the guiding principle of the PCSP, the participating groups, the applicable regulatory programs, and the general approach for project compliance with the PCSP. Sections 2.0 and 3.0 provide guidance on workflows and the general process to facilitate compliance with the PCSP for roadway and non-roadway projects, respectively. The workflows describe the processes for implementing BMPs to the maximum extent practicable (MEP) to protect water quality and include minimum measures, which are practices considered for implementation on all projects, in addition to structural controls as required. Section 4.0 provides requirements for project-specific documentation, which preserves stormwater management decisions and verifies compliance with the program. In addition to the PCSP, other NPDES programs benefit water quality. These programs, which help to sustain the outcome of the PCSP, are discussed in Section 5.0.

1.0 NCDOT's Post-Construction Stormwater Program

The North Carolina Department of Transportation (NCDOT) is required by its National Pollutant Discharge Elimination System (NPDES) permit (NCS000250) to implement a Post-Construction Stormwater Program (PCSP). This program establishes the management strategies for stormwater runoff from NCDOT (also referred to as Department) development and redevelopment for new built-upon area (BUA). This document is an update to NCDOT's PCSP that provides improved documentation of the Department's PCSP compliance practices.

The updated PCSP also provides guidance to participating groups involved in NCDOT roadway and non-roadway projects and facilitates communication between engineers, designers, regulatory agents, and other stakeholders (participating groups). This document provides overarching guidance for evaluating the stormwater management needs of a project site, encourages measures for reducing pollutant loading, promotes drainage design for conveying runoff in a diffuse and non-erosive manner, and provides best management practice (BMP) implementation guidance for projects that require treatment of stormwater pollutants.

The primary objective of the PCSP is to regulate stormwater from a new BUA by requiring structural and non-structural BMPs to protect water quality, reduce pollutant loading, and minimize post-construction impacts to water quality. Table 1.1 lists management measures included in the NPDES permit that must be implemented by NCDOT to meet the objectives of the PCSP.

Table 1.1. NPDES Permit Management Measures

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

1.1 PCSP Guiding Principle

NCDOT's Mission and its Environmental Stewardship Policy identify the underlying principles of the PCSP. NCDOT's Environmental Stewardship Policy outlines the Department's commitment to planning, designing, constructing, maintaining, and managing an interconnected transportation system while striving to preserve and enhance natural and cultural resources. The policy outlines the following responsibilities that are a part of NCDOT's day-to-day operations:

NCDOT's Mission

Connecting people and places safely and efficiently, with accountability and environmental sensitivity to enhance the economy, health, and well-being of North Carolina.

- Safeguarding the public's health by conducting our business in an environmentally responsible manner.
- Demonstrating our care for and commitment to the environment.
- Recognizing that our customers expect NCDOT to provide mobility and a quality of life that includes the protection of the natural resources and the cultural, social, and economic values of their community.

The Highway Stormwater Program (HSP) was developed in 1998 to protect and improve water quality while fulfilling NCDOT's mission of providing and supporting a safe and integrated transportation system that enhances the state. The HSP operates with the following guiding principles:

- Comply with NPDES stormwater permit requirements by managing and reducing stormwater pollutants from roadways and industrial areas.
- Design sustainable programs that can be effectively managed, implemented, and integrated into NCDOT.
- Develop solutions that improve program delivery, are proactive, form partnerships, have technical merit, and are fiscally responsible.

In line with NCDOT's Mission and the Environmental Stewardship Policy, NCDOT employs a collaborative, interdisciplinary, and holistic approach to post-construction stormwater. Existing processes among stakeholders are leveraged to produce post-construction stormwater outcomes that are protective of the state's water resources while balancing needs of the public, state, and federal agencies, and the environment. The collaborative process involves stakeholders in the decision making process; therefore, the overall project outcome achieves consensus of the best comprehensive solution.

The stakeholders involved in PCSP decision making are the PCSP participating groups. PCSP participating groups include the entities within and outside of NCDOT responsible for project planning, design, construction, and maintenance. PCSP participating groups are listed in Table 1.2.

Table 1.2. PCSP Participating Groups

PCSP Participating Groups	Description (See Footnote for PCSP Function)
NCDOT Hydraulics Unit	Responsible for broad range of activities related to hydraulic and surface drainage for roadway construction and activities.[1,2,5,6]
NCDOT Project Development and Environmental Analysis	Leads compliance efforts for the National Environmental Policy Act and State Environmental Policy Act. Drives Merger Process and assists in permit acquisition.[5,6]
Engineering Consultants and Contractors	Companies contracted through NCDOT for design and/or construction services.[2,3,5]
NCDOT Roadway Design Unit	Responsible for the preparation of roadway design plans and engineering cost estimates for all centrally let highway construction projects.[1,2]
NCDOT Structures Management Unit	Develop structural general drawings and structural plans for road and bridge projects.[1,2]
NCDOT Division of Highways (Divisions)	14 transportation divisions responsible for roadway planning, design, construction and maintenance activities.[1,2,3,5]
NCDOT Roadside Environmental Unit	Responsible for wide range of activities for the highway system to enhance the environment, including activities related to BMP operation and maintenance.[4,5]
NCDOT Construction Unit	Provides oversight and administration to highway construction projects under private contract.[3]
NCDOT Facilities Management Division	Responsible for facilities design, construction, and maintenance.[1,2,3,4,5]
NCDOT Ferry Division	Responsible for ferry operations, including planning, design, construction and maintenance of ferry facilities.[1,2,3,4,5]
NCDOT Rail Division	Responsible for rail operations, including planning, design, construction and maintenance of rail facilities.[1,2,3,4,5]
NCDOT Division of Bicycle and Pedestrian Transportation	Responsible for bicycle and pedestrian project development, including planning and design activities.[1,2,3,4,5]

Table 1.2. PCSP participating groups, cont.

PCSP Participating Groups	Description (See Footnote for PCSP Function)
Federal Highway Administration	Provides stewardship over the construction, maintenance, and preservation of the Nation's highways, bridges, and tunnels.[6]
U.S. Army Corps of Engineers	Builds and maintains infrastructure as well as regulates activities covered by the Clean Water Act (CWA).[6,7]
U.S. Environmental Protection Agency	Provides regulatory framework for state and local governments and performs enforcement activities related to regulatory compliance.[6,7]
NC Department of Environment and Natural Resources	Regulates stormwater programs; issues and enforces permits.[6,7]
U.S. Fish and Wildlife Service	Participates in conservation of species through the Endangered Species Act.[6]
National Marine Fisheries Service	Responsible for the management, conservation, and protection of living marine resources within the United States.[6]
N.C. Wildlife Resources Commission	Conserves and sustains the state's fish and wildlife resources through research, scientific management, wise use, and public input.[6]
N.C. Department of Cultural Resources	Leader in using the state's cultural resources to build the social, cultural, and economic future of North Carolina.[6]
U.S. Coast Guard	Military force with broad legal authorities, geographic diversity, and expansive partnerships that promotes maritime safety, security, and environmental stewardship.[6,7]
U.S. Forest Service	Manages public lands in national forests and grasslands.[6]
Tennessee Valley Authority	Provides electrical service, owns and operates hydroelectric dams, reservoirs and associated infrastructure in North Carolina.[6,7]
National Park Service	Manages the 401 parks of the National Park System.[6]

Table 1.2. PCSP participating groups, cont.

PCSP Participating Groups	Description (See Footnote for PCSP Function)
Metropolitan Planning Organizations	Policy-making organizations made up of representatives from local government and governmental transportation authorities. Ensures existing and future expenditures of governmental funds for transportation projects and programs are based on a continuing, cooperative, and comprehensive planning process.[6]
Rural Planning Organizations	Associations of local governments involved in local and regional transportation planning. Advises the NCDOT on rural transportation policy.[6]
Eastern Band of Cherokee Indians	Govern lands within the Qualla Boundary in western North Carolina.[6]

[1]Avoidance and minimization; [2]BMP design; [3]BMP construction; [4]BMP maintenance; [5]Permit applications; [6]Merger process; [7]Regulator

The specific participating groups that are involved in a given project depend on a number of factors, such as project type (roadway or non-roadway), scope, potential impacts, and permitting requirements. Each project is managed on a case-by-case basis, where NCDOT facilitates the process of soliciting appropriate participating group involvement. The participating groups work in concert to arrive at project-specific outcomes that support PCSP guiding principles and comply with required state and federal regulations.

Some projects, such as larger Transportation Improvement Program (TIP) projects, go through the Merger Process, which is designed to efficiently implement the project development and permitting processes. The process was agreed to by the U. S. Army Corps of Engineers (USACE), Department of Environment and Natural Resources (NCDENR), the Federal Highway Administration (FHWA), and NCDOT and is supported by other stakeholder agencies and local units of government. The Merger Process facilitates discussion among participating groups to reach consensus on ways to promote meeting the regulatory requirements of Sections 404 and 401 of the CWA during the National Environmental Policy Act (NEPA)/State Environmental Policy Act (SEPA) decision-making phase for projects. The process helps to document how diverse participating group mandates and regulations are balanced during the shared decision-making process, which results in agency representatives reaching a consensus-based decision.

1.2 State and Federal Regulations that may apply to NCDOT Projects

There are several state and federal regulations that may involve post-construction stormwater requirements for NCDOT roadway and non-roadway projects. These regulations are designed to protect water quality and protect intended uses of surface waters. A list of programs that may impact NCDOT projects is provided in Table 1.3.

Table 1.3. Programs that may impact Post-Construction Stormwater Management on NCDOT Projects

Program/Requirement	Reference
Falls Lake Water Supply Nutrient Strategy	15A NCAC 02B .0281
Jordan Lake Water Supply Nutrient Strategy	15A NCAC 02B .0271
Coastal Counties[1]	15A NCAC 02H .1005
Outstanding Resource Waters (ORW)[1]	15A NCAC 02H .1007
High Quality Waters (HQW)[1]	15A NCAC 02H .1006
Neuse River Basin: Protection and Maintenance of Existing Riparian Buffers	15A NCAC 02B .0233
Tar-Pamlico River Basin: Protection and Maintenance of Existing Riparian Buffers	15A NCAC 02B .0259
Catawba River Basin: Protection and Maintenance of Existing Riparian Buffers	15A NCAC 02B .0243
Randleman Lake Water Supply Watershed: Protection and Maintenance of Riparian Areas	15A NCAC 02B .0250
Goose Creek Watershed: Buffer Types and Managing Activities within Riparian Buffers	15A NCAC 02B .0607
Water Supply Watersheds	15A NCAC 02B .0104(m)
401 Water Quality Certification	15A NCAC 02H .0500
Isolated Waters and Isolated Wetlands	15A NCAC 02H .1300
Coastal Area Management Act	G.S. Chapter 113A Article 7
Endangered Species Act (Endangered and Threatened Wildlife and Wildlife Species of Special Concern)	Endangered Species Act of 1973 (15A NCAC 02B .0110)

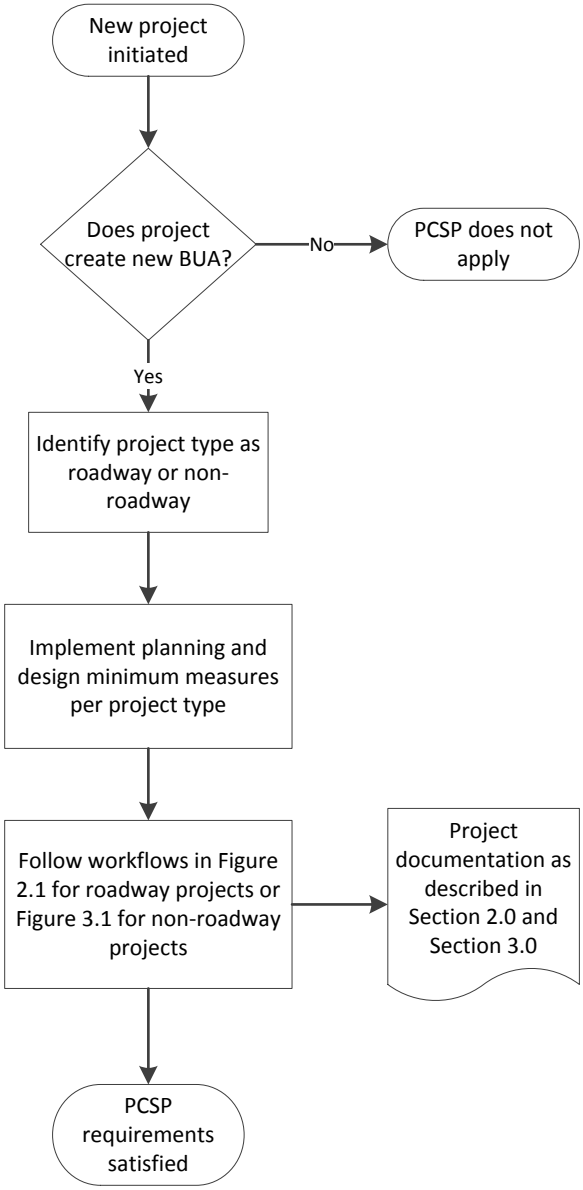
[1]As of August 1, 2013, NCDENR consolidated state stormwater permitting under 15A NCAC 02H .1000 for NCDOT projects under the requirements of the PCSP.

1.3 Layout of the PCSP

There are two primary categories of project types in the PCSP: roadway and non-roadway. Non-roadway projects are implemented similarly to parcel-type development, in that they are generally subject to prescriptive stormwater management criteria. Roadway projects require an approach to allow for customized solutions to meet the environmental protection needs of a project because of the constrained, linear nature of these projects. Roadway projects are covered in Section 2.0 while non-roadway projects are covered in Section 3.0.

Both roadway and non-roadway projects follow the same basic workflow for compliance with the PCSP. See Figure 1.1 for a depiction of the basic PCSP workflow. If a project is subject to state stormwater programs and requires review by regulatory agencies, the appropriate participating groups coordinate with the reviewing agencies to implement BMPs that are protective of surface waters. If a project is not subject to state stormwater programs (and thus does not require regulatory agency review), the appropriate participating group implements BMPs according to the workflows provided in Figure 2.1 and Figure 3.1 for roadway and non-roadway projects, respectively. In either case, if structural BMPs are required for the project, a project-specific Stormwater Management Plan (SMP) is completed.

