Chapter 1 – Introduction

Adoption of this Manual

This manual will be used for guidance immediately upon its effective date. Any design that has completed preliminary design phase (approximately 50% of full design), however, as of the effective date will not be subject to this updated guidance. If this is the status of your project, you must immediately communicate this to the appropriate review authority. However, all projects received or permitted after one year from publication must comply with the updated Manuals. Any reference in DEEP General Permits for adherence to the guidelines, criteria, recommendations and/or requirements specified in the Manual shall be considered to have adopted these dates and criteria.

Any references in municipal regulations shall at least meet the dates above, but, if they so choose may adopt an earlier date of compliance with the updated guidance.

Purpose of the Manual

The Connecticut Stormwater Quality Manual (Manual) provides guidance on the measures necessary to protect the waters of Connecticut from the adverse impacts of stormwater runoff. States like Connecticut, which are National Pollutant Discharge Elimination System (NPDES) authorized, are required to address stormwater pollution from three potential sources: construction activities, municipal separate storm sewer systems (MS4s), and industrial activities. While the NPDES permits are the driver for the requirements, this Manual provides guidance for operators of these sources to evaluate and select the best stormwater design options to meet the requirements in these various permits. The guidance provided in this Manual is applicable to post-construction stormwater controls for new development, redevelopment, and upgrades to existing development (i.e., retrofits).

What's New in this Chapter?

- Summary of major revisions to the Manual and where to find information on future updates
- Updates to the organization and use of the Manual
- Updates to the applicability and regulatory basis of the Manual
- Updated descriptions of federal, state, and local regulatory stormwater programs as they relate to the Manual (moved to the Manual appendices)

The Manual emphasizes the use of source controls and pollution prevention, non-structural Low Impact Development (LID) site planning and design strategies, and structural stormwater Best Management Practices (BMPs). Related topics such as construction-phase soil erosion and sediment control and storm drainage system design are integral components of a comprehensive stormwater management strategy. These topics, which are included in the

Manual as secondary considerations, are addressed in detail in other related state-wide design manuals. Specifically, construction-phase soil erosion and sediment control guidance is provided in the Connecticut Guidelines for Soil Erosion and Sediment Control.

The Manual does not address agricultural[1] nonpoint source runoff. However, many of the LID and structural stormwater BMPs contained in this manual should be considered for existing and new agricultural uses, in addition to other agricultural conservation practices, to address water quality concerns.

Revisions to the Manual

Summary of 2023 Revisions

The practice of stormwater management, the scientific understanding of water quality impacts of stormwater runoff, and the state and federal regulatory environment have evolved substantially since the original Connecticut Stormwater Quality Manual was released in 2004 and then the LID Appendix in 2011. The primary objectives of the 2023 revisions to the Manual were to:

- Incorporate updated information on structural stormwater BMPs based on the current understanding of BMP selection, design, construction, and performance.
- Resolve conflicts and improve consistency between the Connecticut Stormwater Quality Manual and the Connecticut Guidelines for Soil Erosion and Sediment Control for more effective integration of construction-phase and post-construction stormwater management.
- Update the Manual for consistency with the CT DEEP stormwater general permit programs, in particular the post-construction stormwater management requirements of the General Permit for the Discharge of Stormwater from Small Municipal Separate Storm Sewer Systems (MS4 General Permit), the General Permit for the Discharge of Stormwater from Department of Transportation Separate Storm Sewer Systems (CTDOT MS4 General Permit), and the General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities (Construction Stormwater General Permit).
- Incorporate climate change and resilience considerations for stormwater management design and implementation.
- Enhance the usability of the Manual from the perspective of project designers and reviewers.

[1] The Natural Resource Conservation provides additional information specific to agriculture and stormwater control: https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/water/?cid=nrcs144p2_027171

The 2023 revisions to the Connecticut Stormwater Quality Manual were made in conjunction with revisions to the Connecticut Guidelines for Soil Erosion and Sediment Control. This parallel process was initiated to ensure these two documents provided consistent and complementary guidance.

The 2023 version of the Connecticut Stormwater Quality Manual incorporates revisions that include but are not limited to:

- Update and streamlining of the stormwater management standards and performance criteria (Chapter 4 - Stormwater Management Standards and Performance Criteria) for consistency with the post-construction stormwater retention and treatment requirements of the CT DEEP stormwater general permits, including incorporation of permit concepts such as on-site retention of runoff and disconnection of Directly Connected Impervious Area (DCIA). The updated manual also includes a process for demonstrating compliance with the stormwater management standards and performance criteria, incorporating use of the EPA stormwater BMP performance curves for demonstrating compliance with pollutant-specific pollutant load reduction targets when retention of the applicable water quality volume is not achievable.

