

SECTION 4.0

PROJECT DESIGN STORM WATER MANAGEMENT PROGRAM

4.1 Overview

This section describes how NDOT complies with the Permit requirements by incorporating storm water management into NDOT's project planning process. The SWMP's project design process includes NDOT's activities for planning, design, and construction. This section is organized as follows:

- Section 4.2 explains NDOT's Project Design Process.
- Section 4.3 describes Permanent BMPs.
- Section 4.4 describes BMPs for New Development and Redevelopment.
- Section 4.5 describes BMPs for Retrofit Opportunities.
- Section 4.6 describes Flood Management Design associated with the Permit.

4.2 Project Design Process

[4.1.6 Implementation of best management practices consistent with the provisions of the stormwater management program as required by this permit constitutes compliance with the standard of reducing pollutants to the "maximum extent practicable"]

[4.1.11 Implement other BMPs identified in this permit; and]

NDOT considers storm water management during the project design process. NDOT's project development and design process includes a planning and evaluation phase, preliminary design phase, and final design phase. This section provides a brief description of the project design process and associated storm water management considerations.

The process begins with the planning and evaluation phase. This phase may develop a reasonable number of project alternatives. The proposed alternatives are presented in the Alternatives Design Field Study (ADFS) report. The engineering studies follow the ADFS report and compare project particulars such as alignments and associated impacts. The ADFS allows the project designs to advantageously use existing land and waterways to avoid or minimize environmental impacts.

After the alternative designs are selected, the Preliminary Design Field Study (PDFS) is conducted to refine the project scope. Various NDOT Divisions participate in the PDFS to recommend improvements to the major design features of the project.

After the PDFS is approved, the Roadway Design Division develops the 30%, 60%, 90%, 100%, and final PS&E. The Roadway Design Division receives input from other NDOT Divisions during this process. Specifically, Hydraulics, Environmental Services, Construction, Maintenance, Materials, Safety-Traffic, and other NDOT Divisions perform a detailed review usually at the 60% or 100% design submittals. New projects may include permanent BMPs in the design to prevent storm water pollution after construction. The design phase incorporates the specific BMPs into the project plans, no later than the 60% design stage. The Hydraulics Section, with support from other Divisions is responsible for incorporating the permanent BMPs into the PS&E. The Roadway Design Division then compiles a structures list including the quantities list that will be shown on the plans. Coordination is also required with the Specifications Section to present a PS&E package that will clearly define the project and provide clear instruction to the Contractor and Resident Engineer. The NDOT's Roadway Design Policy and Procedures Manual describes the design process in further detail.

Each planning phase requires attention to the storm water quality aspects of the project. NDOT has defined the storm water quality objectives in the project planning and scoping phase to:

- Identify potential impacts from storm water runoff.
- Develop alternatives to mitigate potential impacts.
- Determine if NDOT's right-of-way and budget will accommodate control measures.
- Identify and select the temporary and/or permanent BMPs.

The responsibility of storm water quality planning within the project design process is shared between Hydraulics and Environmental Services with input and support from Roadway Design, Construction, and Maintenance. The following list describes the project design activities necessary to meet the aforementioned storm water quality objectives:

- Determine the potential impacts on water quality from the project and evaluate the available options to mitigate the impacts.
- Establish which BMPs; permanent and/or temporary, will be required either by project studies or regulatory requirements.
- If applicable, determine the specifics of the permanent BMPs selected for the project, (e.g. size, location, and cost).
- Develop planning costs for the temporary BMPs selected.
- Include all findings into the final or scoping report.

The project design process within NDOT may vary from project to project as conditions differ. All projects address storm water mitigation practices, with either temporary or permanent BMPs, depending on the individual components of the project. Through inclusion of storm water management into the design process, NDOT will fulfill Permit requirements and protect the downstream environment.

The construction element in the project design process includes the selection of temporary BMPs to be included in the PS&Es. The selection process of temporary BMPs is managed by NDOT policy, the Project Categorization Score Sheet, local regulatory guidance, and/or specific requirements critical to the selection of BMPs. The Construction Program developed in this SWMP is detailed in Section 5.0, Construction Site BMP Program.

4.3 Permanent BMPs

[4.6.1 A description of structural and source control measures expected to reduce pollutants from runoff from commercial and residential areas that are discharged from the municipal storm sewer system that are to be implemented during the life of the permit, accompanied with a discussion of the basis for the expected reduction of pollutant loads and a proposed schedule for implementing such controls.]