Figure 1.1. Basic PCSP Workflow



Regardless of project type or workflow, minimum stormwater management measures are implemented on all 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. Many of the minimum measures embody the low impact development (LID) and green infrastructure concepts of conservation and use of on-site natural features to retain or treat runoff close to the source. When only minimum measures are implemented on a project, a project-specific SMP is not required in most cases. However, a project-specific SMP may be completed if deemed necessary by an applicable participating group in order to document stormwater management decisions. The implementation of minimum measures on a project, as described in Sections 2.0 and 3.0 of this guidance document, will serve as the programmatic SMP for projects that do not require project-specific documentation.

BMPs are selected to reduce impacts of parameters-of-concern (POCs) as identified by surface water classification, regulation, or other relevant guidance with the goal of protecting surface water quality. BMPs are implemented to the maximum extent practicable (MEP) to provide flexibility to optimize reductions in stormwater pollutants within the unique project context for each project. While the federal CWA requires that NPDES permittees provide controls to reduce the discharge of pollutants to the MEP, it does not provide a precise definition of MEP. This allows each permittee the flexibility to identify management practices for non-structural controls, as well as design and engineering practices associated with structural controls, to address their particular activities in order to reduce stormwater pollutants on a location-by-location basis. However, the US Environmental Protection Agency (USEPA) established some characteristics of MEP (Federal Register, Volume 64, page 68754, December 8, 1999) when it revised the NPDES program for stormwater discharges, in that the MEP

- Is satisfied by compliance with an NPDES permit;
- Should include consideration of conditions of receiving waters, beneficial uses of receiving water, hydrology, geology, climate, specific local concerns, and other aspects, such as those included in a comprehensive stormwater management plan (if existing);
- Should consider the current ability to finance the program or project, and the capacity to perform operation and maintenance;
- Should consider all measures, including non-structural measures, as a whole to assess their ability to address the pollutants;
- May be different for different regulated areas;
- Is a reiterative process and should continually adapt to current conditions and BMP effectiveness.

Therefore, MEP is not just stormwater control requirements but the system and methods used to implement and manage effective controls to meet water quality objectives. Application of MEP is a location-by-location exercise. However, examples of considerations applicable to NCDOT include the following:

- Right-of-way conflicts such as acquisition of property for the sole purpose of stormwater controls

- Taking advantage of established mature trees and buffers that provide water quality and ecological benefits
- Topography limitations that include steep slopes and cut sections that compromise the function and long term operation of stormwater controls as well as increase cost of construction
- Geological limitations that include rock, high ground water table, poor soil, and karst geology
- Environmental justice
- Utility conflicts
- Excessive costs to construct or maintain a control
- Applicability and effectiveness of non-structural controls

The above factors should be considered in the decision-making process when implementing BMPs. Non-structural controls implemented through the HSP are discussed in more detail in Section 5.

Project-specific SMPs are prepared for all bridge replacement projects, as well as all projects requiring structural BMPs. SMPs are important for preserving stormwater management decisions in addition to documenting the implementation of structural BMPs to the MEP. The SMP is discussed in more detail in Section 4.0. Appropriate documentation and retention is an important component of the PCSP which is also discussed in more detail in Section 4.0 of this document.

Approved structural BMPs are provided in the NCDOT *Stormwater Best Management Practices Toolbox* (BMP Toolbox). The BMP Toolbox presents guidance, criteria, and considerations for the design and application of structural BMPs. The BMP Toolbox is updated as needed to include additional BMPs and design criteria. Training is provided by the HSP, as part of the Internal Education Program, for NCDOT staff and contractors to promote compliance with BMP Toolbox implementation. See Section 5.0 of this document for discussion of BMP Toolbox training as part of the Internal Education Program.

In addition to the PCSP, the NPDES permit requires the implementation of several other programs that benefit water quality. These programs, which are discussed in Section 5.0, integrate with each other and the pre-construction and post-construction phases of the PCSP to provide guidance to NCDOT staff and contractors to understand the Department's approach to stormwater management and to help sustain the outcome of the PCSP. For example, the BMP Inspection and Maintenance Program promotes the proper continuing function of structural BMPs so that they continue to treat stormwater as intended. In addition, in the post-construction environment, the BMP Retrofit Program identifies sites with potential to contribute pollutant loading and implements BMPs to mitigate the pollution potential. The other permit programs described in this section highlight the comprehensive and holistic approach NCDOT takes to post-construction stormwater.

1.4 How to use this Document

This document is intended to provide guidance to the participating groups that are involved in the NCDOT PCSP for roadway and non-roadway projects. The processes for compliance with roadway and non-roadway projects are presented in Section 2.0 and Section 3.0, respectively. First, participating groups should identify whether their project is roadway or non-roadway, and then proceed to the

appropriate section. Each section presents the workflow process to achieve compliance, the applicable participating groups, appropriate BMP Toolbox implementation, and any documentation requirements. For more detailed documentation and documentation retention requirements the user is directed to Section 4.0. Section 5.0 provides information on NPDES programs that help to sustain the project-specific outcomes of the PCSP. Appendix A and appendix B contain guidelines for some projects, as directed by appropriate workflows, which are not subject to regulatory review, while appendix C provides resources to support compliance with the PCSP.

2.0 Stormwater Quality Management for Roadway Projects

The NPDES permit requires that the PCSP regulate stormwater from new BUA[1]. The majority of new BUAs introduced into the NCDOT Transportation Separate Storm Sewer System (TS4) are from roadway development. New roadway development is generally defined as any new roadway construction, new weigh stations, roadway widening, or other roadway-related activity occurring within the NCDOT right-of-way (ROW) or easement which results in a net increase in built upon area. Examples of new roadway development include new location roadway projects, addition of new acceleration and deceleration lanes, new bridges and culverts, new median crossovers, and new sidewalks within the NCDOT ROW. Development projects that consist of industrial facilities, maintenance yards, rest areas, parking lots, and other building facilities are considered non-roadway projects and are addressed in Section 3.0 of this document.

New Roadway Development Project Examples[2]

- New location roadways
- Roadway widening
- New acceleration/deceleration lanes
- Interchange modifications
- New bridges or culverts
- Bridge or culvert replacements
- Median crossovers
- Sidewalks within NCDOT ROW
- Bus shelters within NCDOT ROW
- Weigh Stations
- Borrow and waste sites associated with NCDOT road construction

To provide a PCSP that is protective of surface waters and allows for unique project specific solutions, the stormwater management approach is determined on a project-by-project basis. Each project will consider the implementation of BMPs that are protective of the receiving stream within the context of mobility and the needs of the human environment. Provided the responsible parties from the PCSP participating groups follow the process and document decisions as outlined in this section, the resultant approach is considered protective to the MEP and is in compliance with the PCSP.

2.1 PCSP Process for Roadway Projects

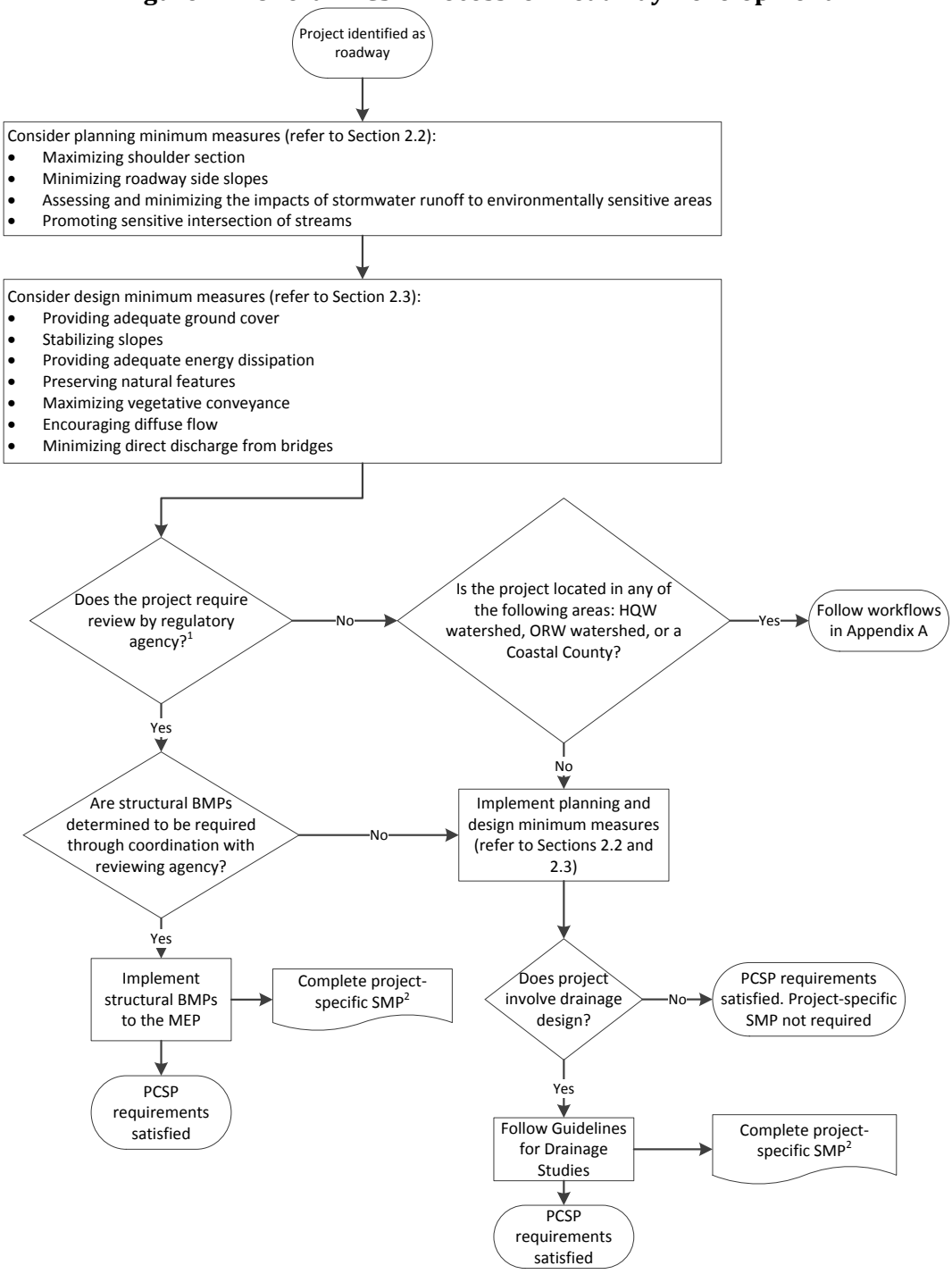
Regardless of whether a roadway project goes through the Merger Process or is managed by the NCDOT Central Office Units or through a division office, the PCSP process for that project remains the same. The PCSP roadway process is provided in Figure 2.1.

Planning Phase
PCSP Participating Groups

- PDEA or Division Environmental Officer
- NCDOT Project Design Team
- Regulatory Agencies

[1] The PCSP does not apply to projects that result in no *net* increase in built upon area. However, these projects may still have environmental requirements associated with other permits and approvals.
[2] This table provides examples of new roadway development projects and is not intended to be an exhaustive list.

Figure 2.1. Overall PCSP Process for Roadway Development



[1]Includes the following programs: 404/401 Water Quality Certification, Isolated Wetlands/ Waters, Merger Process, Riparian Buffer Authorizations, CAMA Permits, Endangered Species Act/Section 7 Consultation.
[2]A copy of the project-specific SMP shall be sent to the Hydraulics Unit.

2.2 Minimum Measures - Planning Phase

For all roadway projects, the PCSP project planning phase is defined as the period between establishing the purpose and need for the roadway project through avoidance and minimization of impacts to the selected preferred alternative. For projects that go through the NEPA/Section 404 Merger Process, the PCSP planning phase refers to the project period between *Concurrence Point 1 - Purpose and Need and Project Area Defined* and *Concurrence Point 4A - Avoidance and Minimization*. Information on the Merger Process is available on the Connect NCDOT website. During the Planning Phase of a roadway project, the applicable PCSP participating groups must consider any applicable and relevant planning minimum measures and maximize their implementation appropriately.

The PCSP participating groups should consider each minimum measure for potential and appropriate inclusion to the MEP on a project-by-project basis. The inclusion of minimum measures should be compared against other design requirements and safety concerns to the MEP. The PCSP participating groups should consider whether implementation would adversely affect safety of the travelling public, impact critical environmental features such as wetlands, or increase project cost beyond a practical measure. Consideration of these minimum measures, even if the result is none of the measures can be implemented, is adequate for compliance with the PCSP.

Planning Minimum Measures

Maximizing Shoulder Section

Definition:
Selecting a typical section with a shoulder that allows diffuse flow.

Merger concurrence points 1/2

Grass shoulder sections allow stormwater to directly run off of the roadway without the impediment of a curb and gutter. Allowing runoff to remain in a diffuse flow pattern encourages passive stormwater treatment as runoff travels over vegetated areas adjacent to the roadway. In addition, this avoidance and minimization practice can reduce erosive peak flow rates associated with concentrated flows.

Key Considerations

- Grass shoulder sections are most appropriate for post-construction stormwater treatment when the adjacent land to the roadway is grassed or otherwise vegetated. This practice may not be practical for areas with development adjacent to the roadway and may not be desired by municipalities.
- In some cases, such as roadway projects adjacent to wetlands and bridges, curb and gutter systems may be requested by environmental agencies or be required by NCDOT policy.
- Curb and gutter may be more appropriate in areas with highly erodible soils.

Minimizing Roadway Side Slopes

Definition:
Selecting the mildest side slope possible to maintain diffuse flow conditions.

Merger concurrence points 1/2

Gentle and flat roadside slopes are required to maintain sheet flow of runoff. In areas where sheet flow is encouraged, erosion prevention and stormwater treatment occur as runoff travels in a diffuse flow pattern over the roadway slope through reduction of runoff velocity, physical filtration, and infiltration.