- Consistent with the CT DEEP stormwater general permits and stormwater management approaches adopted by other states within EPA Region 1, greater emphasis on retention of stormwater as the preferred strategy for reducing stormwater pollutant loads (pollutant concentrations and volumes) and for restoring and maintaining pre-development site hydrology with respect to groundwater recharge and the volume, flow rate, duration, and temperature of runoff.

- Development of a new chapter (Chapter 10 - General Design Guidance for Stormwater Infiltration Systems) on the design of stormwater infiltration systems, which is the primary means of achieving the retention standard. This section provides updated guidance on site suitability, soil evaluation methods, sizing methods, and other design requirements for stormwater infiltration systems.

- Update and consolidation of the LID section of the 2004 Manual and the 2011 LID Appendix into a new chapter (Chapter 5 - Low Impact Development Site Planning and Design Strategies) on LID site planning and design strategies. The updated chapter provides additional guidance on the LID site planning and design process, LID hydrologic analysis, and criteria/credits for reducing DCIA through simple disconnection and other non-structural site planning and design techniques.

- Recategorization of structural stormwater BMPs based on function, replacing the previous "Primary and Secondary Treatment Practices" terminology and framework from the 2004 Manual.

- Update of design storm precipitation to incorporate available precipitation-frequency data for Connecticut for more resilient stormwater management designs. This includes updates

to design storm precipitation for stormwater quantity control (NOAA Atlas 14) and an updated water quality design storm (90th percentile 24-hour rainfall) based on updated rainfall data for Connecticut as of the development of this Manual.

- Incorporation of other climate resilience considerations including sea level rise and coastal considerations in the selection and design of stormwater BMPs in coastal areas, as well as design considerations for mitigating the potential negative impacts of climate change on stream temperatures and nutrient loads.

- Updated structural stormwater BMP selection criteria and matrices, as well as a new stormwater BMP selection flowchart to guide designers and reviewers in the selection of appropriate structural stormwater BMPs for a given project and site (Chapter 8 - Selection Considerations for Stormwater BMPs).

- An updated section on stormwater retrofits (Chapter 9 - Stormwater Retrofits), reflecting the importance of retrofits to the success of municipal stormwater management programs in achieving the DCIA disconnection goals of the CT DEEP MS4 General Permit. The updated stormwater retrofit guidance in the Manual also incorporates and/or references information from a regional stormwater retrofit manual that has been developed for New England.

- Updated section on the appropriate use of proprietary stormwater BMPs (Chapter 11 - Proprietary Stormwater BMPs), as well as new or emerging technologies, including criteria for evaluating the use of such systems and recommended third-party performance programs.

- Updated design guidance for specific types of structural stormwater BMPs with a focus on practices that are most used to meet the retention and treatment standards in the revised Manual (Chapter 13 - Structural Stormwater BMP Design Guidance).

- Greater emphasis on integrating construction and post-construction phase stormwater management, particularly how construction activities should be integrated with LID site planning and design strategies or can impact the effectiveness of post-construction stormwater controls such as infiltration systems.

Updates and Future Revisions

Technical information regarding updates to the Manual will be available at:

http://www.ct.gov/deep/stormwaterqualitymanual

Future versions of the Manual will reflect the technical updates found on the website. Notices regarding future revisions of the Manual will also be posted at this website.

Applicability and Regulatory Basis of the Manual

The Manual itself has no independent regulatory authority. Rather, it establishes guidelines that are implemented through a framework of existing laws and regulations. Many municipalities have incorporated the Manual by reference into municipal planning, subdivision, and inland wetlands regulations. The CT DEEP MS4 General Permit specifically requires municipalities to update their local regulations to incorporate post-construction stormwater management requirements that meet or exceed the guidance contained in the Connecticut Stormwater Quality Manual. Similarly, state agencies have incorporated the Manual by reference into state regulatory and permit programs including the CT DEEP stormwater general permits.

The Manual is therefore applicable to all new development, redevelopment, and other land disturbance activity in the State of Connecticut, whether considered individually or collectively as part of a larger common plan, which triggers a local, state, or federal regulatory requirement to address post-construction stormwater management. This includes projects and activities undertaken by private entities, municipalities, or state agencies. Appendix A – Stormwater Regulation, contains a summary of local, state, and federal regulatory programs in Connecticut that require consideration of post-construction stormwater management. Linear projects have alternative standards and may take a programmatic 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 Construction General Permit and in the supporting materials that CTDOT has developed.

