# Chapter 4 – Stormwater Management Standards and Performance Criteria

## Introduction

This chapter presents stormwater management standards and performance criteria for land development projects in Connecticut. The standards and performance criteria apply to all new development, redevelopment, retrofits, and other land disturbance activities, whether considered individually or collectively as part of a larger common plan, which are subject to local, state, or federal regulatory requirements to address post-construction stormwater management.

**What's New in this Chapter?**

- Updated stormwater management standards and performance criteria
- Consistency with stormwater retention and treatment requirements in the CT DEEP stormwater general permits
- Updated design storm precipitation for stormwater quality and quantity control
- Use of EPA stormwater BMP performance curves and pollutant-specific load reduction targets

Project proponents are required to meet and demonstrate compliance with the management standards and performance criteria using non-structural Low Impact Development (LID) site planning and design techniques and structural stormwater Best Management Practices (BMPs), in addition to operational source controls and pollution prevention. The management standards and performance criteria are intended to help preserve pre-development site hydrology and pollutant loads to the maximum extent possible to protect water quality, maintain groundwater recharge, and prevent flooding.

The performance criteria address the full spectrum of storm flows and their associated water quality and quantity impacts. These range from smaller more frequent storms that are responsible for a majority of the annual runoff volume and pollutant loads, to larger less frequent events that can cause flooding. Given the observed and anticipated future increases in precipitation as a result of climate change, the performance criteria include updated design storm precipitation amounts and intensities for more resilient stormwater management designs.

The management standards and performance criteria presented in this Manual are intended to be consistent with the post-construction stormwater management requirements of the CT DEEP stormwater general permits, as well as local requirements within municipal planning, zoning, and stormwater ordinances and regulations. Some differences may exist between the standards and performance criteria in this Manual and local requirements. For example a local Inland Wetlands and Watercourses authority may require to maintain certain flow levels with respect to a downstream wetland, shallow water body, vernal pool, or small watercourse, etc. Where local requirements are less stringent than noted in this Manual, the intent of this Manual is to provide recommended guidance based on the most relevant science at the time of its publication.

Table 4-1 summarizes the stormwater management standards and performance criteria, which are described in more detail in the following sections.

**KEY TERM:**

**Maximum Extent Achievable (MEA)**

This term is meant to indicate the site design has incorporated that element as completely as possible for the given site parameters. The justification and documentation of achieving this extent is described further in each of the sub sections below.

Maximum Extent Achievable (MEA) - LID Site Planning and Design

Maximum Extent Achievable (MEA) – Stormwater Treatment

Maximum Extent Achievable (MEA) – Stormwater Retention

***Note:** The term MEA is used, but not specifically defined, in the current MS4 General Permit. The concepts described here are synonymous with the term Maximum Extent Practicable (MEP) of the MS4 General Permit.

**Table 4-1. Stormwater Management Standards and Performance Criteria Summary**

| Stormwater Management Standard | Performance Criteria |
|---|---|
| **Standard 1 – Runoff Volume and Pollutant Reduction**<br><br>Preserve pre-development hydrology and pollutant loads to protect water quality and maintain groundwater recharge. | **LID Site Planning and Design (non-structural)**<br>Consider the use of non-structural LID site planning and design strategies, to the maximum extent achievable, prior to the consideration of other practices, including structural stormwater BMPs.<br><br>Refer to Chapter 5 - Low Impact Development Site Planning and Design Strategies for impervious surface disconnection and other non-structural LID Site Planning and Design techniques that can reduce post-development impervious area and stormwater runoff volumes.<br><br>**Stormwater Retention and Treatment (structural)**<br>After application of non-structural LID site planning and design techniques, use structural stormwater BMPs to retain and/or treat the remaining post-development stormwater runoff volume:<br><br>➢ Retention: Retain on-site the following post-development stormwater runoff volume for the site (Required Retention Volume) to the Maximum Extent Achievable using structural stormwater BMPs:<br><br>Required Retention Volume (RRV):<br>○ 100% of the site's Water Quality Volume (WQV)<br>▪ All new development<br>▪ Redevelopment or retrofit of sites that are currently developed with existing DCIA[42] of less than 40%<br>▪ Any new stormwater discharges located within 500 feet of tidal wetlands<br>○ 50% of the site's WQV<br>▪ Redevelopment or retrofit of sites that are currently developed with existing DCIA of 40% or more<br><br>➢ Additional Treatment without Retention: If the post-development stormwater runoff volume retained on-site does not meet the Required Retention Volume for the site, provide stormwater treatment without retention to the Maximum Extent Achievable for the volume above that which can be retained, up to 100% of the site's WQV. The additional stormwater treatment should be provided using structural stormwater BMPs to achieve annual average pollutant load reduction targets for sediment, floatables, and nutrients, per Table 4-3.<br><br>Refer to Chapters 7 through 13 for selection and design of structural stormwater BMPs for meeting the Stormwater Retention and Treatment requirements. |