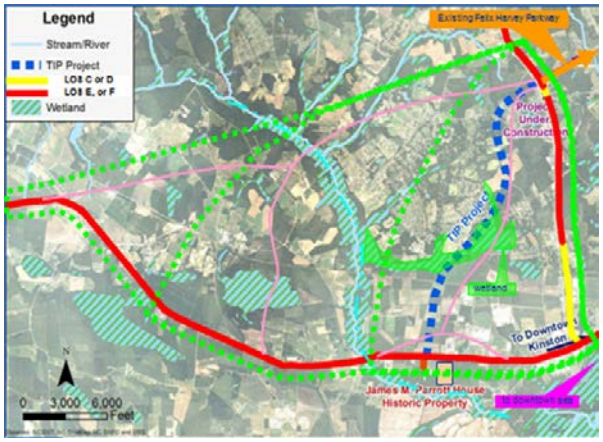
Key Considerations

- Flexibility in determining the roadside slope is limited in many cases. For example, in areas where the project traverses wetlands.
- Implementation of this minimum measure should not be allowed to significantly impact the project cost.

Assessing and Minimizing the Impacts of Stormwater Runoff to Environmentally Sensitive Areas

Definition:
Selecting alignments or design options that minimize impacts to sensitive streams.

Merger concurrence point 2/3



When evaluating various alternative corridors (new locations) or design options (widening and other improvements), consider the alternative or option that avoids high quality or otherwise environmentally-sensitive areas. These areas include habitat for protected, threatened, and endangered species, sensitive streams, and jurisdictional wetlands. If total avoidance of an environmentally-sensitive area is not feasible, the alternative or design options considered should be ones that minimize impacts.

Key Considerations

- Many factors are considered when selecting the preferred alternative for either the roadway corridor or improvement design option. The final selection must fulfill the purpose and need of the roadway project and balance potential impacts on the human and natural environment.
- Environmentally-sensitive streams include nutrient sensitive waters, outstanding resource waters, high quality waters, jurisdictional wetlands, waters with an existing impairment, and all waters in Coastal Area Management Act (CAMA) counties.

Promoting Sensitive Crossing of Streams

Definition:
Selecting alignments that minimize the impacts related to stream crossings.

Merger concurrence points 2/2A

When a new location or widening project must involve the crossing of a stream or other natural environmental resource, many opportunities exist to minimize impacts from stormwater runoff. An alignment that minimizes the impacts to the stream should be selected. Typically, an alignment that intersects the feature as perpendicularly as possible will promote minimization of stream impacts. From a stormwater perspective, minimizing the necessary length of the bridge facilitates containing runoff on the bridge deck to prevent the direct discharge of runoff into the stream.

Key Considerations

- Many factors are considered when selecting locations for crossing streams on proposed corridors. Other potential impacts to the human and natural environment may motivate selection of a crossing where not all impacts can be minimized. The hydraulic structure must be adequate to promote the integrity of the stream and floodplain and minimize impacts to wetlands.

No specific documentation of considerations or decisions made in the planning process is required for compliance with the PCSP program. Review of this guidance and appropriate consideration of planning minimum measures is considered adequate for compliance. However, documentation of implemented planning minimum measures is encouraged in concurrence point meeting-agreement summaries for projects permitted through the Merger Process.

2.3 Minimum Measures - Drainage Design Phase

Drainage Design Phase PCSP Participating Groups
• NCDOT Drainage Design Engineer • Regulatory Agencies

In the PCSP, the drainage design phase of the roadway project refers to the period between avoidance and minimization of impacts for the preferred alternative or design option and the preparation of the project drawings and 100% completion of the hydraulic design. For projects that go through the Merger Process, the PCSP drainage design phase refers to the project period between *Concurrence Point 4B – 30% Hydraulic Review* and *Concurrence Point 4C – Permit Drawing Review.* It is during this period of the project that the design engineer implements drainage area-specific stormwater pollution prevention and treatment BMPs.

Similar to the project planning minimum measures, the design minimum measures should be implemented to the MEP. Implementation of design minimum measures may be significantly limited by decisions made during the project planning phase. However, widespread implementation of these measures is encouraged wherever practical on the project. Consideration of these minimum measures regardless of the degree of implementation is adequate for compliance with the PCSP. No specific documentation of design minimum measures is required for compliance with the PCSP. However,

documentation of implemented design minimum measures is encouraged in the project-specific SMP if one is required for the project.

Providing Adequate Ground Cover

Definition:
Selecting appropriate ground cover to minimize erosion.

Merger concurrence points 4B/4C

A dense and vigorous vegetative cover provides cost-effective protection to surficial soils from the erosive impacts of rainfall and runoff, maintains good soil moisture, and increases soil porosity to improve infiltration.

Key Considerations:

- Different species of vegetation have varying permissible velocities.
- Steeper slopes require more vigorous vegetative cover, temporary soil stabilization measures, and longer establishment periods.
- Planting season and regional climatic and soil variations will also affect vegetation selection.

Stabilizing Embankments and Drainage Ditches

Definition:
Minimizing erosion on slopes.

Merger concurrence points 4B/4C

Slope stabilization measures are implemented where the slope of the embankment or overbank area is such that vegetated ground cover may not be enough to prevent erosion. Riprap slopes and permanent erosion control matting are both examples of post-construction slope stabilization measures.

Key Considerations:

- Riprap used for slope stabilization should be selected so that the gradient of the slope to be stabilized is less than the riprap's natural angle of repose.
- Selection of slope stabilization technique should consider ways to reduce costs and long-term maintenance needs. The hydraulic structure must be adequate to ensure the integrity of the stream and floodplain and minimize impacts to wetlands.

Providing Adequate Energy Dissipation

Definition:
Reducing the energy of flowing runoff by slowing velocity and encouraging diffuse flow, thereby reducing erosion and scour potential.

Merger concurrence points 4B/4C

Runoff collected from impervious surfaces can travel at velocities that may create local scour or more widespread erosion downstream of the discharge point. Energy dissipators are implemented at transitions between impervious and pervious surfaces to reduce the kinetic energy of water to prevent erosion. Common energy dissipators include preformed scour holes and rock aprons.

Key Considerations:

- Energy dissipators should be designed to reduce velocity to a non-erosive rate for the downstream ground cover.

Utilizing Natural Features and Drainage Pathways

Definition:
Utilizing existing natural features on a project that help achieve stormwater management goals.

Merger concurrence points 4B/4C

Existing natural features and drainage pathways on a project can help maintain predevelopment runoff characteristics with minimum modification of existing drainage patterns. Examples of this technique include dispersing runoff through existing wooded and vegetated areas, using naturally depressed areas for runoff storage, and using existing, natural runoff channels for conveyances to maintain existing flow patterns.

Key Considerations:

- When dispersing runoff through natural features, such as wooded and vegetated areas, the stability of the existing ground cover should be evaluated for erosion potential.
- The natural topography should match the final graded needs of the BMP to which this management measure is being applied.
- In most cases, energy dissipation and practices that promote diffuse flow will be needed upgrade of a natural feature used for stormwater management. Some modifications such as installing an outlet structure may be required.

Maximizing Vegetative Conveyance

Definition:
Selecting swales and filter strips for stormwater conveyance wherever possible.

Merger concurrence points 4B/4C

Incorporating vegetation into the drainage system reduces flow velocity while also promoting sedimentation, filtration, and infiltration. Maximizing vegetative conveyance is a minimum measure where vegetated features are preferentially selected for runoff conveyance to take advantage of these passive stormwater treatment benefits. Examples of maximizing vegetative conveyance include selecting a swale over pipe conveyance and selecting vegetated options for channel linings where appropriate.

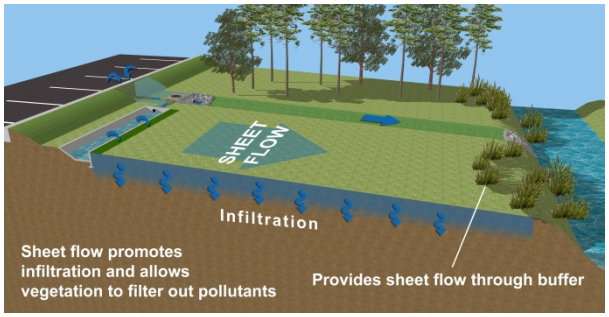
Key Considerations:

- When pipe structures are necessary to collect runoff from the roadway (such as in curb and gutter sections), every effort should be made to direct runoff from the pipe outlet to vegetated areas. Proper energy dissipation and transitions should be implemented.
- To the extent possible, the designer should maintain the predevelopment drainage areas and flow patterns to support greater use of vegetative conveyance. Consolidating drainage areas may preclude vegetative conveyance due to the increased discharges and velocities.
- Evaluate vegetated options for channel linings before considering "hardened" lining types.

Encouraging Diffuse Flow

Definition:
Designing the drainage system to minimize concentrated flow of runoff and maintain diffuse flow conditions.

Merger concurrence points 4B/4C



Encouraging diffuse flow is a design-based BMP where unconcentrated flow is encouraged whenever possible in the drainage design to take advantage of vegetated features. Implementing graded embankments and the use of preformed scour holes to transition from pipes to overland flow are examples of encouraging diffuse flow.

Key Considerations:

- Gentle and flat roadside slopes are required to maintain diffuse flow. In areas where steeper slopes are implemented encouraging diffuse flow may not be practical.
- In-situ soil type, stability, and other factors related to erosive probability should be evaluated prior to implementing diffuse flow conditions.

Minimizing Direct Discharge from Bridges

Definition:
Selecting bridge configurations and drainage designs that avoid directly discharging runoff to receiving streams.

Merger concurrence points 4B/4C

Generally, direct discharge of bridge deck runoff to receiving streams via deck drains should be minimized to the MEP. By routing runoff to the bridge end, other minimum measures such as maximizing vegetative conveyance and energy dissipation can be implemented. For select bridge crossings over large rivers or open waterbodies, a dispersed direct discharge may be an appropriate balance of environmental protection and cost control. However, these situations are expected to be limited and require the approval of the state hydraulics engineer.

Key Considerations:

- Appropriate collection, conveyance, and BMPs should be provided where deck conveyance reaches the end of the bridge.
- Existing well-vegetated areas around the bridge are ideal release areas for runoff and should influence the location of discharge points when possible.
- Use of dispersed discharge may be an appropriate BMP in certain situations with the approval of the state hydraulics engineer.
- Safety of the travelling public must always be the foremost design concern. The designer should carefully follow NCDOT's flow spread design criteria.

2.4 Projects Requiring Regulatory Review

When a project requires review by a regulatory agency, the participating groups coordinate to evaluate the project-specific context to implement BMPs to the MEP. Since these projects require regulatory review for compliance with state and federal regulations, they undergo significant internal and external reviews which result in outcomes that are protective of surface waters.

Regulatory Review PCSP Participating Groups
• NCDOT Project Design Team • Regulatory Agencies

Roadway projects that require permits, exclusions, or approvals, or otherwise require regulatory review, will also be evaluated for the need and appropriate application of structural stormwater BMPs. The programs, if applicable to the project, which require regulatory review are listed in Table 2.1.

Table 2.1. Programs that may impact Post-Construction

Program/Requirement
404/401 Water Quality Certification
Endangered Species Act/Section 7 Consultation
Merger Process
Riparian Buffer Authorizations
CAMA Permits
Isolated Wetlands/Waters

In the process of confirming compliance with each of the above programs, regulatory agency representatives review project plans and characteristics and evaluate potential impacts to receiving streams before issuing approval. During this process, regulatory agencies have an opportunity to review stormwater management efforts. Therefore, issuance of a permit, authorization, certification, or approval associated with any of the above-listed programs is considered documentation of PCSP compliance for a roadway project.

2.5 Projects Not Requiring Regulatory Review

Projects that do not require regulatory review differ from projects that require regulatory review in that coordination with regulatory agencies is not required and the project outcome may not be driven through a collaborative process with regulatory agencies. These projects are not subject to the regulatory review associated with the programs listed in Table 2.1 and should follow the workflow provided in Figure 2.1.

Non-Regulatory Review PCSP Participating Groups
• NCDOT Project Design Team • Hydraulics Unit

2.6 Implementation of Structural BMPs

Structural BMPs are engineering solutions, constructed on site, that provide passive treatment of pollutants in runoff. For NCDOT roadway projects approved structural BMPs and their design criteria are provided in the BMP Toolbox available on the Connect NCDOT website. If a project team wishes to use a structural BMP that is not listed in the BMP Toolbox, a request for use may be made to the state hydraulics engineer or delegated representative. The request should include information on the proposed design criteria and how the BMP will provide stormwater treatment. The state hydraulics engineer will approve or disapprove the use of the BMPs not listed in the BMP Toolbox on a project-by-project basis (this shall be documented in the project-specific SMP).

For projects requiring regulatory review, whether a structural BMP would be beneficial and appropriate on a roadway project is a collaborative decision to be made by the design engineer and the appropriate reviewing agencies. For projects that do not require regulatory review, the design engineer follows the workflow in Figure 2.1 for direction on implementation of BMPs. If it has been determined that one or more structural BMP(s) might be appropriate on a roadway project, the design engineer should use sound engineering judgment in selecting the appropriate BMP. Information to aid selection can be found in the NCDOT's BMP Toolbox, among other resources. The PCSP does not provide a prescriptive BMP selection process for roadway projects in order to allow for project-specific solutions. The PCSP participating groups are expected to consider the unique characteristics of both the proposed roadway project and the receiving stream and develop a short-list of BMPs for consideration on a project-by-project basis.

Once potential structural BMPs have been selected for consideration, their implementation to the MEP should be evaluated based on a site specific engineering analysis. If implementing a BMP is not feasible given the design criteria listed in the BMP Toolbox, the designer should first consider whether deviating

from criteria could provide a treatment or pollution prevention benefit at a reduced degree yet still remain protective of water quality standards. The decision whether this approach would provide a benefit to the receiving waterbody is part of the collaborative process with regulatory agencies for projects that require regulatory review. For projects that do not require regulatory review, the design engineer should use sound engineering judgment when considering implementation of BMPs to the MEP.