The Manual also applies to the design and implementation of stormwater retrofits, which can help municipalities meet the DCIA disconnection goals in the MS4 General Permit, as well as non-regulatory water quality improvement projects (e.g., implementation of watershed management plans or other voluntary nonpoint source management programs).

Organization and Use of the Manual

The Manual is organized into three major functional components. Part 1 (Chapters 1 through 3) contains background information on the Manual and its use, the stormwater-related impacts of land development, and approaches for preventing and mitigating stormwater impacts. Part 2 (Chapters 4 through 13) provides design guidance and is organized around the recommended stormwater management planning and design process. The Manual appendices contain supplemental information on the planning, design, and implementation of stormwater management measures.

Part 1 – Background

- Chapter 1 - Introduction describes the Manual's purpose, current and future revisions, users and organization, and applicability and regulatory basis.
- Chapter 2 - Stormwater Impacts describes stormwater runoff and its impacts on watershed hydrology, water quality, and ecology. Chapter 2 also introduces the concept of

impervious cover and the importance of disconnecting Directly Connected Impervious Area (DCIA). Climate change impacts on stormwater quality and quantity are also discussed.

- Chapter 3 - Preventing and Mitigating Stormwater Impacts, presents an overview of approaches for preventing and mitigating stormwater impacts through LID site planning and design, source controls and pollution prevention, construction soil erosion and sedimentation controls, and post-construction stormwater management.

Part 2 – Design

- Chapter 4 - Stormwater Management Standards and Performance Criteria, describes updated stormwater management standards and performance criteria for new development, redevelopment, and retrofit projects. This chapter also provides updated design storm precipitation for stormwater quantity control and the water quality design storm, as well as a process for demonstrating compliance with the stormwater management standards and performance criteria.

- Chapter 5 - Low Impact Development Site Planning and Design Strategies, addresses non-structural Low Impact Development (LID) site planning and design strategies that can be used to reduce or disconnect impervious surfaces and retain and infiltrate stormwater on-site, thereby eliminating or reducing the need for structural stormwater BMPs. Chapter 5 integrates information from the 2011 LID Appendix and provides additional guidance on the LID site planning and design process, hydrologic analysis, and criteria/credits for reducing DCIA through simple disconnection and other non-structural site planning and design techniques.

- Chapter 6 - Source Control Practices and Pollution Prevention, addresses source control and pollution prevention practices, which are operational practices to limit the generation of stormwater pollutants at their source. This chapter has been abbreviated to provide website links to current information on common source control and pollution prevention practices.

- Chapter 7 - Overview of Structural Stormwater Best Management Practices, introduces functional categories of structural stormwater Best Management Practices (BMPs) that can be used after consideration and use of LID site planning and design techniques to meet the stormwater management standards and performance criteria described in Chapter 4.

- Chapter 8 - Selection Considerations for Stormwater BMPs, provides guidance on selecting appropriate structural stormwater BMPs for a development site based on the requirements and needs of the site. This chapter includes an updated selection process and selection factors.

- Chapter 9 - Stormwater Retrofits, describes techniques for retrofitting existing developed sites to improve or enhance the water quality mitigation functions of the sites. Chapter 9

also discusses the conditions for which stormwater retrofits are appropriate and the potential benefits of stormwater retrofits. This updated chapter discusses the role of stormwater retrofits in meeting DCIA disconnection goals for municipal stormwater management programs.

- Chapter 10 - General Design Guidance for Stormwater Infiltration Systems, addresses the design of stormwater infiltration systems, including updated guidance on site suitability, soil evaluation methods, sizing methods, and other general design requirements for stormwater infiltration systems.

- Chapter 11 - Proprietary Stormwater BMPs, provides guidance on the appropriate use of proprietary stormwater BMPs, as well as new or emerging technologies, including criteria for evaluating the use of such systems and recommended third-party performance programs and testing criteria

- Chapter 12 – Stormwater Management Plan, describes how to prepare a stormwater management plan for review by local and state regulatory agencies. The chapter includes a recommended plan format and contents, and a completeness checklist for use by the plan preparer and reviewer.

- Chapter 13 - Structural Stormwater BMP Design Guidance, provides detailed technical design guidance for each of the structural stormwater BMPs. This chapter includes guidance on the selection, design, construction, and maintenance of these practices, as well as summary information on selection and sizing criteria addressed in previous chapters.