[42] Note DCIA is not equivalent to the impervious area, see the distinction noted in Chapter 2.

| Stormwater Management Standard | Performance Criteria |
|---|---|
| **Standard 2 – Stormwater Runoff Quantity Control**[43]<br><br>Do not exceed pre-development peak flow rates and manage the volume and timing of runoff to prevent downstream flooding, channel erosion, and other adverse impacts, and safely convey flows into, through, and from structural stormwater BMPs. | **Peak Runoff Attenuation for Site Development / Redevelopment**<br>Control the 2-year, 24-hour post-development peak flow rate to 50% of the 2-year, 24-hour pre-development peak flow rate for each point at which stormwater discharges from a site using structural stormwater BMPs.<br><br>Control the 10-year, 24-hour post-development peak flow rate to the 10-year, 24-hour pre-development peak flow rate for each point at which stormwater discharges from a site using structural stormwater BMPs.<br><br>Potentially control the 100-year, 24-hour post-development peak flow rate to the 100-year, 24-hour pre-development peak flow rate for each point at which stormwater discharges from a site using structural stormwater BMPs, as required by the review authority.<br><br>Demonstrate that any increased volume or change in timing of stormwater runoff will not result in adverse effects such as increased flooding downstream of the site or at other off-site locations, as required by the review authority.<br><br>**Conveyance Protection**<br>Design the conveyance system leading to, from, and through structural stormwater BMPs based on the post-development peak flow rate associated with the 10-year, 24-hour or larger magnitude design storm.<br><br>**Emergency Outlet Sizing**<br>Size the emergency outlet of stormwater quantity control structures to safely pass the post-development peak runoff from the 100-year, 24-hour or larger magnitude design storm in a controlled manner without eroding the outlet and downstream drainage systems.<br><br>Refer to Chapters 7 through 13 for selection and design of structural stormwater BMPs for meeting the Stormwater Runoff Quantity Control requirements. |

[43] Per the CTDOT MS4 Permit, linear projects have alternative standards and may take an alternative approach to address constraints that are different than those that affect traditional parcel development projects. These alternative linear project standards can be found in the CTDOT drainage manual, the CTDOT MS4 General Permit, the General Construction Permit and in the supporting materials that CTDOT has developed.

| Stormwater Management Standard | Performance Criteria |
|---|---|
| **Standard 3 – Construction Soil Erosion and Sediment Control**<br><br>Design, install, and maintain effective soil erosion and sedimentation control measures during construction and land disturbance activities. Consideration for final site stabilization should also be included during the development of a SESC Plan. | Develop and implement a Soil Erosion and Sediment Control (SESC) Plan in accordance with local and/or state regulatory requirements, the Connecticut Guidelines for Soil Erosion and Sediment Control Guidelines (as amended), and the requirements of the CT DEEP Construction Stormwater General Permit. |
| **Standard 4 – Post-Construction Operation and Maintenance**<br><br>Perform long-term maintenance of structural stormwater management systems to ensure that they continue to function as designed and implement operational source control and pollution prevention measures. | Develop and implement a long-term Operation and Maintenance (O&M) Plan, which identifies required inspection and maintenance activities for structural stormwater BMPs. Operational source control and pollution prevention practices (see Chapter 6 - Source Control Practices and Pollution Prevention) should be included in the O&M Plan.<br><br>Refer to Chapter 7 – Overview of Structural Stormwater Best Management Practices for general maintenance guidelines for stormwater BMPs, Chapter 13 – Structural Stormwater BMP Design Guidance for recommended maintenance for specific stormwater BMPs, and Appendix B for BMP-specific maintenance inspection checklists. |

| Stormwater Management Standard | Performance Criteria |
|---|---|
| **Standard 5 – Stormwater Management Plan**<br><br>Document how the proposed stormwater management measures meet the stormwater management standards, performance criteria, and design guidelines. | Prepare a Stormwater Management Plan (see Chapter 12 – Stormwater Management Plan) to document how the proposed stormwater management measures for a specific land development project or activity meet the stormwater management standards, performance criteria, and design guidelines contained in the Connecticut Stormwater Quality Manual, as well as other local, state, and federal stormwater requirements. |

Note: Consult local and state regulations for additional stormwater management requirements. The above standards and criteria are recommended where local or state regulations are less stringent.