The result of the process of evaluating structural BMPs to the MEP may result in the outcome that site constraints make implementation of structural BMPs impractical or infeasible. Information on evaluating the feasibility of BMPs can be found in the BMP Toolbox. Generally, the following considerations (in addition to those listed in Section 1.3 of this document) may be considered acceptable reasons for certain structural BMP infeasibility on a roadway project:

- Physical site limitations – available ROW, steep slopes, soil instability, impacts to other cultural resources, and high water tables
- Geographic and geotechnical limitations –karst topography, shallow bedrock, unstable soils, proximity to wetlands, shorelines, riverfronts, steep slopes, and proximity to homes or other buildings, and FEMA regulated floodways
- Hydraulic limitations – lack of available hydraulic head, high water table, low hydraulic conductivity
- Environmental or health risk limitations – existing soil or water contamination
- Maintenance limitations – site restrictions that prevent access, long term costs of operation

2.7 Documentation Requirements

For projects requiring regulatory review, the design engineer must prepare a project-specific SMP if structural BMPs were determined to be required through coordination with regulatory agencies. For projects that do not require regulatory review, refer to Figure 2.1 for information on documentation requirements. Information on the SMP can be found in the BMP Toolbox and on the Connect NCDOT site. All structural controls implemented for the project must be documented in the SMP. In the comment sections of the SMP, the design engineer must describe the stormwater management actions proposed for the project. Any deviations from BMP Toolbox design standards due to site-specific constraints must also be documented in the SMP. The SMP must be provided to regulatory agents for review (as requested) with permit review packages. In addition to the SMP, the design engineer must retain copies of exclusion letters, permits, and approvals for all other applicable environmental permits. Issuance of these items conveys that the applicable regulatory agencies have reviewed the SMP and deem the post-construction stormwater management approach appropriate for the protection of surface water quality standards.

For projects where structural BMPs were not implemented and minimum measures are adequate for protection of water quality standards, a project-specific SMP is not required unless requested by a regulatory agency or the design engineer otherwise chooses to document stormwater management decisions for a project.

3.0 Stormwater Quality Management for Non-Roadway Projects

The NPDES permit, which requires that the PCSP regulate stormwater from new BUA, also includes non-roadway projects. New non-roadway development is defined as any new NCDOT facility or any modification to an existing facility that results in a net increase in BUA and that does not otherwise qualify as new road development. New non-roadway development projects are generally not located within the linear NCDOT ROW. These projects can include new construction or upgrades to existing maintenance yards, rest areas, welcome centers, office buildings, training facilities, parking lots, or other non-roadway facilities. Any ingress or egress drives or streets within the NCDOT owned project boundaries are also considered part of the non-roadway project and should not be separated out as a roadway project.

New Non-Roadway Development Project Examples[1]
• Rest Areas • Maintenance Yards • Office Buildings • Training Facilities • Parking Lots • Railroad Facilities • Material Testing Laboratories • Material Storage Facilities

Unlike NCDOT roadway projects, non-roadway projects are similar to most parcel-based development in that more prescriptive stormwater management criteria apply to projects. Similar to roadway development, projects that are subject to state stormwater programs and require regulatory review coordinate with regulatory agencies to garner the required approval, while projects that do not engage in regulatory review follow the workflow provided in Figure 3.1. Generally, because non-roadway projects are similar to traditional site design projects, they must strive to meet the prescriptive requirements of the state programs or PCSP guidelines that apply to the project. Meeting the requirements of these programs and guidelines, which are discussed in detail in the following sections, is the pathway to compliance with the PCSP for non-roadway projects.

[1] This table provides examples of new non-roadway development projects and is not intended to be an exhaustive list. Project examples assume a net increase of new built-upon area.

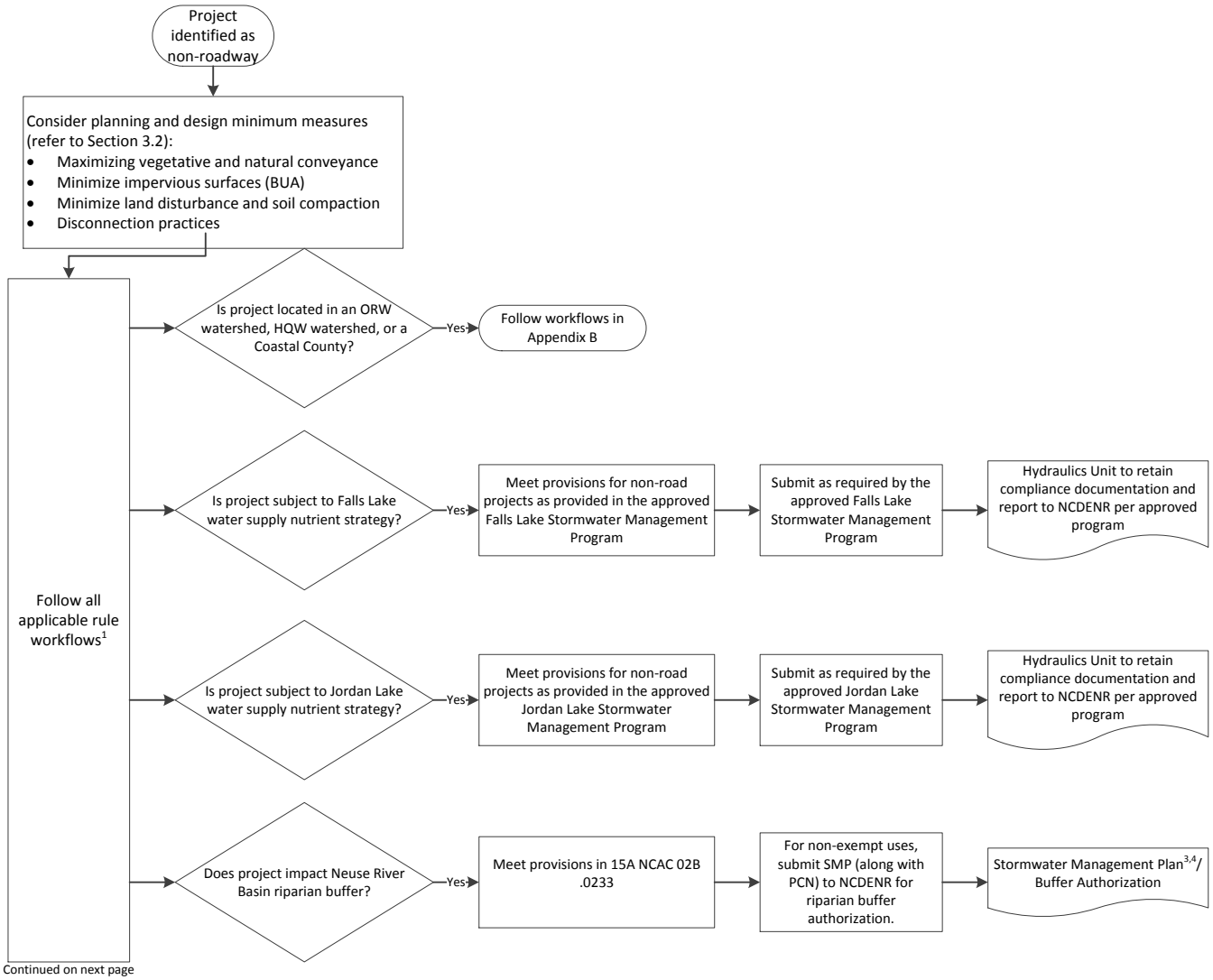
3.1 PCSP Process for Non-Roadway Projects

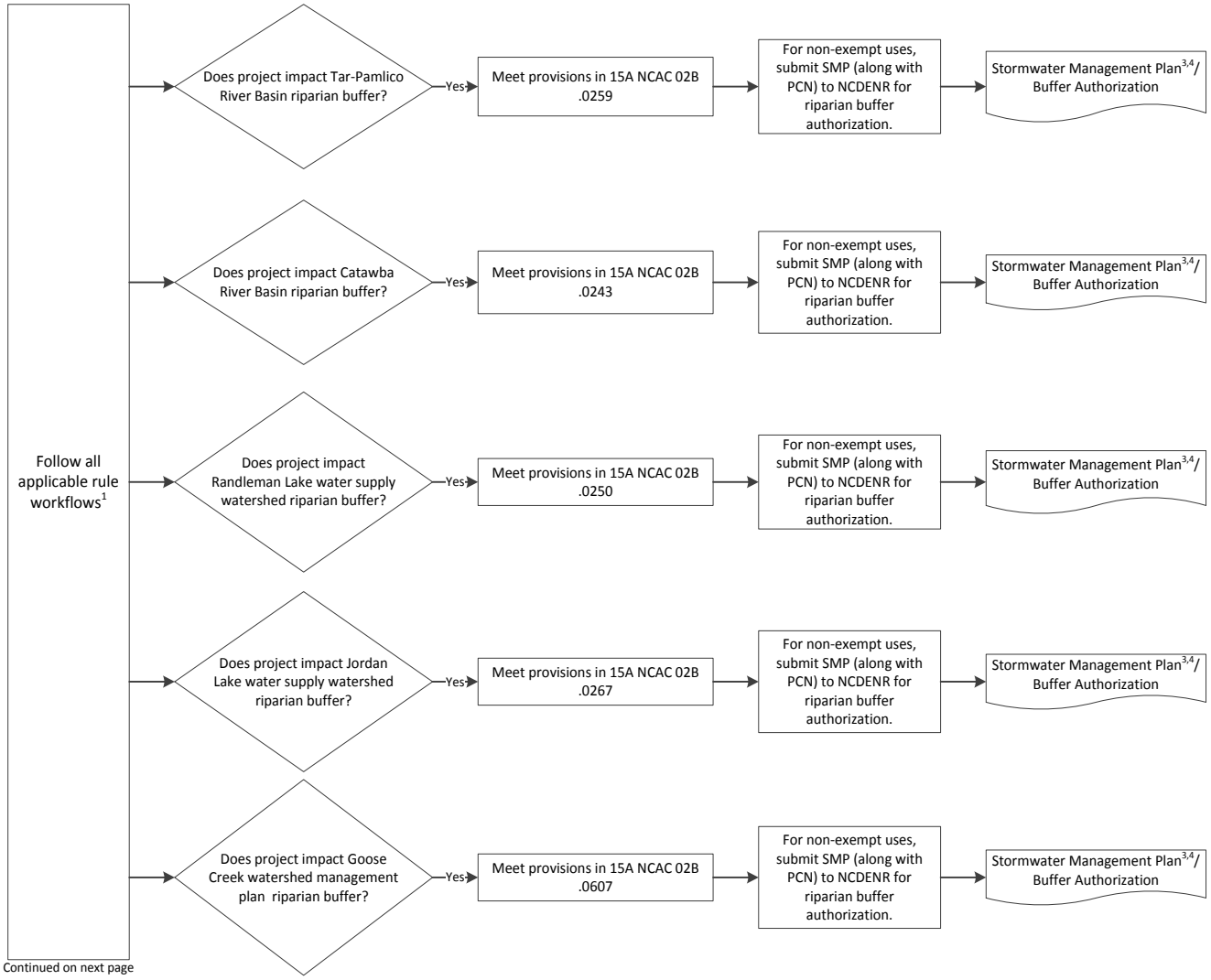
Non-roadway projects can originate from many different groups within NCDOT's organization, such as one of the 14 highway divisions, Facilities Management Division, Rail Division, Ferry Division, Bicycle and Pedestrian Division, or be part of a TIP project (e.g., rest area). Regardless of the source of the project, all design engineers will follow the same process for compliance with the PCSP.

Non-Roadway Participating Groups
• NCDOT Units, Divisions • Hydraulics Unit • Regulatory Agencies • Facilities Management

There are many state stormwater programs requiring permits, authorizations, certifications, or approvals that include post-construction stormwater requirements. A list of programs that may impact non-roadway projects is provided in Table 1.3 in Section 1.0. The programs listed in Table 1.3 were designed to protect water quality and best uses of the receiving stream. Therefore, receiving permits, authorizations, certifications, or approvals from these programs is deemed protective of water quality standards. Projects that are not subject to the regulatory review associated with the programs listed in Table 1.3 should follow the workflow provided in Figure 3.1. In addition to the post-construction requirements of these programs and guidelines, minimum measures are also considered for implementation on all projects involving new BUA. Figure 3.1 outlines the process for PCSP compliance for non-roadway projects.