Permanent BMPs are the control measures employed to protect the downstream environment after construction activity is completed. The permanent BMPs selected to achieve pollutant load reduction from NDOT's MS4 discharges to the MEP are listed in the following tables. NDOT has selected these BMPs through sound engineering judgment, published BMP studies, and experience with other MS4s' storm water programs. The permanent BMPs are categorized as Soil Stabilization (Source Control) BMPs and Treatment Control BMPs. The complete description and design details of the permanent BMPs are in NDOT's PDG.

Permanent Soil Stabilization BMPs are implemented to control the pollution at the source, thereby protecting the downstream environment from pollutants in storm water runoff. Table 4-1 identifies the approved Permanent Soil Stabilization BMPs.

| Table 4-1. Permanent Soil Stabilization BMPs | |
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| Soil Stabilization BMP | BMP Description |
| Consideration of Downstream Effects Related to Potentially Increased Flow (SS-1) | The planning and design elements that may be considered to protect the downstream environment from increased flows. |
| Preservation of Existing Vegetation (SS-2) | The planning consideration and rationale to preserve as much of the existing vegetation as possible. |
| Ditches, Berms, Dikes, and Swales (SS-3) | Conveyance structures used to intercept and redirect runoff to prevent erosion. |
| Slope Down Drains (SS-4) | Pipes, flumes, or paved spillway to convey surface runoff downslopes preventing erosion. |
| Flared Culvert End Sections (SS-5) | Flared end sections placed at the inlet or outlet of pipes and channels to enhance hydraulic operation and prevent scour and erosion. |
| Outlet Protection/Velocity Dissipation Devices (SS-6) | Energy dissipators to protect the outlet from scour and erosion due to the high velocity of the storm water flows. |
| Vegetated Surfaces (SS-7) | Vegetative surfaces installed in disturbed areas to minimize erosion and promote infiltration. |
| Mulching (SS-8) | The application of loose bulk material to disturbed soils to prevent wind and water erosion. |
| Slope Roughening/Terracing/Rounding (SS-9) | Techniques to create uneven surfaces to reduce the erosive potential by decreasing the velocity of the runoff, trapping sediment, and allowing infiltration into the soil. |
| Hard Surfaces (SS-10) | Hard surfaces are introduced when vegetation techniques will not provide adequate erosion control. |
| Retaining Walls (SS-11) | Retaining walls used to stabilize slope surfaces and reduce slope length preventing scour and erosion. |

Treatment Control BMPs are measures to treat storm water runoff before releasing it into the receiving waters. Treatment Control BMPs are often referred to as structural controls. Table 4-2 lists the approved Permanent Treatment Control BMPs.

| Treatment Control BMP | BMP Description |
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| Biofiltration Swales and Strips (TC-1) | Intended to reduce the pollutant load by slowing flows allowing pollutants to settle, as well as promoting biological uptake and infiltration. |
| Infiltration Basins (TC-2) | Designed to capture and hold runoff allowing infiltration, promoting pollutant removal, and reducing runoff volumes. |
| Detention Basins (TC-3) | Used to capture and detain storm water runoff promoting pollutant removal. |
| Traction Sand Traps (TC-4) | Allows traction sand to settle out of highway runoff before discharged into receiving waters. |
| Gross Solids Removal Devices (TC-5) | Designed to remove trash and solids from storm water runoff through physical and mechanical means. |

4.4 BMPs for New Development and Redevelopment

[4.6.1.2 A description of planning procedures including a plan to reduce the discharge of pollutants from MS4s which receive discharges from areas of new development and significant redevelopment]

NDOT's project design process may incorporate a selection of permanent BMPs described in this SWMP for all proposed new or redevelopment projects. New and redevelopment projects will follow the preceding project design process of planning and scoping, preliminary design, and final design incorporating the approved and appropriate permanent BMPs through coordination between NDOT Divisions.

4.5 Retrofit Opportunities

[4.14.1.1.1.1 Identify priority and watershed pollutant reduction opportunities (e.g., improvements to existing urban runoff control structures).]

NDOT, during the scoping and PDFS phase, investigates the existing storm drainage system for opportunities for water quality improvements and watershed pollutant reduction.

4.6 Flood Management Design

[4.6.1.4 A description of procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies and that existing structural flood control devices have been evaluated to determine if retrofitting the device to provide additional pollutant removal from stormwater is feasible]

NDOT's Hydraulics Section is responsible for planning and design of roadway drainage as well as incorporating erosion control elements into the design process. The procedures NDOT has adopted are described in the NDOT Draft Drainage Design Manual.

This specific Permit requirement does not apply to NDOT because NDOT does not own or operate any flood management projects within the NDOT highway system.