Figure 3.1. PCSP Process for Non-Roadway Development





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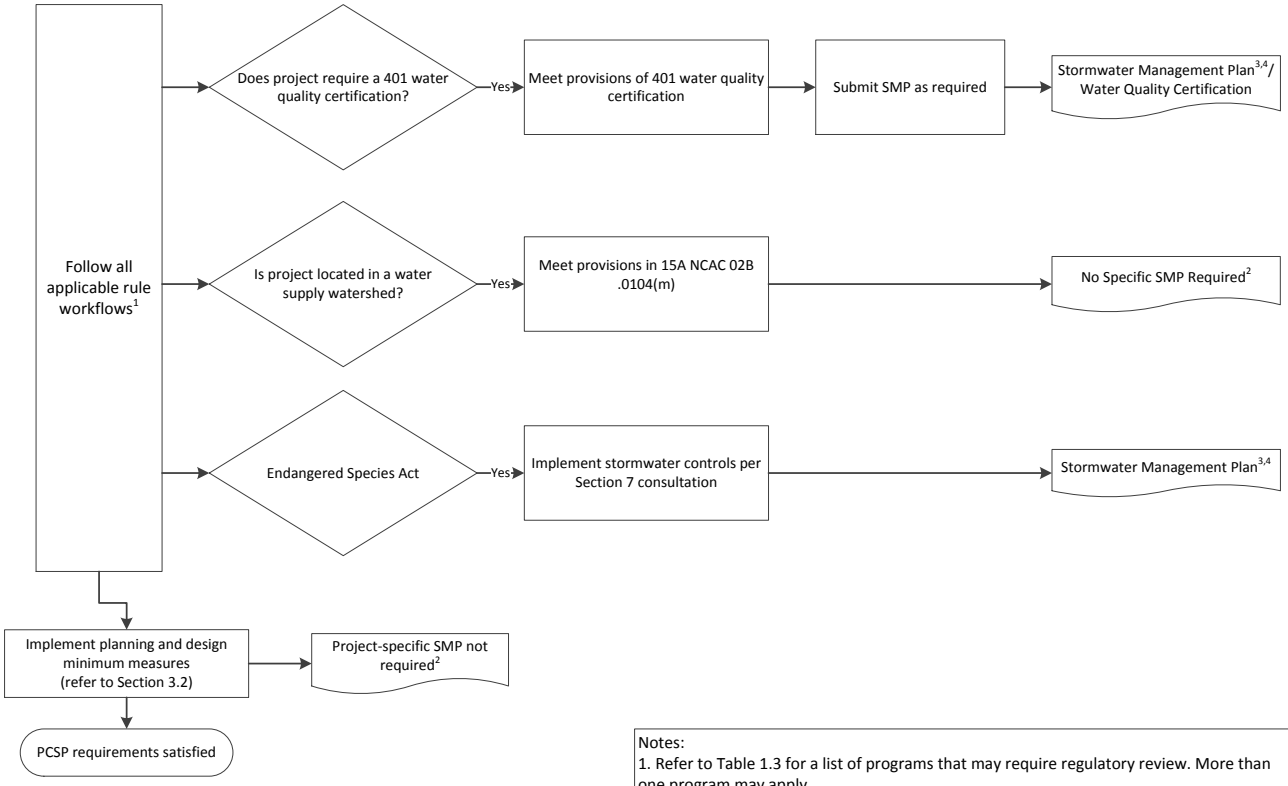


Notes:
1. Refer to Table 1.3 for a list of programs that may require regulatory review. More than one program may apply.
2. Projects that are reviewed by the Hydraulics Unit may require a project-specific SMP.
3. A project-specific SMP is required for projects that implement structural BMPs. Otherwise, a project-specific SMP is not required, unless requested by a regulatory agency.
4. A copy of the SMP shall be sent to the Hydraulics Unit.

3.2 Minimum Measures for Non-Roadway Projects

Planning and design minimum measures are implemented on every non-roadway project. Implementation of minimum measures on projects that are not subject to state stormwater program requirements, PCSP guidelines, or otherwise do not implement structural BMPs is considered protective of water quality and adequate for compliance with the PCSP. No specific documentation is required for projects that only implement minimum measures. Examples of measures NCDOT strives to implement on non-roadway projects are provided below.

Maximizing Vegetative and Natural Conveyance

Definition:
Preserving natural flow paths, utilizing existing vegetative features, directing stormwater flows across vegetated areas, and selecting vegetated swales for conveyance of flows.

Incorporating vegetation into the drainage design promotes infiltration, sedimentation, and filtration through natural processes. Maximizing vegetative and natural conveyance is a minimum measure where vegetated features, natural or existing and/or engineered, are preferentially selected for runoff conveyance to take advantage of the stormwater treatment benefits. Examples of this minimum measure include selecting a swale over pipe conveyance and selecting vegetated options for channel linings where appropriate, or site selection and project siting considerations that utilize natural flow paths in lieu of engineered conveyances.

Key Considerations:

- To the extent possible, the designer should maintain small drainage areas to support greater use of vegetative conveyance.
- If existing drainage features are utilized, the designer should check the stability of features receiving flow. Appropriate energy dissipation should be provided if necessary.
- Evaluate vegetated options for channel linings before considering other lining types.

Minimize Impervious Surfaces (BUA)

Definition:
Use design practices to reduce impervious surfaces such as roads and parking areas.

Impervious surfaces reduce infiltration and increase runoff rate and volume. Reducing the amount of impervious cover provides direct stormwater benefit by decreasing pollutant loading and reducing treatment needs. Parking areas can be minimized by considering the use of smaller parking stalls, providing overflow parking areas with pervious paving materials, or alternative designs, such as one way aisles with slanted parking stalls. Road area can be reduced by considering narrower travel lanes and examining alternative design options to reduce road length.

Key Considerations:
Safety of the travelling public must always be the foremost design concern. Safe roadway width and safe traffic flow patterns should be maintained.

Minimize Land Disturbance and Soil Compaction

Definition:
Minimize site footprint and soil compaction through planning and design practices.

Minimizing land disturbance can improve water quality by preserving existing vegetation and conserving natural areas and open spaces to maintain natural infiltration rates. Overly compacted soils lose valuable stormwater functions such as nutrient cycling, minimizing runoff and erosion, and adsorbing and filtering pollutants. Soil compaction can be minimized by specifying elements of construction on design plans to improve standard construction practices such as limiting construction traffic locations to delineated access routes outside of proposed infiltration areas (grass swales, natural areas, etc.). Soil compaction can also be reduced by minimizing stockpiling and material storage areas. Soils should be considered for restoration with proper post-construction tilling in order to improve permeability. Disturbed area can be further reduced through design practices. Siting buildings, roads and other relevant infrastructure to fit into existing topography can reduce site grading and removal of existing vegetation. Valuable natural or environmentally sensitive areas should be identified and preserved during the design process. These areas should be marked on permits, plans, and at the construction site so that they can be preserved.

Key Considerations:

- Safety of the travelling public must always be the foremost design concern. Appropriate roadway alignments and profiles should be maintained.
- Consideration should be given to not impede construction practices such that costs are negatively impacted.

Disconnection Practices

Definition:
Discharge impervious surfaces to pervious receiving areas instead of to stormwater conveyance systems.

Disconnection practices promote treating stormwater close to the source. Integrated small scale practices throughout the site and treating close to the source help reduce or eliminate the need for a centralized structural stormwater control measure. Roof drains, roadways, and other impervious areas should be disconnected from stormwater conveyance systems wherever feasible. For example, roof drains can discharge to vegetated or infiltrative areas, or integrate with another BMP, such as a cistern. Roads with shoulder sections that runoff into vegetated areas should be considered in lieu of curb and gutter systems.

Key Considerations
Connecting to stormwater conveyances may be more appropriate in areas with highly erodible soils.

3.3 Projects Requiring Regulatory Review

In addition to consideration and application of the minimum measures, non-roadway projects subject to state stormwater program requirements must implement BMPs as practicable and required by the applicable state rules for that project. State programs that may apply to non-roadway projects are listed in Table 1.3 in Section 1.0.

State stormwater programs are designed to protect the intended uses of sensitive or significant waters in North Carolina. Regulators have an opportunity to review the potential impacts to surface waters during the review of permit packages required for receipt of permits, authorizations, certifications, and approvals with these programs. Therefore, issuance of a permit, authorization, certification, or approval associated with any of the state programs is considered confirmation from regulatory agencies that stormwater management efforts are appropriately protective of surface waters. In addition, any permits, authorizations, certifications, or approvals are considered documentation of PCSP compliance for a non-roadway project**.**

The applicable participating groups must coordinate with NCDENR or other appropriate regulatory agencies to verify which post-construction stormwater rules apply to their project and collaborate on project-specific solutions, as well as identify permitting and submission requirements. Guidance is provided in Figure 3-1 on program, submission, and documentation requirements. In the event of overlapping rules, generally, the most stringent rules shall apply. However, for all projects requiring review, coordination with the appropriate regulatory agencies is required to determine applicable rules.

For projects where structural BMPs are required in order to receive permits, authorization, certifications, or approvals, a project-specific SMP must be completed. The structural controls implemented for the project should be documented in the SMP. Any site-specific constraints that

resulted in deviations from BMP Toolbox design standards should also be documented in the SMP as well as a description of how the structural BMPs implemented protect water quality standards. The SMP should be provided to the regulatory agency as required. In addition to the SMP, the design engineer must retain copies of permits, authorizations, certifications, and approvals for all other applicable environmental permits. Issuance of these items conveys that appropriate authorities have reviewed the SMP and deem the post-construction stormwater management approach appropriate for the protection of surface water quality standards.

3.4 Projects Not Requiring Regulatory Review

For projects that are not subject to state stormwater program requirements, in addition to implementing minimum measures, design engineers must follow the workflow provided in Figure 3.1 for non-roadway projects. The applicable participating groups are encouraged to coordinate with the Hydraulics Unit to verify which design criteria apply to their project, the application of BMPs to the MEP, and information to be provided in the SMP. Participating groups have the option to consult with NCDENR on a case-by-case basis as needed to promote the protection of water quality standards.

For projects where structural BMPs are required, a project-specific SMP must be completed. The structural controls implemented for the project should be documented in the SMP. Any site-specific constraints that resulted in deviations from BMP Toolbox design standards should also be documented in the SMP and a description should be provided of how the implemented structural BMPs protect water quality standards.

3.5 Implementation of Structural BMPs

As for NCDOT roadway projects, approved structural BMPs and their design criteria are provided in the BMP Toolbox for non-roadway projects. The BMP Toolbox is available on the Connect NCDOT website. For BMPs not included in the BMP Toolbox, approval from the appropriate regulatory agency through the Hydraulics Unit is required prior to implementation. Coordination of BMP selection with the Hydraulics Unit is strongly encouraged for *every project* in order to discuss operation and maintenance issues and to coordinate efforts with other NPDES programs as needed.

For projects requiring regulatory review, the design engineer shall collaborate with the appropriate reviewing agencies to select appropriate BMPs. For projects that do not require regulatory review the appropriate BMP(s) shall be selected by considering factors such as site configuration, drainage patterns, cost, and maintenance requirements to provide the level of treatment required to protect receiving water quality. While selected BMPs are implemented to the MEP, requirements for non-roadway projects are more prescriptive, so appropriate site planning is important in order to provide for BMPs. In some instances, deviation from design criteria may be justified. In these cases, the design engineer shall consult with the Hydraulics Unit.

3.6 Documentation Requirements

In general, for projects that require implementation of structural BMPs, a project-specific SMP must be completed. Information on the SMP can be found in the BMP Toolbox and on the Connect NCDOT Web site. The structural controls implemented for the project must be documented in the SMP. In the comment sections of the SMP, the design engineer must describe the stormwater management actions proposed for the project. Any site-specific constraints that resulted in deviations from BMP Toolbox design standards must also be documented in the SMP as well as a description of how the structural BMPs implemented protect water quality standards. The SMP must be provided to regulatory agents for review (see Figure 3.1 on guidance for submission requirements) with permit review packages. In addition to the SMP, the design engineer must retain copies of exclusion letters, permits, and approvals for all other applicable environmental permits. For projects that do not require regulatory review, SMPs shall be submitted to the Hydraulics Unit.

For projects where structural BMPs were not implemented and minimum measures are adequate for protection of water quality standards, no specific documentation is required unless requested by a regulatory agency or the design engineer otherwise chooses to document stormwater management decisions for a project.

4.0 Documenting Compliance with the PCSP

Because the stormwater management outcome is often project-specific, a critical component of the PCSP is documenting adherence to the established goals and requirements at the project level. The primary function of adequate record-keeping is to document agreed-upon stormwater management decisions and justifications made by the appropriate PCSP participating groups for each project. These records then provide for easily accessible PCSP-related information, which facilitates proper assessment of NPDES permit compliance during periodic regulatory audits of the stormwater program.

Given that post-construction stormwater management for NCDOT projects is not a one-size-fits-all solution and that project requirements are established and addressed on a case-by-case basis, the required PCSP documentation will consist of a variety of documents. PCSP documentation requirements are provided in Section 2.7 for roadway projects and in Sections 3.6 for non-roadway projects. Ordinarily, for projects that do not require regulatory review and do not meet or exceed the appropriate roadway or non-roadway thresholds established in appendix A and appendix B, respectively, no project-specific PCSP documentation is required. For all other NCDOT projects, a project-specific SMP must be developed and retained for each project. These SMPs are specific to NCDOT and should not be confused with SMPs mentioned as requirements for other environmental programs. The SMP is the primary NCDOT-specific document used to document compliance for projects. In addition to the SMP, there are many other forms of project-specific documentation that should be retained to document compliance with the PCSP including permits, authorizations, certifications, variances, and other regulatory approvals.

This section provides further guidance on the purpose and preparation of project-specific SMPs, summarizes other forms of project-specific PCSP compliance documents, and discusses documentation retention and retrieval requirements.

4.1 Stormwater Management Plans

The SMP is the primary NCDOT and project-specific document used for documenting compliance with the PCSP. Sections 2.7, and 3.6 provide guidance as to when an SMP is required for projects and what type of information should be included in the SMP for each type of project (i.e., roadway and non-roadway). If required for a project, the design engineer should prepare an SMP that evaluates effects to surface water quality and develops and documents rationale for the stormwater management approach and mitigating measures, as needed. A tool, which can be downloaded from the Hydraulics Unit Web page on the Connect NCDOT Web site (https://connect.ncdot.gov/resources/hydro/), has been developed to facilitate and standardize preparation of the project-specific SMP. Instructions for completion of the SMP form are included in the tool. While use of the tool is not mandatory in order to prepare an SMP and to document compliance with the PCSP, it is strongly encouraged if an SMP is required for a project. The SMP can also be created in an alternate format, such as in a narrative; however, the SMP should always include the critical elements and rationale explanations as described in Sections 2.7 and 3.6 for roadway and non-roadway projects.

The following paragraphs provide a more detailed discussion on the purpose and use of SMPs, potential resources for completing SMPs, description of content on the standard SMP form created using the tool, and the SMP review and approval processes.

SMP Purpose and Use

The SMP is a comprehensive document that summarizes project information, potential impacts, and post-construction source control and treatment measures selected to mitigate impacts. The SMP serves the following purposes:

- Demonstrates that stormwater runoff from the project site does not threaten water quality, controls runoff by minimizing built-upon surfaces, diverts stormwater away from surface waters as much as possible, and employs best management practices to minimize water quality impacts as required.
- Communicates how post-construction stormwater controls function and the reasoning behind the selection of BMPs.
- Catalogs proposed locations and other information on BMPs for future use.

The SMP is used primarily to support federal and state environmental permit applications during the design stage of a project. NCDOT projects may require permits, authorizations, and other approvals from numerous agencies.

SMP Resources

Before developing an SMP, the design engineer should gather all available resources. Table 4.1 describes some recommended resource documents, but is not an all-inclusive list. These resources contain information pertaining to environmental designations of surface waters, potential environmental impacts of proposed roadway alternatives, and any environmental commitments NCDOT has agreed to as part of the Merger Process.

Table 4.1. Useful Resources for Completing an SMP

Resource	Responsible PCSP Part. Group	Description
Final Environmental Impact Statement (EIS), Environmental Assessment (EA), or Categorical Exclusion (CE)	Project Development and Environmental Analysis (PDEA)	These documents, also referred to as the *environmental documents*, outline the human, environmental, and cultural impacts (or lack thereof) expected from the project. These documents are necessary to obtain any required federal permits.
Green Sheets	PDEA	These sheets, typically part of the EIS or EA, list any environmental commitments agreed to by NCDOT and other agencies. The green sheets may stand alone and are kept with the design plans throughout construction of the project.

Table 4.1. Useful Resources for Completing an SMP, cont.

Resource	Responsible PCSP Part. Group	Description
Preliminary Hydraulic Recommendations Report	Hydraulics Unit	This report is developed for all projects in the project planning phase and provides recommendations for the design of major drainage structures.
Meeting minutes from merger screening and concurrence point meetings	PDEA and Hydraulics Unit	For merger projects, meeting minutes are prepared for the merger screening and concurrence point meetings. These minutes summarize all meeting discussions and provide a history of project planning decisions.

SMP Content

The SMP will serve as the historical record of NCDOT's efforts to protect surface water quality. During the drainage design stage, the drainage design engineer should complete the SMP as thoroughly as possible. Resources used to complete the SMP should be listed. A brief description of each section of the SMP tool is provided in Table 4-2.

Table 4.2. SMP Tool Content Summary

Overview
This section of the SMP tool provides an introduction and gives general instructions for completing the tool.
Guidance
This section of the SMP tool contains detailed guidance for each element contained in the tool. The designer can reference this section to answer frequently asked questions about terms and parameters used with the SMP.
General Project Information
In this section of the SMP, the drainage design engineer should include information about the environmental designations of the project site, a description of the existing roadway (if any), and a description of the proposed project. This information should support the stormwater management decisions outlined in the Best Management Practices section of the SMP and provide an historical record of the site condition at the time of the project design. In addition, significant environmental designations that describe the project site, such as the river basin in which the project is located, should be included in this section. These may include NCDWQ surface water classifications for the primary receiving stream, any North Carolina riparian buffer protection rules, any total maximum daily loads (TMDL) or 303(d)-listed streams, and whether the project is under the jurisdiction of the CAMA. Finally, information pertaining to the existing roadway characteristics and the proposed project description, such as surrounding land use, roadway typical sections, and the added BUA, should also be noted in this section.
Best Management Practices
Information about structural BMPs should be provided in one of four sections in the SMP tool. These sections include: 1) Swales, 2) Preformed Scour Holes and Energy Dissipators, 3) Level Spreaders, Hazardous Spill Basins, and Forebays, and 4) Other BMPs. The BMPs should be identified in these sections by station and sheet number. To aid in design, checklists, located in Appendix A of the BMP Toolbox, have been developed for each BMP type. Design criteria are also summarized within the SMP tool in the form of a bulleted list at the top of each BMP section. As the checklist is completed and the design criteria reviewed for each BMP, the appropriate box on the SMP tool should be marked to confirm that minimum design criteria have been met, as applicable. At the bottom of each BMP section, the designer should include comments or design assumptions as to how the BMP functions to improve water quality, why this BMP was selected, and any project-specific information pertaining to the BMP (e.g., how BMP location may impact performance).

SMP Review and Approval Processes

Once complete, the SMP is reviewed and approved using one of the following methods, depending on the other regulatory permits required by the project:

- For projects requiring a 404/401 Water Quality Certification with stormwater management conditions as part of the General Certification, the SMP is provided to NCDENR as an attachment to the Pre-construction Notification Form (PCN) or the Individual Permit application. Review and approval of the SMP is performed concurrent with the approval of the 401 Water Quality Certification.
- For projects requiring a Riparian Buffer Authorization, the SMP is submitted with the PCN form to NCDENR for review and approval.
- For all other projects, the SMP is prepared, reviewed, and retained by the appropriate PCSP participating group. A select number of SMPs may be reviewed for compliance as part of NPDES audit.

If a project requires more than one of the permits listed above, the SMP may be reviewed for compliance with the conditions of each of those permits by one or more regulatory representatives.

4.2 Other Project-Specific PCSP Compliance Documents

In addition to the SMP, there are other forms of project-specific documentation that should be maintained to confirm compliance with the PCSP on a project-by-project basis. These documents include permits, authorizations, certifications, variances, and other regulatory approvals that involve post-construction stormwater management for new BUA. These documents and any other documentation of final PCSP decisions and associated regulatory approval should be retained and managed as discussed in Section 4.3. Table 4-3 lists some of the regulatory approval documents that may involve post-construction stormwater management; also provided in the table are the PCSP participating group(s) expected to maintain records for each document. While not exhaustive, this summary exemplifies the types of documents that should be retained to document compliance with the PCSP for specific projects.

Table 4.3. Forms of Project-Specific PCSP Compliance Documentation

Document	Responsible PCSP Part. Group(s)	Description/Purpose
NCDOT Project-Specific SMP	Hydraulics Unit, Highway Divisions, or other NCDOT Divisions	Some NCDOT projects require the development of a project-specific SMP. This SMP is specific to NCDOT and should not be confused with SMPs mentioned as requirements for other environmental programs. The SMP is the primary NCDOT-specific document that is used to document compliance for projects.

Table 4.3. Forms of Project-Specific PCSP Compliance Documentation, cont.

Document	Responsible PCSP Part. Group(s)	Description/Purpose
401 Water Quality Certification	PDEA –Natural Environment Section, Highway Divisions	Stormwater conditions and requirements may be included as part of General Certifications GC3883, GC3884, GC3885, GC3886, GC3891, and GC3893; and may require that the project SMP be submitted and reviewed by NCDENR prior to the issuance of the 401 Water Quality Certification and Individual Water Quality Certifications.
Isolated and other Non-404 Jurisdictional Wetlands and Waters Permit	PDEA –Natural Environment Section, Highway Divisions	Stormwater conditions and requirements are included in the State General Permit for Impacts to isolated and other Non-404 Jurisdictional Wetlands and Waters Permit number IWGP100000; and may require that the project SMP be submitted and reviewed by NCDENR prior to the issuance of the permit.
Riparian Buffer Authorization and Pre-Construction Notification form	PDEA –Natural Environment Section, Highway Divisions	State riparian buffer protection programs are in place for the Neuse River Basin, the Tar-Pamlico River Basin, the Catawba River Basin, the Randleman Lake Watershed, the Jordan Lake Watershed, and the Goose Creek Watershed. A buffer authorization is required for any use (i.e., activity) that is designated as potentially allowable or potentially allowable with mitigation. The PCN form is used to apply for Buffer Authorizations. In addition to the PCN, the diffuse flow plan and any stormwater management or treatment required for the Buffer Authorization should be outlined in the SMP. The SMP is attached to the PCN and submitted to NCDENR for review and approval. The SMP is reviewed with the PCN; stormwater management requirements are reviewed and approved as part of the riparian buffer authorization process.
Riparian Buffer Variance	PDEA –Natural Environment Section, Highway Divisions	Variance from the state riparian buffer protection programs for a specific project may be granted through application with NCDENR. Part of the application may include submittal of an SMP, which describes BMPs used to control nutrients and sediments, how diffuse flow into the buffer is maintained.
Trout Stream Buffer Variance/ Waiver	Roadside Environmental Unit, Highway Divisions, or other NCDOT Divisions	The Sedimentation Pollution Control Act of 1973 requires protected buffer zones along trout waters. If the disturbance will exceed 10 percent or 100 linear feet in every 1000 linear feet, approval for the disturbance must be obtained from the Director of the North Carolina Division of Land Resources (NCDLR) through submittal and approval of a trout variance request. Conditions of the variance/ waiver may involve post-construction stormwater management.

Table 4.3. Forms of Project-Specific PCSP Compliance Documentation, cont.

Document	Responsible PCSP Part. Group(s)	Description/Purpose
Categorical Exclusion	PDEA-Project Development, Highway Divisions	Categorical Exclusions are actions which, based on past experience, do not involve significant environmental impacts and do not require the preparation of an Environmental Assessment or an Environmental Impact Statement. While the list of approved CE activities do not include specific storm water actions, as part of the preparation of the CE document, potential storm water issues and applicable permits will be identified based on preliminary mapping.
Environmental Assessment	PDEA-Project Development, Highway Divisions	An EA is a document prepared to satisfy the requirements of the National Environmental Policy Act (NEPA). An EA is prepared for actions that are not CEs and that do not clearly require the preparation of an EIS. The EA includes the need for the proposal, alternative courses of action, environmental impacts of the proposed action, and a listing of agencies and persons consulted. If applicable, the EA will identify potential storm water issues and applicable permits based on preliminary mapping.
Environmental Impact Statement	PDEA-Project Development	An EIS is a document prepared to satisfy the requirements of the NEPA. An EIS is prepared when FHWA determines that the action is likely to cause significant impacts on the environment. Based on both agency expertise and issues raised by the public, NCDOT prepares a Draft EIS with a full description of the affected environment, a reasonable range of alternatives, and an analysis of the impacts of each alternative. The Draft EIS is followed by the Final EIS, and then a Record of Decision. If applicable, the Draft EIS will list potential storm water issues and applicable permits based on preliminary mapping.
NCDOT Jordan/Falls Lake Stormwater Load Accounting Tool (JLSLAT) certification	Hydraulics Unit	In accordance with the Jordan Lake Rules, Falls Lake Rules, and NCDOT's Guided Reduction of Excess Environmental Nutrients (GREEN) Program, non-roadway projects that rely on the use of NCDOT-JLSLAT should be certified by a North Carolina licensed professional; the certification will affirm that the tool was used in conformity with the Environmental Management Commission (EMC)-approved version or another method acceptable to NCDENR. Site plan and NCDOT-JLSLAT reviews will be supervised through NCDOT's Hydraulics Unit.

4.3 PCSP Documentation Retention and Retrieval

Documenting compliance with the PCSP involves maintaining records of compliance documents as outlined by this guidance and based on the record retention policies set forth in NCDOT's NPDES stormwater permit. Per Part III, Section A of the NPDES permit, records of documentation for all monitoring, measurements, inspections, maintenance activities, and training must be kept for a minimum of five years.

Documents associated with project-specific PCSP compliance should be maintained on-site or at an accessible location for a minimum time period of five years from completion of the project. SMPs should be retained indefinitely.

Project completion should be established on a project-by-project basis and is generally defined as the date when a project transitions from the construction phase to the post-construction (or maintenance) phase. This date could be established based on the concurrence with certain events, including the final acceptance of a contractor's work by NCDOT, the removal of temporary erosion and sediment control measures, or some other event that signifies project completion.

Since SMPs serve as the historical record for PCSP decisions made for the project and are also used to catalog proposed locations and other information for post-construction stormwater controls, these documents should be retained indefinitely, or as long as reasonably possible.

In addition, compliance documents associated with the PCSP should be easily retrievable within a reasonable amount of time. The latest versions of documents for active projects should be evident and easily accessible within the document management system. For completed or archived projects, it is acceptable to retain only final versions of documents to facilitate efficient file organization and management.

Both digital and paper formats are acceptable for storing and maintaining records of compliance documentation; however, digital records are strongly encouraged. If documents are maintained digitally, these records should be stored in a location that conforms to NCDOT electronic backup protocols.

5.0 Sustaining the PCSP Outcome

As noted in Section 1, existing surface water quality regulations and processes, along with the Department's NPDES permit, necessitate the implementation of the PCSP. Additionally, NCDOT's Mission and Goals and its Environmental Stewardship policy identify environmental sensitivity as core practices in NCDOT activities, further promoting the principal of the PCSP.

Compliance with the PCSP is sustained by these commitments and through oversight of the Department's activities by regulatory and resource agencies, such as NCDENR. These actions include review and approval of this document (including subsequent updates) and periodic evaluations of NCDOT's compliance that are performed by NCDENR. Additionally, NCDOT reports on the status of its PCSP annually through its NPDES reporting requirements.

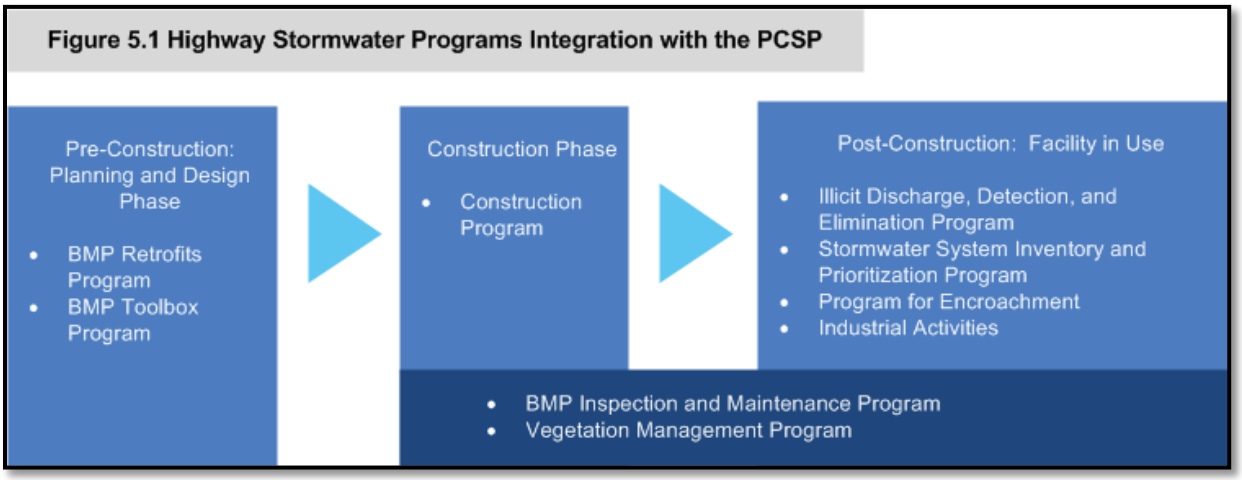
NCDOT's Mission

Connecting people and places safely and efficiently, with accountability and environmental sensitivity to enhance the economy, health and well-being of North Carolina.

5.1 Other Activities Which Sustain Water Quality

The PCSP is one of several processes which NCDOT implements to benefit water quality. Other programs associated with the department's Highway Stormwater Program also contribute to ongoing water quality benefits on both roadway and non-roadway projects. These programs, referenced in Figure 5.1 and described below, combined with the pre-construction and post-construction phases of the PCSP provide guidance to NCDOT staff and contractors, helping to understand the department's approach to stormwater management.

Figure 5.1 Highway Stormwater Programs Integration with the PCSP



BMP Retrofits Program

The purpose of the BMP Retrofits Program is to support NCDOT's efforts to be consistent with NPDES post-construction control measures and to use retrofits to address pollutant loading from existing

NCDOT activities. The Retrofits Program directly protects water quality by control and treatment of pollutants of concern with structural and non-structural solutions.

BMP retrofit projects are identified through coordination with divisions (which are most aware of the condition and functionality of facilities in their designated area), other NCDOT units, and through desktop analysis. Once potential retrofit opportunities are identified, projects are evaluated according to a predetermined implementation strategy that considers metrics such as project type (structural vs. non-structural), cost, credit status, water quality impacts, opportunity for innovation or research, and project feasibility. If the assessment is positive, control measures are designed and implemented. The implementation of retrofits focuses on providing innovative solutions through collaboration with the Research and Toolbox Programs. Retrofits often test new control techniques or new techniques to design and implement components of a control. The research program provides an opportunity to study and quantify the effectiveness of these approaches. If found to be beneficial, the new approach can be integrated into the *NCDOT Stormwater Best Management Practice (BMP) Toolbox, also known as the BMP Toolbox,* and the Retrofit Program can provide feedback on parameters such as cost and constructability.

BMP Toolbox Program

The NCDOT BMP Toolbox*,* is designed to aid NCDOT staff and contractors on the siting and construction of BMPs, and is the primary source of design guidance within the linear system. NCDENR has reviewed and approved the BMP Toolbox. Potential controls (including those used in the Retrofits Program) are regularly evaluated for applicability to NCDOT projects, and if accepted, will be included in subsequent Toolbox updates. Existing controls in the BMP Toolbox are also evaluated on an ongoing basis to promote the use of the latest design trends from research and field experience. Revisions or updates to the BMP Toolbox are submitted to NCDENR for review.

The Toolbox integrates the findings of the HSP's Research and Retrofits Programs, and promotes regulatory compliance by providing implementation guidance for NCDENR-approved controls. The BMP Toolbox outlines the purpose and appropriate application of BMPs to the transportation system, in addition to documenting the water quality benefits provided by each control. The BMP Toolbox also includes checklists for each BMP type to facilitate standard calculations necessary to design stormwater controls and to document the design process. This information is used during the planning and design phases for the PCSP.

Additionally, the BMP Toolbox Program integrates with the BMP Inspection and Maintenance Program by sharing design information to facilitate operation and maintenance, and identifying new BMPs that must be added to the Inspection and Maintenance Manual.

As one of its management measures, the PCSP defines the implementation of the BMP Toolbox and a training program to support its implementation. See Section 1 above and the discussion on the Internal Education Program below.

Internal Education Program

NCDOT has identified the ongoing training program associated with its NCDOT Stormwater Best Management Practice (BMP) Toolbox as a focus for the department's Internal Education Program. The training will continue to focus on educating NCDOT and consultant design engineers on the critical design components for the linear system as described in the NCDENR-approved BMP Toolbox, with updates to the training as new approved BMPs are incorporated into the BMP Toolbox.

Currently, much of the training is performed through presentations or workshops and one-on-one conversations about specific projects. Presentations on the content and uses of the BMP Toolbox have been made to staff and selected contractors during training sessions including the bi-annual Design, Construction, and Maintenance Workshop. One-on-one BMP design training or consultation is provided on an as-needed basis, and includes design engineers from the Hydraulic Unit and contractors seeking site-specific guidance on selecting and designing BMPs.

NCDOT is exploring opportunities for Web-based or third-party training to reach additional staff and consultants. NCDOT anticipates that this training will cover when to use the BMP Toolbox, design components for approved BMPs, and the importance of considering maintenance needs and access for the long-term functionality of the BMP. This training will also review the use of NCDOT's SMP, a form for the documentation of site-specific characterizations, and information used during the design process. Additionally, NCDOT anticipates highlighting the LID concepts already in its BMP Toolbox during the training.

Construction Program

Implementation of the Construction Program occurs between the planning and design phases of the PCSP and the post-construction period. The primary focus of NCDOT's Construction Program is to minimize NCDOT's construction-related water quality impacts to the environment on sites that disturb greater than one acre of land and borrow pit and waste pile projects; however, sediment and erosion control techniques are routinely used on smaller projects as well. These techniques reduce deposits of sediments in receiving waters, which can smother benthic organisms and fish beds, as well as affect fish populations.

The Construction Program is based upon the Sedimentation Pollution Control Act of 1973 and the subsequent 1974 NCDOT Delegated Erosion and Sedimentation Agreement, and incorporates the requirements of NCGO1, the NC Construction General Permit. Emphasis is placed on meeting the compressed time schedule of seven days for groundcover on perimeter construction stormwater controls and steep slopes. All other slopes and exposed areas will strive to meet the 14 day requirement for groundcover following completion of any phase of grading. Therefore, phased plans for land clearing and establishing vegetative cover, as well as routing interaction with NCDOT's Vegetation Management Program is critical. See below for more details.

Although NCDOT's Construction Program goes beyond just the construction of stormwater controls, proper construction techniques for BMPs are necessary to facilitate the post-construction success of a control and its ability to function as designed. Therefore, NCDOT incorporates information into the BMP Toolbox about constructability concerns such as infiltration, and may include critical details about the stormwater controls in the design plans in order to communicate with the construction staff.

In addition, components of the BMP Inspection and Maintenance Program, which are discussed below, are initiated during the construction period.

Vegetation Management Program

The Vegetation Management section, within the operation's Roadside Environmental Unit (REU), is responsible for developing programs for the establishment and maintenance of NCDOT's vegetated areas. This includes turf grasses and other ground covers for erosion control, ornamental plantings, and existing vegetation along roadway ROWs and non-roadway facilities. Vegetative cover reduces impacts to stormwater quality by increasing stormwater infiltration, trapping sediment within the vegetated area, and reducing erosion.

NCDOT implements an Integrated Roadside Vegetation Management (IRVM) Program to control vegetation, reduce noxious and invasive weeds, and promote wildflowers and rare species. Implementation of the IRVM includes the use of cultural or mechanical control methods to minimize herbicide and fertilizer applications, which directly reduce potential negative impacts to stormwater. Cultural techniques include the selection of native plants or vegetative seed mixes that are appropriate to the season of planting and geographical location of the project. This practice promotes the establishment of a vegetative cover that will be more self-sustaining and require less fertilizer and mowing management. Mechanical controls include mowing and trimming of plants to maintain line of sight to promote roadway safety as well as aesthetics, also are often adequate controls to limit chemical applications.

As a last resort, application of chemical herbicides is used to control vegetation. Herbicides are selected to be most effective with the least environmental impact, and are applied in a safe manner by trained and certified staff when the pest plant is in a controllable stage. When feasible, herbicide application is combined with mowing or other direct application techniques, resulting in strategic application directly to the plants which reduces spray application and the potential for over-spray.

The cultural vegetation management techniques are also routinely used during construction activities to facilitate sediment and erosion control.

Verification of Adequate BMP Construction

BMPs on NCDOT's roadway and non-roadway projects pass through the planning, design, construction, and post-construction phases and several HSP programs as described in this document. The following steps are involved in making sure the final, constructed BMP is adequate:

- Planning: Toolbox BMPs are selected in collaboration with NCDENR to protect specific sensitive habitats identified during the corridor selection process;
- Design: Minimum measures are implemented on all projects. Additional Toolbox BMPs are implemented where required to address water quality or control water quantity on a project.
- Construction: Frequent inspections during construction verify the BMPs (including minimum measures) are constructed in order to function as intended. If needed, in-field modifications may be made to address unforeseen issues, but the function and intent of a control is maintained to the MEP. If the control was required under State Stormwater Permits, a review and approval from NCDENR is sought and a collaborative solution is found before proceeding.
- Inspection and Maintenance: Upon final construction, the minimum measures and Toolbox BMPs are inspected to verify they are functioning as intended prior to acceptance into the I&M Program. Afterwards, the controls are routinely inspected and maintenance is performed as needed to maintain performance.

BMP Inspection and Maintenance Program

Structural post-construction controls must be maintained on a regular basis in order to operate as designed for their functional lifespan. Therefore, NCDOT has implemented the Stormwater Control Inspection and Maintenance (I&M) Program, which assists in managing both structural and non-structural stormwater controls. Before the close-out of the construction phase, NCDOT staff involved with the I&M Program will review newly-constructed post-construction controls, including those converted from construction best management practices and minimum measures, to assess if they are functioning as intended. If necessary, repairs or modifications are made to post-construction controls before the construction team (either a contractor or NCDOT staff) is released. The control is then documented in the Stormwater Control Management System, a statewide database used to track and record the inspections and subsequent maintenance that is performed on each control.

The HSP has also developed a *Stormwater Control Inspection and Maintenance Manual*, which provides instructions on the inspection and maintenance of structural controls in NCDOT's BMP Toolbox and additional controls that are common in the NCDOT right-of-way. The manual includes detailed

inspection checklists for different types of structural stormwater controls, which allows the inspector to grade the control for functionality, and assign a level-of-service. Sediment accumulation, bank erosion, blocked weirs, and litter are among some of the considerations in the grading scale. Controls with low level-of-service grades are prioritized for maintenance, ranging from simple maintenance to significant repairs.

Furthermore, NCDOT has implemented a bi-annual Design, Construction, and Maintenance (DCM) Workshop, during which NCDOT staff involved in these activities discuss lessons learned and new techniques. This cross-communication has resulted in modification to design techniques and better understanding of unique construction approaches, which improve the long-term functionality of BMPs.

Illicit Discharge, Detection and Elimination Program

NCDOT further reduces impacts to stormwater through the identification of illicit discharges and coordination with NCDENR to eliminate them where appropriate. Illicit discharges are non-stormwater discharges that are not otherwise permitted under the NPDES program. Examples include improper disposal of wastewater, car wash wastewaters, oil or radiator flushing, laundry wastewaters, auto and household toxics, used oil, and chemical solvents. The benefit of the identification of illicit discharges is the protection of water quality by eliminating these potential hazards and unregulated flows.

This program also identifies events of illegal dumping on NCDOT roadway and non-roadway facilities and coordinates the removal and proper disposal of materials recovered. NCDOT's REU coordinates several programs targeting good housekeeping and pollution prevention on NCDOT ROW. Several sections within REU oversee and facilitate the removal of solid and hazardous wastes dumped on the roadside by travelers, including the Adopt-A-Highway Program, Division Roadside Maintenance crews, and the Hazardous Waste Engineering group. Each of these programs uses controls such as visual inspections, litter removal, and educational programs for the public and NCDOT staff.

Stormwater System Inventory and Prioritization Program

The Stormwater System Inventory and Prioritization Program focuses on maintaining an inventory of existing stormwater outfalls to sensitive waters and outfalls from new construction projects and NCDOT industrial facilities to all surface waters and wetlands. The program also works with NCDENR to develop and maintain a field inventory procedure used to identify outfalls in priority areas. The inventory is used in the PCSP and other permit programs, especially in identification of outfalls in sensitive waters.

Program for Encroachment

Non-NCDOT entities often utilize the ROW, for example, when installing utilities or connecting non-NCDOT roadways to NCDOT's roadway system. These activities, whether temporary or ongoing, can result in pollutants being introduced into NCDOT's stormwater drainage system. Through permit requests (such as driveway permits), NCDOT requires encroachers to certify that appropriate NPDES and State Stormwater Program coverage and compliance mechanisms are in place. This effort helps reduce

the impacts to NCDOT's drainage system and supports NCDENR's role in ensuring all discharges are properly permitted.

In addition, NCDOT staff will assess if off-site construction projects connecting to NCDOT's roadway system are causing sediment and erosion control issues that affect the department's stormwater drainage system. In cases where impact is found, NCDOT will intervene to require the encroacher follow appropriate sediment and erosion control practices and reduce impacts.

Industrial Activities

Some non-roadway facilities maintained by NCDOT are considered "industrial activities," and house NCDOT's roadway maintenance activities, deicing programs, material storage, and equipment repair activities. These facilities must maintain Stormwater Pollution Prevention Plans (SPPP) which documents the good housekeeping and pollution prevention strategies specific to each location to reduce or avoid impacts to stormwater quality. Often, post-construction BMPs are used to control or treat stormwater runoff from these facilities, and are documented in the SPPPs. The HSP assists the county maintenance yards to develop and implement their SPPPs, including inspection and educational activities. Through the SPPPs, the industrial activities facilities contribute to reducing stormwater impacts.

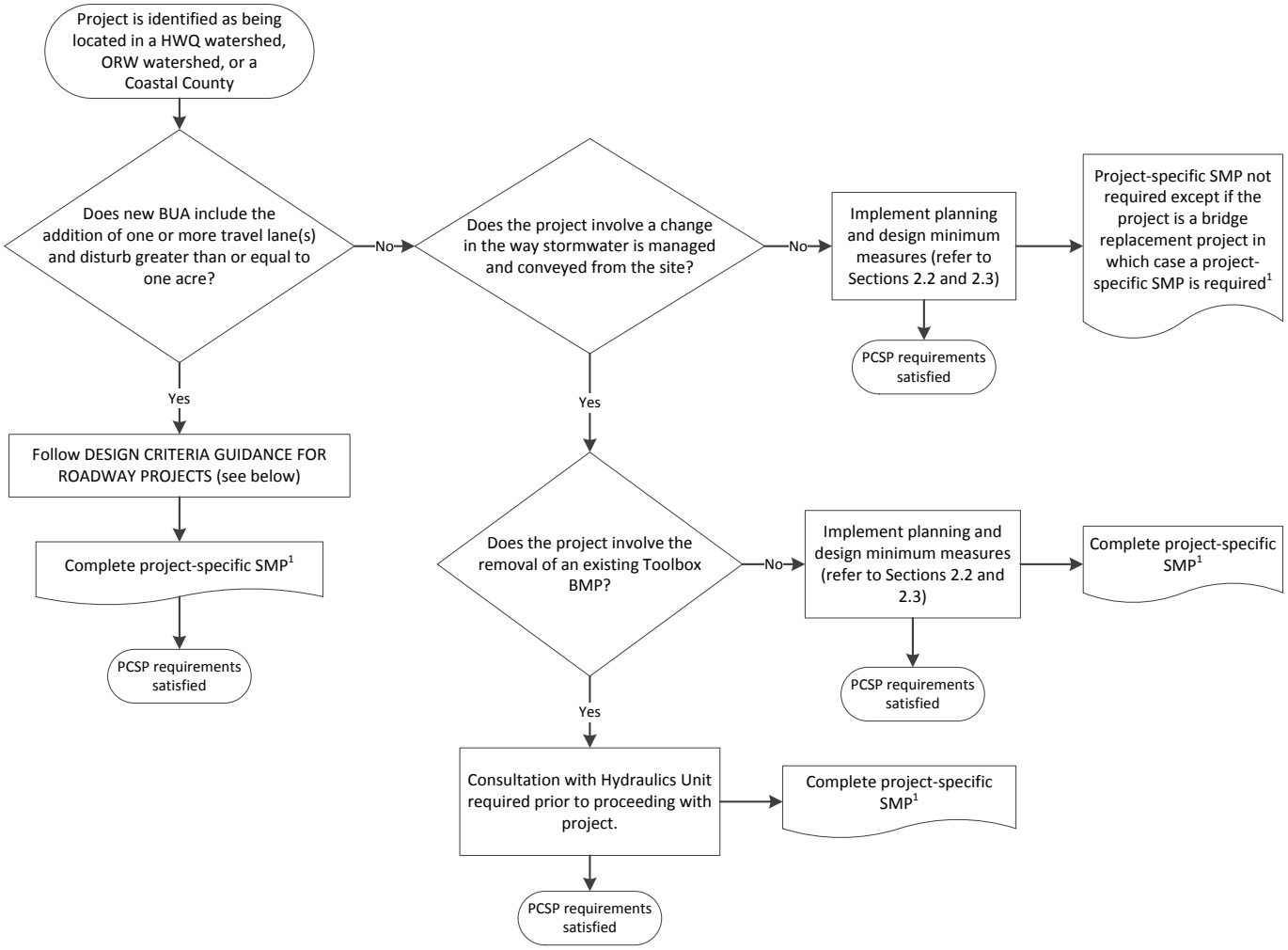
Guided Reductions of Excess Environmental Nutrients (GREEN) Program

Recently, NCDENR has approved new nutrient reduction rules for the B. Everett Jordan Reservoir (Jordan Lake) for new development, and for Falls Lake for new and existing development. As part of these rules, contributors of nutrients, including NCDOT, are required to reduce their loading of total nitrogen and total phosphorous in order to restore water quality standards in the lakes. NCDOT has chosen to develop and implement a stormwater management program in each watershed. The programs, known as Guided Reductions of Excess Environmental Nutrients, or GREEN Programs, target the specific NCDOT roadway and non-roadway activities occurring in each watershed and the requirements of each rule. In effect, each GREEN Program establishes a PCSP program within the respective watershed, and incorporates many of the same techniques described in this document for stormwater controls.

Appendix A – Guidelines for Roadway Projects in ORW Watersheds, HQW Watersheds, and Coastal Counties

STORMWATER MANAGEMENT FOR ROADWAY PROJECTS IN ORW WATERSHEDS, HQW WATERSHEDS, AND COASTAL COUNTIES:

The workflow below shall be followed for roadway projects:



[1]A copy of the project-specific SMP shall be sent to the Hydraulics Unit.

DESIGN CRITERIA GUIDANCE FOR ROADWAY PROJECTS:

For projects located in Outstanding Resource Watersheds (ORW), High Quality Watersheds (HQW), or coastal counties that include the addition of one or more travel lane(s) and disturb greater than or equal to one acre, the following design criteria guidance shall apply:

1) Implement roadway planning and design minimum measures to the maximum extent practicable (MEP).

2) Control and treat new BUA by implementing best management practices (BMP) provided in the NCDOT's BMP Toolbox to the MEP.
3) Stormwater runoff from BUA that is directed into any wetlands shall flow into and through these wetlands at a non-erosive velocity as estimated for a 10-year storm event. Refer to chapter 6 of NCDOT's "Guidelines for Drainage Studies and Hydraulic Design" for more information. This manual is available on Connect NCDOT at the URL specified in appendix C.

If the design engineer has any questions about stormwater management for roadway projects he/she can contact the Hydraulics Unit for more information (see appendix C for contact information).

STORMWATER MANAGEMENT DOCUMENTATION REQUIREMENTS FOR ROADWAY PROJECTS:

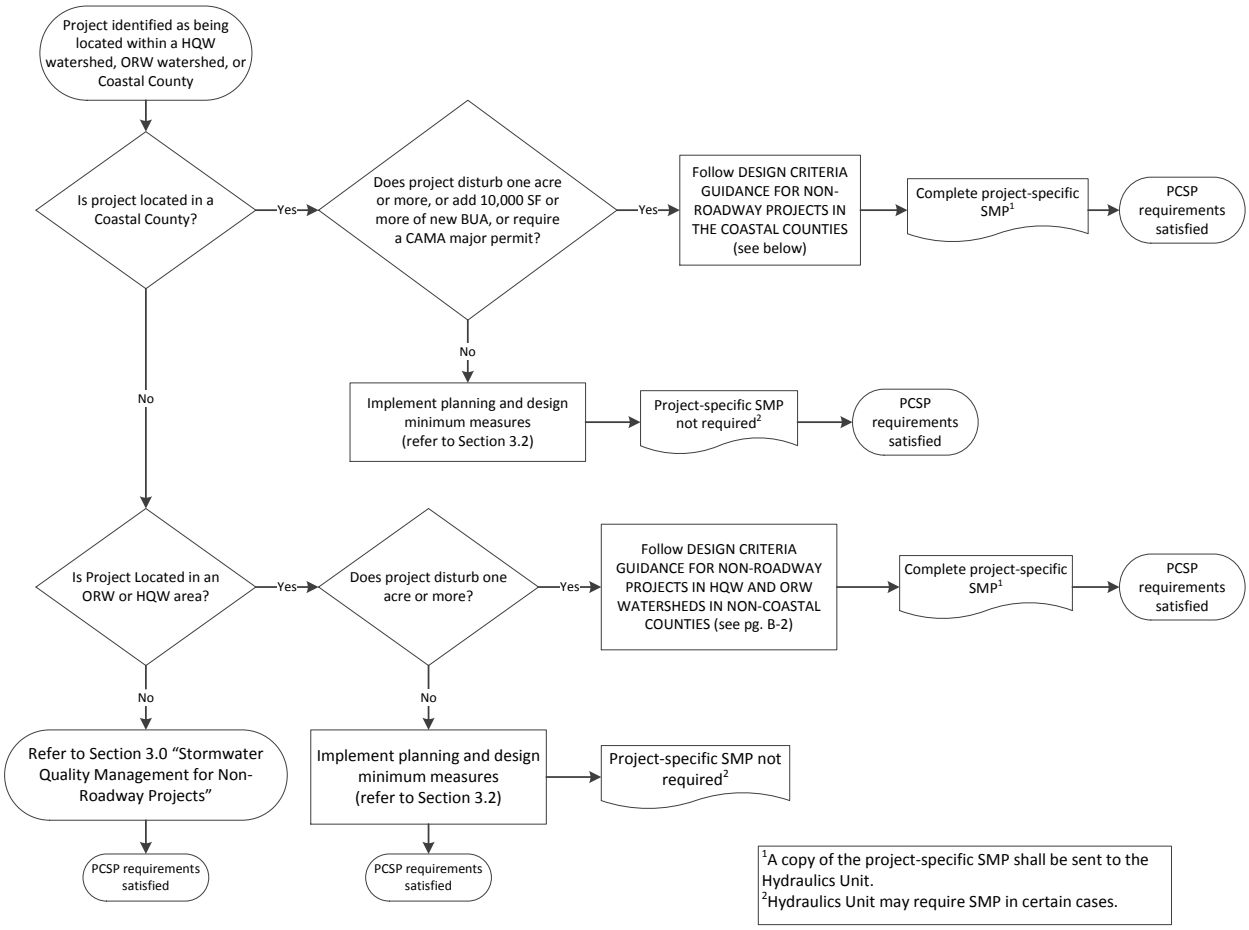
A project-specific stormwater management plan (SMP) must be completed for every project that meets or exceeds the threshold of the addition of one or more travel lane(s) and disturbs greater than or equal to one acre. The most recent version of the SMP spreadsheet should be used and is available on the Connect NCDOT Web site. The BMPs implemented for the project should be documented in the SMP. Any site-specific constraints that result in deviations from BMP Toolbox design standards should also be documented in the SMP.

An electronic copy of the completed SMP for the project should be sent to the NCDOT's Hydraulics Unit for NPDES permit compliance reporting purposes.

Appendix B – Guidelines for Non-Roadway Projects in ORW Watersheds, HQW Watersheds, and Coastal Counties

STORMWATER MANAGEMENT FOR NON-ROADWAY PROJECTS IN ORW WATERSHEDS, HQW WATERSHEDS, AND COASTAL COUNTIES:

The following workflow shall be followed for non-roadway projects:



DESIGN CRITERIA GUIDANCE FOR NON-ROADWAY PROJECTS IN THE COASTAL COUNTIES:

The following design criteria apply to non-roadway projects in the coastal counties, including projects in coastal HQW and ORW watersheds.

For projects that add more than 10,000 square feet of new BUA, or disturb one or more acres of land, or require a Coastal Area Management Act (CAMA) Major Development Permit (pursuant to G.S. 113A-118), the following design criteria shall apply:

1) Implement non-roadway planning and design minimum measures to the MEP.
2) For new BUA, infiltrate the runoff generated by 1.5 inches of rainfall by implementing BMPs provided in the BMP Toolbox to the MEP. If infiltration is not feasible, implement other BMPs

provided in the BMP Toolbox to the MEP in order to treat the runoff from 1.5 inches of rainfall prior to discharge.

3) The project shall provide a 50 foot wide vegetative buffer to the MEP.
4) Stormwater runoff from BUA that is directed into any wetlands shall flow into and through these wetlands at a non-erosive velocity as estimated for a 10-year storm event. Refer to chapter 6 of NCDOT's "Guidelines for Drainage Studies and Hydraulic Design" manual for more information. This manual is available on Connect NCDOT at the URL specified in appendix C.

For all non-roadway projects, the drainage designer has the option to consult with the North Carolina Department of Environment and Natural Resources (NCDENR) on a case-by-case basis as needed to promote the protection of water quality standards.

DESIGN CRITERIA GUIDANCE FOR NON-ROADWAY PROJECTS IN HQW AND ORW WATERSHEDS IN NON-COASTAL COUNTIES:

For projects that are within one mile of and draining to waters classified as HQW or projects that drain to waters classified as ORW and disturb one or more acres of land, the following design criteria shall apply:

1) Implement non-roadway planning and design minimum measures to the MEP.
2) For new BUA, control and treat the runoff generated by 1.0 inch of rainfall by implementing BMPs provided in the BMP Toolbox to the MEP.
3) Provide a 30 foot wide vegetative buffer to the MEP.

If the drainage designer has any questions about stormwater management for non-roadway projects he/she can contact the Hydraulics Unit for more information.

STORMWATER MANAGEMENT DOCUMENTATION REQUIREMENTS FOR NON-ROADWAY PROJECTS:

A project-specific SMP must be completed for every project where the design criteria apply. The most recent version of the SMP spreadsheet should be used and is available on Connect NCDOT. The BMPs implemented for the project should be documented in the SMP. Any site-specific constraints that result in deviations from BMP Toolbox design standards should also be documented in the SMP.

An electronic copy of the completed SMP for the project should be sent to the NCDOT's Hydraulics Unit for NPDES permit compliance reporting purposes.

Appendix C – Resources

Best Management Practices for Protection of Surface Waters – manual which provides an inventory of practices for protecting surface waters customized for transportation related applications. The manual includes practices for all phases of transportation work including planning, design, construction, and maintenance:
https://connect.ncdot.gov/resources/hydro/Guidelines%20for%20Drainage%20Study%20Documents/Best%20Management%20Practices%20for%20Protection%20of%20Surface%20Waters.pdf

BMP Toolbox – design manual for stormwater management practices customized for transportation related applications: https://connect.ncdot.gov/resources/hydro/Pages/Stormwater-Program.aspx

Guidelines for Drainage Studies & Hydraulic Design – manual which provides policy and technical guidance for preforming drainage studies and hydraulic design for NCDOT transportation projects:
https://connect.ncdot.gov/resources/hydro/Pages/Guidelines-Drainage-Studies.aspx

Stormwater Management Plan – Microsoft Excel spreadsheet specially formatted to provide for the documentation of stormwater management decisions on roadway and non-roadway projects:
https://connect.ncdot.gov/resources/hydro/Pages/default.aspx

Hydraulics Unit:

1590 Mail Service Center
Raleigh, NC 27699-1590
919.707.6700

Electronic copies of project SMPs should be sent to the following:
ahmcdaniel@ncdot.gov
Andy McDaniel, P.E.